

## INCIDENTAL EXPOSURE TO ROTATING WARNINGS ON ALCOHOLIC BEVERAGE LABELS

Michael S. Wogalter  
Department of Psychology  
North Carolina State University  
Raleigh, NC 27695-7801

John W. Brelsford  
Department of Psychology  
Rice University  
Houston, TX 77251-1892

### ABSTRACT

No previous research has been published specifically aimed at determining the effectiveness of rotating warnings (as is required in the government-mandated cigarette warnings). This issue has become relevant because decisions may be made with respect to rotating warnings in print and broadcast alcoholic beverage advertisements, and perhaps for labels and ads for other products as well. The present study used 80 participants in a controlled incidental-exposure laboratory experiment. The effect of the current government warning label for alcoholic beverages was compared to a 5-warning and a 10-warning rotating scheme as well as a no-warning control condition. The study was disguised as marketing research where participants were incidentally exposed to the warnings while evaluating a set of alcoholic beverage labels. The dependent measure was performance on a test of alcohol facts and hazards. Findings show that the present single government warning label is inadequate compared to multiple (rotated) warnings. The 10-warning condition produced higher test scores than either the single government warning or no-warning conditions. Overall, the 5-warning condition produced intermediate levels of knowledge. Also, four exposures produced greater specific warning content knowledge than either two or no exposures. The results suggest that rotating multiple warnings are a better means of communicating facts and hazards than a single repeated warning of limited content. Policy implications are discussed.

### INTRODUCTION

For over 30 years cigarette package labels in the U.S. and other countries have included health warnings for the purpose of deterring the product's use. More than 20 years ago the U.S. Congress mandated that, rather than the single "hazardous to health" warning previously appearing on all cigarette packages, four distinct warning messages were to be rotated. There were at least two purposes for instituting the rotating warnings plan. First, the protracted use of an identical warning tended to generate habituation (Waldman, 1988). Following an initial period during which the warning was likely to be noticed, cigarette users tended to pay less attention to it at subsequent exposures, and eventually users simply failed to notice the warning at all. It was believed that using four rotating warnings would decrease or moderate the habituation rate.

The second reason for mandating different, rotating warnings relates to the *content* of the single original warning. Due to highly limited label space on cigarette packages, the first cigarette warning was unable to express the range of hazards associated with the use of tobacco. The four distinct rotating warnings were intended to convey a broader scope of information than the single label. Gardner-Bonneau, Kabbara, Hwang, Bean, Gantt, Hartshorn, Howell, and Spence (1989) report that exposure to multiple, simultaneously-presented warnings leads to a greater range of

hazard information recalled than a single, repeated government warning.

Although cigarette smoking has been generally on the decline in the U.S., it is difficult to assess the *specific* role of rotating cigarette warnings in this outcome. The reason is that many other factors have concurrently occurred with the appearance of the warnings that could have caused the change in people's cigarette habits. In other words, any data collected before and after the appearance of cigarette warnings is contaminated by other potential variables. Nonetheless, it is possible that cigarette package warnings have had their most critical influence in a more indirect manner, such as by influencing nonsmokers to use social and peer pressure to encourage smokers to stop—an important influence of the warnings that might be very difficult to assess.

A review of the research literature reveals that there is no published experimental research on the effectiveness of *rotating* warnings. Because there are no data, several years ago policy makers decided not to require rotating warnings as part of the Congressional mandate (Federal Register, 1989) to include a warning on all alcoholic beverage containers sold in the U.S. A single (not a multiple rotating) warning was mandated.

Currently, several bills pending in Congress (e.g., Kennedy, 1990) propose that all alcoholic beverage advertising (broadcast and print) include warnings. Some of these bills recommend 4 to 6 rotating warnings. However, the basic research question yet to be investigated is whether rotating warnings are more effective than either a single standard warning or no warning. Using an incidental exposure paradigm, the present research focused on that question. We examined the influence of multiple rotating warnings, and measured performance using a general alcoholic beverage facts and hazards test. The specific experimental conditions of the study are described in the following section.

**METHOD**

*Participants*

Eighty undergraduate students enrolled in an introductory psychology course at North Carolina State University participated to fulfill a course requirement. Subjects were randomly assigned to conditions.

*Materials and Procedure*

Subjects in each of the four between-subject experimental conditions received 20 alcohol warnings incidentally inserted in the nominal task of making ratings for a set of alcohol container labels. The experimental conditions were as follows: (a) 10 warnings (two sets of 5 warnings, each warning presented twice), (b) 5 warnings (one set of 5 warnings presented four times), (c) the single government warning presented 20 times, and (d) no warning (control).

The alcohol beverage label graphics were presented and controlled by a Macintosh computer with a 9-inch diagonal monochrome screen. Label stimuli were adapted from those used by Laughery, Young, Vaubel, and Brelsford (1992) and Young (1991). Two example labels are shown in Figure 1.

In the government warning condition, the warning required on all alcoholic beverage containers sold in the U.S. was used:

**GOVERNMENT WARNING:** (1) ACCORDING TO THE SURGEON GENERAL, WOMEN SHOULD NOT DRINK ALCOHOLIC BEVERAGES DURING PREGNANCY BECAUSE OF THE RISK OF BIRTH DEFECTS. (2) CONSUMPTION OF ALCOHOLIC BEVERAGES IMPAIRS YOUR ABILITY TO DRIVE A CAR OR OPERATE MACHINERY, AND MAY CAUSE HEALTH PROBLEMS.

Table 1 shows the warning messages used in the multiple warning conditions. The warnings were adapted from those used by Barlow and Wogalter (1992). Pretests showed that these warnings contain information not well known by the population of individuals taking part in this study, college undergraduates. Warnings were randomly assigned to two sets of five (the "A" and "B" set). In the no-warning control condition, other information was substituted for the warning

Figure 1. Two Example Alcoholic Beverage Labels  
(Representations are not scaled to sizes presented in the experiment)



using various statements such as: "This original lager contains nature's choicest products to provide its prized flavor and robustness. Only the finest hops and grains are used. Selected as America's Best." The label area delimited for the warnings remained constant across all labels and conditions. Font size and style was held constant—except that in the Government warning condition all caps were used (as found on most domestic alcoholic beverage containers); otherwise mixed-case font was used (as specified in most warning-design guidelines).

Container labels from 20 fictitious alcoholic beverages were shown to all participants. Labels were randomly divided into two sets of 10—with one set being shown in the first presentation block and the other set shown in the second presentation block. In the 5-warning condition, each of the five warnings (of set A or B) were randomly assigned to two of the 10 labels in the first block and two of the 10 labels in the second block. Thus, in the 5-warning condition, there were four exposures of each warning in the A to A or the B to B sequences. Subjects in the 5-warning condition saw either the A or B set warnings, but not both sets of warnings.

Table 1

## Content of Alcoholic Beverage Warnings

**Warnings in Set A**

WARNING: Drinking Alcohol During Pregnancy May Cause Fetal Alcohol Syndrome which means the Baby may have Deformities, Mental Retardation, Behavior Problems, or Abnormal Growth.

WARNING: Drinking Alcohol and Taking Sleeping Pills, Pain Killers or other Medicines and Drugs can be Deadly. Antibiotics, When Combined with Alcohol, may NOT Work. In the U.S., 25% of ALL Hospitalized Persons have Alcohol-Related Problems.

WARNING: Drinking Coffee, Taking a Cold Shower or Vigorous Activity does NOT Help to Sober Up. The Body Needs 2 Hours to Remove the Alcohol from 1 Beer, 1 Glass of Wine, or 1 Shot of Spirits.

WARNING: Drive Sober. In Many States, the MINIMUM Penalty for Driving Legally Drunk (.08 Blood Alcohol Count) is 6 Months Suspension of Driver's License, 15 Days in Jail, and a \$1500 Fine. Insurance Costs Increase Dramatically.

WARNING: Drunk Driving is the Number-ONE Killer of Children and Young Adults. 55% of Traffic Deaths are Alcohol Related. There is an Alcohol-Related Death EVERY 22 Minutes. 90% of all Fatally Injured Drinking Drivers are Male.

**Warnings in Set B**

WARNING: Drinking Alcohol Increases the Risk of Throat, Stomach, and Prostate Cancer and Diseases of the Liver and Heart, including Cirrhosis High Blood Pressure. Alcohol is also linked with Dietary Deficiencies.

WARNING: Beverage Alcohol (also called Ethyl Alcohol or Ethanol) is a Drug which can be Addictive. Children of Alcoholics have 4 Times the Risk of Being Alcoholics. 4.5 million Young People are Addicted to Alcohol or are Problem Drinkers.

WARNING: Carbonated Alcohol is Absorbed Faster than Noncarbonated Alcohol. Within 2 Minutes Alcohol is Absorbed by the Stomach and Carried by the Blood to the Brain. You can be Poisoned and Die If You Drink Alcohol Too Fast.

WARNING: Acts of Violence are MORE Likely after Drinking Alcohol, Including Sexual Abuse, Rape, Child Beatings, and Murders. If You are Under the Age of 21, It is Illegal to Buy Alcoholic Beverages.

WARNING: 40% of all Americans Will Be Involved in an Alcohol-Related Traffic Accident During Their Lifetime. Alcohol Impairs Your Ability to Drive a Car or Operate Machinery, and Will Make You Overconfident and Your Responses Slower.

In the 10-warning condition, the procedure was similar to the 5-warning condition. However, participants seeing the A warnings in the first presentation block received the B warnings in the second presentation block. Other subjects received the B warnings in the first presentation block and the A warnings in the second presentation block.

To help disguise the true nature of the study and to ensure that exposure to the warnings was of an incidental nature, participants were told that the research was a consumer product marketing study on the marketability of several alcoholic beverage label designs. Participants were told that they would first see a set of labels for 16 seconds each, and then after each label presentation they were to give ratings on two questions. The questions were: (a) "How pleasant looking is the label?" and (b) "How successful do you feel that a product with this label will be in small-scale markets?" Each question was accompanied by a six-point rating scale with end-point anchors of 0 (indicating the absence of quantity on the dimension) and 5 (indicating maximum

quantity on the dimension). Participants marked their answers on two response sheets, one for each of the presentation blocks. The purpose of the rating procedure was to ensure that participants looked at each label as it was presented on the computer and to avoid suggesting that the study was actually concerned with warnings. These ratings merely served as an orienting task and were not evaluated.

After completing the first 10 labels (the first presentation block), participants were told that another purpose of the study was to evaluate their perceptual speed to determine whether it had any relation with their label ratings. The actual reason for having a perceptual-speed task was to prevent rehearsal of the warnings using this task as an intervening distractor activity to separate: (a) the two blocks of label presentations, and (b) later, the second block with the knowledge test. Specifically, participants were told that they would be given a page filled with an array of random letters, and that at the top of the sheet would be a set of three letters that they would have to search for and circle. Both speed and

accuracy was emphasized and after three minutes, participants were asked to stop and then the letter search procedure was repeated with another sheet using a different set of three letters. In total, the distractor activity took approximately eight minutes including instructions.

After completing the distractor activity, participants were given the second set of 10 labels in the second presentation block in which they again made ratings with respect to the two questions described above. Upon completion of the second block of labels, participants performed a second set of perceptual-speed tasks.

After the second distractor-activity period, participants were given a test that contained 49 (fill-in-the-blanks, multiple-choice, and true-false) questions designed to test their knowledge of alcohol facts and hazards. The questionnaire was based on alcohol-knowledge tests used in previous research (Kalsher, Clarke, and Wogalter, 1992; Barlow and Wogalter, 1992). Answers were given a score of 1 if correct or a 0 if incorrect. The data reported below are proportion means.

## RESULTS

A one-way between subjects analysis of variance (ANOVA) was applied to the proportion correct data from the general-knowledge alcoholic beverage facts and hazard test. The analysis showed a significant effect of conditions,  $F(3, 76) = 3.28, p < .05$ . Comparisons among the means using Fisher's Least Significant Difference test showed that the 10-warning condition ( $M = .495$ ) produced significantly higher test scores than either the government warning ( $M = .440$ ) or the no warning control ( $M = .437$ ) conditions. The 5-warning condition ( $M = .482$ ) was slightly lower than the 10-warning condition but it was not significantly different from this or the other two conditions.

Analysis also sought to determine test performance levels for participants viewing only one or both sets of warnings (i.e., receiving only the A-set warnings in both blocks or only the B-set warnings in both blocks *versus* being exposed to both sets of warnings, one set in each block). The test items addressing the information found in the A-set warnings and other test items addressing information in the B-set warnings were separated producing two distinct test scores for each participant. A 6 (Warning Presentation: AA, BB, AB, BA, Government, and No Warning Control) X 2 (Test score for test items addressing the A warnings vs. the B warnings) ANOVA yielded a significant interaction,  $F(5, 74) = 5.24, p < .001$ . Examination of the means shown in Table 2 indicate that participants who viewed only one of the two sets of warnings generally did better on the specific test items assessing knowledge of the exposed warnings but performed at or near baseline levels on items assessing knowledge associated with the non-exposed warnings. Although

Table 2

Proportion Mean Test Scores as a Function of Warning Condition and Section of Test Assessing A Versus B Set Warning Content.

Group	Test Section	
	A Items	B Items
No Warning	.38	.43
Government warning	.38	.49
5-Warning (4 repetitions)		
AA	.50	.45
BB	.38	.59
10-Warnings (2 repetitions)		
AB	.43	.57
BA	.46	.50

participants who viewed both sets of warnings performed better than baseline on both the A and B question sets, their scores were lower than participants who saw the A or the B warnings twice as frequently (four times as opposed to two times). The ANOVA also showed that in general the B-test items ( $M = .51$ ) were easier to answer than the A-test items ( $M = .41$ ),  $F(1, 74) = 49.60, p < .0001$ .

## DISCUSSION

The results show that repeated exposure to the currently mandated government warning produced no significant increase on the alcoholic beverage knowledge test compared to the no-warning control condition. The most likely reason for this result is that the Government warning does not carry much information (or at least not enough to increase performance on our general alcoholic beverage knowledge test). In other words, if the desire is to increase knowledge of the facts and hazards of alcohol, the present government warning appears inadequate.

The study also focused on the influence of rotating 5-versus 10-warning messages over a constant number of (20) label exposures (across two presentation blocks). The results showed that the 10-warning condition promoted broader knowledge of alcohol facts and hazards (overall higher test scores) than the no-warning and government warning conditions. This result indicates that multiple rotating warnings to be an effective purveyor of information. While the 5-warning condition was not significantly different from the no- or government-warning conditions, it was also not significantly different from the 10-warning condition. Further

examination of the test scores indicated that participants in the 5-warning condition had the highest performance of any condition for the warning information that was specifically shown to them (probably because the warnings were presented four times), but performance was near baseline for other warning information that was not shown to them. Participants who viewed both sets of warnings had intermediate test performance when examining the two test sections separately (probably because they were only exposed to the warnings twice during the course of the experiment). In other words, participants exposed to both warning sets (AB and BA) did better on the overall knowledge test because they were exposed to a broader range of information than participants exposed to only one warning set (AA and BB), although the latter two groups performed particularly well on questions related to the warnings they had seen.

These results have policy implications. First, rotating warnings appear to facilitate communication of facts and hazards for a given domain better than single (or no) warnings. This finding is important because some products have multiple hazards that can not be effectively communicated on a single label due to limited surface space on the product. Rotation of multiple warnings is one method that might be chosen under some circumstances (such as for nondurable consumer goods) to convey a set of lesser known facts and hazards over time and across purchases.

Two final comments should be mentioned. One is that the present study measured knowledge of the warnings and not behavioral compliance. Measurement of compliance for the kinds of warnings presented in this study would be very difficult, and would probably require an entirely different research paradigm — if it is even possible to test at all. Nevertheless, knowledge of the hazards is one of the principle goals of warnings (cf. Wogalter, Allison, and McKenna, 1989) and it is also an important intermediate stage of processing before behavioral compliance (Wogalter and Young, 1992).

The second comment relates to the participant population. All of the participants were undergraduates which might limit the experiment's generalizability to other populations. However, this group is probably the single most relevant population to test for this particular product. Undergraduates are approaching the legal drinking age and they are at considerable risk of alcohol abuse. Moreover, college students are targeted by both the alcohol industry in their advertising and by sponsored alcohol abuse prevention programs. The finding that rotating multiple warnings increases this population's knowledge of alcohol-related hazards suggests it should be considered in large-scale prevention programs as it is critically important to reach college students with this information.

## ACKNOWLEDGMENTS

This research was supported in part by a North Carolina State University Faculty Research and Professional Development Grant to the first author. The authors wish to thank Paul Begley and Lori Scancorelli for their help in collecting and keypunching the data.

The second author worked on this research while on sabbatical leave in residence at the Department of Psychology, North Carolina State University, during the 1993-94 academic year. The author wishes to thank members of that department (especially David W. Martin, Head) for help and support during all phases of this research. Special thanks go to Mike Wogalter, with whom the second author focused most of his research efforts while on leave from Rice University.

## REFERENCES

- Barlow, T., and Wogalter, M.S. (1993). Alcoholic beverage warnings in magazine and television advertisements. *Journal of Consumer Research*, 20, 147-156.
- Federal Register (1989). *Implementation of the Alcoholic Beverage Labeling Act of 1988* (Pub. L. 100-690, 27 CFR Parts 4, 5, 7, and 16), Vol. 54, pp. 7160-7164. Washington, DC: U.S. Department of Treasury.
- Gardner-Bonneau, D. J., Kabbara, F., Hwang, M., Bean, H., Gantt, M., Hartshorn, K., Howell, J., and Spence, R. (1989). Cigarette Warnings: Recall of content as a function of gender, message context, smoking habits and time. In *Proceedings of the Human Factors Society 33rd Annual Meeting* (pp. 928-930). Santa Monica, CA: Human Factors Society.
- Kalsher, M. J., Clarke, S. W., and Wogalter, M. S. (1993). Evaluation of a warning placard for communicating alcohol facts and hazards. *Journal of Public Policy & Marketing*, 12, 78-90.
- Kennedy, J. P. (1990). *Sensible Advertising and Family Education Act*. 102nd United States Congress HR 4493, Washington DC.
- Laughery, K. R., Young, S. L., Vaubel, K. P., and Brelsford, J. W. (1993). The noticeability of warnings on alcoholic beverage. *Journal of Public Policy & Marketing*, 12, 38-56.
- Waldman, S. (1988). Do warning labels work? *Newsweek*, July 18, 40-41.
- Wogalter, M. S., Allison, S. T., & McKenna, N. A. (1989). The effects of cost and social influence on warning compliance. *Human Factors*, 31, 133-140.
- Wogalter, M. S., and Young, S. L. (1992). Using warnings to increase safe behavior: A process model approach. In K. Guindon (Ed.) *Best's Safety Directory* (Vol. 2, pp. 1604-1609). Oldwick, NJ: A. M. Best Company.
- Young, S. L. (1991). Increasing the noticeability of warnings: Effects of pictorial, color, signal icon and border. In *Proceedings of the Human Factors Society 35th Annual Meeting* (pp. 580-584). Santa Monica, CA: Human Factors Society.