

## Self-Awareness-Reducing Effects of Alcohol Consumption

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Three experiments were conducted to examine the effects of alcohol consumption on the self-aware state. Based on a model proposed by Hull (1981), it was predicted that alcohol would reduce self-awareness. In Experiment 1, subjects consumed either alcohol or tonic and then gave short speeches about themselves. All subjects expected to consume alcohol. The speeches were coded for frequency of self-focused statements using the Exner (1973) coding scheme. In support of predictions, alcohol reduced the relative frequency of self-focused statements. Experiment 2 replicated this finding and demonstrated that it did not depend on subjects' expectancies regarding the beverage they consumed. Experiment 3 investigated a potential mechanism for these effects. Alcohol was proposed to reduce self-awareness by interfering with the encoding of self-relevant information. Using an incidental-memory paradigm, it was found that high-private-self-conscious subjects recalled more self-relevant words than did low-self-conscious subjects under placebo conditions, thus replicating the findings of Hull and Levy (1979). In support of predictions, alcohol eliminated differences between high- and low-self-conscious individuals by reducing self-relevant-word recall among high-self-conscious subjects. Discussion centers on the implications of these findings for potential methods of overcoming the maladaptive behavioral consequences of alcohol consumption.

According to a recent model of some of the causes and effects of alcohol consumption (Hull, 1981), alcohol interferes with cognitive processes fundamental to a state of self-awareness. By inhibiting self-relevant encoding processes, the model proposes alcohol to have the opposite behavioral effects of manipulations that increase self-awareness. Insofar as self-awareness is associated with neg-

ative self-evaluations following failure (Fenigstein, 1979; Steenbarger & Aderman, 1979), alcohol is proposed to decrease negative self-evaluations following failure. As a consequence of this latter effect, alcohol may be consumed for its specific effects of decreasing self-awareness following failure in order to avoid negative self-reactions.

Support for the proposition that subjects drink in order to reduce self-awareness in the face of personal failure was found in two recent studies reported by Hull and Young (in press). One study investigated the role of dispositional self-awareness and the quality of self-relevant life events in alcoholic relapse following detoxification. Subjects were 35 men from an alcoholic treatment unit who were nearing completion of a detoxification program. All subjects had been abstinent from alcohol for approximately 3 weeks. All

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subjects completed the Fenigstein, Scheier, and Buss (1975) Self-Consciousness Scale and a life events survey. After discharge from the hospital, subjects were contacted at 3- and 6-month intervals to determine whether they had returned to preabstinence levels of drinking.

The results provided support for the self-awareness model of alcohol consumption. Seventy percent of the high-private-self-conscious subjects who had experienced predominantly negative self-relevant events reported drinking at or beyond preabstinence levels within the first 3 months following detoxification as compared to only 14% of high-private-self-conscious subjects who had experienced predominantly positive self-relevant events. Low-self-conscious subjects fell almost exactly between these extremes (low-self-conscious positive events = 40%; low-self-conscious negative events = 38%). Correlational analyses indicated that the quality of self-relevant events accounted for nearly 30% of the variance in alcoholic relapse among high-self-conscious subjects but less than 1% of the variance among low self-conscious subjects.

These results have been replicated within an experimental design using male social drinkers (Hull & Young, in press). Subjects in this experiment were initially interviewed for potential participation in a series of experiments. The first experiment was described as involving tests of verbal and logical abilities. The second experiment was described as involving a perceptual task during which the subject would taste and rate a series of wines. Upon volunteering to participate, subjects were scheduled to be in the wine-tasting experiment immediately following the verbal-logical experiment. Subjects believed that this arrangement existed simply for their own convenience.

In the first experiment, subjects completed a questionnaire booklet that contained the Self-Consciousness Scale (Fenigstein et al., 1975) and then worked the "intelligence related" tasks. Upon completing these tasks, subjects were randomly assigned success or failure feedback. They were then paid and released.

The wine-tasting experiment took place in a different section of the same building.

When subjects reported to this experiment, they were told that they would be tasting and rating three wines on a series of taste dimensions. Subjects were told to "take as many tastes of the drinks as you need to answer the questions. Just pour them into the glasses as you see fit." These procedures were adapted from Higgins and Marlatt (1975). The amount of wine subjects consumed during the 15-minute tasting period served as the primary dependent measure.

For purposes of analysis, subjects were divided into high- and low-private-self-conscious groups. As expected, the results of this study replicated the previously reported results for alcoholic relapse. There was a significant interaction of private self-consciousness and success-failure. High-self-conscious subjects who received failure feedback drank significantly more than high-self-conscious subjects who received success feedback. Consumption by low-self-conscious subjects fell between these extremes and did not vary as a function of success and failure. In accord with predictions, additional data indicated that these results were mediated by differential sensitivity to the positive-negative implications of success-failure by high- and low-self-conscious subjects.

This pattern of results is conceptually identical to that reported in the earlier study on alcoholic relapse and suggests that the proposed model has a fair degree of generality. Although the relapse study involved the return to preabstinence levels of drinking by alcoholics following a wide range of positive and negative self-relevant life events, the wine-tasting study involved situational consumption by social drinkers following a particular success-failure event.

These findings support the proposition that individuals drink following failure in an attempt to reduce self-awareness. However, they do not explicitly demonstrate that alcohol has the effect of reducing self-awareness. A study was therefore conducted to test the latter hypothesis. To measure self-awareness, previous studies have used (a) relative frequency of first-person pronoun usage (Davis & Brock, 1975) and (b) frequency of self-focused responses on the Exner Self-Focus Sentence Completion questionnaire (Carver & Scheier, 1978). The present study

combined these methods in an open-ended free-response format: Subjects gave short speeches that were then coded for relative frequency of (a) self-focused statements according to the Exner coding scheme and (b) first-person pronouns. These speeches took place after the subjects had consumed either an alcoholic or a placebo beverage. All subjects were led to expect that the beverage they were consuming contained alcohol. We predicted that alcohol would decrease the relative frequency of both self-focused statements and first-person pronouns.

## Experiment 1

### Method

#### Subjects

Fifty-four men were chosen from a group of volunteers who responded to advertisements and posted notices soliciting participants for alcohol research. Subjects were screened to eliminate those with a personal or family history of problem drinking or who took psychoactive drugs for medical reasons.<sup>1</sup> Subjects were asked to complete a series of questionnaires prior to their arrival at the laboratory, to abstain from eating for at least 4 hours prior to the experiment, and to abstain from drinking alcohol for 12 hours prior to the experiment. All subjects were moderate to heavy social drinkers.

#### Procedure

Subjects were run individually. On arriving at the laboratory, subjects completed an informed-consent statement. An experimental assistant then recorded their weight, oral temperature, and blood pressure. Each subject then completed self-report scales of present and anticipated mood (Mehrabian & Russell, 1974). Following completion of this questionnaire, subjects had their blood alcohol content (BAC) taken by breathalyzer.

*Administration of beverages.* Just prior to breath analysis, subjects were asked to rinse their mouth with Chloraseptic mouthwash with the rationale that this would facilitate an accurate BAC reading. In fact, the mouthwash was used to reduce subjects' taste acuity and ability to assess the alcoholic content of their drinks (Wilson & Lawson, 1976). Subjects then witnessed the assistant mix their beverages in a graduated cylinder. All subjects ostensibly saw their drinks being mixed in a ratio of four parts Sunrise tonic to one part 80-proof Popov's vodka with a squirt of lime juice. It had been previously determined that subjects could not reliably detect the presence of vodka at this dilution. For half of the subjects (those in the placebo condition), the bottle labeled vodka actually contained decarbonated tonic water. Thus, subjects in the alcohol and placebo conditions had the same expectancy for receiving alcohol. Assignment to alcohol and placebo groups was made on a random basis by the experimenter, who provided the assistant with the bottle labeled vodka. The assistant was blind to the true nature

of the alcoholic content of this bottle. The alcohol dose employed was 1 g ethanol per kilogram of body weight. This would result in a 145-pound (66 kg) subject consuming 35 ounces (1,039 ml) of total beverage of which 7 ounces (208 ml) would be 80-proof vodka for subjects in the alcohol condition.

Subjects were given 45 minutes to consume all of the beverage. Following this drinking period, a 45-minute absorption period began. During this absorption period, temperature, blood pressure, and emotional state were reassessed. At the end of the period, a second breath sample was obtained, and the subject was escorted to the experimental chamber. There he was seated in a comfortable chair while the experimenter attached a number of electrodes for taking physiological measurements (the data from these measures have been reported by Sher, 1980). While the electrodes were being attached, the assistant entered the room and stated that the subject's BAC was ".11 so he's legally drunk." This was done independently of the subject's true BAC in order to produce a consistent expectancy in both alcohol and placebo conditions.

*Speech instructions.* Subjects were told that after about 10 or 15 minutes they would see the number 360 appear on a display in front of them and that the numbers would count down. At that time, they were to pick up a clipboard beside their chairs, read the speech topic, and replace the clipboard. (The topic was "What I like and dislike about my body and physical appearance.") Subjects were told that when the number on the display reached zero, they were to look into a videotape camera, state their name, and begin their speech. They were told to stop talking when the number 9,999 appeared on the display (this occurred 3 minutes after the start of the speech). They were told to try to be as open and honest as possible and that graduate students would rate the videotape for openness, defensiveness, and other psychological variables.

Upon completion of this phase of the experiment, subjects provided a third breath sample. They then completed a questionnaire designed to assess the effectiveness of the beverage manipulation and the stressfulness of the speech session. Finally, they were debriefed and transportation home was arranged.

*Dependent measures.* Subjects' speeches were transcribed verbatim. Individual statements were then coded using the scheme devised by Exner (1973) for use with his Self-Focus Sentence Completion questionnaire. According to this scheme, statements can be coded into one of four major categories: self-focus, external focus, ambiguous focus, and other (nonfocus). Exner (1973) provides both instructions and examples of this coding scheme. In addition to coding speech statements, the total number of words and self-relevant pronouns (I, me, my, myself, mine) was determined. For purposes of this count, stuttered words were counted as one response. A minimum speech length was set at 100 words and six statements. Data from two speeches failed to meet this criterion and were excluded from analysis.

<sup>1</sup> Subjects were also selected on the basis of their responses to the MacAndrew (1965) alcoholism scale. Because this scale was not of interest in the present investigation, it was not included in any of the analyses.

## Results

### Statement Analyses

Relative frequencies of statement categories were analyzed as proportions of total number of statements. In order to avoid overdetermining the data set, ambiguous focus responses were not analyzed. In accord with predictions, there was a significant effect of alcohol on relative frequency of self-focused statements,  $F(1, 50) = 8.65, p < .01$ , such that alcohol reduced self-focus. In addition, there was a significant effect of alcohol on relative frequency of responses coded "other,"  $F(1, 50) = 6.07, p < .02$ , such that alcohol increased the relative frequency of "other" responses. Attempts to illuminate this latter effect by reclassifying the "other" category into more specific subcategories were unsuccessful. Finally, alcohol nonsignificantly increased the relative frequency of externally focused statements,  $F(1, 50) = 1.52, p = .22$ . Results of the statement analyses appear in Table 1.

### Word Analyses

Alcohol did not affect the total number of words in subjects' speeches ( $p > .15$ ). An analysis of the ratio of self-relevant pronouns to total words revealed a marginally significant effect of alcohol,  $F(1, 50) = 2.60, p = .11$ , such that alcohol reduced the relative frequency of these pronouns. This effect is shown in Table 1.

### Measures Related to Intoxication

*Blood alcohol content.* Subjects who received alcohol had a mean BAC of .072%

following the absorption phase of the experiment and a mean BAC of .070% following the speech phase of the experiment. Subjects not receiving alcohol had a mean BAC of .00% at both measurement periods.

*Self-ratings of intoxication and consumption.* Following the speech phase of the experiment, subjects were asked to rate how drunk they felt (a) right after drinking, (b) during the countdown to the speech, and (c) right now. In addition, they were asked to estimate the total number of ounces of 80-proof vodka they had consumed. In each case, alcohol subjects indicated feeling significantly more drunk (e.g., on a scale of 1 to 10:  $M = 7.35$  after drinking;  $M = 6.54$  during countdown;  $M = 5.62$  after speech) and believing that they consumed more alcohol ( $M = 7.09$  ounces [210 ml]) compared to placebo subjects ( $M = 3.35, 2.35, 1.89$ , and 2.98, respectively). All comparisons were significant at  $p < .01$ .

### Discussion

The results of this first experiment support the proposition that alcohol reduces self-awareness. Thus, alcohol significantly reduced the relative frequency of self-focused statements and increased the relative frequency of statements coded "other." In addition, alcohol tended to reduce the relative frequency of first-person pronouns, although this effect did not achieve conventional levels of significance. Unfortunately, efforts to provide comparable expectancies for consuming alcohol in both alcohol and placebo conditions were unsuccessful. Subjects in the alcohol condition reported consuming more ounces of alcohol and feeling more intoxicated than subjects in the placebo condition. It is possible, then, that the cognition that one has consumed alcohol and not consumption per se is responsible for decreased self-focused responses.

A second study was conducted that orthogonally manipulated expectancy and consumption. Once again, subjects gave short speeches that were coded for relative frequency of self-focused statements and first-person pronouns. These speeches took place under one of four experimental conditions corresponding to a 2(consume alcohol vs.

Table 1  
Experiment 1: The Effects of Alcohol on Relative Frequency of Speech Statements and First-Person Pronouns

Beverage content	Proportion of speech statements			Proportion of self-relevant pronouns
	Self-focus	External focus	Other	
Placebo	.437	.030	.505	.145
Alcohol	.318	.053	.608	.133

consume tonic water)  $\times$  2(expect alcohol vs. expect tonic water) design. To the extent that the expectancy manipulation is successful, such a design allows for an independent assessment of the effects of expectancy on self-focused responses.

We predicted that alcohol would decrease the relative frequency of both self-focused statements and first-person pronouns. We predicted that this effect would be independent of expectancy. Although we predicted that the expectancy manipulation would be successful in affecting subjects' cognitions regarding having consumed alcohol, we made no explicit predictions concerning the effect of expectancy on speech and pronoun usage.

## Experiment 2

### Method

#### Subjects

Forty-six male subjects were chosen from a group of volunteers who responded to an advertisement in the Indiana University campus newspaper offering payment for participation in an experiment involving alcohol consumption. As in Experiment 1, subjects were screened to provide a sample of moderate to heavy social drinkers. Subjects were asked to complete a series of questionnaires prior to their arrival at the laboratory, to abstain from eating and drinking alcohol for at least 4 hours before the experiment, and to refrain from driving themselves to the experiment (taxi service was provided as needed). Subjects were run individually and paid \$7.50 for participating.

#### Procedure

On arriving at the laboratory, subjects were met by an experimental assistant, who recorded height, weight, oral temperature, blood pressure, and initial BAC. Each subject then completed a self-report mood inventory (Nowlis, 1965) and signed an informed-consent statement.

*Administration of beverages.* The experimenter removed the appropriate tonic and/or vodka bottles from the refrigerator and gave them to the assistant, who was blind to their contents. Subjects, who were randomly assigned to one of four conditions of expectancy (expect alcohol or expect tonic) and consumption (consume alcohol or consume tonic), watched the assistant measure the beverages into a graduated cylinder. The contents corresponded to the four conditions to which subjects were assigned as follows: (a) expect alcohol and consume alcohol—subjects observed the assistant measure Popov's 80-proof vodka (1 g ethanol per kilogram of body weight) from a vodka bottle and add four times the amount of Sunrise tonic from a tonic bottle; (b) expect alcohol and consume tonic—the procedure was identical to that of Condition a except that the vodka bottle ac-

tually contained decarbonated tonic; (c) expect tonic and consume alcohol—subjects observed the assistant measure an appropriate amount of liquid from a tonic bottle that actually contained one part vodka to four parts tonic; (d) expect tonic and consume tonic—the procedure was identical to that of Condition c except that the tonic bottle contained only tonic. Conditions a and b thus provide a replication of Experiment 1.

In all conditions, a squirt of lime juice was added to the beverage, which was then divided into three glasses. Regardless of condition, the total amount of liquid consumed was in the same proportion to body weight. Each subject was seated in a private room and told he must consume the beverages in 45 minutes. Subjects were given magazines and newspapers to read while drinking the beverages and during the 40-minute absorption period that followed the drinking session. At the end of the absorption period and just prior to entering the experimental chamber, a final breath sample was obtained by breathalyzer for each subject, but BAC was not computed.

Subjects were escorted to the experimental chamber and seated in a comfortable chair while the experimenter attached a number of electrodes for taking physiological measurements (the data from these measures has been reported by Levenson, Sher, Grossman, Newman, & Newlin, 1980). While the electrodes were being attached, the assistant entered the room to give bogus feedback about the final BAC based on the bottles used to mix the drinks. The assistant, who was blind to the actual BAC reading, stated either "His BAC is .11, so he's drunk," if part of the beverage had been poured from a vodka bottle, or "His BAC is .00, so he's sober," if the drinks had been poured only from tonic bottles. As in Experiment 1, the assistant was blind to the contents of the drinks at all times when interacting with the subject and only later learned the subject's true BAC. The experimenter who attached the electrodes was aware of the subject's true condition but refrained from discussing the content of the drinks with the subjects. The speech instructions and procedures were identical to those used in Experiment 1. Once again, subjects completed a questionnaire designed to assess the effectiveness of the experimental manipulations following the speech phase of the study.

### Results

Subjects' speeches were transcribed and coded as in Experiment 1. Data from two subjects failed to meet the minimum speech-length criteria and were excluded from analysis.

#### Statement Analyses

Relative frequencies of statement categories were analyzed as proportions of the total number of statements. In order to avoid over-determining the data set, ambiguous focus responses were not analyzed.

*Self-focused statements.* There was a significant main effect of alcohol on relative frequency of self-focused statements,  $F(1, 40) = 8.29, p < .01$ , such that consuming alcohol reduced self-focus. In addition, there was a marginal effect of expectation on self-focus,  $F(1, 40) = 4.03, p < .06$ , such that the cognition that one had consumed alcohol tended to increase self-focused responses. The interaction of expectancy and consumption was not significant ( $F < 1.00$ ). The results of the statement analyses for Experiment 2 appear in Table 2.

*Other or nonfocused statements.* Both alcohol consumption and expectations had significant main effects on relative frequency of statements coded "other." Alcohol significantly increased relative frequency of "other" responses,  $F(1, 40) = 7.90, p < .01$ . On the other hand, cognition that one had consumed alcohol decreased relative frequency of "other" responses,  $F(1, 40) = 4.70, p < .05$ . Attempts to illuminate these effects by reclassifying this category into more meaningful subcategories were once again unsuccessful. The interaction of alcohol and expectancy was not significant ( $F < 1.00$ ).

*Externally focused statements.* There was a marginal main effect of alcohol consumption on externally focused statements,  $F(1, 40) = 2.17, p = .149$ , such that alcohol tended to increase the relative frequency of externally focused statements. There were no other effects ( $Fs < 1.00$ ). Meta-analysis using Stouffer's unweighted method for combining independent studies (Stouffer, 1949) indicated that the tendency of alcohol to increase relative frequency of externally focused statement in both Experiment 1 and Experiment

2 remained marginally significant when these studies were combined ( $p = .06$ ).

#### Word Analyses

There were no significant effects or interactions of alcohol and expectations on total number of words in subjects' speeches. An analysis of the ratio of self-relevant pronouns to total words revealed a marginally significant main effect of alcohol consumption,  $F(1, 40) = 3.26, p = .079$ , such that alcohol reduced the relative frequency of these pronouns. Neither the main effect of expectancy nor the interaction of consumption and expectancy approached significance (both  $Fs < 1.00$ ). Meta-analysis using Stouffer's unweighted method for combining independent studies (Stouffer, 1949) indicated that the tendency of alcohol to decrease relative frequency of first-person pronouns in both Experiment 1 and Experiment 2 was significant at conventional levels when these studies were combined ( $p = .018$ ).

#### Measures Related to Intoxication

*Blood alcohol content.* Subjects who received alcohol had a mean BAC of .09% following the absorption phase of the experiment. This is slightly higher than that achieved in Experiment 1 and may be due to timing differences between the experiments. Subjects not receiving alcohol had a mean BAC of .00%.

*Self-ratings of intoxication and consumption.* Following the speech phase of the experiment, subjects were asked to estimate the total number of ounces of 80-proof vodka

Table 2  
Experiment 2: The Effect of Alcohol and Expectancy on Relative Frequency of Speech Statements and First-Person Pronouns

Experimental design	Proportion of speech statements			Proportion of self-relevant pronouns
	Self-focus	External focus	Other	
Consume/expect				
Tonic/tonic	.496	.010	.483	.148
Tonic/alcohol	.568	.011	.401	.144
Alcohol/tonic	.331	.018	.643	.122
Alcohol/alcohol	.455	.021	.511	.129

they had consumed and to rate how drunk they felt during various parts of the experiment. Analysis of subjects' estimates of alcohol consumed revealed main effects of both alcohol consumption,  $F(1, 40) = 29.35$ ,  $p < .001$ , and expectancy,  $F(1, 40) = 8.07$ ,  $p < .01$ . The interaction of consumption and expectancy was not significant ( $F < 1.00$ ). The mean estimates for the respective groups were as follows: expect tonic and consume tonic = .75 ounces [22 ml]; expect alcohol and consume tonic = 2.80 ounces [83 ml]; expect tonic and consume alcohol = 4.55 ounces [135 ml]; expect alcohol and consume alcohol = 6.36 ounces [188 ml]. Analyses of subjects' self-reports of drunkenness revealed similar effects (e.g., drunkenness during speech countdown: alcohol main effect,  $p < .01$ ; expectancy main effect,  $p = .05$ ; interaction,  $p = .48$ ) and identical orders of means. Thus, subjects' perceptions concerning the amount of alcohol consumed and their state of drunkenness were a function of both the actual beverage content and the expectancy established by the experimenter.

### Discussion

Taken together, Experiments 1 and 2 provide support for the proposition that alcohol consumption decreases self-awareness. In both experiments, alcohol consumption was associated with a decrease in the relative frequency of self-focused statements and an increase in other or nonfocused statements. Meta-analyses revealed that alcohol consumption was also associated with a decrease in the relative frequency of first-person pronouns and a marginal increase in externally focused statements. Each of these effects is consistent with the notion that alcohol decreases self-awareness.

In addition, the effect of alcohol consumption would appear not to depend on subjects' expectancies regarding the beverage they consumed. Thus, expectancy was effectively manipulated in the second experiment but tended to have the opposite effect of alcohol consumption on subjects' responses. Expectancy was associated with a decrease in other or nonfocused statements and a marginal increase in self-focused responses.

Given the fact that alcohol consumption was associated with increased cognitions of having consumed alcohol in both Experiment 1 and Experiment 2, the expectancy results suggest that alcohol affects self-aware responses in spite of rather than because of its effects on subjects' knowledge of being intoxicated.

Although Experiments 1 and 2 support the proposition that alcohol decreases self-awareness, they do not provide evidence of how this occurs. The self-awareness model of alcohol consumption proposed by Hull (1981) specifies that alcohol reduces self-awareness by interfering with the encoding of self-relevant information. Such an analysis grows out of a broader framework associating self-awareness with increased sensitivity to self-relevant information (Hull & Levy, 1979). Using an incidental-memory paradigm, Hull and Levy (1979) demonstrated that individuals high in dispositional self-awareness encode self-relevant information at a deeper cognitive level than individuals low in dispositional self-awareness. In accord with these results, Hull and Levy (1979) defined self-awareness in terms of the higher order cognitive process of encoding information in terms of its self-relevance.

Recent research indicates that alcohol interferes with higher order encoding processes similar to those Hull and Levy propose to mediate the self-aware state. Studies by Huntley (1974); Weingartner, Adefris, Eich, and Murphy (1976); Gerrein and Chechile (1977); Miller, Adesso, Fleming, Gino, and Lauerman (1978); and Birnbaum, Parker, Hartley, and Noble (1978) have consistently demonstrated that alcohol interferes with cognitive processes primarily by debilitating informational encoding as opposed to retrieval. The conclusions of these authors are remarkably similar:

The [results provide] strong evidence against the retrieval-deficit hypothesis. On the other hand, the data seem to be consistent with a storage-deficit hypotheses. (Miller et al., 1978, p. 254)

Taken together, these results indicate that the strongest effects of acute, moderate doses of alcohol are to be found in the storage stage of memory. (Birnbaum et al., 1978, p. 333)

It should be stressed that the kind of storage deficit related to learning while intoxicated seems to be focused

not in short term memory but in memory processes involved in the coding and tagging of information. (Weingartner et al., 1976, p. 87)

Recent studies by Hartley, Birnbaum, and Parker (1978) and Birnbaum, Hartley, Johnson, and Taylor (1980) suggest that this effect may be most pronounced in situations requiring the utilization of higher order encoding-elaboration strategies associated with cognitive schemata.

If alcohol affects the quality of cognitive operations performed by a subject, perhaps the debilitation is related to inefficient utilization of more complex representational strategies by intoxicated subjects. (Hartley et al., 1978, p. 646)

In summary, these experiments are consistent with the idea that alcohol affects the kind of thinking that produces stable elaborators or schemas for incoming information. (Birnbaum et al., 1980, p. 300)

Extrapolating from this literature, Hull (1981) proposed that alcohol reduces self-awareness by interfering with self-relevant encoding processes. Thus, (a) self-awareness involves the process of encoding information in terms of its self-relevance through the invocation of self-schemata (Hull & Levy, 1979); (b) alcohol interferes with the utilization of more complex encoding/elaboration strategies such as those involved in the utilization of higher order schemata; therefore (c) alcohol reduces self-awareness by interfering with the process of encoding information in terms of its self-relevance.

In order to test this analysis, an experiment was designed to investigate the effects of alcohol on self-relevant encoding processes among individuals high and low in dispositional self-awareness. Subjects completed the Fenigstein et al. (1975) Self-Consciousness Scale.<sup>2</sup> The Private Self-Consciousness scale of this inventory has been associated with self-relevant encoding processes (Hull & Levy, 1979) and was used to classify subjects into high- and low-self-conscious groups. Following completion of the Fenigstein et al. (1975) questionnaire, subjects consumed either an alcoholic or a placebo beverage. All subjects were told that they were consuming alcohol. Following beverage consumption and absorption, subjects participated in an incidental-memory paradigm that employed procedures identical to those used by Hull and Levy (1979). We predicted that alcohol would have

a greater impact on recall of self-relevant words<sup>3</sup> for high-self-conscious than low-self-conscious subjects and this effect would take the form of an interaction in which (a) high-self-conscious subjects recall more self-relevant words than low-self-conscious subjects under placebo conditions, (b) alcohol reduces recall of self-relevant words for high self-conscious subjects, and (c) alcohol has less of an effect on recall of self-relevant words for low-self-conscious than high-self-conscious subjects.

### Experiment 3

#### Method

#### Subjects

Subjects were 80 men, age 21 to 30 years, chosen from a group of volunteers who responded to advertisements in the Indiana University campus newspaper offering payment for participation in an experiment involving alcohol consumption. Due to the nature of the encoding task, we required that subjects speak English as a native language. Subjects were screened to provide a sample of moderate to heavy social drinkers. They were asked to abstain from eating for 4 hours prior to the experiment, to abstain from drinking alcohol on the day of the experiment, and to refrain from driving themselves to the experiment (taxi service was provided as needed). Subjects were run in groups of four to six and were paid \$8.50 for participating.

#### Procedure

On arriving at the laboratory, subjects completed an informed-consent statement, were weighed, and provided a breath sample for calculation of initial BAC. Just prior to giving the breath sample, subjects were asked to rinse their mouths with Chloraseptic mouthwash on the pretext that this would facilitate an accurate BAC reading. In fact, the mouthwash was used to decrease subjects' taste acuity and ability to assess the alcoholic content of their drinks (Wilson & Lawson, 1976).

Subjects were escorted to a separate room after giving the breath sample and seated in one of six student desks opposite the experimenter. They were asked not to talk to one another during the experiment.

<sup>2</sup> This measure was not included in Experiments 1 and 2.

<sup>3</sup> It is important to note that self-relevant words are self-relevant by virtue of the encoding statement associated with their presentation during the encoding task and not by virtue of any intrinsic characteristic. In this sense the term *self-relevant words* is being used as an abbreviation of the term *words encoded as self-relevant*. The same distinction applies to the term *non-self-relevant words*.

When all subjects had been seated, the experimental procedures were verbally outlined and instructions for the encoding phase of the experiment were presented (see below). Subjects then completed a questionnaire booklet that contained the Fenigstein et al. (1975) Self-Consciousness Scale.

*Administration of beverages.* The experimental assistant randomly assigned subjects to alcohol and placebo conditions after they had been escorted to the experimental room. All subjects were told that they would be consuming vodka and tonic water mixed in a rather weak solution. Alcoholic drinks were mixed in a ratio of one part 80-proof Popov's vodka to four parts Sunrise tonic with a squirt of lime. As in Experiments 1 and 2, the amount of beverage subjects consumed was based on body weight. The alcohol dose was .8 g ethanol per kilogram of body weight. Placebo drinks were composed of Sunrise tonic with a squirt of lime juice. In addition, a small amount of vodka was floated on the surface of the placebo drink and smeared around the rim of the glass to provide olfactory cues of alcohol presence (cf. Wilson & Abrams, 1977). The ethanol content of the alcoholic beverage was thus less than that employed in Experiments 1 and 2 (.8 g per kilogram as opposed to 1 g per kilogram) and more attempts were made to disguise the nonalcoholic character of the placebo drink. Both changes were made in an attempt to equate expectancies of the two groups.

Drinks were administered in three equal portions. Subjects were given a total of 40 minutes to consume all three drinks. The experimenter provided pacing instructions to ensure that subjects drank at a consistent rate over the consumption period. Subjects completed filler questionnaires and read newspapers and magazines while consuming the beverages and during the 25-minute absorption period that followed consumption. Near the end of the absorption period, one alcohol and one placebo subject were randomly selected by the experimental assistant to provide a mid-experiment breath sample. Although the assistant knew the experimental condition of the subject, he refrained from discussing the contents of the drinks during the breath-sampling procedure. The experimenter remained blind to subjects' conditions throughout the experiment.

*Encoding task.* Following the absorption period, the experimenter introduced the encoding task using instructions identical to those employed by Hull and Levy (1979). The procedure consisted of the following instructions read verbatim:

In this experiment you will be asked to evaluate a series of 30 words, which will be presented one at a time. Each word is to be evaluated on one specific dimension. These dimensions are listed in order on the rating sheets you have been provided.

I will call out a number and you are then to read the statement associated with that number. I will then call out a single word. You are then to place a check in the appropriate column to designate whether or not the statement is applicable to that word: in the left column if yes, in the right if no. Some of the statements ask for an evaluation of the length of the word. For these statements check the left if the word is long, the right if short.

Each word is to be evaluated only with respect to

the single statement associated with the word called out. Are there any questions about this procedure?

As indicated above, these instructions had been read to subjects prior to the beverage-consumption phase of the experiment and were repeated at this time. As long as there were no questions, the experimenter continued by calling out a series of 30 words. In each instance, he first read aloud the number associated with the word, waited 5 sec, read aloud the word itself, then waited 15 seconds before calling out the next number.

*Evaluation statements.* Each word was to be evaluated with respect to one of three statements used in experiments by Hull and Levy (1979) and Rogers, Kuiper, and Kirker (1977). The specific criteria used in the present study were (a) how long or short the word was, (b) whether the word was meaningful to the subject, and (c) whether the word described the subject. The order in which the statements appeared was counterbalanced such that in every three trials, each statement appeared once. Subjects were randomly assigned one of three rating sheets, each of which contained a different order of evaluation statements. Thus, within a given testing session, a given stimulus word was evaluated with respect to all three dimensions, the specific dimension depending on which sheet the subject had been randomly assigned. Evaluation statement sheets were provided to subjects at the initial presentation of the encoding-task instructions.

*Dependent measures.* After evaluating all 30 words, subjects were instructed to turn over their rating sheets and write down as many of the words as they could remember. Because stimuli had been presented verbally, they were available only in memory. Subjects were informed that they would have 3 minutes to complete the task. At the end of 3 minutes, subjects were asked to place their names on the top of the rating sheets and return them to the experimenter.

Following the encoding task, subjects were asked to estimate the total number of ounces of 80-proof vodka they had consumed. They then provided a breath sample for computation of final BAC. They were then debriefed and transportation home was arranged.

## Results

Data from two subjects were excluded from analysis: One subject arrived at the experiment under the influence of drugs; a second subject recorded the stimulus words as they were presented. For the purposes of analysis, a median split was performed dividing subjects into high- and low-private-self-conscious groups. Subjects falling at the median were excluded from analysis. Four additional subjects were randomly discarded in order to equate cell frequencies.

### Word Ratings

Stimulus words were rated according to whether a given evaluation statement was

applicable to the given word. Preliminary analyses on these yes-no ratings revealed no main effects or interactions involving either alcohol or self-consciousness (all  $F_s \leq 1.00$ ). Word-recall data were therefore analyzed collapsed across this variable.

### Word Recall

We predicted that alcohol would interact with self-consciousness such that high-self-conscious subjects would recall more self-relevant words than low-self-conscious subjects under placebo conditions and alcohol would have a greater impact on recall of self-relevant words for high-self-conscious than low-self-conscious subjects. Recall of self-relevant words thus constituted the primary dependent measure. A 2(high vs. low self-conscious)  $\times$  2(alcohol vs. placebo beverage) analysis of variance was performed on this measure. In accord with predictions, alcohol interacted with self-consciousness,  $F(1, 60) = 3.93, p = .05$ . Neither the alcohol nor the self-consciousness main effects were significant ( $p_s > .15$ ). Individual comparisons revealed that high-self-conscious subjects recalled more self-relevant words than low-self-conscious subjects under placebo conditions,  $F(1, 60) = 2.83, p < .10$ , although this effect was only marginally significant. Alcohol significantly reduced recall of self-relevant words for high-self-conscious subjects,  $F(1, 60) = 5.68, p = .02$ , rendering this group equivalent to both low-self-conscious groups. Alcohol did not affect recall of self-relevant words among low-self-conscious subjects ( $F < 1.00$ ). These effects are illustrated in Table 3.

To increase statistical power, the analysis of self-relevant-word recall was repeated nesting the 2(high vs. low self-consciousness)  $\times$  2(alcohol vs. placebo beverage) analysis of self-relevant words within a mixed design analysis of variance that treated word type (self-relevant vs. non-self-relevant) as a repeated measure.<sup>4</sup> This analysis revealed a significant interaction of alcohol and self-consciousness on self-relevant-word recall,  $F(1, 60) = 5.97, p < .02$ . Neither the alcohol nor the self-consciousness main effects were significant. Individual comparisons revealed that high self-conscious subjects recalled more self-relevant words than low self-conscious

Table 3  
*Experiment 3: The Effect of Alcohol and Self-Consciousness on Recall of Words Encoded as Self-Relevant*

Self-consciousness	Beverage content	
	Placebo	Alcohol
High		
<i>M</i>	2.81	1.75
<i>SD</i>	1.64	1.24
<i>n</i>	16	16
Low		
<i>M</i>	2.06	2.31
<i>SD</i>	1.00	1.01
<i>n</i>	16	16

subjects under placebo conditions,  $F(1, 60) = 3.90, p = .05$ . Alcohol significantly reduced recall of self-relevant words for high-self-conscious subjects,  $F(1, 60) = 7.82, p < .01$ , rendering this group equivalent to both low-self-conscious groups. Alcohol did not affect recall of self-relevant words among low-self-conscious subjects. There were no other effects. These analyses were repeated on non-self-relevant words. There were no significant effects.

### Measures Related to Intoxication

*Blood alcohol content.* Subjects who received alcohol had a mean blood alcohol content of .055% following the absorption phase of the experiment and a mean BAC of .053% following the debriefing phase of the experiment. Subjects not receiving alcohol had a mean BAC of .00% at both measurement periods.

*Self-ratings of consumption.* Subjects who had received alcoholic beverages estimated that they consumed more ounces of vodka

<sup>4</sup> The four means on which these comparisons are based remain the same as those in the analyses reported above and appear in Table 3. However, the error term against which comparisons are calculated is reduced vis-à-vis the between-subjects design by virtue of including additional information on subjects' general ability to recall stimulus words. The category of non-self-relevant words was created by averaging the number of words subjects recalled that had been encoded using the "long-short" and "meaningful" evaluation statements.

than subjects who received placebo beverages,  $F(1, 60) = 18.27, p < .001$ . However, self-consciousness did not affect subjects' estimates. It is particularly important to note that there was no interaction of self-consciousness and beverage type ( $F < 1.00$ ). In some studies, high-self-conscious subjects have been less susceptible to placebo effects than low-self-conscious subjects (e.g., Gibbons, Carver, Scheier, & Hormuth, 1979). This was not the case in the present study. If anything, high-self-conscious subjects were slightly less likely than low-self-conscious subjects to discriminate alcoholic from placebo beverages (high-self-conscious alcohol and high-self-conscious placebo = 4.62 ounces and 3.00 ounces [137 ml and 89 ml], respectively; low-self-conscious alcohol and low-self-conscious placebo = 5.66 ounces and 3.16 ounces [167 ml and 93 ml], respectively). Finally, subjects' estimates of the amount of alcohol they consumed were unrelated to the number of self-relevant words they recalled ( $r = .09, p > .25$ ).

### General Discussion

Experiment 3 supports the proposition that alcohol reduces self-awareness by interfering with the process of encoding information in terms of its self-relevance. Thus, high-self-conscious individuals recalled more self-relevant words than did low-self-conscious individuals under placebo conditions. This effect replicates the findings of Hull and Levy (1979). In addition, alcohol eliminated differences between high- and low-self-conscious individuals by reducing self-relevant-word recall among high-self-conscious subjects. Stated somewhat differently, alcohol eliminated the self-consciousness contribution to the processing of self-relevant information.

These effects do not appear to depend on subjects' expectancies of having consumed alcohol. In Experiment 3, judgments regarding alcohol consumption were unrelated to self-relevant-word recall. A stronger test of the expectancy hypothesis was provided in Experiment 2. In this case, consumption and expectancy were orthogonally manipulated. Expectancy had a tendency to affect responses in a manner opposite to that of con-

sumption. Given the weak, conflicting findings of expectancy, conclusions regarding its effects on self-aware responses are left to future research. However, it can be concluded that the effects of consumption on self-aware responses are not dependent on the individual's cognition that the beverage contains alcohol.

### Implications

The self-awareness model of alcohol consumption (Hull, 1981) proposes that alcohol has several specific effects on behavior by virtue of its self-awareness-reducing properties. Thus, by reducing self-awareness, alcohol is proposed to be associated with decreased adherence in internal and external standards of appropriate conduct resulting in socially and personally inappropriate behaviors. In addition, insofar as alcohol reduces self-awareness and self-awareness is associated with increased reactivity to the positive/negative implications of past performances, self-aware individuals are proposed to regulate alcohol consumption on the basis of past successes and failures.

The socially inappropriate consequences of alcoholic intoxication are numerous and well known, ranging from inappropriate conversational styles (Smith, Parker, & Noble, 1975) to inappropriate aggression (Zeichner & Pihl, 1979, 1980) and violent crime (Shupe, 1954). According to the self-awareness model of alcohol consumption, one cause of such socially inappropriate acts is the intoxicated individual's decreased tendency to encode situational cues of appropriate conduct in terms of their self-relevance. It follows that one possible means of overcoming the inappropriate behavioral consequences of alcohol consumption is to provide the individual with a cognitive repertoire of self-relevant encoding schemes to employ when he or she has been drinking. For example, What is my behavior saying about the kind of person I am? How would I react if someone was behaving this way toward me? What do I want to say with my behavior? Such a strategy will be effective in reducing the inappropriate consequences of intoxication to the extent that alcohol has its greatest effects on the propensity of the individual to employ self-

relevant schemata rather than on the ability to benefit from the utilization of such schemata. Recent research by Birnbaum et al. (1980) suggests that this may be the case.

With regard to the proposition that individuals drink in order to reduce self-awareness, Hull and Young (in press) have found that high-self-conscious individuals with a recent history of personal failure are especially likely to return to preabstinence levels of drinking following alcoholic detoxification when compared to high-self-conscious individuals with a recent history of success. Such alcoholic relapse was unrelated to life events of success and failure among low-self-conscious individuals. Hull and Young also report a laboratory experiment that manipulated success and failure and found a similar pattern of results: High-self-conscious individuals tended to be more behaviorally and affectively reactive to success and failure than low-self-conscious individuals and were more likely to regulate their alcohol consumption on the basis of the quality of their performance. The present experiments suggest that such self-aware alcohol consumption might be reduced by altering individuals' encoding strategies. This could be accomplished by reducing self-awareness prior to the availability of alcohol (e.g., through increased physical activity; Duval & Wicklund, 1973) or by actively invoking a variety of attributional schemes that decrease the self-relevance of the performance (e.g., by emphasizing the unimportance of performance vis-à-vis personal goals, the nonpermanent implications of performance, or extenuating circumstances surrounding performance). To the extent that past failures are processed as non-self-relevant, the motivation to consume alcohol should be reduced.

### Conclusion

Experiments 1 and 2 support the proposition that alcohol reduces self-awareness. Experiment 3 suggests a potential mechanism whereby this occurs. Alcohol would appear to reduce self-awareness by interfering with the process of encoding information in terms of its self-relevance. Given that alcohol reduces self-awareness, the emotional and behavioral consequences of alcohol con-

sumption take on new meaning. Future research might center on the implications of such an analysis for methods of overcoming the maladaptive behavioral consequences of consumption and reducing the motive to drink.

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