

# Effects of Cost and Social Influence on Warning Compliance

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The behavioral effects of cost and social influence on warning compliance were examined. Participants in several studies performed a chemistry laboratory task using a set of instructions that contained a warning directing them to wear a safety mask and gloves. Cost was manipulated by locating the masks and gloves in either an accessible location (low cost) or a less accessible location (high cost); social influence was manipulated by the presence of a confederate who either did or did not comply with the warning. The results showed reduced compliance with the warning when the cost was high and that the compliance rate was biased up or down depending on the behavior of the confederate. The results from a field study confirmed the social influence effect. Implications of this research for facilitating warning effectiveness and safety are discussed.

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## INTRODUCTION

McCarthy, Finnegan, Krumm-Scott, and McCarthy (1984) concluded from a literature review that research has failed to demonstrate that warnings are effective. Their review produced considerable interest in and research on the effectiveness of warnings (e.g., Wogalter, Godfrey, Fontenelle, Desaulniers, Rothstein, and Laughery, 1987). Research on warnings has begun to examine the conditions that facilitate and inhibit warning effectiveness. For example, Wogalter et al. (1987) have shown that warning placement can affect compliance. Warnings placed at

the beginning of procedural instructions produce the greatest amount of compliance. In addition, the factors of embeddedness in text (Strawbridge, 1986) and salience (Wogalter et al., 1987) have been shown to affect compliance rates.

Product warning labels serve several distinct functions (Cunitz, 1981; Peters, 1984). First, a warning serves an *informational* function to the extent that the warning informs the consumer of the possible dangers associated with use of the product. A product warning should accomplish more than mere education, however; it should also represent the manufacturer's attempt to persuade the consumer to comply with the warning's instructions. This *behavioral* function that the warning serves is far more important than

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the informational function because it is more critical for individuals (e.g., children) to comply with a warning than it is for them to know why they are complying (compare Wagenaar and Groeneweg, 1987).

The present research is based on the assumption that product warnings represent the manufacturer's attempt to influence consumers' behavior. Current social psychological theory distinguishes between social influence attempts that assume that the target individual systematically processes the persuasive messages and social influence attempts that assume heuristic processing of persuasive messages (Chaiken, 1980; Eagly and Chaiken, 1984). Social influence attempts that assume systematic processing focus on the quality (content) of the persuasive arguments. When people systematically process information, they distinguish high-quality arguments from low-quality ones and thus are persuaded more by arguments high in quality (Petty, Cacioppo, and Goldman, 1981). In contrast, when people heuristically process information, they rely on simple rules of thumb, or heuristics, to guide their thinking about the quality of a persuasive message. Because people have been estimated to be exposed to more than 3,000 social influence attempts daily (primarily from advertising), they rely almost exclusively on heuristics to guide their judgments about compliance (Cialdini, 1984).

Examples of compliance heuristics abound. Eagly and Chaiken (1984) identified five major heuristics that people might employ when deciding whether to be influenced. First, when confronted with a persuasive message they may rely on the perceived expertise of the source of that message. For example, the surgeon general's report on the hazards of smoking carries more weight than an admonishment from a casual friend. Second, people tend to be susceptible to greater influence by those they like than by people

with whom they associate little positive affect. This heuristic is one explanation why Bill Cosby has enjoyed great success selling Jell-O pudding and investment banking. Third, people may evaluate the quality of a persuasive message by the sheer number of arguments contained in the message. Thus they tend to use the number of arguments as a heuristic to infer the validity of them, judging that a greater number of arguments is indicative of the soundness of a position on an issue. Fourth, people are sometimes influenced by the presence of statistics in support of an argument. As a result they buy more sugar-free gum if told that four out of five doctors recommend it than if told only that chewing sugar-free gum has certain benefits.

The fifth compliance heuristic, social influence, is one focus of the present research. People often use the behavior of others to infer the appropriate action for a given situation (Asch, 1955). The terms *consensus* and *conformity* are often used to describe the behavioral result of social influence. As targets of persuasion we might observe the behavior of others to decide whether or not to comply. The social influence heuristic implies that in a situation involving compliance with a warning instruction, we will be more likely to comply with the warning when others are doing so than when others are not. This heuristic also implies the alternative course of action: that we will be less likely to obey a warning if we see that others do not. The present research examined whether warning compliance is influenced by the compliance or lack of compliance of another person.

A second important variable believed to affect the degree to which an individual is susceptible to a persuasion attempt is the perceived cost, in terms of time and effort, associated with the behavior desired by the influence source. Piliavin, Piliavin, and Rodin (1976) varied the cost associated with

engaging in a helping act and found that under conditions of higher cost, people are less likely to offer assistance to a stranger. Cost has also been shown to influence compliance with warning instructions. In a field study conducted by Wogalter et al. (1987) people were more likely to disobey a warning on a set of doors when the warning requested that they take a more effortful diversion, whereas people were more likely to comply when the warning requested less effortful behavior. The present research further examines this effect of cost on warning compliance in a laboratory setting.

Three experiments involved a chemistry demonstration paradigm (Wogalter et al., 1987) in which participants followed instructions to mix chemicals under varied conditions. The first experiment examined the effect of cost on warning compliance. Two follow-up experiments examined the effect of social influence under low- or high-cost conditions. A field study was then conducted to examine the effect of social influence in a real-world setting.

### EXPERIMENT 1

The focus of the first experiment was to examine whether cost would affect warning compliance in a controlled laboratory situation. It was expected that people would be more likely to comply with a warning that instructs a low-effort activity than a high-effort activity.

#### *Method*

*Participants.* Twenty-three college students from an introductory psychology course at the University of Richmond served as voluntary participants to fulfill a course requirement.

*Materials.* A variety of chemistry equipment was provided. The equipment used to perform the demonstration task included a triple-beam balance, beakers, flasks, a gradu-

ated cylinder, a stirring rod, measuring spoons, aluminum foil, measuring cups, disposable vinyl gloves, and paper surgical masks. Purple and green water (made using food coloring) was contained in two wash bottles labeled Solution A and Solution B. Canisters labeled Substance A, Substance B, and Substance C contained green sugar, corn meal, and yellow powdered sugar. The solutions and substances were disguised to help create the illusion that participants were mixing potentially hazardous chemicals.

Participants were given a printed sheet of instructions that described the specific procedures of the chemistry demonstration task. The first few lines provided a short introductory overview of the task they were to perform. The overview told participants (1) that they should complete the laboratory task as quickly and as accurately as possible, (2) that they had a limited amount of time to complete the task, and (3) that the final product would be evaluated for accuracy. Following this introduction was the following warning on a separate line of the text: "WARNING: Wear gloves and masks while performing the task to avoid irritating fumes and possible irritation of skin." Under the warning were two lines of blank space followed by the specific chemical mixing instructions. The instructions contained six steps describing how to measure and mix certain quantities of substances and solutions.

*Procedure.* Participants signed consent forms in a small room near the lab demonstration room where many sets of gloves and masks had been placed on the only table present. Each participant was then taken to a nearby room approximately 8 m (25 ft) away. The second room had a table containing the chemistry materials. The experimenter told participants that they should work as quickly and accurately as possible, that the quality and time to perform the task were being measured, and that if they ran into any prob-

lems simply to do the best they could. An earlier experiment yielded no significant effect for high versus low cost using the present procedure when participants were given an unlimited amount of time and were allowed to ask the experimenter questions. In the present study participants were told they would have a limit of 5 min to complete the task. They were not permitted to ask questions during this time. Before the written instructions were given, participants were asked if they were familiar with a triple-beam balance. If they were not, they were shown how to use it.

In the low-cost condition masks and gloves were in the consent form room and on the laboratory demonstration table as well. In the high-cost condition the masks and gloves were in the consent form room only. Participants were later debriefed.

### Results

The independent variable was high versus low cost and the dependent variable, frequency of compliance (i.e., use of mask and gloves). Table 1 shows the observed frequency of compliance for this experiment and for the other laboratory studies reported

TABLE 1

Frequency of Compliance with Warnings in Laboratory Studies

Using Protective Equipment when Mixing "Chemicals"		Participant Compliance	
		Yes	No
Experiment 1			
Cost	Low	8	3
	High	2	10
Experiment 2 (Low Cost)			
Confederate compliance	Yes	8	0
	No	3	6
Experiment 3 (High Cost)			
Confederate compliance	Yes	7	3
	No	0	10

here. It is apparent that participants in the high-cost condition complied less often than in the low-cost condition. A chi-square analysis of frequency showed the cost effect was significant,  $\chi^2(1, N = 23) = 7.34, p < 0.01$ .

### Discussion

The results of Experiment 1 indicate that the effort of walking to another location can reduce compliance with a warning. These findings are consistent with the Wogalter et al. (1987) field study that showed people are more likely to obey a warning when the cost is low than when the cost is high. The results also support the cost effects found in social psychological research (e.g., Piliavin et al., 1976).

## EXPERIMENT 2

In Experiment 2 we examined the effects of social influence on warning compliance. As mentioned in the introduction, social psychological research suggests that persons are more likely to comply when other persons comply. Conversely, people are less likely to comply when others do not comply. In the present study we examined the influence of the behavior of only one other person (a confederate) to determine whether compliance with warnings is affected by the compliance or noncompliance of the confederate.

### Method

*Participants.* Seventeen college students from an introductory psychology course participated.

*Materials and procedure.* The materials were identical to those in Experiment 1 except that the equipment needed to perform the task was doubled. The procedure was identical to the low-cost condition in Experiment 1 except that a confederate acting as another student participated simultaneously. The confederate either complied or did not comply with the warning.

### Results

Table 1 shows the observed frequency of compliance. It is apparent from the table that when the confederate complied with the warning, the real participants donned masks and gloves more often than when the confederate did not comply. The chi-square analysis for these data was significant,  $\chi^2(1, N = 17) = 8.24, p < 0.01$ .

### Discussion

Warning compliance was reduced or enhanced depending on the behavior of the confederate. Under low-cost conditions 67% of the participants failed to comply when the confederate failed to comply. Although the means to comply (i.e., masks and gloves) were readily available in both conditions, participants tended to follow the actions of the confederate.

## EXPERIMENT 3

Experiment 3 examined the effect of social influence in a high-cost situation. The question was whether the social influence effect would be replicated under high-cost conditions.

### Method

*Participants.* Twenty college students from an introductory psychology course at the University of Richmond participated.

*Materials and procedure.* The materials and procedure of Experiment 3 were identical to those of Experiment 2 with one exception: the experiment was run under the high-cost rather than the low-cost condition of Experiment 1.

### Results

Table 1 shows that participants complied with the warning more often when the confederate complied than when the confederate did not comply. The chi-square analysis of

these data was significant,  $\chi^2(1, N = 20) = 10.77, p < 0.001$ .

### Discussion

Under high-cost conditions, as under low-cost conditions, people are likely to follow the actions of another person. In Experiment 1, 17% of the participants in the high-cost condition complied. In Experiment 3, 70% of the participants complied at high cost when the confederate complied. Nobody complied when the confederate did not comply. Apparently people are more likely to expend the effort to comply when they see another person do so but do not make this effort when the other person does not comply.

To examine the relative potency of cost and social influence effects on warning compliance, we can consider the graphed data from Experiments 2 and 3 presented in Figure 1. The figure shows that although cost and social influence are both important determinants of compliance behavior, the effect of social influence (67%) is twice that of cost (33%). It is also apparent that these two variables do not interact.

In considering the noncompliance with warnings observed here, we could speculate that participants did not actually perceive any risk in the laboratory studies. However, comments from participants (e.g., questions about safety, trying to guess the chemical terms for the substances they used) suggest that the laboratory study validly measured noncompliance with warnings under conditions of some perceived risk. Prior to debriefing, participants were asked whether they remembered seeing the warning. Of those who did not comply, 66% said that they saw the warning.

## A FIELD STUDY

Significant effects of cost and social influence on warning compliance have been confirmed in the laboratory. We might ask next

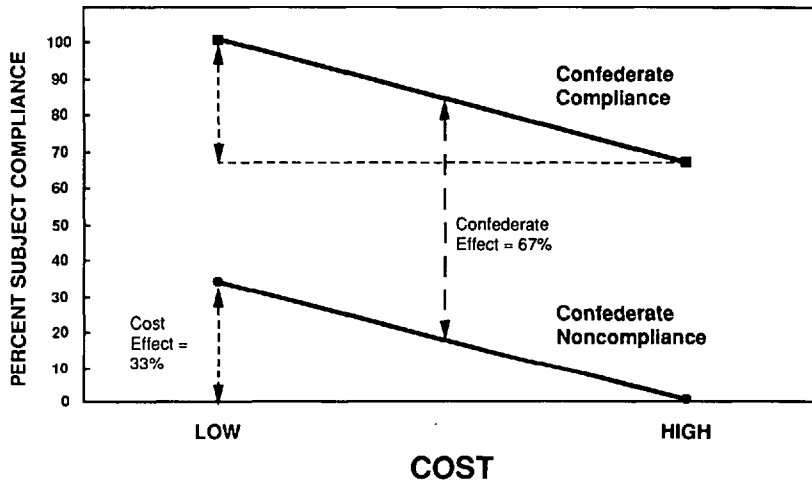


Figure 1. The relative effects of cost and confederate compliance on compliance using the combined data of Experiments 2 and 3.

whether cost and social influence have meaningful effects in a real-world setting. Do these notions have external validity? The effect of cost on warning compliance in a field setting has already been demonstrated (Wogalter et al., 1987). However, there has not yet been external validation of the effects of social influence. We examined that question in the following field study.

The study was conducted in a large women's dormitory at the University of Richmond. A warning was placed just above the buttons of the only elevator in the building. The warning was a 14 × 11-cm (5.5 × 4.5-in) white piece of paper with a handwritten sign in large black letters that stated:

CAUTION  
Elevator May Stick Between Floors  
Use the Stairs

The elevator ran from the basement up to the third floor. The warning was located on the first floor. Several sets of stairs were located at various points in the building. One set of stairs was located approximately 3 m (10 ft) from the elevator. The location of the

elevator and the stairs relative to the walkway allowed observers to distinguish between those people who initially intended to use the stairs and those whose initial intent was to use the elevator.

The study took place over several days and at various times. Three conditions were observed during the course of the study. One was to collect a baseline rate of using the elevator and stairs when the warning was present. The other two conditions examined the effect of a confederate's compliance or noncompliance behavior on the compliance of other people.

The confederate stood in front of the elevator as if waiting for the doors to open. When another person walked up to the elevator, the confederate pressed the button and stared at the warning. In the confederate compliance condition, when the elevator was about to arrive (as indicated by a tone and light signal), the confederate turned and used the stairs. In the confederate noncompliance condition the confederate stopped staring at the warning when the elevator arrival signals came on. When the elevator door opened the confederate entered the elevator and pressed a button

for a floor (after the other person had made his or her choice) different from the one chosen by the person being observed. Only individual persons were observed in this manner in order to avoid complications in experimental controls.

The frequency of compliance can be seen in Table 2, which shows that in the baseline condition most people used the elevator (i.e., they did not comply with the warning). It can also be seen that most people did comply when the confederate complied. An overall chi-square analysis of frequency revealed a significant effect of conditions,  $\chi^2(2, N = 54) = 16.44, p < 0.001$ . The chi-square comparing compliance rates of the baseline and of the confederate-compliance condition was significant,  $\chi^2(1, N = 36) = 11.69, p < 0.001$ . The chi-square comparing the confederate-compliance condition with the confederate-noncompliance condition was also significant,  $\chi^2(1, N = 36) = 13.83, p < 0.001$ , but there was no significant effect for the confederate-noncompliance condition versus the baseline condition,  $\chi^2(1, N = 36) = 0.13$ .

Although the warning sign was placed at a conspicuous location, it is possible that some people did not notice it. It was not practical to ask whether people saw the warning (or to debrief them in any other respect) without letting on that the sign was part of an experiment. However, there are some indications that people saw the warning. One is that baseline compliance was 33% rather than

zero. Moreover, because the present research shows a strong effect of social influence on behavior, we might suppose that people followed other actions of the confederate: if the confederate stared at the warning, then probably other people looked at it too. It should be noted, however, that confederate noncompliance had no effect relative to the baseline. Baseline compliance was already so low that the confederate's actions could not reduce compliance any further.

### GENERAL DISCUSSION

The results of these studies have several implications. To maximize compliance it is preferable to have warnings that direct people to behave in ways that are not effortful. Cost reduction is an engineering problem. Product designers must not only provide necessary warnings but also consider the entire product-human interaction. A given warning might seem satisfactory on the surface (e.g., it attracts attention and communicates hazard information), but the warning may not be effective because of other factors, such as the amount of effort needed to obey the warning's instructions. As we have seen, the simple presence of a warning does not mean that people will comply with its instructions. Warnings need to be tested to determine their effectiveness. Testing should indicate whether redesign of the warning and/or product is needed.

One way to reduce the behavioral cost is to provide ready means to perform the correct behavior. For example, if protective equipment is to be used in conjunction with a product (e.g., gloves with oven cleaners), manufacturers should not expect that users will automatically take steps to obtain safety equipment. One solution is to include the required protective equipment with the product (as with hair-coloring products that contain protective gloves).

The present results show that the behavior

TABLE 2

Frequency of Compliance with Warnings in Field Study

<i>Using Stairs to Avoid "Defective" Elevator</i>		<i>Participant Compliance</i>	
		<i>Yes</i>	<i>No</i>
Confederate compliance	Yes	16	2
	No	5	13
Baseline, no confederate		6	12

of another person has a powerful influence on warning compliance. Compliance is higher when at least one other person also complies, and compliance is lower when at least one other person fails to comply. Therefore, all persons in potentially hazardous work environments should be encouraged to comply with warnings. For example, in work environments where a mask or respirator device is required by warnings, no worker should be seen without the appropriate protective equipment.

The magnitude of the social effect suggests that a potent way to affect compliance is through training that involves behavior modeling. Showing people what to do is probably much more effective than merely telling people what to do. Compliance will be facilitated when others in the hazardous situation model the appropriate behavior.

In considering the potential generality of the social influence effect, we should note that in these studies the behavior of only one other person produced a powerful effect on warning compliance. Research is needed to examine the effects of more than one other person on compliance. According to Latané's (1981) social impact theory, the effects of social influence tend to reach their maximum with three confederates. We might expect a similar ceiling effect with warnings. However, it is not clear what pattern of effects would be found in cases when some persons are seen to comply with a warning and others are seen to ignore it. We can speculate that behavior will be influenced in the direction of the majority but that when there is no clear majority, compliance will be largely influenced by other factors, such as the compliance heuristics noted in the introduction to this paper.

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