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The Effects of Alcohol and the Salience of Aggressive Cues on Triggered Displaced Aggression

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Alcohol increases the aggression-augmenting effects of provocation. Theories of alcohol and aggression suggest that impaired cognitive processing induced by acute intoxication leads individuals to process aggression-inducing social cues differently depending on whether they are high or low in salience. We examined the effects of intoxication and aggressive cue salience within the triggered displaced aggression paradigm. An ethnically diverse sample of 74 primarily young adult participants (40 men and 34 women; $M = 23.28$, SD = 3.14 years) were recruited from the university community and surrounding area. All participants were provoked by an experimenter, randomly assigned to a 2 (alcohol condition: alcohol vs. placebo) × 2 (trigger salience: high vs. low salience) between-subjects design, and then given the opportunity to aggress against the undeserving triggering agent. As expected, intoxication combined with a salient triggering cue elicited the most displaced aggression among all conditions. These results provide the first evidence that the effect of alcohol on triggered displaced aggression is moderated by the salience of the triggering event. Aggr. Behav. 34:25–33, 2008.

Keywords: alcohol intoxication, aggression, triggered displaced aggression, aggressive cues

INTRODUCTION

There is substantial evidence that acute alcohol intoxication increases aggressive and violent behavior. Alcohol is involved in a large number of homicides, sexual violence, and domestic violence [Kyriacou et al., 1999; Pernanen, 1991; Roizen, 1993, 1997]. Quantitative reviews of the experimental literature consistently demonstrate that alcohol increases aggression and that this effect is moderated by a number of situational variables [Bushman and Cooper, 1990; Hull and Bond, 1986; Ito et al., 1996; Steele and Southwick, 1985]. Among these moderators is the salience of aggressive cues in the environment. This study investigates both the effects of alcohol and the salience of aggressive cues on triggered displaced aggression.

Displaced Aggression and Triggered Displaced Aggression

Displaced aggression occurs when a person is provoked, is unwilling or unable to retaliate against the original provocateur, and subsequently aggresses against a seemingly innocent target [Dollard et al., 1939; Hovland and Sears, 1940; Marcus-Newhall et al., 2000]. Often the target provides no justification or instigation to warrant a retaliatory response from the aggressor, as when a man at a bar assaults another man for no *apparent* reason – except that earlier that day, his boss insulted him. On other occasions, however, the ''innocent'' target may provide a trivial and ambiguous instigation (viz., ''trigger'') to aggress. For instance, after being

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insulted by his boss earlier in the day, a man might assault a fellow bar patron after receiving an innocuous "bump". This latter example illustrates *triggered* displaced aggression (TDA). Such "disjunctively" escalated aggression refers to a level of aggression exceeding norms of reciprocity and tit-for-tat matching rules [Axelrod, 1984; Gouldner, 1960]. Moreover, prior research demonstrates that this disjunctive escalation of aggression occurs only when the triggering event is of minor intensity and has been preceded by a provocation [Vasquez et al., 2005].

Why does disjunctively escalated aggression occur in the TDA paradigm? Consistent with recent models of aggression [Anderson and Bushman, 2002; Berkowitz, 1993], Miller et al. [2003] propose a theory of TDA which argues that the initial provocation primes aggression-related affect, cognition, and arousal. This increased activation increases the likelihood that the second minor annoyance – the trigger – will be perceived more negatively than usual. Subsequently, when confronted with a minor triggering event, individuals aggress to a greater extent than is sanctioned by tit-for-tat matching rules. Evidence now shows that TDA is a reliable and robust phenomenon and is consistently observed across disparate experimental paradigms [e.g. Aviles et al., 2005; Bushman et al., 2005; Miller et al., 2003; Pedersen et al., 2000; Vasquez et al., 2005].

Only one previous study experimentally investigated the effects of alcohol on TDA [Aviles et al., 2005]. An interactive effect was observed, such that aggression was greatest when previously provoked participants were both intoxicated and triggered by a mildly annoying bogus participant. This study is designed to assess how *the salience of a minor triggering provocation* interacts with alcohol intoxication to affect aggression toward the triggering person. The outcomes of experimental research on the acute effects of alcohol in the TDA paradigm have implications for real world instances of aggression, including that which might occur in domestic violence and bar fights. Hence, investigation of the salience of such triggering events is clearly important.

The Salience of Aggressive Cues

Social psychological variables moderate the effect of alcohol on aggressive behavior. Several theorists focus specifically on the cognitive impairment produced by alcohol and how it might affect social information processing [Pernanen, 1976; Steele and Josephs, 1990; Steele and Southwick, 1985; Taylor and Chermack, 1993; see also Ito et al., 1996]. Steele and colleagues [Steele and Josephs, 1990; Steele and Southwick, 1985] proposed that alcohol impairs cognitive processing capacity, thereby narrowing attention, and ultimately restricting the focus of attention to those cues that possess the most salience. Steele's perspective argues that it is more difficult to attend to multiple environmental cues when intoxicated than when sober and that consequently, intoxicated individuals process only the most salient cues. If such cues are aggressive in nature, one may overreact to these aggression-instigating cues and fail to process less salient aggression-inhibiting cues.

Why might this occur? According to Steele, the answer lies in cue salience. Aggression-instigating cues are usually highly salient. On the other hand, inhibitory cues are likely to be less obvious and require retrieval of information relevant to social norms or personal standards of behavior. For example, due to alcohol-induced cognitive impairment, intoxicated individuals may not consider the likelihood of arrest and other negative consequences associated with aggressive behavior. Such impairment also presumably impacts one's ability to empathize with the provocateur (e.g., take into consideration that s/he may be having a bad day).

Although Steele's concept of alcohol's effect on aggression has had considerable influence on research, relatively few studies have experimentally examined the role of cue salience. Leonard [1989], however, reported one such study. Intoxicated and sober participants overheard a confederate state his intention to deliver to them either the strongest possible electric shock or the lowest possible electric shock. Then, the confederate actually set the shock level at the lowest shock value. Intoxicated persons behaved more aggressively toward the confederate, presumably because they paid attention to the highly salient aggressive cue (viz., the stated *intention* to set the most painful shock), and did not effectively process the less salient cue (i.e., the confederate's subsequent *actually* setting of the lowest shock).

The Present Research

This study is the first to experimentally test the effects of alcohol and cue salience on triggered displaced aggression. Because alcohol increases aggression after provocation [Bushman and Cooper, 1990; Ito et al., 1996], we expected that participants would behave more aggressively in the alcohol

condition than the placebo condition. In addition, we manipulated cue salience. We hypothesized that alcohol would interact with the manipulation of cue salience, such that intoxicated individuals in the highly salient cue condition would aggress more against the "innocent" participant than those in the other three conditions. From our conceptualization, this interaction is expected because the initial provocation primes aggression-related affect, cognition, and arousal, while alcohol impairs the processing of all but the most salient cues. Finally, because sober participants are able to process the triggering cue regardless of its salience, we expected that aggression among sober participants would not be affected by the salience of the triggering cue.

METHOD

Participants

Participants were recruited through advertisements in the university newspaper or local community entertainment newspaper offering payment for research participation from persons over 21 years of age. To avoid obtaining a biased sample, no mention of alcohol appeared. Interested participants were screened over the phone concerning their previous reactions to alcohol and their general health. Those who reported previous adverse reactions to alcohol, poor health, or medication that contraindicated alcohol were excluded. The Michigan Alcohol Screening Test [Selzer, 1971] was administered, and those who obtained scores of eight or above were excluded. If participants met these criteria, they were invited to undergo a clinical interview using the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I). Written informed consent documents were obtained from all participants. Potential participants with symptoms that fulfilled criteria for Axis I disorders were excluded.

Participants who had not been excluded were invited to participate in the experimental study. Female participants were given pregnancy tests before participation. No positive tests were obtained. Participants were randomly assigned to one of the four experimental conditions. In the context of an initial Time 1 provocation that was administered to all participants, a 2 (alcohol condition: alcohol vs. placebo) $\times$ 2 (trigger salience: high vs. low) between-subjects design was used. A total of 74 participants ($M = 23.28$, SD = 3.14 years; 40 males, 34 females; 30% White, 24% Black, 15% Asian, 11% Latino/a, 18% Middle Eastern, and 3% other ethnicity) completed the study.

Design

The full experimental design for the TDA paradigm crosses provocation (present vs. absent) with a trigger (present vs. absent). Theoretical considerations specify that a disjunctive escalation in aggression occurs when a minor trigger is preceded by provocation and indeed research in this paradigm attests to these effects [Miller et al., 2003; Vasquez et al., 2005]. Because there is no theoretical reason to expect displaced aggression in the absence of prior provocation [Miller et al., 2003], and because five published studies consistently confirm that when it is absent no displaced aggression occurs [Bushman et al., Study 2; Denson et al., 2006, Experiment 1; Pedersen et al., 2000, Studies 1 and 2; Vasquez et al., 2005], we omitted these control conditions from our current design. Hence, the design used in this work consists of a 2 $\times$ 2 between-subject study in which we factorially manipulated drug (alcohol vs. placebo) and cue salience (low vs. high).

Procedures and Materials

Procedures that closely resembled prior research from our laboratory were used [Aviles et al., 2005; Vasquez et al., 2005]. Upon arrival at the laboratory, the experimenter and one assistant greeted the participants. The true purpose of the experiment was not explained until the termination of each individual session. Instead, participants were told that the study was investigating the effects of alcohol on cognitive ability, physical distraction, and social impression formation. First, the experimenter explained that they would be receiving a beverage, which may or may not contain alcohol. Participants were informed that they would be told whether or not their beverage contained alcohol upon termination of the study. It was explained that the study simultaneously involved another participant and that therefore, the assistant would be primarily in charge of running the experiment while the experimenter would be running the other (bogus) participant. The experimenter then stated that he was in charge of scoring their data and that he would be checking in with the participant from time to time. The experimenter then left the room ostensibly to begin running the bogus participant.

Administration of questionnaires and breath alcohol level. Participants were weighed and given the first of four breath alcohol level (BAL) tests with an Alco-Sensor IV to insure they were not

initially intoxicated. They then filled out a demographic information sheet. They also completed the trait portion of the State-Trait Anxiety Inventory [STAI; Spielberger et al., 1983] and the Biphasic Alcohol Effects Scale [BAES; Earleywine & Erblich, 1996; Martin et al., 1993]. The trait portion of the STAI is a 20-item self-report that assesses general levels of anxiety ($\alpha = .90$). Because the effects of trait anxiety have not been investigated in the context of laboratory alcohol and displaced aggression, and it seemed plausible that trait anxiety may moderate the effects of alcohol on TDA, we included the STAI to investigate this possibility. The BAES is a 15-item self-report unipolar scale that assesses sedative (seven items; e.g., "sluggish"; $\alpha = .87$) and stimulant effects (seven items, e.g., "energized"; $\alpha = .86$) of alcohol. The scale also contains a 15th item ("intoxicated"). The BAES was included as a subjective measure of intoxication to complement the BAL as an objective measure of intoxication.

Alcohol and placebo administration procedure. Participants in the *alcohol* condition received .7 g alcohol/kg, a dose comparable to that of the low dose groups in the meta-analysis by Ito et al. [1996]. Four alcoholic drinks were prepared by combining 100 proof Vodka 1:8 with Sprite. The assistant brought one alcoholic drink every 5 min, for a total of 20 min. To obtain an accurate measure of the second BAL, participants rinsed their mouths with water before providing the second breath sample. In the *placebo* condition, the procedures were identical, except that the rims of the cups were rinsed with vodka to provide an odor of alcohol and only Sprite was administered.

Provocation manipulation. After consuming the four beverages, the assistant returned to the laboratory room and told the participant that the first part of the study involved a test of cognitive ability under conditions of auditory distraction. Specifically, participants listened to cacophonous music (Stravinsky's "Rites of Spring") at a moderately loud volume (approximately 80 decibels) while completing a sheet with four easy (e.g., meit = time) and 15 difficult anagrams (e.g., tophhapogr = photograph). The assistant informed the participant that they would have 4 min to complete all 15 anagrams, started the music, and left the room. When he re-entered, he took the anagram answer sheet and gave the participant a computer printout showing that most previous participants had gotten nearly all of the anagrams correct. He then left the room ostensibly to give the anagram answer sheet to the experimenter for scoring. Three minutes later, the experimenter entered and told participants that their performance was far below average compared to a sample of engineering students. Furthermore, he insulted them in an irritated and exasperated tone of voice: "You really got a lot of these wrong. This data is useless to me. We should probably just start all over, but to be perfectly honest with you, I don't want to waste my time." He then abruptly departed. The provocation was completed approximately 27 min following the initiation of beverage consumption.

Trigger salience manipulation. Participants then completed a task in which they listed six traits necessary for a good astronaut [Bettencourt et al., 1992]. Upon completion of this task the assistant appeared, ostensibly to take the participant's trait-listing task to the other participant for evaluation. Two minutes later, he returned with a bogus completed astronaut task and an evaluation form for the participant to fill out. Participants were instructed both to evaluate their co-participant's task performance on five scale dimensions and make other comments with a blue pen, but written comments about the co-participant were to be made with a red pen. (These latter instructions were included to increase the plausibility of the trigger salience manipulation.) Allegedly, evaluations would be exchanged with the other participant. Similar to procedures used in prior research [Vasquez et al., 2005], this exchange of evaluation forms served as the trigger manipulation.

To implement the trigger salience conditions, participants received from the alleged other participant an evaluation of the degree to which their astronaut task performance exhibited *originality*, *quality*, *effort*, a *variety* among traits listed, and *made sense*. In addition, an overall evaluation was provided. In both trigger salience conditions, the individual ratings and overall evaluation were 3, 4, 3, 3, 4, and 4, respectively, on seven-point linear scales with labeled endpoints (1 = *no good at all*, 7 = *extremely good*). The trigger manipulation was completed approximately 34 min following the initiation of beverage consumption.

In the space available for additional comments we manipulated the salience of the trigger by varying two key features in the bogus evaluation of the participant's work. In the *low salience* condition, the additional comments section contained a single paragraph written entirely in blue ink. In most of this paragraph the other participant explained that he had completed the task by thinking of people s/he knew who would make a good astronaut. A single sentence was embedded in this paragraph to serve as the triggering comment, and counter to instructions, this comment about the participant was written in

blue: "The performance was not great and I think the other person really could do better." In the *high salience* condition, the additional comments section contained the same paragraph in blue, with the exception that now the annoying comment was written in red ink and presented separately from the rest of the paragraph.

Physical aggression. Participants were given approximately 3 min to look over their evaluation, after which the third BAL was obtained. The assistant returned with a cup containing two pieces of paper and explained that the next portion of the study would investigate the effects of physical distraction on impression formation. Participants then drew one slip of paper to determine which distraction condition they would be in (tactile distraction or no-distraction). In reality, both pieces of paper contained the no-distraction, control condition. The assistant then left the room ostensibly to see which distraction condition the other (bogus) participant received.

Approximately 2 min later the experimenter returned with a bucket of cold water (10°C) and the dependent measures. He informed the participant that the other participant had received the tactile distraction condition. The participant was told that s/he would determine how long the other (bogus) participant would submerge one hand in the bucket of cold water while performing an impression formation task. Participants were instructed to place one hand in the bucket of water for 5 sec, ostensibly because such experience was necessary to make an informed decision about the length of time that their (bogus) partner would be distracted. Next, participants were instructed to circle the amount of time that the other participant should be distracted on a nine-point linear scale starting at "1 = *no distraction at all*" which increased by 10 sec intervals to "9 = *80 sec/very strong distraction*". This rating provided by the participant served as the dependent variable of displaced aggression. This measure was obtained approximately 40 min following the initiation of beverage consumption. Participants were asked to slide the aggression sheet under the door so that the experimenter could administer the task to the other participant.

Participants then completed measures assessing reactions to the triggering agent, the BAES for a second time, and a word completion task designed to assess the cognitive accessibility of aggression-related constructs in which words could be completed either aggressively or non-aggressively. (Although it would have been informative to obtain BAES effects, as well as BALs, at intermediate points on the ascending and descending limbs of intoxication, we did not want to further distract participants with such repeated, intermediate assessments).

The experimenter then entered, obtained the fourth BAL, probed for suspicion with a funnel debriefing, and thoroughly explained the purpose of the study to the participant. Participants who consumed an alcoholic beverage remained in the room until their BAL dropped to an acceptable level (i.e., .04 or below). All participants were then paid and dismissed.

RESULTS

Statistical Analyses

Recently, Wilcox and Keselman [2003] reviewed a substantial body of evidence suggesting that traditional methods of inferential statistics based on means perform poorly under most circumstances encountered in psychological research (e.g., heavy tails, slight skewness, heteroscedasticity). These authors demonstrated that bootstrap methods and analyses with trimmed means provide superior performance relative to traditional procedures. Because socially undesirable behaviors such as aggression are not well approximated by normal distributions and because arbitrarily small violations of the assumptions of normality or homogeneity of variance may greatly decrease the sensitivity of traditional analysis of variance methods and produce biased results [Wilcox, 1998, 2005; Wilcox and Keselman, 2003], we adopted the robust statistical method approach advocated by Wilcox and colleagues. These methods accurately control Type I error rate, provide increased power, and tolerate violations of the homogeneity and normality assumptions. Additional information on these robust statistical methods is available through *http://www-rcf.usc.edu/~rwilcox*. Because there was no main effect of gender, nor did it interact with the experimental manipulations, the analyses presented below are based on the entire sample.[1]

Alcohol Manipulation Checks

Before the experiment, all participants had BALs equal to zero. Within the alcohol conditions,

[1]In the context of this experiment, the lack of gender effects is not surprising. In this study, all participants were provoked. Meta-analytic work suggests that whereas unprovoked men are more aggressive then unprovoked women, provocation markedly attenuates this gender difference [Bettencourt and Miller, 1996].

the BALs of those in the low and high trigger salience conditions did not differ from each other just before aggressing against the bogus participant, $T_y^* = 0.45$, *ns*, high salience $M = .063$, low salience $M = .062$ [Yuen's bootstrap *t*-test; Wilcox, 2005, p 162] nor at the end of the experiment, $T_y^* = 0.16$, *ns*, high salience $M = .063$, low salience $M = .064$. On the BAES, those in the alcohol condition reported being more intoxicated at the end of the experiment than those in the placebo condition, $T_y^* = 9.97$, $P < .001$ (alcohol $M = 5.09$; placebo $M = 0.82$).

The first BAES, administered at the beginning of the experiment when all of the participants were sober, yielded no differences between the alcohol and placebo conditions for the stimulant (alcohol $M = 5.14$; placebo $M = 4.68$) or sedative (alcohol $M = 2.11$; placebo $M = 2.21$) descriptors. At the end of the experiment, approximately 65 min following the initiation of beverage consumption, participants in the alcohol condition endorsed more sedative descriptors on the BAES, $T^* = 2.87$, $p < .01$ (alcohol $M = 3.85$; placebo $M = 2.37$) than those in the placebo condition but no differences emerged for stimulant descriptors (alcohol $M = 4.24$; placebo $M = 3.54$). Pre-post comparisons on the BAES showed that participants in the alcohol condition reported significant reductions in stimulant effects during the course of the experiment, $T^* = -2.84$, $P = .01$ (pre $M = 5.14$, post $M = 4.24$), and significant increases in sedative effects, $T^* = 4.57$, $P < .001$ (pre $M = 2.11$, post $M = 4.24$). Comparable pre-post comparisons on the BAES showed that participants in the placebo condition showed significant reductions in stimulant effects during the course of the experiment, $T^* = -2.93$, $P < .01$ (pre $M = 4.68$, post $M = 3.54$), but changes in sedative effects did not distinguish them, $T^* = 0.17$, *ns* (pre $M = 2.21$, post $M = 2.37$). Taken together, the effects for the BALs and the BAES are consistent with a successful implementation of the alcohol conditions. On the BAES, both groups show a decline in stimulation, as would be anticipated as the arousing effects of having first entered an experimental setting for an unknown experience also decline. Yet, as anticipated, those in the alcohol condition reported increased sedation at the end of the experiment whereas those in the placebo condition did not. Moreover, among those participants who received alcohol, those in the high and low trigger salience conditions did not differ from each other on the BAES sedative or stimulant descriptors at the beginning or end of the experiment (all P's $> .30$).

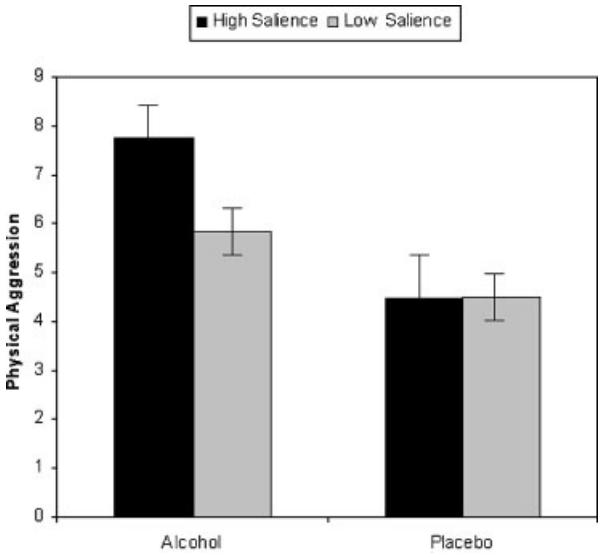

Fig. 1. Physical aggression 20% trimmed means as a function of alcohol condition and trigger salience.

Physical Aggression

A 2 (alcohol condition: alcohol, placebo) $\times$ 2 (trigger salience: high, low) between subjects ANOVA with 20% trimmed means [Wilcox, 2005] revealed a main effect of Alcohol, $F_t = 11.44$, $P < .002$, which was qualified by an alcohol $\times$ trigger salience interaction, $F_t = 5.77$, $P < .05$. Planned bootstrap linear contrasts on 20% trimmed means were conducted. As hypothesized, aggression in the alcohol-high salience condition was greater than that in the alcohol-low salience condition, $\psi = 2.11$, $P < .05$, placebo-high salience condition, $\psi = 3.04$, $P < .02$, and the placebo-low salience condition, $\psi = 4.50$, $P < .01$. As expected, within the placebo conditions, cue salience did not moderate displaced aggression, $\psi = -.04$, *ns*. Fig. 1 displays these results.

No main effects or interactions for alcohol or cue salience were observed for the measures assessing the reaction to the triggering agent or the word completion task that tapped cognitive accessibility of aggressive constructs.[2] The lack of

[2]Because the initial provocation occurred after the beverage administration, those in the alcohol condition may have perceived the initial provocation differently from those in the placebo condition. If those in the alcohol condition perceived the initial provocation as more aversive than those in the placebo condition, such differences may explain the higher level of aggression among those in the alcohol condition (but do not explain the alcohol $\times$ trigger salience interaction). Although there were no differences between the alcohol and placebo groups in the perception of annoying participant, we cannot definitively rule out this possibility.

effects on this latter measure is not unusual, in that subsequent aggression measures often show diminished or little effect by comparison with those positioned earlier [Lindsey and Anderson, 2000]. The STAI was unrelated to displaced aggression.

DISCUSSION

The primary contribution of this research is its experimental manipulation of the salience of the cue that triggers displaced aggression. Our results showed that intoxicated individuals exposed to a highly salient triggering cue exhibit higher levels of aggression than do either intoxicated participants exposed to less salient cues or sober participants. Moreover, the fact that the aggression levels of sober participants did not vary as a function of cue salience confirmed our expectation that these participants were equally able to process the trigger regardless of its salience. Thus, cue salience moderates the effects of alcohol on TDA. These outcomes can be viewed as consistent with social-cognitive models of alcohol and aggressive behavior [Steele and Josephs, 1990; Steele and Southwick, 1985].

Our results also show that, overall, TDA is exaggerated among participants under conditions of alcohol intoxication as opposed to sobriety. This confirms previous meta-analytic research showing that alcohol intoxication augments direct aggression [e.g., Bushman and Cooper, 1990; Hull and Bond, 1986; Ito et al., 1996] but in addition, extends this well-established effect to displaced aggression, thereby replicating our prior work on alcohol and TDA [Aviles et al., 2005]. Although intoxicated participants exhibited stronger displaced aggression than their sober counterparts, even under low trigger salience, we suspect that this latter effect will disappear under higher doses of alcohol. Under higher doses, the cognitive impairment of intoxicated persons might preclude notice of an aggressive cue that lacks salience.

Turning to more detailed aspects of our findings, one might be surprised by the lack of an effect of the cue salience manipulation in the placebo condition. Should not the sober participants also be more likely to notice the highly salient comment written in red ink than the comment embedded in a paragraph of blue ink? Should not the sober participants perceive the mildly negative comment as more malicious in its intent when it appeared as a spatially separated remark in red ink than when it appeared as an embedded comment in blue ink? Two features of our experimental design likely precluded this occurrence. First, due to experimental demand, participants were motivated to attend to *all* cues present in the study materials. Thus, sober participants were likely to process both cues equally effectively. Second, one key feature of our instructions to participants was that they should write about the other participant in red ink. Because they were instructed to use red ink for this purpose, sober participants were unlikely to attribute the color of red ink to malicious intent, although it is possible that intoxicated participants may have forgotten the not overly salient instructions and made a hostile attribution. To our knowledge, however, there is no empirical literature demonstrating that aggression increases in the presence of red, and at least one study found that a request for help delivered in red ink increased prosocial behavior relative to a request in a less salient color, thereby suggesting that red ink produces a salience effect rather than an aggressive priming effect [Rogers et al., 1982].

One may also wonder whether the comment written in red ink was perceived as a more personal insult than the comment in blue ink. If the red ink had a strong "personal insult" effect, participants in the placebo condition who received the trigger high in cue salience should have been more aggressive than participants who received the trigger low in cue salience. Inspection of placebo condition means, however, shows that they are quite similar (see Fig. 1). A second experiment has since conceptually replicated this finding with a cognitive load manipulation rather than alcohol [Vasquez, 2006].

We do, however, acknowledge that in many real world situations, increasing the salience of an aggressive cue is often confounded with an aggression-arousing effect, and thereby, would amplify aggressive behavior even among sober participants. For instance, when a very minor insult is delivered in a real-world setting to a sober person in a soft and querulous tone of voice, it is likely to be less salient as well as less provoking than might that same comment be when delivered in a loud and firmly authoritative tone, and consequently, elicit a lower level of aggressive responding.

One limitation of our findings concerns generalizability. Although our sample was selected from both the university and surrounding community, we intentionally eliminated problem drinkers. In addition, the sample was quite young. Specifically, there were few participants over 30 years of age. Thus we cannot readily generalize our findings to problem drinkers or older individuals. We suspect, however,

that had we only studied problem drinkers, our reported effects would only be stronger.

A second limitation concerns the lack of manipulation checks for impaired social information processing. Although such differential processing of high vs. low aggressive cues presumably occurs implicitly, future research could focus on the simultaneous assessment of alcohol-induced cognitive impairment and its role in mediating interpersonal aggressive behavior. In a post hoc analysis, we attempted to use the number of anagrams completed as an indicator of cognitive impairment. However, these results did not reveal any alcohol condition differences—an outcome that could be attributed to either the design of the anagram task, the dose of alcohol that was used, or both. Briefly, to provide the impression that the anagram task was not impossible, we intentionally constructed it with four easy anagrams and 11 difficult ones. We therefore obtained a limited range of responses that did not distinguish the alcohol and placebo conditions (e.g., the mean number of correct anagrams was 4.67). Also, because the alcohol dose administered was relatively low, more sensitive neuropsychological measures might be necessary to document reliable changes in cognitive impairment. Specifically, it might be necessary to include measures of prefrontal and frontal brain function to document reliable changes in cognition that are affected by alcohol and correlated with the social and interpersonal disinhibition that gives rise to aggression. Hence, future studies with more sensitive measures of cognitive impairment may yet provide support for its mediating role.

Other issues concerning the design and procedures raise additional questions for future research. Specifically, the results of this research indicate that the disjunctive escalation of aggression that occurs following both the provocation and the trigger is exaggerated by alcohol intoxication compared to sobriety, irrespective of cue salience. Indeed, the conceptual significance of the main effect for alcohol that was observed in this research is noteworthy because it raises the spectra of the real-world consequences of the susceptibility of the intoxicated brain to the provocation-trigger sequence, particularly in light of the relatively low alcohol dose selected for study. Because our theoretical focus concerned cue salience, as opposed to the general mechanisms that govern the exaggeration of disjunctive escalation in aggression under conditions of alcohol intoxication, we did not use procedures such as the balanced placebo design that would allow us to disentangle expectancy and drug effects on aggressive behavior. Generally, however, meta-analysis of previous research on direct aggression that used balanced placebo designs did not reveal strong evidence of substantial expectancy effects [Hull and Bond, 1986]. Obviously, for those whose interests concern the extent to which the TDA observed herein was due to alcohol as opposed to expectancy effects, a balanced placebo design would be requisite. Because our purpose differed, however, in that we sought to ascertain the effects of cue salience on TDA under alcohol intoxication, the placebo condition specifically provided a useful comparison condition for gauging the extent of the exaggeration in the displaced aggression induced by acute alcohol intoxication.

Finally, consideration of how our manipulation of cue salience generalizes to instances of real world TDA warrants comment. We have reported elsewhere that individual differences in trait displaced aggression differ qualitatively from individual differences in general trait aggression [Denson et al., 2006]. Moreover, individual differences in trait displaced aggression, but not general trait aggression, are associated with spousal abuse and road rage [Denson et al., 2006].[3] Thus, individuals high in trait displaced aggression may be especially aggressive toward undeserving others (viz., romantic partners, children, coworkers) when intoxicated and confronted with a salient aggressive cue.

Moreover, some individuals tend to ruminate in response to a provocation [Caprara, 1986; Denson et al., 2006]. Future research could therefore examine the effects of rumination in the context of alcohol and TDA. Although the effects observed here were over a relatively short period of time in the laboratory, future work could focus on the roles of alcohol and rumination over longer periods of time. Indeed, provocation-focused rumination increases TDA [Bushman et al., 2005; Denson et al., 2006, Experiment 2].

We believe our data herein are applicable to many situations where intoxicated individuals are provoked and subsequently confronted by one of life's many mild annoyances. For example, after having drinks at a bar, a man may find himself in an argument with a fellow patron, drive home, and find himself confronted with a mildly annoying comment from his wife such as "Did you mow the lawn, yet?" When delivered in an exasperated tone of voice the effect may be disastrous, whereas if delivered in a

[3]We did not control for individual differences in trait displaced aggression because the present research was initiated before publication of Denson et al. [2006].

friendly or neutral tone of voice, the intoxicated husband may pay less attention to the comment or even ignore it. This might be especially true if other highly salient cues are simultaneously present in the environment. Following alcohol and provocation, one can also imagine instances of intoxicated road rage developing from salient gestures and honking. By contrast, less salient annoyances, such as another driver's failure to use his turn signal, may have little aggression-arousing effect.

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