Effect of Warning Signal Word and Source on Perceived Credibility and Compliance Likelihood

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1. Introduction

The purpose of warnings is to inform people about potential hazards in the environment and to persuade them to engage in behaviors that allow them to avoid injury or property damage (Wogalter & Laughery, 1996). Over the last decade, human factors researchers have identified a variety of factors that influence the effectiveness of warning signs and labels. Some of these are perceptual (e.g., color and size) and some are motivational (e.g., cost of compliance and social influence). Another factor that has the potential to enhance warning effectiveness is the source of the warning message. However, to date, very little research has examined this possibility. Indeed, there has been only one published study on this topic, concerning perceived expertise of a warning's source (Lirtzman & Shuv-Ami, 1986).

The paucity of research is somewhat surprising for two reasons. The first concerns the existence of an extensive body of research in the social persuasion literature showing that source characteristics contribute significantly to message persuasiveness (McGuire 1980). Identified factors include credibility, likability, power, expertise, quantitative aspects, and demographics. It is noteworthy, however, that most of this research has focused on source characteristics in the context of complex messages — not on the simpler messages usually found in warnings. The second reason relates to the important role that well-designed warnings can play in preventing serious injuries. Because of this role, it is critical that efforts be taken to systematically examine factors that can enhance their effectiveness, including characteristics of their source.

Despite the absence of empirical evidence to guide them, the U.S. Congress has mandated specific wording in warnings for cigarettes and beverage alcohol. The cigarette warning begins with the signal word WARNING, whereas the alcohol warning begins with the terms GOVERNMENT WARNING. Yet, it is not clear whether having an attributable source in the warning (i.e., the government) facilitates its effectiveness. If it does, then perhaps adding other terms along with GOVERNMENT that add specificity might further increase its influence.

A related issue is whether the signal word WARNING is even necessary. While there exists a body of research comparing the hazard connotation of various signal words such as DANGER, WARNING, and CAUTION (Wogalter and Silver, 1990, 1995), there has been very little research examining the effect of having a signal word or not, and the research that has been done thus far on this issue has not always yielded positive effects (Wogalter et al., 1987, 1994).

The present research examined the effect of: (a) the presence vs. absence of the signal word WARNING, (b) adding the term GOVERNMENT to the signal word WARNING, and (c) adding other specific terms to GOVERNMENT WARNING (i.e., U.S. and FEDERAL).

2. Method

Participants
Sixty-six undergraduates from Rensselaer Polytechnic Institute participated. This group had a mean age of 19.9 years (SD = 1.5). Thirty six were males. Forty-six were Caucasians.

Materials and procedure

Participants viewed warning messages for three products: alcohol, cigarettes, and iron vitamin supplements. They are shown below.

> _____: (1) 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.

> _____: Cigarette smoke contains carbon monoxide. Smoking causes lung cancer, heart disease, emphysema, and may complicate pregnancy. Smoking by pregnant women may result in fetal injury, premature birth, and low birth weight. Quitting smoking now greatly reduces serious risks to your health.

> _____: Keep away from children. Keep in original package until each use. Contains iron which can harm or cause death to a child. If a child accidentally swallows this product, call a doctor or poison control center.

The alcohol warning message has been mandated since 1989 to be on all beverage alcohol containers sold in the U.S. The cigarette warning message combined the four separate messages mandated to be on cigarettes packages and advertising since the 1980s. The iron warning message was taken from one that the U.S. FDA was considering for iron supplement (e.g., multi-vitamin and mineral) labels.

The warning messages were printed on separate sheets and surrounded by a 4-point rectangular black border. Each had a blank space (underlined) followed by a colon to indicate the location of added prefix wording (if any). Below the warning, they were given six alternatives prefixes (blank/nothing, WARNING, GOVERNMENT WARNING, U.S. GOVERNMENT WARNING, FEDERAL GOVERNMENT WARNING, and U.S. FEDERAL GOVERNMENT WARNING). Participants were told to imagine that each of the prefixes (if any) were added to the beginning of the warning text and instructed to evaluate them according to two 9-point scales. One scale asked for a rating of credibility of the resulting warning and the other asked for rating on the likelihood that they would comply to the warning. The credibility scale was verbally anchored on the even-numbered points with the following: (0) not at all credible, (2) somewhat credible, (4) credible, (6) very credible, and (8) extremely credible. The compliance likelihood scale was verbally anchored on the even-numbered points with the following: (0) not at all likely, (2) somewhat likely, (4) likely, (6) very likely, (8) extremely likely. Participants marked their response on an answer sheet.

Initially participants were asked to read and sign a consent form. They were told that the purpose of the study was to assess people's impressions of warnings that differed in wording. Upon completion of the questionnaire, participants were debriefed, thanked, and dismissed.

3. Results

Table 1 shows the mean credibility and compliance likelihood ratings as a function of product warning and prefix. The table shows that as the prefix increases in specificity and length (number of characters), the ratings become greater. A separate 3 (product warning) X 6 (prefix) repeated-measures analysis of variance (ANOVA) was conducted on each question. For the credibility ratings, the ANOVA showed a significant main effect of product warning, $F(2, 130) = 6.46$, $p < .05$, and a main effect of prefix, $F(5, 325) = 44.39$, $p < .0001$. The interaction was not significant ($p > .05$). Paired comparisons among means using the Tukey HSD test ($ps < .05$) indicated that the iron warning was rated significantly more credible than the other two product warnings. The presence of the signal word WARNING made the message more credible compared to its absence. Adding U.S. GOVERNMENT to the word WARNING (but not GOVERNMENT by itself) produced significantly higher credibility ratings. The three highest rated prefixes (U.S. GOVERNMENT WARNING, FEDERAL GOVERNMENT WARNING, AND U.S. FEDERAL GOVERNMENT WARNING) did not differ, but the two highest were significantly greater than GOVERNMENT WARNING.

Analyses and comparisons of the compliance likelihood ratings mirrored those of the credibility ratings described above. The main difference between the two sets of scores is that for compliance likelihood the iron warning received even higher ratings (compared to the other two product warnings) than it did for credibility.

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Table 1

Mean ratings of credibility and compliance likelihood as a function of product warning and prefix.

Prefix	Credibility			Compliance Likelihood		
	Alcohol	Cigarette	Iron	Alcohol	Cigarette	Iron
[blank]:	2.67	2.71	3.07	3.11	3.06	3.82
WARNING:	3.64	3.81	4.36	3.89	3.96	4.92
GOVERNMENT WARNING:	4.30	4.25	4.64	4.15	4.28	5.29
U.S. GOVERNMENT WARNING:	4.79	4.82	5.14	4.51	4.80	5.51
FEDERAL GOVERNMENT WARNING:	5.13	5.00	5.31	4.62	4.85	5.66
U.S. FEDERAL GOVERNMENT WARNING:	5.33	5.13	5.41	4.69	5.13	5.77

4. Discussion

The present study represents one of the first studies to systematically assess characteristics of warning source. While preliminary, these results suggest that the source of a warning can affect its effectiveness, at least as gauged by the measures used in this study. The main finding of interest was that participants' ratings of perceived credibility and likelihood of compliance were directly related to the length and specificity of the source. Indeed, the highest ratings on these dimensions accompanied the longest, most specific prefix: U.S. FEDERAL GOVERNMENT WARNING. Also as predicted, the presence of a signal word (e.g., WARNING) increased perceived credibility and compliance likelihood estimates compared to its absence, supporting the results of previous research on warnings (e.g., Wogalter et al., 1994).

When applying these findings to the design of warnings, however, the following potential tradeoff should be considered: because the available surface area of warnings is often limited, extra source-related words might preclude the inclusion of other potentially useful information, or it might require the use of smaller size print which could negatively impact legibility and noticeability. In other words, any enhancements provided by the use of specifically named sources might be offset by the loss of other important information due to space limitations.

Finally, it should be noted that the U.S. Government was the only source investigated in this study. It is possible that the persuasive influence of this source might depend on the extent to which people trust their government for guidance. Systematic research on source characteristics is needed, including media stars, scientific organizations, specific government agencies, manufacturers, trade organizations, and other potentially relevant sources not yet identified. Research is also needed on the appeal of these sources to general as well as specific audiences.

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