Groupdrink : the effects of alcohol and group process on vigilance errors

Daniel Frings, Tim Hopthrow, Dominic Abrams, Lorne G. Hulbert, Roberto Gutierrez

Abstract

This research examined how group processes alter the impact of alcohol on a judgment task requiring vigilance. The authors compared two competing explanations, deindividuation and group monitoring, for the possible effects of alcohol. Two hundred and eighty-six undergraduates with normal drinking habits undertook a vigilance task alone or in four-person groups having consumed either alcohol (calculated to achieve up to .08 blood alcohol content) or a placebo. The vigilance task required them to count occurrences of the word "the" in a spoken passage. Alcohol significantly impaired the performance of individuals but not groups. Group members performed at a similar level in both conditions, making fewer errors than individuals in the alcohol condition. The fit of different decision-making models were tested. In both the alcohol and placebo conditions, group consensus was predicted by processes consistent with the group monitoring hypothesis. The evidence highlights that under certain conditions, group process can compensate for the cognitively impairing effects of alcohol on individuals.

KEYWORDS: alcohol, group decisions, vigilance

It is widely assumed that the consumption of alcohol inevitably causes serious social problems. In the United Kingdom, 48% of violent crimes (Home Office, 2006) and 21,000 accident and emergency admissions (Department of Health, 2004) are associated with alcohol. Employers are becoming increasingly concerned about alcohol in the work place. Many are introducing stringent alcohol controls including the introduction of random testing for public servants and employees of many private companies (Independent Inquiry into Drug Test at Work, 2004). However, social drinking (i.e., consuming alcohol in small groups) remains ubiquitous in many societies. Despite this and a large body of evidence that examines problem drinking, it is perhaps surprising that there is little systematic evidence on how or whether being in a group alters the consequences of alcohol consumption.

Alcohol can also facilitate social interactions by reducing social anxiety and easing communication (Hull, 1981) and increasing social bonding when groups are forming (Kirchner, Sayette, Cohn, Moreland, & Levine, 2006). However, the research literature tends to focus more on the negative impacts of alcohol. Alcohol can foster violence (Pernanen, 1991), sexual impulsivity (Stall, McKusick, Wiley, Coates, &Ostrow, 1986), and certain forms of risk taking (Sayette, Kirchner, Moreland, Levine, & Travis, 2004). Alcohol levels as low as 0.02% blood alcohol concentration (BAC), only one-quarter the British drink and drive limit in the U.K., can be detrimental for tasks that require sustained attention (Koelega, 1995). Moderate and high levels of alcohol have been shown to reduce performance on both divided attention tasks and vigilance attention tasks (Koelega, 1998; Mongrain& Standing, 1989; Moskowitz &Depry, 1968; Schulte, Muller Oehring, Strasburger, Warzel, &Sabel, 2001).

Whereas it is known that alcohol impairs individuals' ability to sustain vigilance, it is not known whether comparable effects will be found in groups. Abrams and colleagues (Abrams, Hopthrow, Hulbert, & Frings, 2006) proposed various processes that could mean groups might attenuate or exacerbate such effects. In the present study, we test how group processes influence performance on a vigilance task following alcohol consumption by individuals and group members.

Continuous attention to incoming information is a common task facing groups or teams as well as individuals. Examples of this include groups of watch-keepers on board ships or individuals taking notice during workshops, seminars, or committees. Alcohol is often used in contexts where group vigilance is required, and impaired vigilance could have severe consequences. Alcohol is often quoted as being the cause of (occasionally fatal) accidents in maritime and aeronautical contexts. For instance, of 23 maritime accident fatalities in U.K. waters in 2005, alcohol played a major part in four (Maritime Accident Investigation Branch, 2006). The National Aeronautical Space Agency (NASA; 2007) also reveals moderate alcohol use is an accepted feature of some astronauts' personal preflight routines. Although this has not been linked to a specific accident, it has sparked a debate as the level to which the astronauts' behavior would affect their performance in a high-risk environment,

One form of vigilance task that may be affected by alcohol is cumulative quantity estimation (attending to stimuli and attempting to identify the number of times a target appears). In cumulative quantity estimation, a recurring target must be identified and added to a running total. Several cognitive activities are needed for accurate cumulative quantity estimations. Attention must be sustained for the duration of the task to detect targets. Short-term memory is needed to update the total and a priori estimates and information need to be appropriately generated and integrated into the final judgment. These activities are also needed in situations that could be encountered while mildly intoxicated in the company of others. For instance, drivers need to sustain attention upon the road, continually monitor for road signs, and maintain numbers (such as the speed limit) in short-term memory. Such activities may also be group based, for example, ship crews may need collectively to monitor for safety information such as the visual/auditory presence of other shipping. These examples raise the question of how alcohol and group processes *combine* to affect judgments in cumulative quantity estimation tasks requiring vigilance.

In the present study, we ask individuals or four-person groups to complete a vigilance task while either sober or intoxicated. In the groups, members first make private judgments and then have to arrive at a group consensus. We consider that groups could potentially enhance or undermine performance for various reasons including social facilitation and social loafing. Thus one question is the empirical issue of changes in mean level performance under alcohol and comparing individuals and groups. The second aim of this research was to understand more clearly the processes involved in group judgments. Specifically, we compare different statistical models of how groups arrive at their judgments that test the relative fit of two competing theoretical explanations of group behavior under alcohol, namely deindividuation and group monitoring.

Social Facilitation and Social Loafing

Groups potentially bring both advantages and disadvantages to cumulative quantity estimation task performance. Studies into social facilitation suggest that simply being part of a group can lead to an increase in the effort and resources directed at a task. Specifically, the mere presence of others can led to improved performance by increasing the “dominant” response, for example people try harder and more persistently at simple tasks (Triplett, 1898; Zajonc& Sales, 1966). This effect occurs only when individuals perceive themselves as personally accountable for a performance they believe will be evaluated (Geen, 1989). We might expect to see social facilitation of performance, particularly among members of sober groups, when group members make private judgments. This corresponds to the classic “coaction” situation in which social facilitation effects have been observed in previous research. The net effects of social facilitation can be tested by comparing the accuracy of lone individuals with the accuracy of private estimates made by group members *before* they communicate with their group.

In contrast, group membership could also lead to a reduction in effort directed at a task either through social loafing—the reduction of effort exerted at a task when labor is divided among members of a group (Karau& Williams, 1993)—or because attention previously directed at the task is allocated to attending to the group (Gastorf, Suls, & Sanders, 1980). We might expect to observe social loafing effects in the group consensus stage because that is the point at which members may decide simply to allow others to do the “work” involved in deciding a group judgment. The net effects of social loafing can be tested by comparing the accuracy of group decisions with the mean accuracy of private estimates made by group members.

Once group members share information, group decision making processes may also affect accuracy (Harries, Yaniv, & Harvey, 2004). Accuracy gains can be made by both the statistical error reduction due to aggregating members' judgments and because members can compare, identify, and reject inaccurate judgments (Harries et al., 2004; Yaniv, 2004). Groups typically outperform individuals in quantity estimation tasks (Sniezek& Henry, 1989). Therefore sober groups might be expected to equal or outperform sober individuals.

Group decisions can also be affected by systematic biases that may increase the likelihood they will endorse inaccurate information. For example, early studies intosocial norm formation demonstrated that individuals' quantitative judgments are often moderated by group pressure, even when the group norm conflicts with perceptual evidence (Asch, 1951; Sherif, 1936), especially when responses are witnessed by other group members (Abrams, Wetherell, Cochrane, Hogg, & Turner, 1990). It seems conceivable that alcohol might induce error proneness among individual members and this could become consolidated by normative pressures into an erroneous group consensus.

This research explored these questions by having participants complete a cumulative quantity estimation task in either a placebo condition or while moderately intoxicated with alcohol. The alcohol consumption factor was crossed with group membership. Participants completed the task alone or as part of a four-person group.

Deindividuation and Group Monitoring

Social loafing and social facilitation may be useful for characterizing motivational influences in group performance. However, they do not specify the decision process groups use to make judgments. Abrams et al. (2006) identified two mechanisms that may be especially relevant to the effects of alcohol on group judgments;deindividuation and group monitoring. Deindividuation predicts that alcohol will have a negative impact on the accuracy of groups' judgments. Alternatively, group monitoring predicts that the deleterious effects of alcohol will be compensated by aspects of group process that sustain optimal judgments. These two mechanisms can be modeled mathematically.

Deindividuation

Both group membership and alcohol reduce self-awareness and self-regulation (Hull, 1981; Mullen, 1986). When self-awareness/regulation in a group are reduced, this is theorized as a state of deindividuation (Diener, 1980). Deindividuation in groups leads to reliance on salient emergent group norms, and reduces systematic information processing (Postmes& Spears, 1998). Lowered sense of accountability has also been shown to decrease the effort group members direct at a task (Karau& Williams, 1993). Thus, it seems plausible that deindividuation whether caused by alcohol, group membership or both, could lead to a reliance on others judgments, a lack of critical evaluation and increased conformity to norms.

Deindividuation has also been theorized to lead to more extreme or polarized group judgments and actions (Bonner, Gonzalez, & Sommer, 2004; Diener, Lusk, DeFour, & Flax, 1980). Thus, one consequence of deindividuation for group decision making is that distinctive or extreme judgments in the group may serve as salient norms. It is conceivable that distinctive judgments may on occasion be correct, and the rest of the group erroneous. However, given that alcohol leads to impaired performance in individuals, it seems more likely that extreme judgments are decreasingly rather than increasingly accurate. Furthermore, decreased self-awareness may lead to a decreased critical evaluation of such judgments. Consequently, salient extreme positions that would be rejected by sober group members might hold sway among groups that have consumed alcohol.

We note that deindividuation does not always occur in groups, especially when group size is small (Diener et al., 1980). In such circumstances, however, the additional decreases in self-regulation caused by alcohol may amplify relatively small decrements of performance. In support of this (although not directly linked to deindividuation), Sayette et al. (2004) found that intoxicated groups were more likely to take a one-time risk to continue an experiment than were sober groups. Such effects seem liable to occur either through a lack of critical rejection of outlying judgments by other group members, or reliance upon extreme judgments due to their heightened salience. This latter process can be modeled by predicting that groups will form a consensus to adopt the most extreme judgment that any one member of that group initially makes. In sum, intoxicated individuals should be more error prone than sober individuals. Deindividuation in groups will either consolidate these errors by converging on the central tendency, or exaggerate the errors by converging on extreme positions.

Group Monitoring

The group monitoring hypothesis offers an alternative prediction (Abrams et al., 2006). This hypothesis predicts that group process can compensate for the effects of alcohol. Abrams et al. (2006) found support for the group monitoring hypothesis in relation to attraction to risk. When rating the attractiveness of a series of bets, intoxicated individuals were more attracted by risk than sober individuals. Moreover, alcohol had no effect on groups' attraction to risk.

In relation to cumulative quantity estimation, groups could improve upon judgments in two ways. First, the presence of other group membership could motivate better individual performance, negating the deleterious effect of alcohol. Second, the decision-making processes used by groups may improve performance. For example, even among intoxicated members, a comparison of quantity estimations could reveal outlying judgments. Discarding such judgments should increase accuracy (Yaniv, 1997, 2004). Additionally, differences in levels of confidence in ones' judgments can be communicated so that, assuming members with greater accuracy tend to be more confident, more accurate members would carry more weight in the group's judgment. Finally, a group member who fails to attend to particular information can be made aware of it by a comember.

Collectively, these factors could reduce deindividuation effects and decrease the impact of erroneous judgments. Based on Abrams et al. (2006) it seems plausible that, at moderate levels of alcohol intoxication, group members can still pool their information to compensate for the increased error proneness of individual members. Thus, according to the group monitoring hypothesis, alcohol consumption should have a less damaging effect on accuracy of group decisions compared with the judgments of lone individuals.

Group monitoring can be modeled mathematically by adopting assumptions from Davis' Social Judgment Scheme (SJS; Davis, 1996). This assumes that groups will converge on decisions that reflect the highest degree of consensus (orprototypicality) in the group. Individual group members whose decisions are close to the area of most consensus are given a high weighting in the final judgment, whereas those further away have decreasing impact. The SJS model assigns weight to each individual's judgment according to how close it is to the preferences of each of the other group members. The less central the judgment, the lower weight it receives, and the less impact it has upon the final judgment. As members with central judgments will exert more influence than those with extreme judgments, the final decision should therefore fall closer to central judgments than peripheral judgments.[1]

The present research tested the deindividuation and group monitoring explanations of how alcohol affects groups compared with individuals. As far as we are aware, this is the first research to test effects of alcohol on group vigilance performance, and the first to conduct any formal model tests for group decision processes when groups have consumed alcohol. The deindividuation prediction is that group membership will combine with and exacerbate the effects of alcohol. In contrast, the group monitoring prediction is that group membership will insulate group members from the effects of alcohol. Both actual judgmental accuracy and tests of how adequately mathematical models simulate actual behavior are used to test the two explanations.

Overview

Participants participated in the experiment either alone or as a group of four people. Individuals and groups either consumed alcohol or a placebo. In the group conditions, participants first made a private judgment and were then required to reach an agreement on a group judgment. To examine the effects of alcohol it is possible to conduct three analyses: (1) individuals' judgments can be compared with the private judgments made by group members; (2) individuals' judgments can be compared with group decisions; and, (3) group decisions can be compared with the average of the private judgments made by members within each group. These analyses allow us to consider whether group decision processes have an effect over and above that of merely being in a group. This design also allows us to test formally specified models of how groups combine their judgments to reach a decision.

Method

Participants

Procedures were given consent by ethical review panels prior to use and conformed to the ethical guidelines of both the British Psychological Society and The American Psychological Association. Two hundred and eighty-six university students (191 male) participated in the experiment. Sixty-six participated as individuals and the remainder in four-person, single-sex groups (n = 55). Single-sex groups were selected to avoid possible confounds arising from cross-gender interactions. On recruitment, participants gave informed consent before completing a revised Alcohol Use Disorders Identification Test (Hopthrow, Abrams, Frings, & Hulbert, 2007) to screen out abnormally high alcohol consumers and those that did not consume alcohol. Experimental sessions commenced late afternoon. Participants were required not to eat for 3 hours, and to abstain from alcohol for 18 hours, prior to participating.

Design

Participants were randomly assigned to condition in a two (Condition: Alcohol,Placebo) by two (Decision Level: Individual, Group) between-participants experiment. In addition, within the Group decision level there were two phases (Private Judgments, Group Consensus) that can be compared separately with the individual level, and can be treated as a repeated measure by aggregating the private judgments to a within group mean.

Procedure and Materials

On arrival at the laboratory, participants' breath alcohol concentration (BrAC) was measured with a Lion SD400 Alcometer. One participant had a BrAC greater than 0 and was therefore not eligible to participate. Participants were weighed and briefed, and signed informed consent and medical screening forms. They were then given a strong, peppermint-tasting, lozenge (“Fisherman's Friend”) to disguise the flavor of the drink. In the alcohol condition, the drink consisted of equal parts orange juice, tonic, and 40% abv vodka (measured to deliver 1.13g of ethanol per kg of body weight for males, 0.74g per kg for females). This quantity of alcohol was calculated to intoxicate participants at a maximum level of 0.08% BAC (the U.K. and US drink-and-drive limit). In the placebo condition a mixture of orange juice and tonic was administered with 2 ml of vodka floated on the surface (insufficient to register when breathalyzed). Participants were given 6 minutes to consume the drink. This method of alcohol administration was adapted from previous work by Fillmore and Weafer (2004) and Maylor and Rabbitt (1993), and has been used in Abrams et al. (2006)and Hopthrow et al. (2007). Participants were informed that the consumption of the drink should not be unpleasant, but if they felt any unpleasant effects they should stop drinking. They were also told that if they stopped drinking they would not forfeit any of their fee for participation and could leave when it was safe to do so (i.e., when their BAC was below 0.028%). During the subsequent absorption phase, participants viewed videos of comedy shows. Participants were breathalyzed after the absorption phase.

Participants were told they would hear a short, prerecorded passage and were instructed to estimate the number of times the word “the” had occurred as soon as the passage finished, without conferral. They were told they should count without any form of record. The target word, 'the,' appeared 20 times in a 300-word passage about Russian history (Andrews &Mitrokhin, 1999). Similar counting tasks have been used to measure sustained attention in the past (Ortuño et al., 2002). The present task was considered especially suitable for the present research, as alcohol consumption has been shown to affect individuals' sustained attention (Clifasefi, Takarangi, & Bergman, 2006; Rohrbaugh et al., 1988).

After listening to the extract, all participants privately recorded their individual estimates. Participants in the group condition then discussed their estimates and recorded a single group decision (their consensual decision). On completion of the experiment, participants remained in the laboratory until their BAC was below 0.028%. At this point they were debriefed and paid for their time.

Results

Mean BAC in the alcohol condition was consistent with comparable research (e.g.,Hopthrow et al., 2007) at 0.06%.

To assess the accuracy of the quantity estimations, we subtracted the participants' answers from the correct answer (there were 20 instances of the word “the”). In the case of group-level decisions, the group judgment was subtracted from the correct answer. When overestimations occurred an absolute error was calculated. An absolute error approach was chosen because both under- and overestimations indicate poor performance, but statistically differentiating between the two increases error variance, increasing the risk of a Type II error. Mean errors and their associated standard deviations can be seen in Figure 1.

Three ANOVAs were conducted. The first examined whether alcohol affected group members' abilities to make judgments on their own relative to individuals. The second examined whether group members' individual performance was affected by alcohol relative to the group's final judgment (group consensus). Finally an ANOVA was conducted to differentiate between deindividuation explanations and group monitoring explanations by examining how alcohol affected individuals relative to group consensus.

A condition (alcohol/placebo) × decision level (individual vs. group member's private judgments) ANOVA was conducted upon the number of errors. Means and standard deviations are shown in Figure 1. There was a significant main effect of condition. Participants made larger errors in the alcohol than in the placebo condition, $F(1, 281) = 10.53$, $p < .001$, $\eta^2 = .04$. There was also a significant main effect of decision level. Lone individuals' made larger errors than did group members when making private judgments, $F(1, 281) = 11.32$, $p < .001$, $\eta^2 = .04$. The interaction between condition and decision level was nonsignificant, $F(1, 281) = 2.71$, $p = .10$, $\eta^2 = .01$. However, when considering an a priori hypothesis it is meaningful to perform simple main effects analysis (Howell, 1992). Recall that deindividuation andsocial loafing might both result in worse performance in a group, exacerbated by alcohol. Group monitoring and accountability might result in improved performance in a group, and might counteract any impairment caused by alcohol. Within the placebo condition, the simple effect of decision level was not significant, $F(1, 281) = 1.91$, $p = .169$, $\eta^2 < .01$. However, in the alcohol condition, individuals made larger errors than group members, $F(1, 281) = 10.25$, $p = .002$, $\eta^2 = .04$.

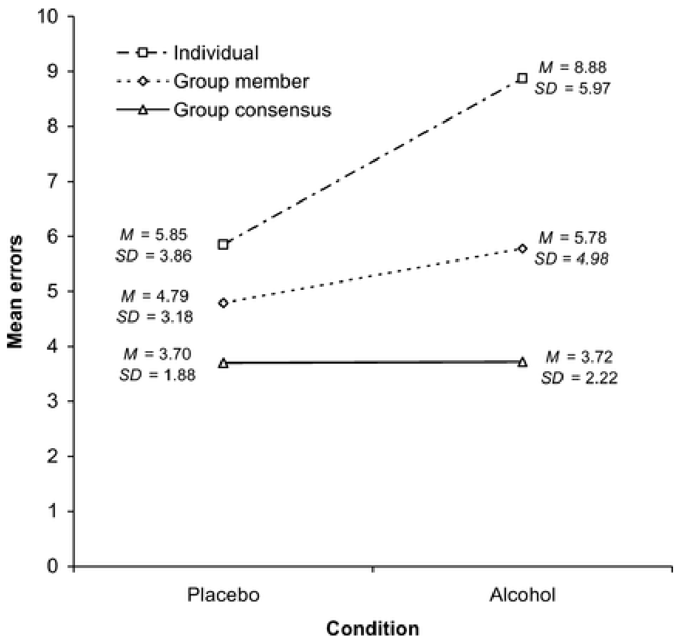

Figure 1. Mean number of errors of made by individuals and group consensus, in placebo and alcohol conditions

Individuals Versus Group Members' Private Judgments

Group Members' Private Judgments Versus Group Consensus

To compare group members' private judgments with their group's consensual judgment, the private judgments were averaged within each group and a mixed ANOVA was conducted with condition as a between participants factor and decision level (private vs. consensus) as a within participants factor. Note that the standard deviations for the private judgments differ from those in Figure 1 because of the aggregation. The standard deviations were 2.65 in the alcohol condition and 1.86 in the placebo condition.

There was a significant main effect of decision level. Group consensus was less erroneous ($M = 3.71$, $SD = 2.05$) than group members' private judgments ($M = 5.24$,$SD =$

Table 1
Kolomogorov Smirnov D and Model Fit for Deindividuation and Group-Monitoring Decision-Making Schemes, According to Alcohol Condition

Condition	Hypothesized Decision Process	Model	Kolmogorov-Smirnov (*D*)	*P*
	Deindividuation	Extreme score	.40	.194
Placebo		Mean	.20	.586*
		Median	.20	.586*
	Group monitoring	SJS	.27	.236*
	Deindividuation	Extreme score	.58	.003
Alcohol		Mean	.40	.037
		Median	.32	.155
	Group monitoring	SJS	.24	.486*

Note. Models with a $p > .2$ are considered to fit, and indicated with an asterisk.

2.29), $F(1, 53) = 67.73$, $p < .001$, $\eta^2 = .38$. In line with the group monitoring prediction, the main effect of condition was not significant, $F(1, 53) = .96$, $p = .33$, $\eta^2 = .02$. The interaction between condition and decision level was marginal, $F(1, 53) = 3.02$, $p = .088$, $\eta^2 = .05$. As in the preceding analysis, we examined the simple main effects of decision level within conditions. As shown in Figure 1, Group consensus was less erroneous than private judgments both in the placebo condition, $F(1, 53) = 8.45$, $p = .005$, $\eta^2 = .14$ and the alcohol condition, $F(1, 53) = 25.01$, $p < .001$, $\eta^2 = .32$.

Individual Judgments Versus Group Consensus

To directly test between deindividuation and group monitoring explanations, a third ANOVA was conducted upon error scores, with alcohol and decision level (Individuals' judgments/Group consensus) as between-participant factors. There was a significant main effect of condition, $F(1, 116) = 4.68$, $p = .033$, $\eta^2 = .04$. Participants made larger errors in the alcohol condition ($M = 6.24$, $SD = 5.06$) than in the placebo condition ($M = 4.94$, $SD = 3.42$). There was also a significant main effect of decision level, $F(1, 116) = 27.02$, $p < .001$, $\eta^2 = .19$. Individuals made larger errors ($M = 4.94$, $SD = 3.42$) than groups ($M = 3.71$, $SD = 2.05$). More important is the significant interaction between condition and decision level, $F(1, 116) = 4.56$, $p = .035$, $\eta^2 = .04$. Simple effects analysis revealed alcohol elevated individuals' errors, $F(1, 116) = 9.74$, $p = .002$, $\eta^2 = .08$ but did not affect group errors, $F(1, 116) < .001$, *ns*, $\eta^2 < .01$. Furthermore, groups were more accurate than individuals in both the alcohol, $F(1, 116) = 22.65$, $p < .001$, $\eta^2 = .17$ and placebo condition, $F(1, 116) = 5.67$, $p = .019$, $\eta^2 = .05$.

Social Judgment Scheme Analysis

To examine the likely process underlying group consensus, we conducted statistical model fit tests (see Davis, 1996). Kolmogorov–Smirnov (two samples) tests were used to test the fit of each model. This test compares the actual decisions made by each group to the score the different models predict they should have made based on the distribution of judgments made by members prior to their group's decision. In these analyses models are null hypotheses therefore a conservative alpha (> .20) is used for significance testing, as is the convention in other research modeling group dynamics (Zuber, Crott& Werner, 1992).

We first examined how the different models related to one another by inspecting thecorrelations among the expected values provided by each model within the alcohol and placebo conditions. In the placebo condition, only the correlation between the mean and median models was significant, $r(25) = .88$, $p < .001$. In the alcohol condition the pattern was the same, only the correlation between mean and median models was significant, $r(30) = .97$, $p < .001$. All other intercorrelations ranged between +.18 and −.19, all *ps* > .32. Thus, aside from these central tendencymodels, all others made independent predictions.

As outlined in the introduction, we believe that the deindividuation process could be reflected either by a heuristic adoption of the group's central tendency(operationalized as the mean or median of private judgments) or by seizing on a salient extreme score (operationalized as the most discrepant from the mean of private judgments). Thus, the deindividuation hypothesis would be supported to the extent that these positions are adopted as the group consensus. Given that deindividuation should be most likely in the alcohol condition, this prediction should be supported more clearly in that condition.

The group monitoring hypothesis assumes that group members should strive to find an accurate consensual position, reflected by the SJS model which places greatest weight on the region of closest consensus among private judgments. The presumption is that the group monitoring process should mean that members discard outlying, and generally less accurate, positions. The hypothesis expects this process to occur in both the placebo and the alcohol conditions. Assuming private judgments are relatively accurate in the placebo condition, the mean, median, and consensus models should all fit reasonably well and the extreme model should fit poorly. Assuming private judgments are less accurate in the alcohol condition we expect the consensus (SJS) model to fit better than either mean or median, and we expect a poor fit for the extreme model.

As can be seen in Table 1, in the placebo condition group consensus was predicted by the mean, median, and SJS models whereas the extreme score model fits less well. Prediction from mean, median, and SJS model were in the same region because the greatest consensus coincides with central tendency (as one would expect if all group members were reasonably accurate). Thus, the decisions are consistent with group monitoring but less so with deindividuation. In the alcohol condition, group consensus was not accurately predicted by the mean or median models, and not at all by the extreme model. However, consensus was well predicted by SJS. As demonstrated by the ANOVA tests, the central tendencies (mean/median model) of intoxicated group members' judgments were liable to be erroneous, presumably because of because of extreme errors by some members. In line with the group monitoring hypothesis, and with the sustained levels of accuracy in group decisions, the groups discarded these extreme scores, and relied upon the areas of consensus when making decisions.

Discussion

The present research investigated the interactive effects of alcohol and group decision-making processes on a cumulative quantity estimation task requiring vigilance. Alcohol reduced individuals' accuracy but had a lesser effect on group members' and group's decisions, respectively. Furthermore, group members' private estimates and group consensus were less erroneous than individuals' judgments. These findings are contrary to predictions generated by the deindividuationhypothesis that groups' accuracy should significantly decrease, particularly when members are intoxicated. In line with the group monitoring explanation, group consensus remained equally accurate, regardless of whether members had consumed alcohol. From these findings we conclude that both group membership and group discussion reduced the effect of alcohol on performance.

It seems likely that these effects were only partially attributable to social facilitation. When group members were sober, mere group membership did not significantly increase their accuracy (effect size $\eta^2 = .14$). When they were intoxicated, however, member membership of a group facilitated their performance ($\eta^2 = .32$). Thus, group membership made a bigger difference in the intoxicated condition than the placebo condition. It seems likely that individuals and group members were already quite motivated to be accurate in the placebo condition, and that being part of a group helped to sustain that motivation in the alcohol condition.

We expected that group monitoring processes should also contribute to group accuracy by affecting their decision processes. Specifically, we hypothesized that group monitoring would lead groups to agree on judgments that reflected the highest consensus in the group (SJS). In the placebo condition model fit tests indicated SJS predicted judgments, and so did predictions based on the mean ormedian of the group members' estimates. However in the alcohol condition, where members' private judgments were more erroneous, decisions reflected the consensual process fitting the SJS model rather than simple convergence on the group mean or median. It is likely that this occurred because the increased frequency of more erroneous, outlying individual judgments made the mean and median models less accurate in the alcohol condition.

Questions for Future Research

The present research raises several questions for further exploration. Our findings suggest that group membership can partially offset the impairing effects of alcohol on quantity estimation judgments. It is not clear whether this arises because of a closer attention to the task itself or whether it arises from evaluating the relative capacities (e.g., drunkenness) of fellow group members. In the present research all members were intoxicated to a similar level matched to their body mass index, but it may be that some had higher tolerance levels or were less affected than others. Presumably in natural groups, there is also likely to be a range of levels of alcohol consumption. Therefore it would be of interest to explore drunk and sober group members' perceptions of drunk and sober colleagues differ, to see whether they are sufficiently sensitive to these differences to assign different weights to information or judgments provided by each member.

Group members' expectancies about the effects of different types and amounts of alcohol upon their fellows may influence group monitoring (Fillmore & Blackburn, 2002). For example people may regard some types of drink as more “potent,” which may affect the extent to which they believe they need to monitor members consuming those drinks. Likewise some people may believe they are unaffected by alcohol up to certain levels of consumption. These expectations may affect their openness to being monitored and influenced by other members. A related issue is the role of so-called “designated drivers” within a group. These are members who explicitly remain sober in the midst of a group of drinkers so as to drive them home without risk. It could be hypothesized that the presence a designated driver would reduce the degree of group monitoring, and increase reliance on that member. Alternatively the impact and influence of a sober (and in many cases more accurate, less risky, and more sensible) group member may be less when they are among a drunk group than a sober one, particularly on tasks unrelated to that member's role (e.g., nondriving activities).

The manner in which information is distributed across a group of drinkers may also be of interest. In the present study, all task members had access to the information needed to complete the task (i.e., they could all hear the stimuli). In many work situations, however, some group members may have exclusive access to some information, and need to communicate this to the group before a successful collective decision can be reached. For example, it is conceivable that the effects of hidden profiles and groups' inability to adequately share information may be made more extreme when members have been drinking (Stasser& Titus, 1985). Alternatively, group monitoring may still negate some of the effects of alcohol in this case (as group members try harder/attend more).

We note two important limitations in the present research. First we only raised alcohol intake to a moderate level, but it is known that many of the worst effects of alcohol arise through extreme binge drinking (Department of Health, 2007). Second, we focused on a relatively objective and nonemotional judgment task, but it is also known that groups that drink engage in more socioemotional activities (cf. Kelly & Spoor, 2007; Sayette et al., 2004). Whereas we have shown that groups can offset cognitive effects of moderate alcohol consumption, we do not assume that this will continue at higher levels of intoxication. Individuals need to be sufficiently capable of attending to one another and the group for group monitoring to occur. On the other hand, it seems likely that some types of group goal (e.g., conflict or violence against a target), particularly those that involve a sense of identification with the group might appear to be enacted more forcefully with increasing levels of alcohol (e.g., gang violence) (e.g., Postmes& Spears, 1998). The ways in which group goals are achieved by heightening motivational processes toward particular goals, as distinct from sustaining continuous and rational decision processes, may therefore differ at different levels of alcohol intake.

In the present study, group membership and group discussion ameliorated the effects of alcohol. We are also aware there are likely to be other boundary conditions for group monitoring. For instance, if tasks are highly difficult or prior knowledge cannot be applied, no accurate central tendency, or basis to evaluate other judgments, will exist and the group monitoring effect will disappear. In the present research participants were asked to judge as accurately as possible. Given this motivational goal it seems that group monitoring sustained accuracy despite alcohol. However, it is possible that alcohol and group membership may combine to lead to more extreme judgments when groups have different goals, such as speed rather than accuracy. In addition, goals that are tangential to the task, for instance in response to external threats experienced in situations such as intergroup competition (Hopthrow et al., 2007) could also come into play.

Another feature of the task that could affect the group performance is that members first made private judgments. In situations where group members do not make explicit private judgments prior to reaching consensus we might predict alcohol would result in greater process loss due to production blocking (Steiner, 1972). That is, group members may be more likely to forget their unstated private judgments and thus be less able to reach an accurate group consensus. This would be an interesting avenue for future research.

Finally, group members in the present study were strangers to one another before the task began. In the case of groups beyond the laboratory with a history of problem solving and judgment making, alcohol may have differential effects. High status group members may exert more influence when groups are intoxicated, as group members rely upon their judgments more. Alternatively, the influence of high status members may be reduced, as they are deemed to as impaired as other group members.

In conclusion the present research complements an emerging body of evidence investigating how alcohol affects group processes. Alcohol levels that are sufficient to increase individuals' vigilance errors do not have the same impact upon groups. The decision process used by groups appears to offset the deleterious effects of alcohol upon individual members. Alcohol consumption is often a social business, yet despite the social, practical and economic significance of this fact, surprisingly little research has examined the precise social dynamics involved when people drink alcohol in groups. The present work shows that alcohol and group processes can combine to produce some distinctive outcomes. We hope that, despite the intensity of effort and resources to conduct such work, the present findings will stimulate further research in this area.

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Footnotes

1 The mathematical formula for the SJS model states the group judgment (*G*) is the product of the sum of each members judgment (*x*) weighted by (*c*); $G = c_1x_1 + c_2x_2 + \ldots + c_rx_r$. Where the weights (*c*) are themselves a function of the distance between each individual members' judgment and the judgments of each of the other group members;

$$c_i = \frac{\sum_{j=1}^{r} f(|X_i - X_j|)}{\sum_{i=1}^{r}\sum_{j=1}^{r} f(|X_i - X_j|)}, i \neq j,$$

Where; $f(|x_i - x_j|) = e^{-\theta(|xi - xj|)}$, $i \neq j$.

Following Davis, (1996) and Ohtsubo, Masuchi and Nakanishi, (2002) the value of was θ was set to 1.