The Effects of Acute Alcohol Intoxication on Person Memory: The Stereotypical Drunk

SHEILA J. CUNNINGHAM,2 ALAN B. MILNE, AND JOHN R. CRAWFORD
School of Psychology
University of Aberdeen
Aberdeen, United Kingdom

Research has suggested that acute alcohol intoxication disrupts cognitive functioning by reducing the availability of executive resources for person perception. The present study tested the prediction that this effect would increase stereotype application during impression formation by reducing the encoding of nonstereotypical information. Participants were instructed to complete an impression-formation task following consumption of low, medium, or high doses of alcohol. This task involved the encoding of both stereotypical and neutral material. A subsequent free-recall test demonstrated that alcohol significantly decreased participants' encoding of neutral information, but did not affect the memorability of stereotypical information. These findings are discussed in relation to models of both stereotyping and alcohol intoxication.

Forming an impression of a stranger requires the processing of a complex array of information. Therefore, the use of heuristics such as social stereotypes to simplify impression formation is often desirable, perhaps even necessary, and such heuristics have a significant impact on memory for the target person (Bodenhausen & Lichtenstein, 1987). Stereotypes simplify impression formation by providing a framework through which expectancy-congruent (i.e., stereotypical) information can be encoded, stored, and retrieved easily (Srull & Wyer, 1989). The extent to which stereotypes are applied in impression formation has been the subject of much research.

One of the most widely replicated findings is a tendency for perceivers to recall more stereotype-congruent than incongruent information, especially

1The authors thank Superintendent Dave Cormack and Grampian Police's Traffic Department for their help with the supply and calibration of breath-analyzing equipment. We also thank two anonymous reviewers for their helpful comments on an earlier draft of the manuscript.

2Correspondence concerning this article should be addressed to Sheila Cunningham, School of Psychology, William Guild Building, University of Aberdeen, UK, AB24 2UB. E-mail: sheila.cunningham@abdn.ac.uk
under conditions of attentional depletion (for reviews, see Sherman, Macrae, & Bodenhausen, 2000; Stangor & McMillan, 1992). This tendency has been tested by asking perceivers to carry out executive demanding tasks, such as holding digit sequences in memory or randomly generating sequences of numbers; manipulations that increase the proportion of stereotype-congruent to incongruent items encoded in memory (Dijksterhuis & van Knippenberg, 1995; Macrae, Bodenhausen, Schloerscheidt, & Milne, 1999; Macrae, Hewstone, & Griffiths, 1993; Pendry & Macrae, 1994; Pratto & Bargh, 1991; Stangor & Duan, 1991).

There are two aspects of the extant research on this topic to date that are worthy of mention. First, recall of stereotypical information tends to be reported in comparison with the memorability of stereotype-incongruent material (e.g., Dijksterhuis & van Knippenberg, 1995; Macrae et al., 1999; Pendry, 1998; Pendry & Macrae, 1994; Sherman, Lee, Bessenoff, & Frost, 1998; Stangor & Duan, 1991). One may reasonably question, however, the extent to which perceivers encounter disconfirmatory information during their interactions with other social targets.

In most settings, it is probable that perceivers learn a few stereotypical things about a target, together with a wealth of information that has no bearing at all on category stereotypes (i.e., neutral information). The power of this neutral information is that it may dilute stereotyping effectively if it can be brought to mind readily. If, however, stereotypical thinking obstructs the encoding of neutral information (much like stereotype-inconsistent material), then stereotype-based responses are likely to prevail. Indeed, studies that have compared stereotypical to neutral encoding (e.g., Macrae, Bodenhausen, Milne, & Wheeler, 1996; Macrae, Stangor, & Milne, 1994) have shown this pattern.

Second, despite their methodological utility, laboratory measures of resource depletion (e.g., random-digit generation) rarely impinge on everyday, information-processing settings. The issue arises, therefore, of whether naturalistic measures of resource depletion would mimic the effects on memory performance observed in the laboratory. We consider these two issues in the current investigation.

Examining the encoding of neutral information is one way that the present study seeks to increase the real-life applicability of stereotype-based effects on memory performance. The second, and more important, method of achieving realism is to investigate the impact of a prevalent, socially important source of attentional depletion: alcohol intoxication. Alcohol is acknowledged to impair executive functioning through a reduction in resource availability (e.g., Fillmore, Carscadden, & Vogel-Sprott, 1998; Fillmore & van Selst, 2002; Fillmore & Vogel-Sprott, 1998, 1999; Fillmore, Vogel-Sprott, & Gavrilescu, 1999; Finn, Justus, Mazas, & Steinmetz, 1999; Peterson, Rothfleisch, Zelazo, & Pihl, 1990; Steele & Josephs, 1990). This
reduction in attentional capacity produces a range of behavioral effects, such that intoxicated participants produce more unwanted prepotent responses in word-completion tasks (Fillmore et al., 1999) and show greater behavior modification in response to salient environmental cues (MacDonald, Fong, Zanna, & Martineau, 2000) than their sober counterparts. The interpretation that is offered for these findings is that alcohol impairs executive functioning.

The aforementioned findings have some interesting implications for research in person perception. In particular, they suggest that acute alcohol intoxication may exacerbate stereotype-based responding. This prediction gains some support from a study by Reeves and Nagoshi (1993) in which participants watched a videotape showing interactions between a Black and a White actor, following consumption of either alcohol or a placebo. The videotape showed the Black actor giving the White actor an ambiguous shove, an incident that participants were asked to rate for level of intended aggression. Reeves and Nagoshi reasoned that elevated ratings of aggression would indicate higher levels of prejudice toward the Black actor. They found that alcohol consumption significantly increased the perceived aggressiveness of the ambiguous shove. Moreover, this pattern was observed even among participants with low scores on the Modern Racism Scale (McConahay, Hardee, & Batts, 1981), suggesting that, while intoxicated, these participants were applying a stereotype that otherwise they were motivated to avoid in everyday life.

The finding that racial stereotyping increases with alcohol consumption clearly has important social implications, given the increase in violent crimes and aggression already known to be associated with intoxication (Hoaken, Giancola, & Pihl, 1998; Pernanen, 1976). The present study’s examination of the effects of alcohol on stereotyping in person perception, therefore, may increase our understanding of the etiology of such behaviors (see Bartholow, Pearson, Grattan, & Fabiani, 2003). The experiment compares the recall of stereotypical and neutral information by participants who form impressions of a target following alcohol consumption. It is expected that alcohol intoxication will cause an overall decrease in memory (Ryback, 1971), but that the encoding of neutral information will be particularly impaired. proportionately, therefore, participants are expected to remember more stereotypical information following alcohol consumption.

Overview

Participants were assigned to one of three alcohol conditions in which they consumed either a negligible quantity of alcohol; sufficient alcohol to
raise their blood alcohol concentration (BAC) to about the UK legal drunk-driving limit (80 mg of alcohol per 100 ml of blood); or about double this latter quantity of alcohol. They were then asked to complete an impression-formation task, which involved listening to an interview with a computer programmer that included both stereotypical and neutral information (with regard to computer programmers). The following day, participants were asked to recall information about the target person, and the proportion of stereotypical and neutral items that they recalled was assessed.

Method

Participants and Design

The participants were 123 male students at Aberdeen University who were recruited for participation through on-campus advertisements, in exchange for payment of £3 per hour or partial course credit. Participants ranged in age from 18 to 54 years, with a mean of 21.1 years (participants who were under the age of 18 years were excluded from the experiment to comply with UK legal regulations). Female participants were not included in the experiment in order to avoid the risk of giving alcohol to someone who could be pregnant, and also to maximize control over participants’ BAC. The same quantity of alcohol results in different BACs at different points in the menstrual cycle as a result of changes in levels of water retention (see Graham, Wilsnack, Dawson, & Vogeltanz, 1998; Reichman et al., 1993). Therefore, it is more difficult to control a woman’s BAC reliably than that of a man.

Participants who had a history of alcohol or drug addiction or who reported previous social problems caused by alcohol consumption were identified in a screening session and were excluded from the study. This criterion was applied for the participants’ own safety. Participants who generally abstained from alcohol also were identified in the screening session and excluded. The experiment had a mixed 3 (Alcohol Consumption: low, medium, or high) × 2 (Item Type: stereotypical or neutral) design, with repeated measures on the second factor.

Procedure and Stimulus Materials

Before agreeing to take part in the experiment, all participants were required to attend a screening session in which they completed the Drinking Habits Questionnaire (DHQ; Vogel-Sprott, 1992). The DHQ elicits information about drinking habits, such as the number of years that the
participant has been drinking, quantity of alcohol consumed on a typical night out, and number of times per week that alcohol is consumed. It also requests information about alcohol-related problems, such as addictions and convictions for drunk driving. Participants’ responses on the DHQ allowed problem drinkers and those who abstained from alcohol to be identified and excluded from the study.

Participants whose drinking habits allowed them to be included in the study were given a detailed information sheet and consent form, and were invited to sign up to participate in the experiment. The information sheet included the important instruction that participants should avoid drinking for 24 hr and eating for 4 hr before the experiment, to ensure that initial blood alcohol levels were nil and that alcohol absorption rates were matched as closely as possible between participants.

Participants were tested in small groups of 3 to 6 individuals. Each group was assigned randomly to an alcohol consumption and instruction condition, with each member of the group being in the same condition. Participants were informed that the experiment comprised three alcohol conditions, but were not told to which one they had been assigned.

Upon participants’ arrival at the laboratory, their BAC was measured using a Lion Alcometer® SD-400 to ensure that none had consumed alcohol already; and their body weight (in kg) was recorded. All participants were then given three drinks spaced 5 min apart, with instructions to finish each drink within 1 min. All drinks were mixed out of participants’ sight, in order to reduce participants’ ability to judge accurately to which alcohol group they had been assigned. The amount of alcohol and mixer (carbonated sugar-free bitter lemonade) contained in each drink was determined by participants’ weight and the alcohol consumption condition to which the person had been assigned.

Participants in the low alcohol condition were given 0.15 ml of 47.5% alcohol per kg of body weight, a quantity low enough to prevent BAC from rising above 0. This alcohol was dripped onto 150 ml of mixer, and participants’ cups were laced with alcohol around the rim. These measures were taken to ensure that alcohol would be tasted and smelled during consumption. Participants in the medium alcohol condition were given 0.77 ml of 47.5% alcohol per kg of body weight divided equally between the three drinks, a quantity expected to increase BAC to about 80 mg/100 ml, which is the legal driving limit in the UK. Participants in the high alcohol condition received a total of 1.53 ml of 47.5% alcohol per kg of body weight, a quantity expected to increase BAC to about 160 mg/100 ml, which is twice the legal driving limit. The drinks of participants in the medium and high alcohol conditions were of a concentration of one part alcohol to five parts mixer. After participants had consumed all three drinks, they waited for
30 min to allow the alcohol to be absorbed before beginning the impression-formation task. At the end of this 30-min period, participants’ BACs were recorded.

For the impression-formation task, participants were told that they would be required to listen through headphones to an audiotaped interview with a target person, and that their task was to form an impression of him. The target person used in the experiment was a visually stereotypical computer programmer. This target category was chosen because previous pilot testing \((N = 40)\) established that computer programmers are associated with a strong and consistent stereotype, which is not socially sensitive and so is unlikely to be spontaneously suppressed (see also Yzerbyt, Coull, & Rocher, 1999).

Pilot testing \((N = 47)\) of photographs showing computer programmers sitting in front of their computers identified one that was particularly stereotypical of the category. This photograph was presented to participants before the impression-formation task began in order to activate the stereotype. Participants listened to one of two versions of an interview with the target person, in which he described aspects of his life, such as his job, background, and hobbies. Two versions of the interview were compiled to ensure generalizability. Both interviews lasted for 2 min and contained a mixture of neutral and stereotypical information, classified on the basis of pilot research \((N = 32)\). The interviews contained nine items of stereotypical information (e.g., “I enjoy reading computer magazines,” “I don’t go out much”) and seven items of neutral information (e.g., “I am 29 years old,” “I have two cats”).

After participants had listened to the interview, their BACs were measured for a third time. Participants whose BACs were below 80 mg/100 ml were allowed to leave, while those who were still legally intoxicated were asked to remain with the experimenter until repeated measurements showed that their BACs had fallen to below 80 mg/100 ml. Participants returned to the laboratory the following day to complete a surprise recall task in which they were asked to list as much information about the target as they could recall. No time limit was imposed on this task. They were then paid, fully debriefed, and dismissed.

Results

Level of Intoxication

The BAC readings taken from participants upon entering the laboratory were all 0.0 mg/100 ml, thereby confirming that all participants were sober
before beginning the experiment. BAC readings taken 30 minutes after consuming the beverages, when participants were about to begin the impression formation task, confirmed that all participants in the low alcohol condition had blood alcohol levels of 0.0 mg/100 ml. The BAC readings of participants in the medium alcohol condition had risen to a mean of 76.2 mg/100 ml ($SD = 18.3$), and those in the high alcohol condition had a mean BAC of 156.3 mg/100 ml ($SD = 30.4$). These figures suggest that the alcohol intoxication manipulation was successful, as low alcohol participants were legally sober; while those in the medium alcohol condition had a mean BAC close to the UK legal driving limit; and those in the high alcohol condition had a mean BAC of approximately double this limit. Participants’ BACs were submitted to a single-factor ANOVA, which confirmed that the main effect of alcohol consumption was significant, $F(2, 120) = 596.38, p < .001$; and post hoc analysis (Tukey’s HSD) shows that all three between-group differences were significant (all $ps < .001$).

Memory Performance

Of the 123 participants, 10 did not return to complete the experiment, so they provided no free-recall data. Therefore, a total of 113 participants were included in the statistical analysis. Proportional recall scores were calculated for each participant according to a gist criterion by a coder blind to experimental condition by dividing the total number of stereotypical or neutral items recalled by the number of stereotypical or neutral items contained in the relevant interview.

Participants’ proportional recall scores were submitted to a 3 (Alcohol Consumption: low, medium, or high) × 2 (Item Type: neutral or stereotypical) ANOVA, with repeated measures on the second factor. The ANOVA reveals a significant main effect of item type, $F(1, 110) = 27.06, p < .001$, with a higher proportion of stereotypical than neutral items recalled (stereotypical, $M = 0.39, SD = 0.11$; neutral = 0.30, $SD = .11$). Alcohol consumption also constitutes a significant main effect, $F(2, 110) = 4.63, p = .012$, such that recall performance decreased as alcohol consumption increased. However, this effect was moderated by a significant interaction between alcohol consumption and item type, $F(2, 110) = 3.32, p = .04$. As can be seen in Figure 1, this interaction arose because participants in all three alcohol groups recalled a similar proportion of stereotypical items, but the proportion of neutral items recalled decreased with alcohol consumption. The effect of alcohol on neutral recall was shown to be significant, $F(2, 110) = 6.79, p = .002$; and post hoc tests (Tukey’s HSD) confirm that there were significant differences in neutral recall between the high alcohol condition, and
both the low and medium alcohol groups ($p = .001$ and .033, respectively). In contrast, there was no significant simple main effect of alcohol consumption on stereotypical recall, $F(2, 110) = 0.41$, $p > .05$.

In order to explore further the nature of participants’ recollections, an additional stereotypicality score was calculated for each participant, representing the percentage of the total number of items recalled that were stereotypical. In the low alcohol condition, participants’ mean recall was 54% stereotypical, a figure that rose slightly to 58% in the medium alcohol condition, and increased to 66% in the high alcohol condition. A single-factor ANOVA confirms that the main effect of alcohol consumption was significant, $F(2, 110) = 5.02$, $p = .008$. Tukey’s tests show that the only significant between-group difference was between the high and low alcohol conditions ($p = .023$), although the difference between the high and medium alcohol groups approached significance ($p = .064$).

Discussion

The results of the current experiment support the predictions that were advanced. As expected, the free-recall data show that significantly more stereotypical than neutral items were recalled, replicating previous findings that stereotype activation facilitates the encoding of stereotype-congruent information (Macrae, Milne, & Bodenhausen, 1994; Macrae, Stangor, et al.,
A main effect of alcohol consumption was found also, with alcohol impairing overall recall. More interestingly, alcohol was found to have a different effect on the recall of stereotypical and neutral items. The recall of stereotypical items was not significantly different between groups, but neutral item recall was impaired following alcohol consumption. Neutral recall became increasingly impaired as alcohol consumption increased, with the biggest difference arising between the low and high alcohol conditions. It seems that following stereotype activation, alcohol intoxication significantly impaired the executively demanding task of encoding neutral information, while stereotype congruent information could still be encoded (see Macrae et al., 1999).

The pattern of alcohol’s effects on stereotypical and neutral encoding is of more than theoretical interest. As discussed previously, the encoding of neutral person information is likely to play an important role in person perception, diluting the impact of stereotypical items in impression formation. If intoxicated individuals are unable to encode sufficient neutral information, then their person perception will be characterized by increasing stereotypicality. The practical implication of this pattern is that intoxication will increase stereotyping behavior, perhaps contributing to alcohol’s association with racial prejudice (Reeves & Nagoshi, 1993) and aggressive interactions (Pernanen, 1976).

The effects of alcohol on person perception are consistent with previous research showing that low executive resource availability increases reliance on stereotypes (Stangor & McMillan, 1992). There are two possible explanations for the preserved stereotypical recall found in the present study. The most obvious is that the decreased availability of attentional resources had no impact on stereotypical encoding because of the level of facilitation provided by stereotype activation. However, it is also possible that the relatively stable levels of stereotypical encoding reflect an increase that was masked by the detrimental effects of alcohol on memory. Previous research has provided mixed evidence regarding this point, with some studies suggesting that stereotypical recall is increased when attentional resources are scarce (e.g., Dijksterhuis & van Knippenberg, 1995; Pendry, 1998; Stangor & Duan, 1991), whereas others have reported no increase or a slight decrease in stereotypical encoding in these conditions (e.g., Macrae et al., 1993, 1999; Sherman et al., 1998). It may be that the determining factor is the severity of resource depletion, so whether stereotypical information encoding would continue to be preserved comparatively in the face of increasing alcohol intoxication is a question for future research.

An issue that was not examined in the present study is the impact of intoxication on the encoding of stereotype-incongruent information. A study by Bartholow et al. (2003) suggests that inconsistency resolution is
rendered more difficult by intoxication, so it would be expected that incongruent information would become increasingly difficult to encode. Intuitively, it could be predicted that when all three classes of information are encountered during intoxication, the congruent items would be encoded most frequently, followed by neutral items, with incongruent items being relatively poorly encoded. Again, future research is required to test this prediction.

A further limitation is that the present study measured only recall of target information; the impact of increased stereotype reliance on judgments and overt behavior awaits investigation. However, previous social cognition research has suggested that stereotype effects on cognition do translate to behavior (e.g., Bargh, Chen, & Burrows, 1996; Macrae, Bodenhausen, Milne, & Jetten, 1994). Therefore, the implications of the present study for alcohol research are clear. Examining the effects of alcohol on person perception—and social cognition in general—could provide an important method of examining intoxicated social behavior, a problematic area of study to date (Steele & Josephs, 1990).

In conclusion, the present study provides a novel, naturalistic demonstration of the impact of executive resource depletion on person perception. The finding that intoxication increases the stereotypicality of person memory has important implications for both social and alcohol research, and strongly supports Bartholow et al.’s (2003) argument that studying the effects of alcohol on social cognition will be a fruitful source of future research.

References


