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Psychological experimentation on alcohol-induced human aggression

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Abstract

This paper provides an overview of recent research on alcohol and aggression. We examine major experimental laboratory paradigms used in research on the social factors and psychological processes that elicit aggression among healthy persons under conditions of acute alcohol intoxication and sobriety. Issues concerning the validity of such experimental research in relation to violence in everyday life are discussed along with empirical evidence that attests to the importance of experimentation for an understanding of alcohol-induced violence. The theoretical roles of provocation and frustration as cues that elicit alcohol-induced aggression are also considered. We conclude with a presentation of a newly developed experimental laboratory procedure that can reliably produce disjunctively escalated aggressive responding — the triggered displaced aggression paradigm (TDAP) — and discuss its potential for revealing more about the mechanisms involved in alcohol-induced aggression. © 2002 Elsevier Science Ltd. All rights reserved.

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1. Introduction

This article focuses on social and psychological factors that interact with alcohol to increase aggressive behavior. Our central concern is with the most prominent customary conceptualization of human aggression — the perpetration of an act that is harmful toward another. Although disinhibition may eventually serve as the global explanatory construct that permits a unification of alcohol effects found in substantive areas as diverse as neurobiology and sociology, progress in identifying specific mechanisms and processes that underlie various forms of alcohol-induced disinhibition is sorely needed within each substantive field. Hence, identification of key social and psychological factors that affect alcohol-induced aggression is an important step in filling these gaps.

Generally, as one manifestation of disinhibited behavior, a facilitation of aggression during alcohol intoxication has been consistently observed among healthy individuals (e.g., Bushman & Cooper, 1990). Nevertheless, a comprehensive theory to explain the ubiquity of these findings awaits formulation. Thus, even though other specific factors, including brain damage, hormonal mediation, and trait hostility, will eventually assume important roles in explaining alcohol-induced violence, knowledge about relevant social cues and moderating psychological contexts will inevitably be necessary for a complete picture.

We begin by describing two major experimental paradigms typically used in studying social psychological factors that affect alcohol-induced aggression. Then, issues concerning the validity of such experimental laboratory studies are discussed. These sections show that substantial information on key theoretical constructs and on specific individual difference and situational variables that affect aggressive behavior has been obtained in experimental laboratory research with healthy volunteers.

Next, we consider specific social and psychological factors that might be important in understanding alcohol-induced aggression. Prior research on sober persons demonstrates that some key variables, namely, provocation and frustration, can alter or moderate aggressive behavior. In our own attempt to better understand the relationship between alcohol and aggression, we used meta-analytic methods to assess each (Ito, Miller, & Pollock, 1996). We include an overview of these latter findings in the present report.

Finally, we turn to a discussion of some distinct processes that can lead to dramatic escalations of aggressive behavior, particularly under conditions that do not seem to warrant it. Such escalation is frequently observed in real life, as when a seemingly innocuous comment elicits a major episode of wife battering. We close by describing a newly validated paradigm devised to study such dramatic escalations of aggressive behavior — the triggered displaced aggression paradigm (TDAP). Although not heretofore used in studies of alcohol-induced aggression, this paradigm possesses high ecological validity for the study of many facets of aggressive behavior that are characteristically associated with alcohol. For instance, it appears to correspond well with incidents of domestic violence.

2. Laboratory paradigms in alcohol-induced aggression research

Consider three related incidents: (1) It is a hot Saturday morning and Richard is attempting to teach his 12-year-old son to play golf. After quenching his thirst with a few beers, Richard accompanies his son to the first tee. Given his inexperience, the son makes numerous mistakes, each of which is immediately followed by a verbally abusive remark by his father. (2) A week later, Richard is again at the same golf course, this time wagering money on each hole with a friend while drinking. They each contribute US\$200 to a pool of money held by their caddy. A coin flip determines that Richard's partner is to decide the amount of each bet. The winner of each hole collects the money, and in the spirit of the competition, derogatory remarks about the loser's ability are rife. (3) The following week, after a particularly bad round of golf, Richard retires to the clubhouse for lunch and drinks. When the waiter arrives to deliver the meal, he accidentally gives Richard the wrong item. Richard is furious and, attracting the attention of the other people in the room, loudly berates the waiter.

What do these three incidents have in common? Each represents a distinct paradigm for investigating alcohol-induced aggression: (1) teacher-learner (Buss, 1961), (2) direct competition (Taylor, 1967), and (3) triggered displaced aggression (Pedersen, Gonzales, & Miller, 2000), respectively. In the teacher-learner procedure (Buss, 1961), a rigged lottery is used to assign the real participant to the role of teacher and the confederate to the role of learner. Mistakes on the part of the learner result in the teacher delivering electric shocks or some other form of aversive punishment to the learner. This aversive stimulation may vary both in its intensity and duration (viz., the dependent measures). In the first of the three anecdotes about Richard, Richard serves the role of teacher while attempting to instruct his son — the learner — about golf. Mistakes by his son elicit aggressive abuse (viz., verbal insults).

In the Taylor (1967) paradigm, a participant competes in a reaction time task with an "opponent" who is allegedly located in another room. The loser of each trial, ostensibly determined by who reacts more slowly, is first informed of the level of shock (or other aversive stimulation, such as loud blasts of white noise) that has been selected by his/her opponent before that particular trial began. This is followed by the loser's receipt of the indicated physically aversive stimulation. In reality, the number of trials won by the participant, as well as the shock intensity selected by the "opponent," is determined by the experimenter. The shock intensities selected by the true participant serve as the dependent measure. In the second anecdote, Richard competes with his friend for an amount of money that is determined by his opponent before they begin each hole. The loser of each hole (viz., trial) receives noxious stimulation in the form of lost money and derogatory remarks.

Both the Buss (1961) and the Taylor (1967) procedures have been used extensively within the alcohol and aggression literature (Bushman & Cooper, 1990). Each involves direct aggression (viz., retaliatory aggression directed against the original provocateur). When using the Taylor paradigm, or minor modifications thereof, researchers typically find that participants who consume alcohol are more aggressive than sober participants either in placebo or non-alcohol control conditions (e.g., Chermack & Taylor, 1995; Ganter & Taylor, 1992; Giancola & Zeichner, 1997). Similar findings characterize the teacher–learner paradigm (e.g., Gustafson, 1985a, 1985b, 1985c).¹

The third incident illustrates a type of displaced aggression — triggered displaced aggression. Displaced aggression is aggression that is not directed toward the source of a provocation, but instead, toward an innocent target. In triggered displaced aggression, the target of displaced aggression also emits a provocation. In the third anecdote, the waiter's minor mistake triggered an aggressive response from Richard that had nothing to do with the initial source of negative affect (viz., Richard's poor performance on the golf course). The topic of displaced aggression attained scientific prominence with the publication of *Frustration and Aggression* (Dollard, Doob, Miller, Mowrer, & Sears, 1939) and with the work of Hovland and Sears (1940). We discuss a paradigm for studying situations that correspond to this third anecdote in a later section of the paper.

The many differences between paradigms preclude meaningful comparison of the levels and types of aggression elicited within each. Both Bushman and Cooper (1990) and Ito et al. (1996), however, performed meta-analyses of the alcohol and aggression literature in which they coded for whether the target (victim) of the participant's aggression could retaliate. Both reviews indicated significantly larger average effect sizes for studies in which the victim could retaliate. Although seemingly counterintuitive in that the fear of retaliation should serve to inhibit rather than exacerbate aggressive responding, opportunity for retaliation corresponds directly with the type of paradigm employed in each study. Specifically, in the teacher–learner paradigm, the victim can never retaliate, whereas the opposite is true in the Taylor reaction time paradigm, in that the participant loses on a set number of trials and, hence, on each subsequent trial, can retaliate. Thus, across two separate meta-analytic reviews, the Taylor paradigm is associated with larger effect sizes relative to studies that used the teacher–learner procedure.

What might account for larger differences between the alcohol and control groups when the Taylor paradigm is employed? One possibility is that different motives are elicited by each paradigm. Two categories are typically used to conceptualize aggression: (a) hostile or affective and (b) instrumental (Geen, 1990). Hostile aggression is conceptualized as impulsive and motivated by a desire to inflict harm, whereas instrumental aggression is viewed as more thoughtful or deliberate and designed to achieve a goal other than causing harm to the victim (e.g., obtaining material resources, teaching a lesson, etc.). The Taylor

¹ Most experimental studies of alcohol-induced aggression have used either the Taylor competitive reaction time task or the teacher–learner paradigm (Ito et al., 1996). Another more recently developed method for investigating alcohol-induced aggression is the Point Subtraction Aggression Paradigm (Cherek, 1981). It is not specifically reviewed herein because relatively few studies of alcohol-induced aggression have used it. In studies employing this paradigm, participants are placed in front of a panel that has two buttons. Pressing the first button 100 times results in one point being allocated to the participant. Each point is redeemable for a specified amount of money. In contrast, pressing the second button 10 times subtracts one point from the participant's opponent. The dependent measure is the number of times the second (viz. subtraction) button is pressed. Several studies have demonstrated that alcohol participants behave in a more aggressive manner than those in control conditions (e.g., Cherek, Spiga, & Egli, 1992; Dougherty, Cherek, & Bennett, 1996; Kelly, Cherek, & Steinberg, 1989; Kelly, Cherek, Steingberg, & Robinson, 1988).

procedure is a competitive zero-sum game, thereby removing the likelihood that a desire to help the "other subject" is a significant motivator. In situations governed by the matching rule, such as interpersonal bargaining, competitive responses can function as mild provocations that reciprocally and incrementally heighten aggression (Axelrod, 1984). More importantly, the participant will typically lose roughly 50% of the trials, thereby receiving numerous shocks from his or her opponent. These shocks (and the associated pain) serve as a series of aggression-inducing provocations (Lindsay & Anderson, 2000). In fact, in our meta-analytic review of the alcohol and aggression literature, many of the studies rated high in provocation intensity were those employing the Taylor (1967) paradigm (Ito et al., 1996). Under these circumstances, aggression displayed towards the target is likely to be motivated by a desire to inflict harm upon the target (viz., hostile aggression).

By contrast with the Taylor (1967) paradigm, motivation of participants in experiments employing the teacher–learner procedure appears to be somewhat different. First, the stated or implied goal in these studies is the use of punishment to help the target learn a task. To the degree that the salience of this goal exceeds that of the frustration produced by the learner's inability to master the task, such studies are likely to elicit instrumental rather than hostile aggression. It is therefore not surprising that commentators have noted that the teacher– learner paradigm may elicit altruistic intentions because the goal is to aid the partner in learning a task (e.g., Baron & Eggleston, 1972; Taylor, Gammon, & Capasso, 1976). Second, poor performance on the part of the learner will not result in the participant receiving painful electric shocks or noise blasts from the learner. Instead, the participant is likely to experience frustration rather than provocation. Specifically, the learner's mistakes block the goal-directed behavior of helping the learner to achieve mastery of the material. Consistent with this interpretation, Ito et al. (1996) reported that the majority of alcohol and aggression studies rated high in frustration were those that used the teacher–learner paradigm.

3. Validity of laboratory studies of aggression

The value of experimental laboratory research on aggression has been questioned, as has the degree to which the results of such studies correspond to aggressive episodes in real-world settings. It has even been suggested that the results of laboratory studies be excluded from theoretical formulations about the relation of alcohol to aggressive responding (e.g., Gottfredson & Hirschi, 1993). At the core of this debate are concerns about the following: (1) construct validity; (2) internal validity; (3) external validity; and (4) the differentiation or commonality among measures of aggression. We discuss the relevant highlights bearing on each of these four issues in turn (for more detailed discussions of validity, see Carlsmith, Ellsworth, & Aronson, 1976; Cook & Campbell, 1979; Miller, Pedersen, & Pollock, 2000).

3.1. Construct validity

Construct validity refers to the degree to which a scientific construct is reliably related to other scientifically established concepts. For instance, physical anthropologists have shown that the cephalic index (viz., the ratio of head width to breadth) can be very reliably measured. They have documented consistent mean differences on the measure among various national/ ethnic groups. Yet, these national/ethnic differences have never been shown to be related to any other scientifically interesting dependent measure (e.g., intelligence). Thus, the cephalic index lacks construct validity.

The question concerning the construct validity of aggression in experimental laboratory studies is whether the evidence provides reliable and theoretical meaningful relationships between manipulations of relevant independent variables and dependent measures of aggression. Three lines of evidence indicate that aggression possesses construct validity within experimental laboratory studies. First, meta-analytic evidence shows that manipulations of anger, frustration, and personal attack augment aggressive responding in the hypothesized manner regardless of whether the dependent measure was physical or written aggression (Carlson, Marcus-Newhall, & Miller, 1989). In addition, effect size estimates of different measures of physical aggression (e.g., intensity, duration, and number) were significantly and positively correlated, as were measures of physical and written aggression (Carlson et al., 1989). Therefore, these laboratory measures all appear to assess a single latent variable: the construct aggression. Second, Anderson and Bushman (1997) showed that a variety of relevant antecedent variables, including sex, trait aggressiveness, provocation, and anonymity, augmented dependent measures of aggression in accord with theoretical predictions. Finally, and most importantly, the numerous textbooks on aggression (e.g., Berkowitz, 1993; Geen, 1990) present an array of evidence concerning aggression and its relation both to conceptually distinct antecedent as well as dependent measures. Clearly, there is ample evidence for the construct validity of aggression.

3.2. Internal validity

A second important issue when discussing laboratory aggression experiments is internal validity. High internal validity occurs when the researcher can firmly conclude that the manipulation of the independent variable(s) caused the systematic changes in the dependent measure. Experimentation is the most powerful tool for its establishment (Cook & Campbell, 1979). Nevertheless, it is not invulnerable to compromised internal validity. Demand characteristics are a major source of such compromise. *Experimental demand* refers to the researcher's inadvertent, but differential, provision of cues that are distinct from, but correlated with, the experimental manipulations. Because these cues are correlated with the experimental treatments, they can produce effects that are mistakenly attributed by the experimenter to the manipulated independent variable(s). They provide a major justification for experimenter-blind procedures.

The potential impact of experimental demand can be illustrated by research on the weapons effect (e.g., Berkowitz & LePage, 1967). The visible presence of weapons was hypothesized to function as an aggressive prime. Thus, those exposed to the sight of weapons might be more responsive to a subsequent insult by more strongly exhibiting reactive, angry aggression. Alternatively, however, these cues might be viewed by experimental participants as an indirect instruction by the experimenter to behave aggressively. Ordinarily, most people

initially adopt the fallback response of cooperating with a request. Consequently, stronger aggressive responding to the insult by those in the weapons condition can be viewed as compliance with the experimenter's implicit request to do so by having put weapons in plain sight. Were this latter process to occur, aggressive responding is not angry reactive aggression. Instead, it is instrumental behavior in response to experimental demand. Yet, the researcher might mistakenly view it as the former, thereby confusing a demand effect on instrumental aggression with support for the predicted relationship between priming and angry reactive aggression.

If such demand characteristics were actually responsible for producing aggression effects, removal of participants who are influenced by demand should reduce, if not eliminate, differential aggressive responding across experimental conditions. Interestingly, when Carlson, Marcus-Newhall, and Miller (1990) examined this issue on a meta-analytic level, they found just the opposite. Specifically, when participant suspicion regarding the experimental hypothesis was high, as assessed by postsession interviews and by examination of the nature of the experimental manipulation, the presence of weapons as a situational cue was shown to inhibit aggression. When suspicion was low, presence of a weapon augmented aggression relative to a control condition in a manner consistent with the original aggression cue-priming hypothesis of Berkowitz and LePage (1967). These meta-analytic results strongly undercut the position of critics who contested the hypothesized priming function of weapons on angry reactive aggression and instead viewed the supporting results as artifactual experimental demand for instrumental aggression.

Aggression research often has been criticized as vulnerable to demand effects (e.g., Tedeschi & Quigley, 1996). Some, however (e.g., Berkowitz & Donnerstein, 1982), contend that demand cues in laboratory aggression experiments do not approach the level of seriousness indicated by critics. In fact, experimenters often devise elaborate cover stories to convince participants that these studies are not concerned with aggression (e.g., Giancola & Zeichner, 1995a; Taylor, 1993). Furthermore, manipulation checks, which are used to verify the participant's beliefs about the nature and purpose of the experiments, most often show the cover stories to have been convincing. Moreover, participants who express suspicion regarding the true nature of the study are routinely excluded from the statistical analysis (e.g., Hammock & Richardson, 1992). In summary, then, in view of these considerations, it does not appear that demand characteristics are likely to exert significant impacts on outcomes of laboratory studies of aggression especially if proper care is taken to remove the data of suspicious participants.

3.3. External validity

Laboratory experiments offer distinct advantages over observational (including clinical) studies because they allow for the isolation of theoretical variables of interest in a controlled environment. Thus, laboratory experiments allow development of stronger causal statements. They can also be superior in terms of efficiency, financial cost, and ethical considerations (Anderson & Bushman, 1997). Moreover, it is important to consider that "the primary goal of most laboratory research is the development of theories designed to explain underlying

processes and mechanisms. Furthermore, it is these theoretical principles that one wishes to generalize, not the specific characteristics of the sample, setting, manipulation, or measure" (Anderson and Bushman, 1997, p. 22).

Nevertheless, although questions concerning the external validity of laboratory findings have been leveled at areas of psychology outside aggression research (e.g., Harre & Secord, 1972; Neisser, 1978), laboratory studies of aggression, at first glance, appear to be particularly vulnerable to such criticism. For instance, what do such "real-world" instances of aggressive behavior as diverse as child or spousal abuse, gang killings, or "road rage" have in common with laboratory studies in which participants deliver white noise blasts to an opponent in the context of a reaction time game or provide negative evaluations of a research assistant who is applying for a coveted job?

The general argument against the external validity of laboratory studies of aggression rests on the assumption that laboratories possess many "artificial" features that are not present in real-world settings (e.g., Gottfredson & Hirschi, 1993). If the results of laboratory studies did not generalize to "real-world" settings, however, then discrepancies should exist in the relationships observed between independent and dependent variables in the laboratory and observational settings. In other words, if the external validity of laboratory research in aggression is low, the variables that consistently augment aggressive responding in the laboratory should fail to affect aggression in nonlaboratory studies and vise versa.

The external validity of laboratory studies of aggression was assessed in a meta-analysis by Anderson and Bushman (1997). They compared the outcomes of studies on aggression conducted within the laboratory with those conducted outside of it. Specifically, they examined three individual difference variables — sex, trait aggressiveness, and Type A personality, and five situational variables — provocation, alcohol, media violence, anonymity, and heat. Their results showed a high degree of overlap between the outcomes of laboratory and observational studies. Presence of anonymity, for example, served to significantly increase aggressive responding relative to a control condition irrespective of whether the research was conducted in the laboratory or outside of it (i.e., average effect size of +0.57 and +0.47, respectively). Even more impressive was the observation that the same form of interaction between sex of the participant and type of aggressive responding was present both inside and outside the laboratory: larger gender differences were evident in studies that used physical measures of aggression, and smaller gender differences were evident in studies that used verbal measures of aggression.

Overall, all three of the individual difference variables and four of the five situational variables exhibited the same relation to aggression both inside and outside of the laboratory. Results for the remaining situational variable (viz., heat) showed different patterns of results depending on the location of data collection (see Anderson, 1989; Anderson & DeNeve, 1992), as was predicted by Anderson and Bushman (1997). These results are important not only because they so strongly support the external validity of laboratory experimentation on aggression, but also because of their implication about the role of demand effects, as discussed in regard to laboratory experimentation. Demand is far less likely to arise when research is conducted in field or nonlaboratory settings wherein researchers rely on or examine *naturally occurring events*. Consequently, if demand was, in fact, a serious problem

in laboratory experimentation, Anderson and Bushman (1997) could not have obtained the consistent effects that they did. That is, findings of laboratory studies compromised by demand outcomes would not exhibit accord with those obtained in field settings that, as indicated, are far less vulnerable to the intrusion of demand.

3.4. Discriminative construct validity: differentiation among related constructs

A fourth concern regarding laboratory studies of aggressive behavior is differentiation or commonality among aggression measures. Specifically, do laboratory protocols that have been employed to assess aggressive responding, such as the teacher–learner task, essay evaluation, and the Taylor (1967) competitive reaction time procedure, all elicit a similar type of aggression? That is, do results obtained in these diverse paradigms reflect the operation of a unitary construct, or do they elicit different types of aggression? As we have previously suggested, these paradigms manifestly appear to elicit a variety of motivations and intentions with respect to the aggressive responding produced within them. Greater attention to the measurement of potentially distinct variables, such as tit-for-tat retaliation, beliefs about potential targets of aggression, perspectives on social control, concerns about justice, and reestablishment of a positive self-image, may provide ingredients for building distinct theoretical models for different types of aggression. Such work might also draw important conceptual distinctions between simple, as opposed to more complex, motivations for aggressive action.

The distinction between hostile, reactive aggression and instrumental aggression, raised previously with respect to characteristics of the teacher–learner and the Taylor paradigms, has often been raised as an issue by critics of aggression research. It has been suggested that most laboratory paradigms elicit and measure hostile or reactive aggression but not instrumental aggression (Tedeschi & Quigley, 1996). However, like real-world violence, it seems unlikely that affective and instrumental aggression are mutually exclusive constructs. If, for instance, affectively hostile and reactive aggression is conceptualized as analogous to other forms of consummatory behavior, as seen in animal studies of basic learning processes, there is no doubt that instrumental behavior is one of the core components of affective aggression. In animal consummatory behavior, the thirsty rat readily learns to turn left in the T-maze to obtain the water at the end of the alley, and will persist in doing so until satiated. Likewise, the angered husband readily will learn hostile, abusive responses that produce enough visible pain on the part of his wife to satiate his anger. In this example, the husband clearly emits behaviors that are instrumental in producing pain and capitulation in response to his angry reactive aggression.

In fact, recent theoretical work has argued that the distinction between instrumental and angry aggression, although seemingly ubiquitous in aggression textbooks, is not clear-cut. It does not take into account the multiple motives that are likely to trigger the aggressive act (Bushman & Anderson, 2001). Instead, researchers may benefit from conceptualizing aggression in terms of knowledge structure models. Knowledge structures consist of pieces of interrelated information stored in long-term memory. The repeated coactivation of these items over time results in such strong association among them that activation of any subset tends to activate

the knowledge structure in its entirety (Bushman & Anderson, 2001). The most common examples of knowledge structures are schemas (which act as perceptual filters) and scripts (which organize and activate responses). Models based on knowledge structures do not confound types of aggression with different types of information processing (i.e., automatic and controlled). Instead, they allow for instances of aggression that are characterized by multiple motives (e.g., Anderson, Benjamin, & Bartholow, 1998; Anderson & Dill, 2000; Huesmann, 1998).

Another approach to the issue of conceptual differentiation among measures of aggression is to assess their discriminative construct validity (Miller et al., 2000). In an attempt to assess the discriminative construct validity of aggression as measured in the Taylor paradigm, Giancola and Zeichner (1995b) considered the potentially related constructs of guilt, indirect hostility, and inwardly directed anger. Notwithstanding the hazards of attempting to form a conclusion that is based on the absence of an effect, they reject these motives or emotions as possible alternatives to angry reactive aggression in the Taylor paradigm because responses elicited therein were unrelated to measures of these states.

A more refined or molecular distinction that can be drawn with respect to aggressive responding concerns the "topography" of the aggressive response. Researchers frequently measure both the duration and intensity of an aggressive response. Shock intensity is often viewed as a more active and direct form of aggression, whereas shock duration may be more indirect and possibly less volitional (Berkowitz, 1974; Carlson et al., 1989; Giancola & Zeichner, 1995a). Here, in accord with Giancola and Zeichner, we note that the moderate, but statistically significant, correlations between shock intensity and duration reported by Carlson et al. (1989) are to be expected of two measures that may each have some unique variance (viz., direct vs. indirect), but nevertheless share assessment of a single underlying latent variable (viz., aggression).

3.5. Summary

Most laboratory paradigms devised to assess antecedents, moderators, and mediators of aggressive responding appear to tap some aspects of aggression, although the balance between affective and instrumental determinants of it requires elucidation. Some empirical works support the discriminative construct validity of aggression by failing to find evidence that guilt, indirect hostility, and inwardly directed anger are responsible for the outcomes. In addition, demand characteristics do not appear to be an important methodological feature that limits the validity of inferences drawn from experimental laboratory research on aggression (Berkowitz & Donnerstein, 1982). Finally, Anderson and Bushman (1997) present substantial evidence in support of the external validity of laboratory studies of aggression.

4. Antecedent variables that impact alcohol-induced aggression

In the current section, we review evidence concerning the effects of provocation and frustration — two important social psychological moderators of aggressive behavior. Each has been shown to reliably moderate aggressive responding in sober individuals.

4.1. Provocation and alcohol-induced aggression

Provocation not only directly elicits negative affect and aggression (Averill, 1982; Berkowitz, 1989; Feshbach, 1964), but it also provides a justification for aggression (Bettencourt & Miller, 1996). Even knowledge of an intended attack is sufficient to provoke aggression (Greenwell & Dengerink, 1973). Additionally, within social interaction, the tit-fortat matching rule (Axelrod, 1984), or as reflected at a more molar level, the norm of reciprocity (Gouldner, 1960), exerts powerful effects that incrementally escalate conflict and hostility (e.g., Dodge & Coie, 1987).

Effects of provocation on intoxicated persons have been a frequent feature of experimental research on alcohol and aggression (e.g., Kelly et al., 1988; Richardson, 1981; Shuntich & Taylor,1972). Both Gustafson (1993) and Pernanen (1976) have emphasized the need to consider the level of provocation when interpreting research on alcohol and aggression. Relatively little attention, however, has been devoted to developing a theoretical model of its role. Two distinct and opposing theoretical conceptualizations are possible.

One view is that alcohol facilitates aggression only in the presence of provocation (Gustafson, 1993). From this perspective, it is assumed that in the absence of provocation, intoxicated individuals will show levels of aggression similar to those exhibited by their sober counterparts (Gustafson, 1993). Logical extension of this conceptualization implies that as the intensity or level of provocation increases, more aggressive behavior will be exhibited by intoxicated as compared with sober persons. Thus, at low levels of provocation, aggressive behavior among intoxicated persons might exceed that of sober ones. By contrast, at high levels of provocation, the differences between groups would become even more pronounced due to the heightened aggressive behavior exhibited by intoxicated persons.

An alternative theoretical analysis leads to an opposing viewpoint. Specifically, alcohol appears to reduce inhibition — or in other words, it induces disinhibition (e.g., Steele & Southwick, 1985). Given that social restraints normatively suppress aggressive action, this premise suggests that intoxicated persons will behave more aggressively than sober ones. Thus, even under low provocation, intoxicated individuals are less likely to conform to normative proscriptions. Consequently, they will behave more aggressively than sober persons. When a strong provocation is present, however, its justifying function is likely to become especially relevant to those who are sober. It will release them from the inhibition they ordinarily feel. By contrast, because intoxicated persons are already disinhibited by the alcohol that they have consumed, the additional disinhibiting effect of a new justification does not have the same impact on them as it does on sober persons. Thus, it is less likely to further disinhibit them by comparison to sober persons.

These latter expectations parallel the general and well-established Weber–Fechner (or S.S. Steven's) psychophysical law of a diminishing increase in subjective intensity of a stimulus as a function of increasing physical intensity. The same increase in justification is much more disinhibiting to sober persons than to those who, because they are intoxicated, are already disinhibited. Thus, increasing levels of provocation will attenuate the difference between sober and intoxicated individuals by providing a justification that allows sober persons to ignore social constraints that ordinarily inhibit their aggression. Its aggression-

releasing effects on intoxicated persons will be weaker. A similar theoretical argument applies to the role of provocation in attenuating gender differences in aggression (Bettencourt & Miller, 1996). In mediational analysis of their meta-analytic data, Bettencourt and Miller (1996) showed support for the notion that stronger provocations invoked justifying perceptions. These justifying perceptions, in turn, reduced the differential aggressiveness of males and females.

The moderating effect of provocation was examined in a meta-analysis of the effects of alcohol on aggression (Ito et al., 1996). The results were consistent with the second of the two theoretical interpretations presented above: the aggressive behavior of intoxicated participants reliably exceeded that of sober ones. Moreover, among studies with the lowest levels of provocation, intoxication led to significant increases of aggressive behavior, relative to sober states. Most importantly, the difference in aggression between intoxicated and sober persons decreased as a function of stronger provocation.

These outcomes are consistent with theorizing which specifies that people respond more aggressively to provocation when they are intoxicated by alcohol than when they are sober. This same direction of effect was found in separate analyses of high- and low-dose studies, although it was only reliable in the low-dose subset. Additional analyses suggested that this effect is stronger in circumstances that more fully elicit angry or affective aggression, as in the Taylor paradigm (e.g., Jeavons & Taylor, 1985). It was somewhat weaker in the teacher–learner paradigm (Buss, 1961). As previously argued, in this latter paradigm, aggression may be somewhat more instrumental in that inadequate performance by the partner might be seen as reflecting poorly on the participant's ability as a teacher–supervisor (Rule & Percival, 1971).

4.2. Frustration and alcohol-induced aggression

Following introduction of the frustration-aggression hypothesis (Dollard et al., 1939), the impact of frustration on aggressive responding has received considerable attention. Some researchers consider frustration a type of provocation (e.g., Gustafson, 1993). More characteristically, however, provocation is defined as the induction of negative affect (e.g., anger or irritation), whereas frustration is conceptualized as the blocking of goal-directed behavior. Therefore, even though frustration is linked to negative affect, most theorists view it as conceptually distinct from provocation.

Historically, frustration research centered on refuting the notion that it invariably causes aggression (Dollard et al., 1939). Nevertheless, it can instigate aggression (Berkowitz, 1989). It can also justify aggression, even when its cause is undeniably nonhuman and situational. Therefore, frustration may moderate the impact of alcohol on aggression in a manner similar to provocation. Specifically, the aggressive behavior of intoxicated participants is likely to exceed that of sober ones under conditions of minimal frustration. As the level of frustration increases, however, more similar levels of aggressive responding can be expected.

Meta-analytic findings are inconsistent with this latter theorizing (Ito et al., 1996). Specifically, whereas higher levels of provocation were associated with a reduction in the difference in aggressive behavior between intoxicated and sober individuals, increases in

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frustration led to larger effect sizes. In explaining this somewhat puzzling finding, Ito et al. (1996) noted that paradigm differences are associated with the high provocation and high frustration studies. Most high provocation studies employed a competitive reaction time task (e.g., Jeavons & Taylor, 1985) wherein the loser of each trial received an electric shock. By contrast, the majority of high frustration experiments used a teacher–learner (Buss, 1961) type of paradigm. The Taylor task is more likely to motivate harm or retaliation for pain inflicted by the confederate (Ito et al., 1996). When instead (Ito et al., 1996) the confederate performed poorly in the typical teacher–learner paradigm, it jeopardized the participant's likelihood of obtaining a reward and thereby elicited frustration (e.g., Gustafson, 1986). Thus, the latter situation is likely to elicit more instrumentally focused aggression, which is motivated by somewhat different considerations than those solely dominated by the elicitation of angry reactive aggression. In addition, participants were sometimes explicitly told that their aggressive behavior towards the confederate could be instrumental in obtaining a monetary reward (e.g., Gustafson, 1985a, 1985b, 1985c).

In summary, the increase in aggressive behavior among intoxicated participants under conditions of high frustration may be attributable to these paradigm-induced motivational differences (see Ito et al., 1996). If so, interpretation of the results of alcohol and aggression studies requires attention to specific paradigm features that differentially induce frustration and provocation (Gustafson, 1993; Pernanen, 1976).

5. The TDAP

Separate from the teacher–learner (Buss, 1961) and Taylor (1967) paradigms is the TDAP. It is a promising, yet, relatively unexplored, arena for research that is particularly well suited to development of an empirically based understanding of social factors that interact with alcohol consumption to disjunctively increase aggressive reactions. This examination is important because both the paradigm's and alcohol's addition to it has broad ecological validity (Miller & Marcus-Newhall, 1997).

5.1. Displaced aggression

As previously indicated, aggression is sometimes elicited by a provocateur toward whom retaliation is constrained. When aggression is subsequently directed toward an innocent target, it may reflect the effects of the prior instigation. If so, it is termed displaced aggression. Although the historical roots of displaced aggression can be traced back to Freud's (1920) analysis of interpersonal dynamics, we noted that its modern roots lie in the work of Dollard et al. (1939) and Hovland and Sears (1940). Content analysis of social psychology textbooks between 1900 and 1998 reveals that this initial interest soon subsided (Marcus-Newhall, Pedersen, Carlson, & Miller, 2000). Thus, whereas the mean number of sentences devoted to displaced aggression was 22.0 in the 5-year period of 1940–1945, there were no references to the concept in texts published before 1940. Across 5-year time blocks subsequent to 1945, there were, on the average, a mean of 4.89 sentences per textbook

(Marcus-Newhall et al., 2000). Seemingly, then, perhaps because of well-noted opposing effects (e.g., Berkowitz & Knurek, 1969; White, 1979), the concept has been abandoned by contemporary Social Psychology. Geen (1990), in his mainstream aggression textbook, confirms this view. He does not reference the concept in his index, and only devotes 40 words of text to it, defining it in accord with the frustration–aggression theorists (Dollard et al., 1939). Not only do contemporary researchers rarely discuss the concept (exceptions are Green, Glaser, & Rich, 1998; Hepworth & West, 1988; Mullen, 1986), but also in the decade of 1988–1997, we could not locate a single published experimental study concerned with displaced aggression.

Meta-analytic findings (Marcus-Newhall et al., 2000), however, present a different picture. They show that displaced aggression is a highly reliable phenomenon with a mean effect size (viz., +0.54) of moderate magnitude (Cohen, 1977). Moreover, on the heels of our new theoretical model (viz., Miller & Marcus-Newhall, 1997), recent experimental evidence suggests a reemergence of interest in displaced aggression (e.g., Bushman & Baumeister, 1998; Bushman, Baumeister, & Stack, 1999; Pedersen et al., 2000).

5.2. Triggered displaced aggression

Of potentially greater theoretical interest, however, is the concept of triggered displaced aggression (Dollard, 1938). It extends the concept of displaced aggression to circumstances in which its target also emits a provocation. Presence of such triggering events results in a level of aggressive retaliation that exceeds that warranted by tit-for-tat responding (Axelrod, 1984). The third of our three opening vignettes illustrates this process. Richard, who was angry after playing a bad round of golf (viz., the initial provocation), experiences a second minor triggering provocation from the waiter at the clubhouse — he accidentally gives Richard the wrong menu item for lunch. The resulting violent outburst from Richard appears to be not commensurate with the relatively trivial nature of the waiter's mistake. In general, displaced aggression is thought to occur when a person is provoked at Time 1 and is precluded from retaliating against the provocateur, perhaps because the provocateur has abruptly left the scene, or has sufficient power to deter retaliation. Then, at Time 2, this person behaves aggressively toward an innocent other. Thus, triggered displaced aggression differs from displaced aggression by virtue of the fact that the target person at Time 2 emits a triggering provocation.

The experimental design that will allow assessment of an interaction showing disjunctive escalation of aggression within the context of the TDAP requires conditions that separately assess the levels of aggression produced by the initial provocation alone and the trigger alone. In addition, it requires a no-treatment control condition against which to assess these latter independent effects. Finally, to assess the interaction, it requires a treatment that combines the initial provocation and the triggering provocation.

These ingredients will appear in a 2×2 between-subjects factorial design that manipulates the presence of the Time 1 provocation and the presence of a triggering action by the Time 2 target person. When the Time 2 triggering event is of low intensity and has been preceded by a Time 1 provocation of moderately strong intensity in circumstances that precluded retaliation, an interaction occurs. The aggressive response to the triggering action of the displaced aggression target exceeds the additive combination of the levels of aggression elicited toward the target person by the provocation and triggering event when each is experienced by itself (Pedersen et al., 2000). That is, when the setting precludes retaliation to an initial provocation, an aggressive response to a subsequent second triggering provocation can multiplicatively exceed the level implicit in the additive combination of the effects of (a) the initial provocation and (b) the triggering event.

The reliability of this multiplicative effect has now been demonstrated across several studies that differ in the nature of the aggression dependent measure (viz., both verbal and physical aggression), the race of the target of aggression, and the experimental inductions of the Time 1 provocation and the Time 2 triggering events (Bushman, Pedersen, Vasquez, Bonacci, & Miller, 2001; Pedersen et al., 2001). However, we expect that this type of interaction between provocation and trigger will occur only in cases where the intensity of the triggering event is relatively minor (Miller & Marcus-Newhall, 1997; Pedersen et al., 2000). Relative to strong triggering events, *low intensity* triggering events are more ambiguous as to whether they constitute a provoking action. Priming effects from the initial provocation can cause such ambiguous stimuli to more readily be noticed (e.g., Higgins & King, 1981). In addition, such prior priming is likely to have attributional effects, leading to an interpretation of the minor triggering event as having intentionally been provoking (Duncan, 1976). Such attributional distortion is less likely in the absence of prior priming by means of a strong initial (Time 1) provocation. Therefore, when preceded by an initial provocation from another source, a low intensity triggering action by a second person can elicit an aggressive response that greatly exceeds that expected from Axelrod's (1984) matching principle. The retaliatory response dramatically exceeds the intensity of the triggering event that elicited it.

If the TDAP is to have broad ecological validity as an explanation of disjunctively escalated aggression, it must be shown to apply in situations in which the temporal interval between the initial provocation and the subsequent triggering event exceeds the 20-min duration for which an affective arousal ordinarily persists. Rumination is a process by which the affective reaction to the Time 1 provocation might remain in conscious awareness and, thus, be highly salient over long periods of time (Martin & Tesser, 1989; Wegner, 1994). Thus, a carryover of affective arousal between the Time 1 and Time 2 events — a core theoretical ingredient necessary for other paradigms such as excitation transfer (Zillman, 1971; Zillman, Katcher, & Milavsky, 1972) — need not be a necessary ingredient for triggered displaced aggression. Recent work from our laboratory supports this view, showing disjunctively escalated triggered displaced aggression with a 40-min interval between the initial provocation and the triggering event (Bushman, Pedersen, Vasquez, Bonacci, & Miller, 2001).

5.3. Alcohol and triggered displaced aggression

Past research has demonstrated that intoxication narrows attention (Huntley, 1973; Moskowitz & DePry, 1968; Steele & Southwick, 1985; Taylor & Chermack, 1993) and decreases the number of cues to which a person can attend (Pernanen, 1976). Intoxicated individuals may only be capable of attending to the most salient cues in the environment

(Steele & Southwick, 1985; Taylor & Chermack, 1993; Taylor & Leonard, 1983). The tendency of intoxicated individuals to narrowly focus on salient cues has important implications for explaining disjunctively escalated aggressive responding. In this section, we discuss its anticipated effect when applied to the TDAP.

Specifically, the narrowing of attentional focus induced by alcohol leads to two predictions within the TDAP: when the Time 2 aggression-instigating cue is highly salient, alcohol will augment aggression; when it lacks salience, the impaired cognitive capacity produced by alcohol will make intoxicated persons less likely to notice the Time 2 cue, by comparison with sober persons. This theoretical position offers a rich variety of empirical tests. For instance, manipulations of the intensity of the Time 2 trigger can alter its salience. Even though previously provoked, when the Time 2 trigger is of very low intensity, the processing impairment of intoxicated persons is likely to lead them to fail to notice it. By contrast, previously provoked sober persons will not fail to notice it. Second, we expect that the degree to which the Time 2 trigger is embedded within or veiled by other stimuli or information will moderate the aggressive responses of intoxicated relative to sober individuals. If the triggering event is presented with a variety of other stimuli, intoxicated persons are unlikely to notice it. Finally, the salience of the Time 2 trigger might also depend on events that intervene between the Time 1 provocation and the Time 2 trigger. Thus, the likelihood that a Time 2 event of low salience will be noticed and, hence, elicit high levels of triggered displaced aggression will be moderated by whether the aggression-priming effect of the Time 1 provocation is maintained in conscious awareness.

As previously discussed, applicability of the TDAP to both longer, as well as short, periods between the provocation and the trigger permits investigation of the relative contribution of cognitive and affective (arousal) factors in aggressive responding. Acute doses of alcohol not only impair cognitive processing (e.g., Steele & Josephs, 1988), but also alter affective states (e.g., Ito et al., 1996). Moreover, arousal varies as a function of time elapsed after alcohol ingestion (e.g., Earleywine & Erblich, 1996). This suggests that it will be important to study the interaction between the key structural features of the paradigm and the temporal points at which alcohol is ingested.

A number of other theoretically important mediators of alcohol's effects on aggression can be explored within the TDAP. These include, for example, the study of the differential effects of the type of emotion that is elicited prior to the Time 2 event. For instance, the distinction between sadness and anger is important within the context of aggression research because the two emotions elicit different behavioral orientations. Anger elicits the approach response of aggressively striking out. Sadness elicits internal self-focus, less responsiveness to nonsalient external stimulation, and inaction (Miller & Carlson, 1990). Consequently, inductions of these emotional states between the Time 1 and Time 2 events of the TDAP will elicit differences in the level of aggressive behavior in response to the Time 2 event. In addition, rumination on anger is likely to augment aggression, whereas rumination about sadness is likely to reduce it. Alcohol ingestion is likely to exaggerate these effects. In summary, it is clear that the TDAP has considerable potential for studying the key theoretical issues concerning alcohol-induced aggression.

6. Conclusion

We have discussed the most common laboratory paradigms for investigating the impact of alcohol consumption on aggressive behavior. Evidence argues for the utility and validity of these procedures. In addition, we have examined two theoretically important situational variables on alcohol-induced aggression: provocation and frustration. Finally, and most importantly, we introduce the TDAP and point out the important contributions that it can make to the scientific study of alcohol and aggression. We believe this paradigm is an important development for explaining the disjunctively escalated aggressive actions often seen in the response of intoxicated persons to trivial provocations.

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