Research Report

ABSOLUT® MEMORY DISTORTIONS: Alcohol Placebos Influence the Misinformation Effect

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Abstract—*Can the simple suggestion that you have consumed alcohol affect your memory for an event? Alcohol placebos affect social behaviors but not nonsocial ones, and have not previously been shown to affect memory. We investigated the effect of alcohol placebos using materials that revealed both the social and the nonsocial influences of memory. Subjects drank plain tonic water, but half were told it was a vodka and tonic; then all subjects took part in an eyewitness memory experiment. Subjects who were told they drank alcohol were more swayed by misleading postevent information than were those who were told they drank tonic water, and were also more confident about the accuracy of their responses. Our results show that the mere suggestion of alcohol consumption may make subjects more susceptible to misleading information and inappropriately confident. These results also provide additional confirmation that eyewitness memory is influenced by both nonsocial and social factors.*

Many people believe that drinking alcohol affects their ability to remember events. In fact, some people who have committed violent crimes while drunk claim to have no memory of the crimes (Swihart, Yuille, & Porter, 1999). Although some of these offenders may be lying, Swihart et al. suggested that for others, memory lapses might be a state-dependent memory effect: A man who assaults his partner while drunk does not remember hitting her once he is sober. In the study we report here, we investigated how people's memories are affected when they have not consumed alcohol, but simply are told that they have.

Research shows that the mere suggestion that one is drinking alcohol can influence a wide range of dependent measures (Hull & Bond, 1986; Marlatt & Rohsenow, 1980). For example, when subjects receive an alcohol placebo, they become more aggressive (Lang, Goeckner, Adesso, & Marlatt, 1975), interested in violent and erotic material (Lansky & Wilson, 1981; Wilson & Lawson, 1976), and sexually aroused (George & Marlatt, 1986), even though their beverage contains nothing more than plain tonic.

The pioneering procedure in this line of research is known as the balanced placebo design (Marlatt & Rohsenow, 1980). In this design, subjects are told either that they are drinking alcoholic beverages or that they are drinking nonalcoholic beverages, and what they are told is either true or false. This 2×2 design separates the physiological and psychological effects of alcohol on a dependent measure. Interestingly, Hull and Bond's (1986) meta-analysis showed that there is no interaction between the physiological and psychological effects of alcohol on memory; they concluded that researchers can run only half of the design, depending on their research question. As cognitive psychologists, we were interested in only the effects of alcohol placebos on memory; therefore, we ran the half of the balanced placebo design manipulating expected drink content, but served all subjects a nonalcoholic beverage.

Although alcohol placebos have produced significant changes in social behaviors, they have not produced similar changes in nonsocial behaviors—those not thought of as being socially constrained, or in the sphere of social influence, such as reaction time, memory for word lists, and performance on general knowledge tests (Hull & Bond, 1986; Maylor & Rabbitt, 1993; Nelson, McSpadden, Fromme, & Marlatt, 1986).

Why are only social behaviors affected by alcohol placebos? Research suggests that alcohol provides an excuse for people to engage in desired—but socially inhibited—behaviors, and then explain them away (Marlatt & Rohsenow, 1980). Of course, Hull and Bond (1986) showed that these effects are not limited to "relatively deviant social behaviors" (p. 347), but can extend to any behavior that people may normally keep in check (e.g., outbursts of laughter; Vuchinich, Tucker, & Sobell, 1979). Memory performance is not typically described as something kept in check; perhaps unsurprisingly, then, there has been no successful demonstration of alcohol-placebo effects on memory.

We believe that previous investigations of alcohol placebos and memory have not used materials that would reveal the social influences of alcohol on memory. However, the classic eyewitness memory paradigm (Loftus, Miller, & Burns, 1978) incorporates both nonsocial and social factors, and is thus an ideal method by which to study the effects of alcohol placebos on memory. In this procedure, subjects first view slides depicting a simulated crime, then read a narrative of the event riddled with misinformation, and finally are asked what they remember about the original event. Hundreds of experiments have shown that it is easy to distort people's memory of an event (Frost, 2000; Lindsay, 1990; Loftus et al., 1978). The question we asked was whether subjects who are told that they are consuming alcohol are more prone to the misinformation effect (Belli, 1989) than subjects who are told that they are consuming a nonalcoholic drink. This question turns on the extent to which the misinformation effect has a social component.

Certainly, the effect has a cognitive component, which involves performance on control items: Subjects base their answers on what they can remember from the slide sequence and report this information on the memory test. On what do subjects base their test answers for items about which they have been misled? Research suggests that there are social factors affecting performance in the face of misleading information. For example, the misinformation effect can vary depending on the status of the person who provides the misinformation. Dodd and Bradshaw (1980) showed that the impact of misleading postevent information (PEI) varied with the credibility of the "misinformation messenger." Subjects were more influenced by misleading PEI when it was supposedly written by a neutral source than when it was written by a defense lawyer. In another study, when subjects heard spoken PEI, only those who rated the speaker high on a scale of power and attractiveness tended to be misled; those who rated the same speaker low on those dimensions were unaffected by PEI (Vornik, Sharman, & Garry, in press). Finally, for the misinformation effect to occur, at some point subjects must capitulate to the misleading information,

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which is provided by another person. Thus, social factors do affect the extent to which people are misled even when they do not receive the suggestion that they are drinking alcohol.

In the current research, we combined two classic experimental paradigms: half the balanced placebo design (Marlatt & Rohsenow, 1980) and an eyewitness testimony design (Loftus et al., 1978). Before subjects took part in a misinformation experiment, we gave them a plain tonic beverage and told them it was either a vodka and tonic or a plain tonic drink. Because alcohol placebos affect behaviors in the sphere of social influence but not outside it, we had two predictions: First, because the effect of misleading PEI is influenced by social factors, we predicted that subjects told they drank alcohol (*told-alcohol* subjects) would be more prone to misleading PEI than subjects told they drank plain tonic (*told-tonic* subjects). Second, because memory for the slide sequence (in the absence of misleading PEI) would not be influenced by social factors, we predicted that subjects in the two groups would be equally accurate on control items. This second prediction fit with Yuille and Tollestrup's (1990) finding that subjects given an alcohol placebo and those who drank no beverage at all reported a staged event equally accurately.

However, there were also reasons to predict that alcohol placebos might cause other patterns of memory distortion. For example, told-alcohol subjects might have poorer event memories for event slides not because they were more suggestible, but because they simply did not pay much attention to the slides. By the time they read the PEI, they might believe they were starting to sober up, and read the misleading narrative carefully. In this case, told-alcohol subjects would be less likely than told-tonic subjects to report correct control details, but more likely than told-tonic subjects to report incorrect details about which they had been misled. Yet another outcome was also plausible: Told-alcohol subjects might not pay attention to either the event or the PEI, and therefore might perform at chance levels on the memory test.

In short, we were interested in whether subjects who were falsely told they were consuming alcohol would be more susceptible to misleading PEI than their counterparts who were correctly told they were consuming plain tonic. Such a finding would have theoretical implications for how both the misinformation effect and the functions of memory should be conceptualized.

METHOD

Subjects

One hundred forty-eight undergraduates participated in the experiment.

Design and Procedure

Our study was a 2 × 2 mixed design. Drink condition (told alcohol or told tonic) was a between-subjects factor. All subjects received both control and misleading PEI. This information was counterbalanced so that an item appeared equally often as a control item or as the target of misinformation (misled item). Thus, PEI (control or misled) was a within-subjects factor.

Subjects were told that the experiment was about alcohol's influence on preferred learning modes (visual and verbal). They sat in a room set up as a bar, spacing themselves apart from one another. A volunteer in the group chose an envelope that ostensibly assigned the group's drink condition (tonic, vodka and tonic). The envelopes were rigged so that half the time they said tonic, and half the time they said vodka and tonic. Regardless of what the envelope said, all subjects were served plain tonic.

To convince subjects that the drinks contained alcohol, we followed successful procedures from past research using the balanced placebo design (Rohsenow & Marlatt, 1981). For example, subjects were weighed and told that the amount of alcohol they would receive was proportional to their weight. "Alcoholic drinks" were poured from Absolut® Vodka bottles and prepared in plain view of subjects. Drink glasses were rimmed with vodka-soaked limes, and submerged in vodka to smell like alcohol.

While they watched an action movie, subjects spaced their drinks over 13 min, and then watched the movie for an additional 6 min. At the end of the 19 min, subjects viewed a slide sequence of a man shoplifting items in a bookstore (see Loftus, 1991). There were eight critical items: a candle, notebook, stapler, textbook, sweatshirt, magazine, elevator, and towel. We prepared two versions of the slide sequence that showed the same critical items but with different characteristics (e.g., white candle vs. yellow candle). Each slide was presented for 2.5 s.

After working on filler-task puzzles for 12 min, subjects read a 541-word narrative, which contained misinformation about four of the critical items and neutral information about the other four. There were four narratives that differed in their descriptions of the critical items, and slide and narrative combinations were counterbalanced across subjects (e.g., a subject who saw a white candle read about either a "yellow candle" or a "candle," depending on the condition that subject was in, and a subject who saw a yellow candle read about either a "white candle" or a "candle").

Finally, after working on puzzles for 3 min more, subjects took a 19-item forced-choice test in which they indicated the details they remembered seeing in the slide sequence. For each item they chose between the correct event detail and the suggested detail. Furthermore, subjects were asked to rate their confidence that their answers were correct, using a scale from 1 (*not confident at all*) to 5 (*very confident*). The instructions minimized demand characteristics by emphasizing the importance of basing answers on the event, not the narrative (Lindsay, 1990). Afterward, subjects were fully debriefed.

RESULTS AND DISCUSSION

Data were retained from 117 of the 148 subjects who took part in the study. Because of an equipment failure, data from 24 subjects were eliminated; 6 subjects did not complete the test, and 1 had seen the slides before in a public talk. Our told-alcohol subjects expressed surprise at the debriefing, indicating that they believed they had consumed an alcoholic beverage, rather than plain tonic.

Misinformation Effect

Figure 1 shows the classic misinformation effect in both drink conditions: Performance on control items exceeded performance on misled items. However, the primary question in this study was whether told-alcohol subjects would be more affected by misleading PEI than told-tonic subjects. Figure 1 shows that they were, as does the significant Drink Condition × PEI interaction, $F(1, 115) = 4.20$, $p = .04$; the effect size was small to medium, $f = 0.38$ (Cohen, 1988). There was no difference between groups in performance on control items, $t(115) = 0.56$, $p = .58$. These results show that the mere suggestion to subjects that they had consumed alcohol caused them to be more susceptible to misleading postevent suggestion.

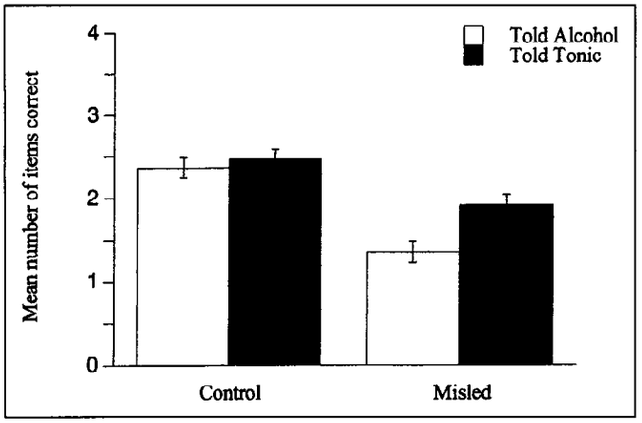

Fig. 1. Performance on control and misled items by drink condition. Error bars represent standard errors for the individual means.

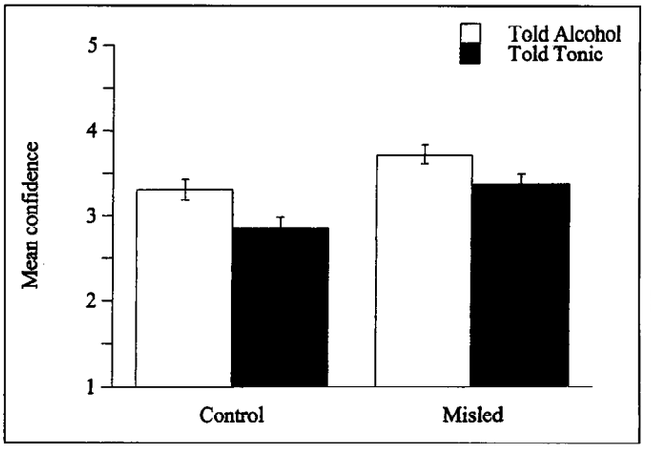

Fig. 2. Confidence scores for control and misled items by drink condition. Higher scores indicate greater confidence. Error bars represent standard errors for the individual means.

Confidence Measures

Recall that when subjects took the test, they also rated their confidence that each answer was correct. Research has demonstrated that confidence for misled items tends to be higher than confidence for control items (Loftus, Donders, Hoffman, & Schooler, 1989). We observed this pattern as well. Although drink condition did not interact with confidence on control or misled items, $F < 1, f = 0.08$, subjects were more confident that their responses were correct when they were misled than when they were not misled, as demonstrated by the main effect for PEI, $F(1, 114) = 15.25, p < .01, f = 0.37$ (see Fig. 2).[1] More surprisingly, as Figure 2 suggests, told-alcohol subjects were more confident of their responses overall than told-tonic subjects, as shown by the main effect for drink condition, $F(1, 114) = 11.33, p < .01$. This effect size was medium to large, $f = 0.63$. Thus, subjects' belief that they had drunk alcohol actually boosted their confidence regardless of their accuracy.

Discussion

In summary, our results show that subjects who were told falsely that their plain tonic beverage was a vodka and tonic were significantly more misled on an eyewitness memory task than subjects who were told correctly that their beverage was plain tonic. Furthermore, told-alcohol subjects were more confident about their answers than were told-tonic subjects. Together, these results lead us to conclude that the suggestion that one has consumed alcohol can affect not only memory for an event, but also confidence about how accurate that memory is.

Why was memory affected by an alcohol placebo in our experiment, when other research has not found such an effect? Recall that Hull and Bond (1986) showed that alcohol placebos affect social behaviors, whereas nonsocial behaviors are not affected. In contrast to previous research investigating memory and alcohol placebos, our experiment relied on a paradigm that captured both nonsocial and social components of memory.

Our finding that subjects' memory for misled items, but not control items, was affected by alcohol placebos also lends support to the idea that memory can be affected by social factors, and is consistent with other research showing that the misinformation effect itself comprises both nonsocial and social components. Our pattern of results fits with the idea that the alcohol placebo did not affect memory per se, but influenced subjects' tendency to capitulate to suggestions made by the experimenter.

These findings are important for two reasons. First, our experiment is the only demonstration of alcohol-placebo effects on memory. Kvavilashvili and Ellis (1999) showed that other types of placebos—ones with no preconceived social suggestions—could affect memory. However, they gave subjects a pill and told them explicitly that it would impair memory. By contrast, we made no such claims, and even disguised the fact that our study was about memory. More to the point, Kvavilashvili and Ellis proposed that their subjects showed a decrease in memory performance because their encoding processes were negatively affected. Most researchers interested in alcohol and memory have proposed similar encoding-disruption explanations (a point made by Read, Yuille, & Tollestrup, 1992). However, in our experiment, poorer processing among our told-alcohol subjects should have led to poorer performance on control items, relative to told-tonic subjects. Because we found no difference between these two groups in performance on control items, we find Kvavilashvili and Ellis's conclusion to be untenable.

Second, our findings fit with the growing awareness that memory is not purely a cognitive function devoid of a social component (see, e.g., Gergen, 1994; Neisser & Hyman, 2000). Neisser has long argued that memory has a social function (Neisser, 1980; Neisser & Harsch, 1993). In Neisser's view, this social function often overshadows the need for accuracy. Other researchers have put forth compatible views (Conway, 1996; Pillemer, Goldsmith, Panter, & White, 1988).

Although in our experiment we manipulated alcohol suggestions throughout the three-stage misinformation procedure, researchers might wish to manipulate suggestions at different stages. For example, debriefing subjects about the alcohol manipulation after they view the slides but before they read the postevent narrative should eliminate the difference in suggestibility between told-tonic and told-alcohol subjects. Additionally, our combined paradigm could provide researchers with a novel means by which to study the role of placebos in state-dependent learning effects.

1. One subject was removed for failing to rate confidence on a misled item, so there were 114 degrees of freedom in the analyses of confidence.

Finally, with respect to the misinformation effect itself, there has been much controversy over whether this effect is even a memory effect at all, or merely the result of demand characteristics or other social influences (see Belli, 1989; McCloskey & Zaragoza, 1985). Our results suggest that, like memory itself, the misinformation effect is the product of cognitive and social factors.

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