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DESIGNING WARNINGS TO BE READ AND REMEMBERED

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DESIGNING WARNINGS TO BE READ AND REMEMBERED

by

PAMELA R. ROTHSTEIN

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE

MASTER OF ARTS

APPROVED, THESIS COMMITTEE:

Kenneth R Laughery
Kenneth R. Laughery, Director
Professor of Psychology

Randi C. Martin
Randi C. Martin,
Assistant Professor of Psychology

Michael J Watkins
Michael J. Watkins,
Professor of Psychology

Sarah A. Burnett
Sarah A. Burnett,
Associate Professor of Psychology

Houston, Texas

May, 1986

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ABSTRACT

Cognitive psychology studies were reviewed for principles that could be used to design warning messages. The likelihood that a warning would be read was tested as a function of location of the warning, highlighting the signal word, and instructing subjects to read. Locating a warning before the directions and highlighting the signal word increased the probability a warning would be read. Memory for on-product warnings was tested as a function of message length, serial position, message format, and pre-questioning. Recall of hazards, procedures to avoid an accident, and the action to take in the event of an accident were tested. Performance, in general, was poor. Message length, message format, and pre-questioning had small effects on recall. No significant effects of serial position were found. Encoding problems due to the nature of the experiment, prior knowledge of warning information, and other types of interference are discussed as explanations for minimal effects.

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Many thanks to my supportive, loving family and to all of my friends in Columbus. Special thanks to all of my committee members and of course, to the whole "warnings group."

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INTRODUCTION

On-product warnings are used to alert consumers to hazards associated with many household products. The warnings also serve to instruct consumers in the event of an accident. Instructions in a warning may direct the consumer to call a physician, induce vomiting, drink milk, get fresh air, or any number of alternatives. Because these instructions could be life saving, it is important that they be communicated in a manner that will lead the consumer to take action as quickly as possible.

It seems reasonable to expect that much research would precede the design of on-product labels. However, it is only within the last couple of years that the study of warnings design has come under the scrutiny of psychologists. Psychologists in the areas of psycho-linguistics, discourse processing, and memory have conducted many studies that are relevant to the design of warnings. In these studies variables such as size of print, length of message, and location of message are investigated. Findings from these studies can provide guidelines for designing warnings that will be noticed, read, understood, and remembered. Some of the relevant literature is discussed below.

Psycholinguistic Research

Psycholinguistic studies offer many guidelines for the construction of individual sentences. In a very general sense, the objective of these guidelines is to foster clear (i.e., concise) writing. More specifically, comprehension and recall of information should be improved when such guidelines are followed. A review is presented of psycholinguistic guidelines for verb, proposition, and noun usage, as well as for overall organization.

Traditional psycholinguistic studies focused on verb usage and proposition type. Coleman (1964) recommended the use of action verbs. Basically, Coleman simplified difficult prose passages by transforming all sentences to their active-verb counterparts. He found that the passages with active-verb transforms were more comprehensible and better recalled than the original passages. Much research supports the use of active voice rather than passive voice and the use of affirmative rather than negative propositions (e.g., Gough, 1965; Mehler, 1963; Slobin, 1966; Clark and Chase, 1972). Generally the use of passive voice and negatives slows the reader down and/or causes the reader to make more errors (both comprehension and recall errors). However, Broadbent (1977) mentioned several examples for which the use of the passive voice is recommended over the use of the active voice. For example, when one has to challenge a presupposition of the reader, a negative could suitably be used. Further, when the use of

negatives or passives will more closely match the order in which some actions will take place, then they should be used rather than the affirmative or active counterparts. Both of these recommendations are very important and quite applicable to the design of warning messages. It is often the case that the function of a warning is, just as Broadbent pointed out, to challenge a presupposition. The purpose of the warning is to prevent the reader from acting in a certain way. Another possibility is that the warning may require the reader to follow a set of ordered instructions. Broadbent's recommendation was that the material should read in such a way that what must be done first is read first. In other words, there should be a correspondence between the sequence of words and the sequence of actions. For example: "Depress the accelerator 2 inches before turning the ignition on" rather than "Turn the ignition on after you have depressed the accelerator 2 inches." In some cases the use of passive voice aids in establishing this correspondence.

Psycholinguistic research has also led to recommendations regarding noun usage. Paivio's (1971) studies on concrete and abstract word differences led to his recommending concrete words and sentences. There will be times, of course, when the content of a warning message is such that it is not possible to use concrete nouns, but as a general rule, they are preferred. Another recommendation regarding noun usage was for consistent

terminology (Hayes-Roth and Thorndike, 1979). In other words, when one term is to be referred to more than once in a warning message, the same word or phrase should be written each time. Finally, the words that are used should be important content words, not filler words such as "there are" or "it is thought" (Bever, 1970).

The guidelines mentioned so far are rather straightforward and have direct implications for the design of individual sentences in a warning message. The use of active verbs is recommended. The use of the active voice and affirmative propositions are generally recommended. However, when the purpose of the text is to challenge a presupposition of the reader or to instruct the reader about an ordered series of events, then the passive voice and the use of negatives may be preferred.

The psycholinguistic studies that remain to be covered, those about organization principles, are more complicated. The degree to which existing organization principles should govern the design of warnings messages must be tempered by the fact that interactions may exist between organization variables and other variables that have not been studied. For example, Frase (cited in Kanouse and Hayes-Roth, 1980) suggested numbering facts in a paragraph. While this procedure seems to be a reasonable recommendation, it may be that for warning messages, numbering facts (i.e., sentences) does not aid recall. Perhaps the length of the total message would interact with

the effect of sentence numbering. Also, numbering some other unit such as the hazards or the prescriptive information might aid recall more than numbering every sentence. It would be informative to systematically investigate the use of numbering in warning messages. Of particular interest is which unit should be numbered to yield the highest probability of recall. Frase also recommended that most sentences be kept short. Although keeping sentences short is a good rule of thumb, sentences must always be long enough to minimize ambiguity and to maximize comprehension and recall (Foss, Bever, and Silver, 1968). Organization issues and their effects on recall are further discussed in subsequent sections of this paper.

The studies presented thus far by no means exhaust the contributions of psycholinguistic research findings. In particular, studies have not been reviewed which consider the dimensions of individual words such as frequency, length, pronunciation, and meaningfulness. Felker (1980) provided an excellent review of these and other psycholinguistic topics. The primary reason for reviewing the psycholinguistic literature was to obtain principles for structuring comprehensible sentences that are easy to recall. The design of warning messages, however, involves more than structuring individual sentences. The reader may confront 2, 7, or 15 or more sentences to read, understand and remember. Researchers in the field of discourse processing, a special branch of psycholinguistics, study

comprehension and retention of narrative text. In this field the to-be-learned material is at least one paragraph long and often consists of several paragraphs.

Discourse Processing Research

Some of the earliest studies in discourse processing dealt with how people acquire and retain information. One major finding was that people will incorrectly recognize partial concepts if the original sentences are semantically related. The explanation that Hayes-Roth and Thorndike (1979) gave was that people integrate the sentences into holistic ideas. The implications of this finding for structuring warning messages is that readers' presuppositions and inferences play a role in what is remembered. Sometimes information will be remembered incorrectly because of the way a reader integrated it with existing knowledge. Therefore, warning message writers should determine who their audience is and what prior assumptions that population makes regarding the use of the product. Whenever possible the warning should be field-tested to determine what kinds of inferences are made when the warning is read and what the consequences are of such inferences.

Other discourse processing literature has demonstrated the functionality of titles (e.g., Niegermann, 1982). Kozminsky (1977) demonstrated that the use of titles affects what information the reader emphasizes and also how

the reader organizes that information for later recall. In considering the design of warnings one issue of interest is whether a signal word acts as a kind of title. Three signal words, danger, warning, and caution, are currently used to denote three levels of hazards. An interesting research question is "Does the signal word influence the reader's memory or organization of the text?" Of course another useful question is "Does the signal word have the connotation that it is intended to have?" A few informal studies have addressed this last question. K.R. Laughery (personal communication, November, 1984) found that danger connotes the most severe hazard, but warning and caution are not well-differentiated. If signal words act as a kind of title, it may be that the connotations associated with the particular signal words influence recall of warning messages.

More recent studies of discourse processing have investigated the effect of text structure and organization on comprehension (e.g., Kintsch and Kozminsky, 1977). As expected, the general finding was that such structure does affect both comprehension and recall. It is also generally believed (Felker, 1980) that information is organized hierarchically and that people understand and retain topic information more than details. Implications for the design of warnings are that when details are important (and they may often be) additional means of ensuring recall are necessary. In the review of the other cognitive psychology

literature, possibilities for increasing the probability of recall are discussed.

To conclude the review on discourse processing one more study is presented in greater detail. Bower (1982) investigated whether college students would arrange elements of narrative episodes in the same importance hierarchy as story grammars claimed the episodes belonged. Further, Bower studied whether the students would summarize episodes and recall them based on this same hierarchy. Bower presented 8 sentences to each student: 4 filler sentences (unimportant), a goal, a complication, an action, and an outcome. Some students read the story and 15 minutes later recalled it. Other students rank-ordered the 8 statements according to their importance within the episode. Bower found that the filler sentences were least likely to be recalled and also were rated as least important. He further noted that the goal statement was rated as most important and received the second highest probability of being recalled. In summary, there seemed to be some correlation between ranked importance of a statement and the probability of its being recalled. This finding has some very interesting implications for the design of warnings. If this same correlation exists for the kind of information in a warning message, and if there is some interindividual consistency as to which statements are most important, then statements which have a high probability of being recalled could be specified. Also

statements which are less likely to be recalled could be predicted, and strategies for increasing the recall probability for those statements could be developed.

Discourse processing literature provides guidelines for structuring warning messages as does the broader field of psycholinguistics. The advantage of generalizing from the discourse literature is that one or more paragraphs serve as the stimulus material rather than single words or sentences which are the traditional units of study in psycholinguistic experiments. None the less, the discourse processing findings must be tested using warnings as stimulus materials before previous results can be considered generalizable. The need for this additional testing is two-fold. First, the text in the discourse studies are generally story-like events, the kind of narration found in children's books. Often in that kind of text understanding one part of a paragraph depends on an understanding of an earlier part. On the other hand, the text in warning messages is connected only in that each sentence refers to a common product. Although subsets of sentences in a warning may be related, comprehension of the last few sentences is unlikely to depend on comprehension of the first few sentences, and rarely does a unifying plot unfold. Second, the retention interval used in discourse studies is generally short; that is, subjects are presented with the stimulus material for a minute or so and are tested for recall about 45 minutes later. The retention

interval in tests of warning messages should be longer than 45 minutes, because a consumer may read a product label and then not need to recall the information for hours, days, or weeks.

Text Manipulation and Memory Research

The remainder of this review covers two variables that can affect memory for text. The two major topics are serial position effects and the use of questioning within the text.

Serial position effects are some of the most reliable, robust phenomena in cognitive psychology. In free recall tasks two serial position curves are obtained depending on when the test period occurs. When recall of word lists is requested immediately after the presentation of the words then the last few words in the list have the highest probability of being recalled. This result is known as the recency effect. In addition, the first couple of words also have a high probability of being recalled relative to the words that occurred in the middle of the list and is known as the primacy effect. Another relevant serial position function is the one obtained for delayed recall. The recency effect in the delayed condition is less than in the immediate condition. Not only is the magnitude diminished, but in some cases performance on the last presented items will actually drop below recall for items

in the middle of the list. This relatively poor recall of the last items is known as the negative recency effect.

One implication of the primacy effect for warning messages is that placing information in the first few sentences will increase the probability of recall of that information relative to the probability of recall of that same information in later positions. Unfortunately, the stimulus items traditionally used in serial position studies are single words; whereas warning messages are composed of many sentences. A reasonable question then, is "Does a primacy effect occur in delayed recall conditions when the stimuli are parts of warning messages?" While findings from this line of research have direct implications for the organization of warning messages, it may be that other factors such as perceived importance of the sentences interact with the serial position effect. Since the serial position effects are usually robust, it will be interesting to look for the same findings in the applied context of on-product warning messages.

The next variable is often characterized as text manipulation (Felker, 1980). Questions are inserted in different parts of the text to increase comprehension. The basic idea is that the questions help focus the reader's attention. Typically, questions are placed either before or immediately following prose passages. Subjects are told to answer the questions while they study the passages. After subjects read the passages they are given a posttest.

Rothkopf (1966) and Rothkopf and Bisbicos (1967) found that prequestions and postquestions increased learning of information related to the questions, but that only postquestions facilitated incidental learning.

Question variables other than location have also been investigated. Felker (1980) cites investigations of the frequency of questions, and of subject motivation to answer questions. A fourth variable, and one that is relevant to the design of warnings is the type of inserted question. Some types of questions are fairly easy for the reader to answer. Questions that require verbatim answers do not demand much of the reader relative to other kinds of questions involving concept applications or inferences. For example, Brunning (1969) found that completion-type questions resulted in better learning than did statement-type questions. Similarly it has been found that requiring subjects to engage in semantic orienting tasks facilitates recall of information more than participation in non-semantic tasks (e.g., Hyde and Jenkins, 1973). More generally, memory for text should increase with the amount of processing required and with the difficulty of processing required. A review of the literature on the use of questions in text can be found in Glaser and Resnick (1972).

Summary of Basic Research

To reiterate, several areas of basic research provide guidelines for structuring warning messages. Psycho-linguistic studies provide principles by which nouns, verbs, and propositions should be chosen. In addition, those studies raise the possibility of using numbers to help organize the text and to facilitate recall. Studies in discourse processing emphasize the role of prior knowledge in recall of information, suggesting that user population characteristics be carefully considered. Other studies demonstrate the functional use of titles and the tendency for people to recall topic information more than details. Also of interest is the finding that ranked importance of statements correlates with the probability of recall. Still other studies provide principles for organizing the text. Primacy/recency findings demonstrate that the first few items in a list will be recalled more often than the remaining items. Finally, studies on the use of questioning indicate that adding questions to the beginning or ending of warning messages may facilitate deeper processing of the information and improve subsequent recall.

These studies provide a great deal of information about what people are likely to understand and remember when they read; however, the studies do not provide information about people who are reading actual on-product warnings. In research similar to the examples presented

above, subjects are involved in a limited number of tasks, they are provided with written materials that are on a standard size paper, and they are in a relatively safe environment. In contrast, a consumer about to use a product may be in the middle of 4 or 5 other chores, may be exposed to products that really are dangerous, and may have to read extremely small print.

The examples just mentioned point up some of the problems with deriving design guidelines from basic research studies. To confirm the use of these guidelines, it is necessary to demonstrate their utility in applied settings. To date, very little research with that purpose has been conducted. However, there are a few researchers who have investigated the effects of basic memory variables in applied settings. Findings from some of those studies also have implications for the design of on-product warnings.

Applied Research

Philip Ley has conducted research on patients' recall of medical information presented by doctors. Ley reports baseline recall of information at about 40-60 percent. In other words, most people can recall only half of what their doctors say (Ley, 1980). In several experiments Ley investigated and manipulated variables in an attempt to increase recall. In one study Ley (1975) found a significant effect for specificity. When medical advice

was formulated in a specific manner such as "Weigh yourself every Saturday at 11:00." recall was better than when advice was formulated more generally. An example of the general advice is "Keep track of your weight." This result seemingly contradicts a finding mentioned previously that topic information is better recalled than details. However, it may be that details can be perceived as either pertinent or irrelevant. When details are perceived as pertinent, they are remembered, otherwise they are forgotten. Ley (1980) also reported a correlation between recall and the amount of information presented. In 1973 he reported that categorization facilitated recall. The study that will be discussed in more detail was conducted in 1972. Ley (1972) investigated serial position, rated importance, and recall of medical information. Six or twelve statements were presented to each subject. The statements had been previously ranked for importance by other subjects. The statements were read to the subjects and twenty minutes later a recall test was given. Ley reported that the important statements were better recalled than the unimportant statements. This finding is consistent with Bower's findings (1982). Ley also reported a primacy effect. Subjects recalled best what they were told first and what was rated as most important.

Although Ley's work is relevant to the study of on-product warnings, the following factors limit the direct application of Ley's work to the design of on-product

warnings. Ley did not discuss how the position and importance variables might interact. Certainly in the design of warnings the interaction is important. Also, the statements were read to the subjects. In most instances when people encounter warnings, they read the warnings silently. A third limitation to the immediate generalizability of Ley's results is that recall was requested only after 20 minutes. It is desirable to test retention after a few days in order to make recommendations for warnings.

STATEMENT OF THE PROBLEM

The reusable nature of some household products such as glues and toilet bowl cleaners present a special problem in the design of warnings. As household products are reused, the warnings are less likely to be useful for several reasons. First, as a product is reused, the warning is less likely to be noticed and read (Godfrey & Laughery, 1984). Second, the product may no longer be in its original container; thus for all practical purposes, the warning does not exist. And finally, even if the product is in its original container, and even if the consumer is inclined to read the warning, the original product label may have worn off. For these reasons it is important to design warnings that are easy to remember.

The purpose of the research reported here is to determine the extent to which some of the basic laboratory findings are generalizable to the study of memory for on-product warning messages. Ley's research provides an excellent illustration of the need to test the generalizability of basic research findings. Often the basic findings will hold up in applied settings, but it is important to identify the conditions under which the findings do not hold up. Many factors that influence comprehension and recall were identified in the studies presented above. Four readily identifiable factors were message length, serial position, message format, and pre-questioning. In the context of the basic studies these

factors influenced memory. However, the extent to which these factors influence memory for warning information remains to be demonstrated.

METHOD

Prior to the memory experiments two studies were carried out to determine an appropriate design for the labels to be used in the memory studies. In the first design study subjects looked at 13 labels, and ranked the labels from least likely to most likely to be read. The second design study determined if subjects were more likely to read the labels that had been ranked as more likely to be read.

Label Design Experiment #1

Subjects. Twenty college students participated voluntarily in the first study.

Materials. Each of the 13 warning labels was displayed on a sheet of 8-1/2 x 11 inch paper. Each label had been reduced using a copy machine so that the text area was approximately 3 x 5 inches. A label was composed of a warning, directions for use, and a general description of a product. The words were the same on all labels. The three variables that were manipulated were 1) the location of the warning relative to the directions (before or after), 2) the method for highlighting the signal word (red background, red outline, or no highlight), and 3) an instruction to read the warning (statement or no statement). These three variables were combined

factorially producing 12 different labels. A label design from a previous pilot study was included as the 13th label. On this label the warning appeared after the directions, had no highlighting or instruction to read, and had less white space relative to text than the new labels. Examples of the 13 labels are presented in Appendix A.

Procedure. Subjects were instructed to look through the set of labels and to then order the labels on the basis of which warning they would be most likely to read. Subjects ordered the labels by placing them in a pile with the one most likely to be read on top and the one least likely to be read on the bottom. Each label was scored for each subject from 1 to 13 on the basis of its position in the ordered set, resulting in 20 scores for each label (1 for each of 20 subjects).

Results. The mean ranking for each of the labels is presented in Table 1. T-tests were conducted for each of the three variables using the mean score for each of the 13 labels. To investigate the role of the variable location, the mean ranking when the warning occurred before the directions was compared to the mean ranking when the warning occurred after the directions. To investigate the role of highlighting, the mean ranking when the highlight was a red background was compared to when the background

Table 1

Mean Ranking of Each Label Design

Label Design	Mean Ranking
USR1	2.90
UNR1	4.05
DSR1	3.45
DNR1	4.50
USR2	5.10
UNR2	5.80
DSR2	5.85
DNR2	6.75
USB	8.95
DSB	10.10
UNB	10.35
DNB	10.60
000	12.40

Note. 1 = Most likely to be read
13 = Least likely to be read
U = Warning before directions (Up)
D = Warning below directions (Down)
S = Statement to read warning
N = No statement to read warning
R1 = Highlight signal word with red background
R2 = Highlight signal word with red outline
B = No highlight (blank)
000 = Old label design

was a red outline. Comparisons to no highlighting were also made. Similarly, to investigate the use of instructions to read the warning, the mean ranking when a statement appeared was compared to the mean ranking when no statement appeared.

Significant effects ($p<.05$) were found for all three variables. The obtained values were as follows: Location $T(19)=2.35$; Instruction $T(19)=2.58$; Highlight #1, red

background compared to no highlight T(19)=9.68; Highlight #2, red outline compared to no highlight T(19)=7.29. In summary, the warnings were rated as more likely to be read when the warning preceded the directions, when there was an instruction to read the warning, and when the signal word was highlighted.

Label Design Experiment #2

Subjects. Forty-four college students received course credit for participating in this experiment.

Materials. Three labels from Experiment #1 were selected for this experiment. The three labels had the following characteristics: 1) warning message first, red background, instruction to read; 2) warning message first, red background, no instruction to read; 3) warning message last, no highlight, no instruction to read (label used in pilot work). In this experiment, each label appeared as described in the previous experiment except that the labels were each affixed to a bottle of glue.

Procedure. Subjects were told that they would be carrying out part of a creativity task. They were to use a set of 4 products to build a structure of their own choosing. The labels on the four products were the same design for any given subject. Twenty subjects were exposed

to the first design listed above, 14 subjects were exposed to the second design, and 10 subjects were exposed to the third design. Once the instructions were given to the subject, the subject was to begin reading the labels on the products and creating a structure. Just after the subject began building something, the experimenter stopped the subject and explained that the experiment was over. The experimenter then pointed out the warning portion of the label on each of the four products and asked the subject whether the warning was read (for each product).

Results. The percentage of subjects reporting reading each of the 3 designs was calculated. The results show that 96% of the subjects seeing design #2 reported reading the warning, while 40% of the subjects seeing design #1 reported reading the warning, and 35% of the subjects seeing design #3 reported reading the warning.

Discussion. Based on the findings from these two experiments, design #2 was implemented in the recall studies that are reported below. That label design included a warning that preceded the directions, a red background for the signal word, and no instruction to read the warning label.

Memory Experiments

An incidental learning paradigm was used to determine the effect of message length, serial position, pre-questioning, and message format on memory for on-product warnings. First, four commercial products were chosen, one product for each variable (to be described below). The four products were dressed with computer-generated warning labels and then packaged in a "creativity kit." Subjects spent their first experimental session using the four products in the kit to build any structure that they could imagine. Subjects were told to read and follow all directions, to use all four products, to allow only three of the products to come in contact with one another, and not to build anything symmetrical. The second experimental session included an unexpected recall test for the warning information on each product.

Subjects. A total of 81 students from Rice University and the University of Houston received course credit for participating in this study. Fifty-four students made up the experimental group, that is, 54 subjects participated in both experimental sessions described above. Twenty-seven subjects were in a baseline group. These 27 subjects participated only in the second session described above. These baseline subjects were tested on the same questions as the experimental subjects, though the test for

the baseline subjects was a test of general knowledge rather than a test of recall based on exposure during the experimental session. It is this level of general knowledge against which the effect of exposure to the warnings is compared.

Materials. The labels used in the different conditions are shown in Appendix B. Each of the labels had black print on white paper and was taped on to the product container. As mentioned above, the warning statements preceded the directions for use on each of the labels and the signal word was surrounded by a red background. Every warning consisted of 3 components: a hazard, a means to avoid the accident associated with the hazard, and a remedy in the event of the accident. For example, a warning statement about an eye injury would contain the following three sentences: 1) May cause serious eye injury. 2) Do not point or spray near face. 3) If in contact with eyes, flush with water for 15 minutes and call a physician.

The warning information found on each product varied depending on the condition the subject represented. The instructions for use varied across products, of course, but was consistent across conditions for any given product.

Message length. The variable message length was manipulated on a party string product marketed in an aerosol spray can. There were three levels of this

variable. Each label had 3, 6, or 9 warnings. In other words, there were 9 possible warnings (9 sets of the 3 sentences). One-third of the labels were designed with all 9 warnings, 1/3 of the labels were designed with 6 of the warnings, and the remaining 1/3 were designed with only 3 warnings (i.e., 3 sets of the 3 sentences). Eighteen subjects received the label with 9 warnings. Similarly, 18 subjects received labels with 3 warnings and 18 had labels with 6 statements. To control for item effects, 3 subsets of 3 warnings and 3 subsets of 6 warnings were prepared. All subjects were tested by responding to 8 questions.

Serial position. The serial position effect was examined for warning statements on an adhesive product. Using the adhesive required mixing together wood glue, an epoxy component, and a resin component. There were 6 warnings on each of these labels. The order in which the items were listed was arranged according to a Latin square, so that every item occurred in every position. Using this procedure, 6 labels with different orders were created, and each of the 6 orders was seen by 9 subjects.

Format. The variable format was manipulated on a fake snow product that is marketed in an aerosol spray can. There were two possible formats, list and paragraph. The order of the specific warning items and the number of items (5) was kept constant on these labels. Twenty-seven

subjects saw the list format and the other 27 subjects saw the paragraph format.

Pre-questioning. This variable was manipulated on a modeling compound usually referred to as "play-dough." All subjects saw the same warning statements (there were 4). The manipulation was the appearance of one question preceding the warnings. There were three levels of this condition. The label seen by 18 of the subjects had no question. The label seen by 18 of the subjects was headed with the question "Are you aware of these hazards??" The label seen by the remaining 18 subjects was headed by the question "What would you do if these accidents occurred??"

Procedure: Experimental Session #1 (Exposure to the On-Product Warnings. Fifty-four subjects were run individually in the first session. The experimenter placed the four products in a "creativity" kit on a table in front of the subject. The four products, as mentioned above, were party string, adhesive, fake snow, and play-dough. Each subject was instructed to carry out a creativity task by building something using the materials in the kit. The important qualifiers were to "read and follow all directions" and to "use all of the products." Materials included in the kit were the 4 products with accompanying labels, popsickle sticks, macaroni, and a cardboard base on which to build the structure.

At the end of 25 minutes the subject was asked to complete the creation. At that time the experimenter asked the subject several questions, most of which were distractors. The questions are shown in Appendix C. One important question was whether each of the labels had been read. It should be noted that this question was asked in a rather inconsequential manner so that it would not arouse any suspicion that the label information was an important part of the second experimental session. The subject was then excused and reminded to attend the second session. No mention was made of what specifically would be done at the second session.

Procedure: Experimental Session #2 (Unannounced Memory Test of On-Product Warnings. Two groups of subjects participated in this session. The first group involved the 54 subjects who had previously participated in the first session. In addition, a control group of 27 subjects who did not participate in the first session was included. This later group provided the baseline scores for all 4 variables. Baseline data represents the level of general knowledge against which the experimental subjects' scores are compared.

Subjects were tested in small groups. Before being told that they were to receive recall tests, subjects were asked to write down what they thought they would be doing during this session (baseline group excluded). The

experimenter then named and demonstrated each of the 4 products. Next, the three kinds of recall were tested for each of the four variables. The experimenter read each question to the subjects and the subjects wrote their responses on mimeographed answer sheets. These questions are presented in Appendix D. The first task was to recall the hazards that were associated with each of the products. For example, the experimenter would say "Think about this adhesive product. Several hazards (the word hazard was then defined) were listed on this label. Write down all of the hazards you can think of that were listed." The second task was to respond to a series of "what to..." questions. Each of the questions corresponded to a warning sentence on one of the products that dictated what precaution should be taken to avoid a certain accident. For example, the experimenter would state, "Think about this adhesive product. What would you do to avoid an eye injury while using this product?" The third task was to respond to a series of "what if..." questions. For example, the experimenter would state, "Think about this adhesive product. What would you do if you got this product in your eye?" Subjects were instructed to think carefully about what was specified on the label of the particular product in question. Experimental subjects were told to respond primarily on the basis of their memory for the information, but when they could not remember, they were told to write

down some reasonable action. Baseline subjects were told to write down some reasonable action.

Half of the subjects received the questions in one order and half of the subjects received the questions in the reverse order.

RESULTS

Prior to scoring the recall tests, a list of acceptable answers to each question was prepared. Examples of acceptable answers are presented in Appendix E. Subsequently, each response was scored as correct or incorrect. The number of correct responses was then tallied. The data presented below include subjects who reported reading the labels together with subjects who reported not reading the labels. The reason for reporting the data combined is that significance tests on data from only the readers did not differ from significance tests run on data from all subjects. In other words, significant effects for readers-only data were also significant when readers and non-readers data was combined and analyzed. Similarly, non-significant effects for readers-only data were also non-significant when readers and non-readers data was combined and analyzed. The number of subjects who reported reading/not reading the warnings is reported along with the significance tests for each variable.

Significance tests were run for the three recall measures for each of the four variables. Following a MANOVA significant at $p<.05$ (using Wilk's criterion), separate ANOVA's were run for each of the 3 dependent variables. ANOVA's significant at $p<.05$ are reported below and were followed with Studentized Newman-Keul's pair-wise comparisons.

Message Length

Subjects were exposed to 0 (baseline), 3, 6, or 9 warnings. Scores were the total number of correct answers (out of 8). Average number of correct answers for each group are reported in Table 2 for each of the three recall measures.

Table 2

Message Length:
Average Number of Correct Answers (out of 8)
For Each Condition For Each Recall Measure

	Average Number Correct		
Condition	Hazard	To	If
Baseline	2.56	2.63	1.15
3 Statements	2.06	2.67	1.72
6 Statements	2.39	3.72	1.39
9 Statements	2.61	3.83	1.72

Note. Number Reporting Reading Label = 44
Number Reporting Not Reading Label = 10

An effect of message length was found for one dependent measure, the "what to..." questions, $F(3,77) = 3.98$, $p<.05$. The subjects exposed to 9 statements and those exposed to 6 statements answered correctly significantly more questions than did the subjects exposed to 3 statements and the baseline subjects. There were no significant differences between the subjects

exposed to 6 and 9 statements, nor between the subjects exposed to 0 (baseline) and 3 statements.

A second way to study this data is to consider the proportion of information that subjects recalled across recall measures. For example: for subjects exposed to 3 statements, first convert all means to percentages, 1.72 = 57%, 2.06 = 69%, 2.67 = 89%; then divide by 3 to get the average percent correct across all recall measures = 72%.

Combining means across recall measures subjects exposed to 9 statements recalled about 34% of what they were exposed to; subjects exposed to 6 statements recalled about 42%; and subjects exposed to 3 statements recalled about 72%.

Responses for each subject were also scored to determine the number of intrusions. An intrusion was defined as a response to any question that was not correct for that product, but that would be a correct response for another product. The average number of intrusions for each condition is reported in Table 3 for each of the three recall measures.

An effect of message length on number of intrusions was found for one dependent measure, the "recall the hazards" questions, $F(3,77) = 14.39$, $p<.05$. The number of intrusions was significantly greater for the experimental subjects exposed to 3 statements, (i.e., the shortest message length).

Table 3

Message Length:
Average Number of Intrusions
For Each Condition For Each Recall Measure

	Average Number Intrusions		
Condition	Hazard	To	If
Baseline	0.00	0.74	1.93
3 Statements	1.39	0.28	1.17
6 Statements	0.39	0.56	1.89
9 Statements	0.33	0.67	1.78

Serial Position

The percentage of correct responses (for all subjects) for each serial position for each recall measure is reported in Table 4. None of the effects of serial position were significant, even when excluding those subjects who reported not reading the label. For one set of questions, the "What would you do to avoid an accident..." questions, only 5 questions were asked. The omission of the sixth question was an experimenter error.

Format

Subjects were exposed to warnings in a list or a paragraph format (or nothing, as in the baseline condition). Scores were the total number of correct responses. The average number of correct responses is reported in Table 5.

Table 4

Serial Position:
Percent of Correct Responses
For Each Position For Each Recall Measure

	Percent Correct Response		
Position	Hazard	To	If
1	46	17	39
2	39	26	43
3	35	24	44
4	41	30	29
5	46	19	31
6	44	--	43

Note. Only 5 positions were tested for "what to..." questions.

Number Reporting Reading Label = 47
Number Reporting Not Reading Label = 7

Table 5

Message Format:
Average Number of Correct Answers (out of 5)
For Each Condition For Each Recall Measure

	Average Number Correct		
Condition	Hazard	To	If
Baseline	1.48	1.56	0.37
List	1.33	2.11	0.44
Paragraph	1.15	2.48	0.37

Note. Number Reporting Reading Label = 44
Number Reporting Not Reading Label = 10

The omnibus significance test did reach significance $F(2,8) = 4.57$, $p<.05$, for the "what to..." questions, but the subsequent pair-wise comparison revealed an effect of exposure to the paragraph format rather than an effect of the type of format. More specifically, the average number of correct responses (out of 5) for the subjects receiving the paragraph format was significantly greater than the average number of responses for the baseline subjects. There was no difference between the average number of correct responses for the subjects receiving the paragraph format and the subjects receiving the list format.

Pre-Questioning

Scores were the total number of correct responses. The average number of correct responses for each group is reported in Table 6. An effect of pre-questioning was found for the "what to..." questions, $F(3,77) = 5.75$, $p<.05$.

The average number of correct responses (out of 4) for the experimental subjects receiving the question "Are you aware of these hazards??" was significantly greater than any of the other subject groups. The omnibus significance test for the "what if..." questions was significant, $F(3,77) = 2.94$, $p<.05$.

Another question addressed to this set of labels was whether the presence of a question would influence whether the label would be read. An anova was conducted on the

Table 6

Pre-Questioning:
Average Number of Correct Answers (out of 4)
For Each Condition For Each Recall Measure

	Average Number Correct		
Condition	Hazard	To	If
Baseline	0.85	0.85	0.52
No Question	0.83	1.11	1.00
Are aware?	1.00	1.61	1.11
What to do?	0.78	1.17	0.89

Note. Number Reporting Reading Label = 35
Number Reporting Not Reading Label = 19

number of subjects in each condition who reported reading the label. The anova revealed significant differences, $F(2,51) = 3.21$, $p<.05$. The number of subjects who read the label with the question "Are you aware..." was 15, whereas only 10 people in the other two experimental conditions read the label.

DISCUSSION

The likelihood that warnings would be read was examined as a function of three label design variables: location of warning, use of highlighting, and instruction to read. Recall for on-product warnings was examined as a function of four variables: message length, serial position, message format, and pre-questioning.

Results from the label design experiments indicated that warnings were more likely to be read when they preceded the directions on the label and when the signal word was highlighted. Exposure to this optimal design resulted in almost all subjects (96%) reading the warning, whereas exposure to other designs resulted in about one-third of the subjects reading the label. Clearly, the location of a warning and the use of highlighting should be considered important factors in the design of on-product warnings.

The results from the memory studies are not so straight-forward, though the results provide much useful information. One effect of message length was that subjects exposed to 6 or 9 statements recalled about 1 more "how to avoid an accident" statement than did the subjects exposed to 3 warnings. It is interesting that subjects exposed to 2 and 3 times the amount of information recalled only 1 more item. The implication of this apparent ceiling effect is that increasing the length of a warning message will not guarantee an increase in the amount of information

that is remembered. Further, it is likely that if an increase occurs, it will not be very large.

A second effect is that subjects exposed to 3 warnings (short length) had significantly more intrusions than the other groups when the information to be recalled was naming hazards. It may be that the subjects were aware of more hazards from their life experiences that interfered with producing answers specifically from the experimental context. Because the hazards listed on the products were similar to hazards listed on store-bought products, it makes sense that interference would be greater for the general level of knowledge required of a "what are the hazards" question than from the more specific "what if..." kind of question. The answers to the "what if..." questions were not as similar to store-bought products.

Quite surprisingly, there were no significant effects of serial position. Findings from traditional memory studies dictate primacy and possible recency effects. To investigate this unusual finding, correct answers to each question were tallied, irrespective of the position in which they occurred. The answers were tallied separately for two groups: those who reported reading the labels, and those who reported not reading the labels. The subjects who reported reading the label did, in fact, perform better on some of the questions, as indicated in Table 7. An overview of the data presented in Table 7 clearly indicates the existence of item effects.

Table 7

Percentage of Correct Answers
For Each Question For Each Recall Measure

	Percentage Correct Per Question					
Recall Measure	1	2	3	4	5	6
Recalling Hazards						
Readers	13	64	66	62	51	0
Non-Readers	14	57	86	29	14	0
Answering "What to..."						
Readers	0	62	6	47	6	-
Non-Readers	0	4	0	4	2	-
Answering "What if..."						
Readers	17	57	45	38	64	21
Non-Readers	2	4	4	6	4	4

Note. Readers = Subjects who reported reading the warning. Non-Readers = Subjects who reported not reading the warning.

Subjects were likely to recall only 3 of the 6 hazards: the eye hazard, the ingestion hazard, and the finger bonding hazard. The other 3 hazards were rarely recalled. Responses to "what to..." questions about eye hazards and noxious vapors were correct about half of the time, whereas responses to the other 2 questions were almost never correct. Responses to the "what if..." questions about eye hazards and noxious vapors were answered correctly most of the time. Responses to questions about finger bonding and ingestion were correct almost half of the time. And response to the remaining 2

questions were least likely to be correct. Performance for the non-readers was poor across all questions.

The existence of similar item effects for baseline and experimental subjects, as well as overall low performance, supports a previous statement that the variables manipulated in this experiment had relatively little effect on subjects' memory for on-product warnings. In some cases, exposure to the warning labels did increase recall performance, but the exposure also resulted in interproduct interference which decreased performance for some experimental subjects.

The one significant finding for the effect of format indicated an advantage for subjects exposed to the paragraph format in recalling "what to..." questions. However, the advantage for those subjects was less than one correct answer over the baseline subjects. And even with this advantage, performance was still low. As can be seen in Table 5, the maximum average correct number of responses was less than 2 and one-half out of 5 possible. In this study the variable format seemed to have little, if any, effect on memory for warning information. It should also be noted that the list versus paragraph variable did not influence subjects to read the warning. Twenty-two subjects exposed to the list format read the warning (out of 27 possible) and 22 subjects exposed to the paragraph format read it (also out of 27 possible).

Although significant differences were not found for the other two recall measures, the number of correct responses was slightly higher for subjects exposed to the list format. The small advantage for the baseline subjects in recalling hazards associated with each product is not necessarily an unusual finding. The responses from baseline subjects are indicators of general knowledge, whereas the responses from the experimental subjects may include interference from information read on the other three products during the first experimental session.

The results from the pre-questioning variable are the easiest to interpret. The question "Are you aware of these hazards??" induced more subjects to read the warning (15 subjects in that group versus 10 subjects in each of the 2 other experimental groups). Further, the question that follows from the above is, "What would one do to avoid those hazards?" The same subjects scored higher on those questions than the other subjects. Because only 4 hazards were stated for this condition, and they were all relatively common, it is not surprising that there were no significant differences in the number of correct responses to the "recall the hazards" questions.

A closer look at the data for this variable revealed an interesting finding. The question about getting playdough in the mouth was very likely to be answered correctly (more than a 75% chance) by all subjects - those who reported reading the warning, those who reported not

reading the warning, and by those who were in the baseline group and never saw the warning. This finding is representative of a pattern found across all of the variables. The interesting pattern is that items that were recalled well by one group were very likely to be recalled by the other groups. Similarly, items that were not recalled well by one group were not recalled well by any of the groups.

A second fairly consistent finding remains to be discussed. Studying the results in three categories, that is, by the type of question asked, leads to an interesting observation. For two of the question types - "What are the hazards associated with..." and "What action would you take if the following accident occurred..." there were no significant differences between any of the conditions for any of the 4 variables. Instead, all of the significant differences reported in this study occurred for the question type "What would you do to avoid an accident with..." The implication from this observation is that some kinds of information are more likely to be affected by experimental manipulations than others. The results of this study suggest that information about how to avoid an accident was influenced by these experimental manipulations more so than other types of information.

The experimental paradigm developed and used in this study has advantages over previous warnings research in that the warning labels were, in fact, on products, and

that the subjects did not expect the memory test. Another advantage to this study was that three dependent measures were assessed. As mentioned above, the three measures provided data for studying how the variables affect these "memories," and produced findings which suggest that some kinds of information are more likely to be affected by experimental manipulations than others.

Some of the problems of this study are that the subjects seemed so interested in building the most creative structure possible, it is difficult to know to what extent the warning information was processed and if that processing is similar to the amount and kind of processing that occurs outside the laboratory. Overall, recall performance was low. None of the four variables seemed to affect performance to a large degree, and they certainly never affected recall in a consistent manner. One possible explanation is that the subjects, in this laboratory setting, did not consider themselves at risk, and did not take the warnings seriously. In other words, it is difficult to assess the nature of the subjects' reading activity. An important point to realize is that subjects who did report reading the warnings did not necessarily read the entire warning.

Secondly, the subjects were exposed to four products and associated warnings in a very brief amount of time and without much context, increasing the occurrence of interproduct interference (substituting an answer that

would be correct if the question pertained to another product). A third problem is that many of the warning statements were make-believe, yet subjects came to the laboratory with some experiences with most of the products. Subjects were expected to discriminate warning information they read on the products in the labs from warning information they carry around. For example, they were expected to answer the question "What would you do if you got the modeling compound on your clothes?" with the response that was on the label "soak soiled article for 10 minutes in vinegar and water solution" rather than whatever they previously believed such as "Allow product to dry before removing clay" or "Remove clothing and wash as usual."

Actually several types of errors were made by the readers, the non-readers, and the baseline subjects. Errors made by all 3 groups were the following: 1) substituting answers that made common sense, or substituting those that were real solutions in every day situations rather than providing answers specific to the experimental context (example given above); 2) providing answers in very general terms such as "Avoid contact" rather than "Avoid prolonged contact to sensitive skin."; and 3) omitting any answer. In addition to those errors, the following errors were made almost exclusively by the subjects who reported reading the warning: 1) interproduct intrusions, and 2) substituting answers that would be

correct for that product if it were for a different question. For subjects who reported reading the warnings, interproduct intrusions and providing answers that were too general were the most common errors.

In summary, even though there were significant effects of three variables (message length, message format, and pre-questioning), performance was low and the results are not nearly as robust as is typically found in the laboratory. This finding is important because it may serve as a basis for questioning the generalizability of basic research findings to applied settings. It would be useful to determine if the failure to find the serial position effect was due to a limited data base, the complexity of the task, the prevalence of other variables or interactions, or other possibilities. Determining why the expected effect was not found in this experiment will help to determine to what extent basic research should be relied upon for warning design guidelines.

Two major issues have been discussed in this paper. For reasons mentioned above, a needed criterion for adequate warnings is the memorability of warnings. It is unlikely that many warnings will be obeyed if they cannot even be remembered. Further, it is unlikely that warnings will be designed so that they will be remembered if memorability is not considered a criterion for adequacy. The second issue concerns the design of such warnings, and the question Where do the guidelines come from? Studies

presented in this paper demonstrate that although basic research provides a valuable service by pointing out principles that may affect the memorability of warnings, these findings may not always be generalizable to the applied studies.

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APPENDIX A

LABELS USED IN LABEL DESIGN EXPERIMENTS

Note: For key to abbreviations
see Table 1 on page 23

UNR 1

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

[redacted]

-Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

-String will burn and create fire potential. Do not spray near hot appliances such as toasters and lamps. If string touches a hot appliance, remove the string with a wooden utensil and discard.

-Inhalation of fumes can be addicting. Do not deliberately concentrate and inhale the contents. If you become dizzy seek medical attention.

-String can discolor human hair. Avoid prolonged contact with hair. After contact with hair, remove string within 20 minutes to avoid hair discoloration.

-Infection may result. Do not allow spray to contact open wounds. In the event of contact wash wound with antiseptic solution.

-Can may explode. Do not puncture, incinerate, or store above 120° F. In the event of an explosion, contact fire department immediately.

Directions

1. Shake can before and while using.
2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

DNR 1

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

Directions

1. Shake can before and while using.
2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

[redacted]

-Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

-String will burn and create fire potential. Do not spray near hot appliances such as toasters and lamps. If string touches a hot appliance, remove the string with a wooden utensil and discard.

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-Can may explode. Do not puncture, incinerate, or store above 120° F. In the event of an explosion, contact fire department immediately.

DNR 2

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

Directions

1. Shake can before and while using.
2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

⚠ WARNING

-Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

-String will burn and create fire potential. Do not spray near hot appliances such as toasters and lamps. If string touches a hot appliance, remove the string with a wooden utensil and discard.

-Inhalation of fumes can be addicting. Do not deliberately concentrate and inhale the contents. If you become dizzy seek medical attention.

-String can discolor human hair. Avoid prolonged contact with hair. After contact with hair, remove string within 20 minutes to avoid hair discoloration.

-Infection may result. Do not allow spray to contact open wounds. In the event of contact wash wound with antiseptic solution.

-Can may explode. Do not puncture, incinerate, or store above 120° F. In the event of an explosion, contact fire department immediately.

UNR 2

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

⚠ WARNING

-Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

-String will burn and create fire potential. Do not spray near hot appliances such as toasters and lamps. If string touches a hot appliance, remove the string with a wooden utensil and discard.

-Inhalation of fumes can be addicting. Do not deliberately concentrate and inhale the contents. If you become dizzy seek medical attention.

-String can discolor human hair. Avoid prolonged contact with hair. After contact with hair, remove string within 20 minutes to avoid hair discoloration.

-Infection may result. Do not allow spray to contact open wounds. In the event of contact wash wound with antiseptic solution.

-Can may explode. Do not puncture, incinerate, or store above 120° F. In the event of an explosion, contact fire department immediately.

Directions

1. Shake can before and while using.
2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

USR1

Use this rubber compound to decorate, design, or spell messages on most surfaces It is as fun to use as it is easy

[redacted]

Read this warning message.

-Contents under pressure To avoid eye injuries keep can away from face while spraying and cleaning In case of eye injury seek medical attention immediately

-Allergic reaction possible If rashes develop, remove all string and wash with mild soap and water Discontinue use of rubber compound

-Extremely flammable Do not use near fire, flame or while smoking Use sand to extinguish flames

-Spraying string near food is not recommended Do not use spray on food items If ingestion occurs, drink two glasses of milk

-String will burn and create fire potential Do not spray near hot appliances such as toasters and lamps If string touches a hot appliance, remove the string with a wooden utensil and discard

-Inhalation of fumes can be addicting Do not deliberately concentrate and inhale the contents If you become dizzy seek medical attention

-String can discolor human hair Avoid prolonged contact with hair After contact with hair, remove string within 20 minutes to avoid hair discoloration

-Infection may result Do not allow spray to contact open wounds In the event of contact wash wound with antiseptic solution

-Can may explode Do not puncture, incinerate, or store above 120° F In the event of an explosion, contact fire department immediately

Directions

1 Shake can before and while using
2 Listen for rattle inside can to insure thorough mixing and even pressure
3 If valve clogs, simply lift off activator and clear valve by hand
4 Replace cap after use.

DSR1

Use this rubber compound to decorate, design, or spell messages on most surfaces It is as fun to use as it is easy

Directions

1 Shake can before and while using
2 Listen for rattle inside can to insure thorough mixing and even pressure
3 If valve clogs, simply lift off activator and clear valve by hand
4 Replace cap after use

[redacted]

Read this warning message.

-Contents under pressure To avoid eye injuries keep can away from face while spraying and cleaning In case of eye injury seek medical attention immediately

-Allergic reaction possible If rashes develop, remove all string and wash with mild soap and water Discontinue use of rubber compound

-Extremely flammable Do not use near fire, flame or while smoking Use sand to extinguish flames

-Spraying string near food is not recommended Do not use spray on food items If ingestion occurs, drink two glasses of milk

-String will burn and create fire potential Do not spray near hot appliances such as toasters and lamps If string touches a hot appliance, remove the string with a wooden utensil and discard

-Inhalation of fumes can be addicting Do not deliberately concentrate and inhale the contents If you become dizzy seek medical attention

-String can discolor human hair Avoid prolonged contact with hair After contact with hair, remove string within 20 minutes to avoid hair discoloration

-Infection may result Do not allow spray to contact open wounds In the event of contact wash wound with antiseptic solution

-Can may explode Do not puncture, incinerate, or store above 120° F In the event of an explosion, contact fire department immediately

USR2

Use this rubber compound to decorate, design, or spell messages on most surfaces It is as fun to use as it is easy

⚠ WARNING

Read this warning message.

-Contents under pressure To avoid eye injuries keep can away from face while spraying and cleaning In case of eye injury seek medical attention immediately

-Allergic reaction possible If rashes develop, remove all string and wash with mild soap and water Discontinue use of rubber compound

-Extremely flammable Do not use near fire, flame or while smoking Use sand to extinguish flames

-Spraying string near food is not recommended Do not use spray on food items If ingestion occurs, drink two glasses of milk

-String will burn and create fire potential Do not spray near hot appliances such as toasters and lamps If string touches a hot appliance, remove the string with a wooden utensil and discard

-Inhalation of fumes can be addicting Do not deliberately concentrate and inhale the contents If you become dizzy seek medical attention

-String can discolor human hair Avoid prolonged contact with hair After contact with hair, remove string within 20 minutes to avoid hair discoloration

-Infection may result Do not allow spray to contact open wounds In the event of contact wash wound with antiseptic solution

-Can may explode Do not puncture, incinerate, or store above 120° F In the event of an explosion, contact fire department immediately

Directions

1 Shake can before and while using
2 Listen for rattle inside can to insure thorough mixing and even pressure
3 If valve clogs, simply lift off activator and clear valve by hand
4 Replace cap after use

DSR2

Use this rubber compound to decorate, design, or spell messages on most surfaces It is as fun to use as it is easy

Directions

1 Shake can before and while using
2 Listen for rattle inside can to insure thorough mixing and even pressure
3 If valve clogs, simply lift off activator and clear valve by hand
4 Replace cap after use

⚠ WARNING

Read this warning message.

-Contents under pressure To avoid eye injuries keep can away from face while spraying and cleaning In case of eye injury seek medical attention immediately

-Allergic reaction possible If rashes develop, remove all string and wash with mild soap and water Discontinue use of rubber compound

-Extremely flammable Do not use near fire, flame or while smoking Use sand to extinguish flames

-Spraying string near food is not recommended Do not use spray on food items If ingestion occurs, drink two glasses of milk

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-Inhalation of fumes can be addicting Do not deliberately concentrate and inhale the contents If you become dizzy seek medical attention

-String can discolor human hair Avoid prolonged contact with hair After contact with hair, remove string within 20 minutes to avoid hair discoloration

-Infection may result Do not allow spray to contact open wounds In the event of contact wash wound with antiseptic solution

-Can may explode Do not puncture, incinerate, or store above 120° F In the event of an explosion, contact fire department immediately

USB

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

WARNING

Read this warning message.

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-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

-String will burn and create fire potential. Do not spray near hot appliances such as toasters and lamps. If string touches a hot appliance, remove the string with a wooden utensil and discard.

-Inhalation of fumes can be addicting. Do not deliberately concentrate and inhale the contents. If you become dizzy seek medical attention.

-String can discolor human hair. Avoid prolonged contact with hair. After contact with hair, remove string within 20 minutes to avoid hair discoloration.

-Infection may result. Do not allow spray to contact open wounds. In the event of contact wash wound with antiseptic solution.

-Can may explode. Do not puncture, incinerate, or store above 120° F. In the event of an explosion, contact fire department immediately.

Directions

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2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

UNB

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

WARNING

-Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

-String will burn and create fire potential. Do not spray near hot appliances such as toasters and lamps. If string touches a hot appliance, remove the string with a wooden utensil and discard.

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-String can discolor human hair. Avoid prolonged contact with hair. After contact with hair, remove string within 20 minutes to avoid hair discoloration.

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Directions

1. Shake can before and while using.
2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

DSB

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

Directions

1. Shake can before and while using.
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3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

WARNING

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DNB

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

Directions

1. Shake can before and while using.
2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

WARNING

-Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

-Allergic reaction possible. If rashes develop, remove all string and wash with mild soap and water. Discontinue use of rubber compound.

-Extremely flammable. Do not use near fire, flame or while smoking. Use sand to extinguish flames.

-Spraying string near food is not recommended. Do not use spray on food items. If ingestion occurs, drink two glasses of milk.

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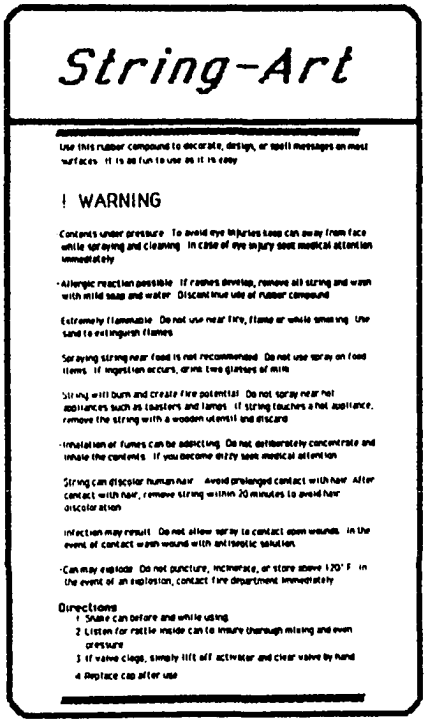
APPENDIX B

LABELS USED IN MEMORY EXPERIMENTS



String-Art

Use this rubber compound to decorate, design, or spell messages on most surfaces. It is as fun to use as it is easy.

! WARNING

Contents under pressure. To avoid eye injuries keep can away from face while spraying and cleaning. In case of eye injury seek medical attention immediately.

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Directions

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2. Listen for rattle inside can to insure thorough mixing and even pressure.
3. If valve clogs, simply lift off activator and clear valve by hand.
4. Replace cap after use.

NET WT. 3.5 OZ.

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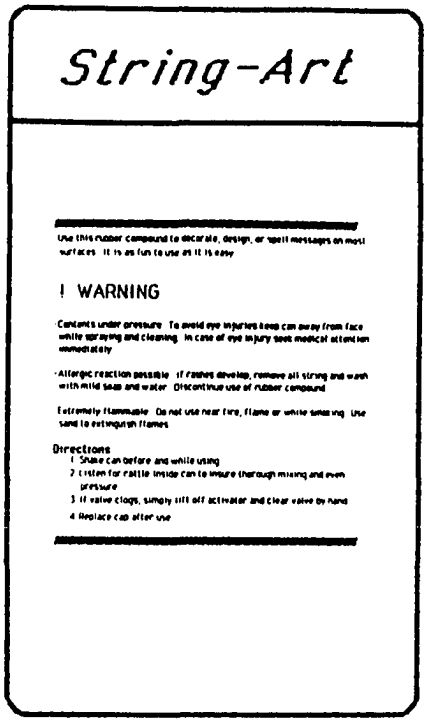

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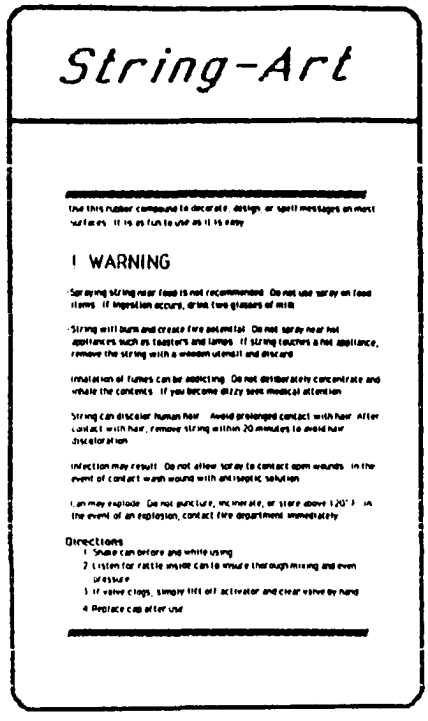

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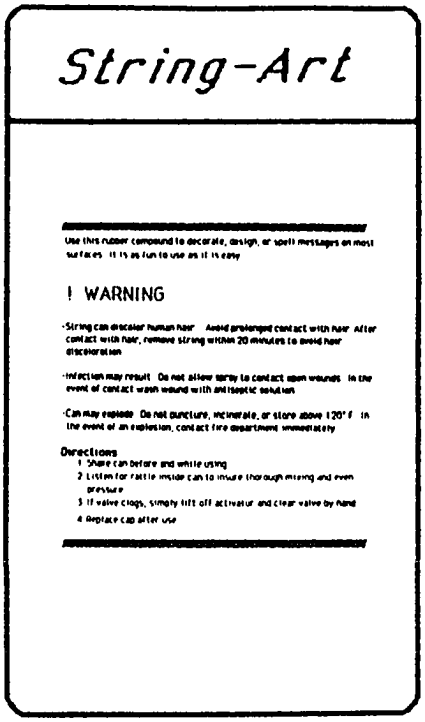

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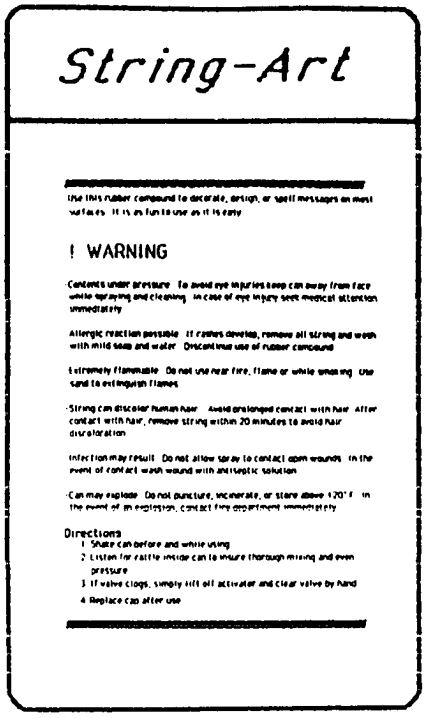

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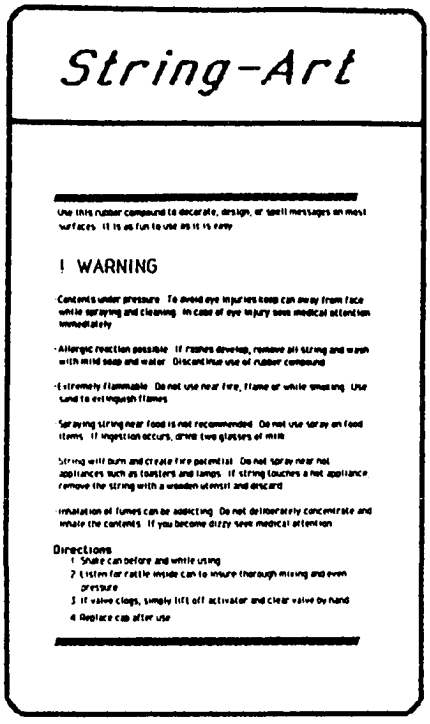

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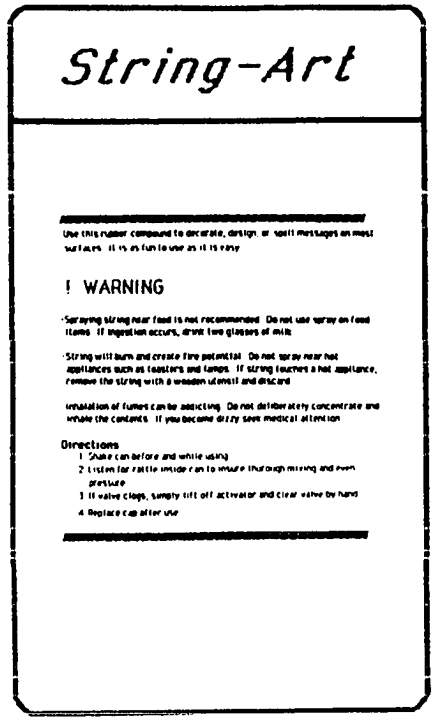

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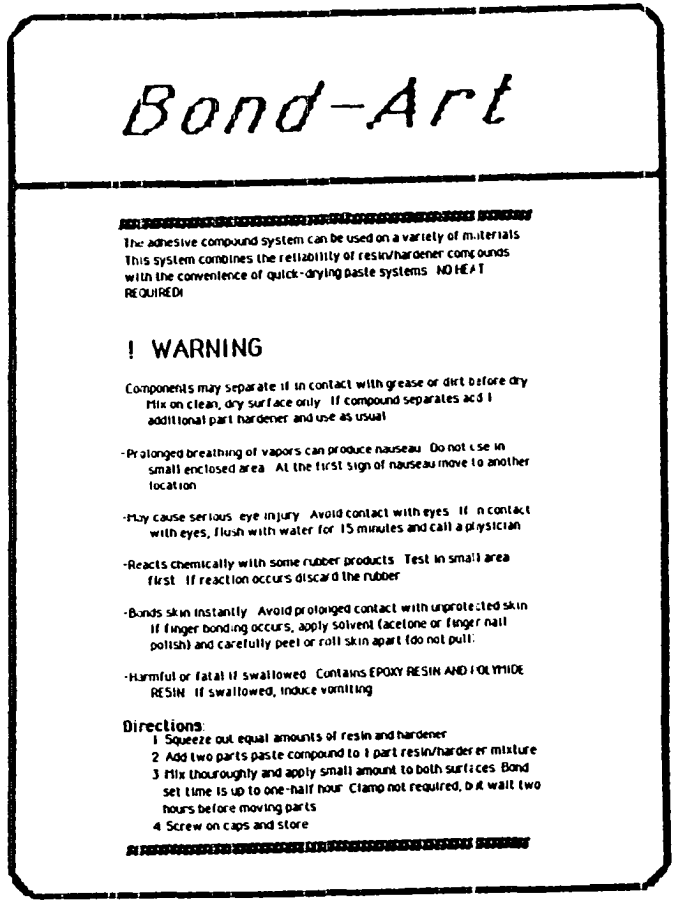
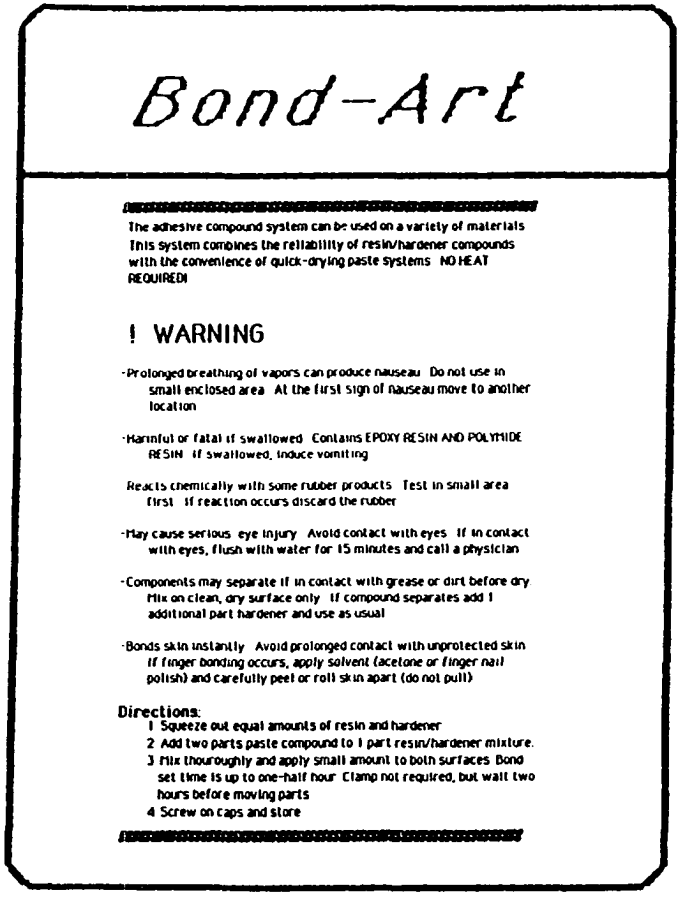
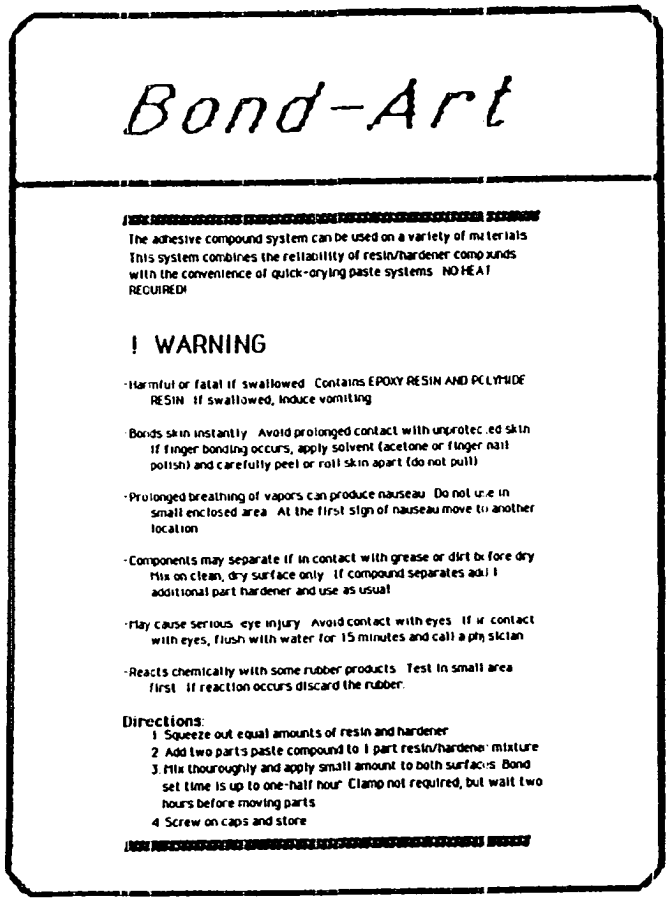
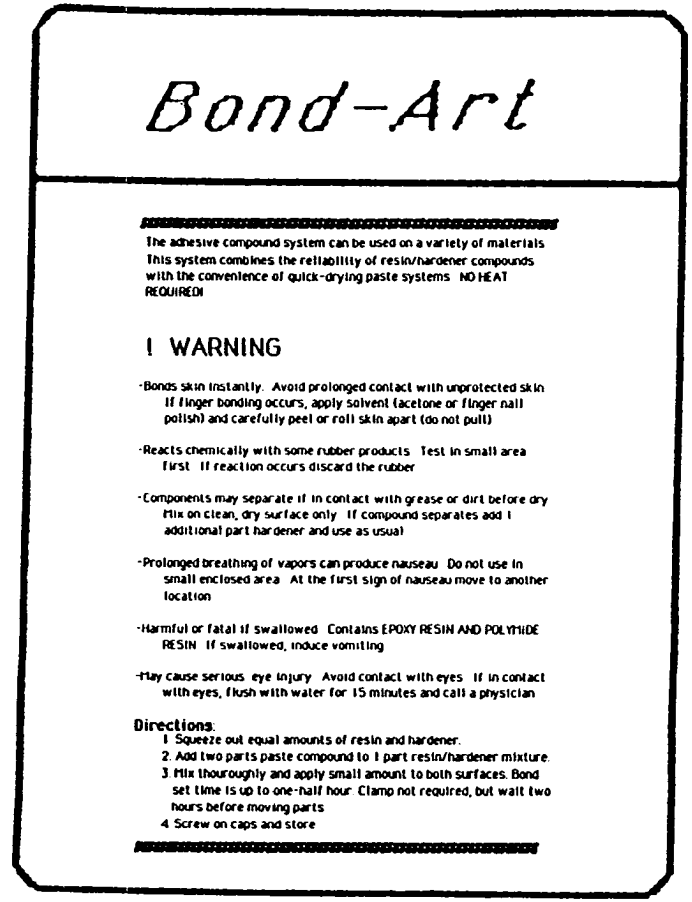
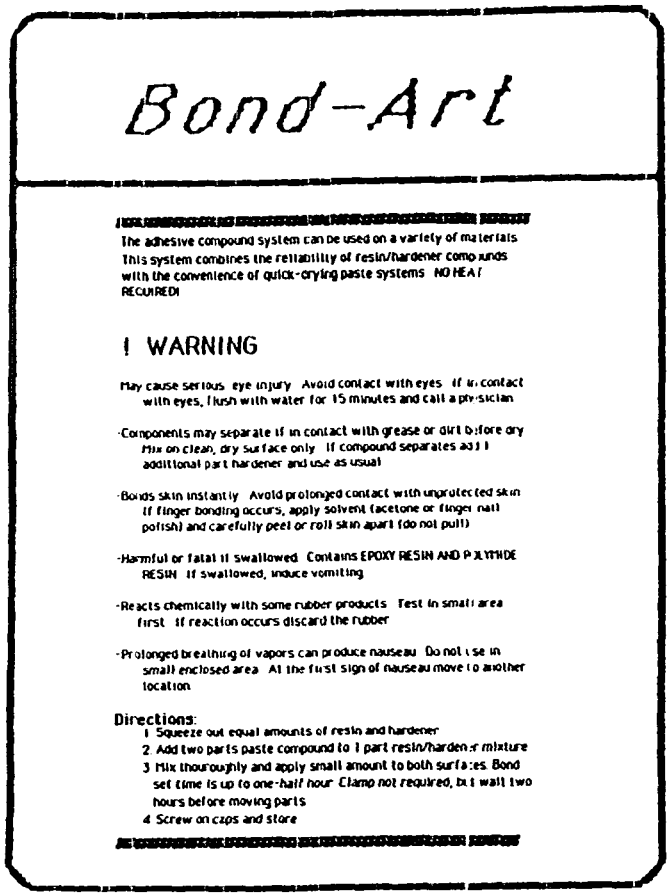










Bond-Art

The adhesive compound system can be used on a variety of materials This system combines the reliability of resin/hardener compounds with the convenience of quick-drying paste systems NO HEAT REQUIRED!

! WARNING

May cause serious eye injury Avoid contact with eyes If in contact with eyes, flush with water for 15 minutes and call a physician

-Components may separate if in contact with grease or dirt before dry Mix on clean, dry surface only If compound separates add 1 additional part hardener and use as usual

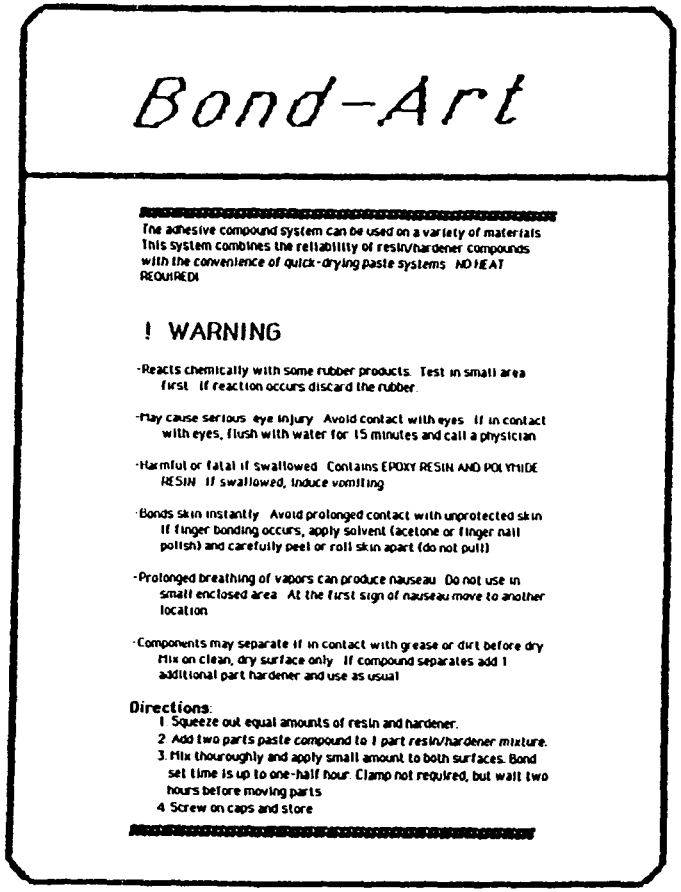
-Bonds skin instantly Avoid prolonged contact with unprotected skin If finger bonding occurs, apply solvent (acetone or finger nail polish) and carefully peel or roll skin apart (do not pull)

-Harmful or fatal if swallowed Contains EPOXY RESIN AND POLYAMIDE RESIN If swallowed, induce vomiting

-Reacts chemically with some rubber products Test in small area first If reaction occurs discard the rubber

-Prolonged breathing of vapors can produce nauseau Do not use in small enclosed area At the first sign of nauseau move to another location

Directions:
1 Squeeze out equal amounts of resin and hardener
2 Add two parts paste compound to 1 part resin/hardener mixture
3 Mix thouroughly and apply small amount to both surfaces Bond set time is up to one-half hour Clamp not required, but wait two hours before moving parts
4 Screw on caps and store



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-Harmful or fatal if swallowed Contains EPOXY RESIN AND POLYAMIDE RESIN If swallowed, induce vomiting

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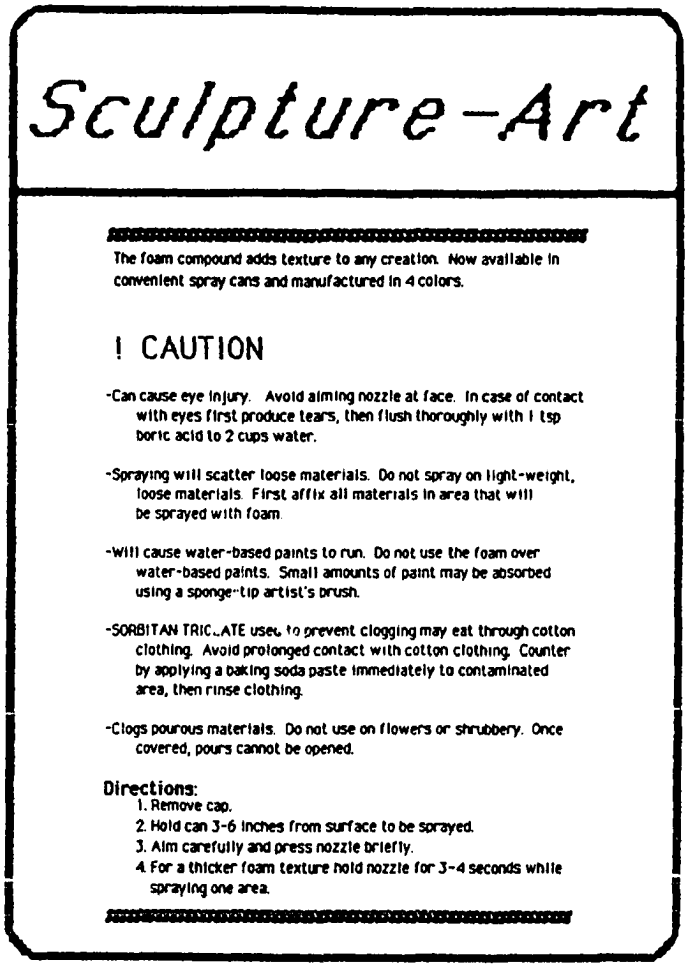
-Prolonged breathing of vapors can produce nauseau Do not use in small enclosed area At the first sign of nauseau move to another location

-Components may separate if in contact with grease or dirt before dry Mix on clean, dry surface only If compound separates add 1 additional part hardener and use as usual

Directions:
1 Squeeze out equal amounts of resin and hardener.
2 Add two parts paste compound to 1 part resin/hardener mixture.
3 Mix thouroughly and apply small amount to both surfaces. Bond set time is up to one-half hour Clamp not required, but wait two hours before moving parts
4 Screw on caps and store



Sculpture-Art

The foam compound adds texture to any creation. Now available in convenient spray cans and manufactured in 4 colors.

! CAUTION

-Can cause eye injury. Avoid aiming nozzle at face. In case of contact with eyes first produce tears, then flush thoroughly with 1 tsp boric acid to 2 cups water.

-Spraying will scatter loose materials. Do not spray on light-weight, loose materials. First affix all materials in area that will be sprayed with foam.

-Will cause water-based paints to run. Do not use the foam over water-based paints. Small amounts of paint may be absorbed using a sponge-tip artist's brush.

-SORBITAN TRIC..ATE used to prevent clogging may eat through cotton clothing. Avoid prolonged contact with cotton clothing. Counter by applying a baking soda paste immediately to contaminated area, then rinse clothing.

-Clogs pourous materials. Do not use on flowers or shrubbery. Once covered, pours cannot be opened.

Directions:

1. Remove cap.
2. Hold can 3-6 inches from surface to be sprayed.
3. Aim carefully and press nozzle briefly.
4. For a thicker foam texture hold nozzle for 3-4 seconds while spraying one area.

NET WT. 4.0 OZ.

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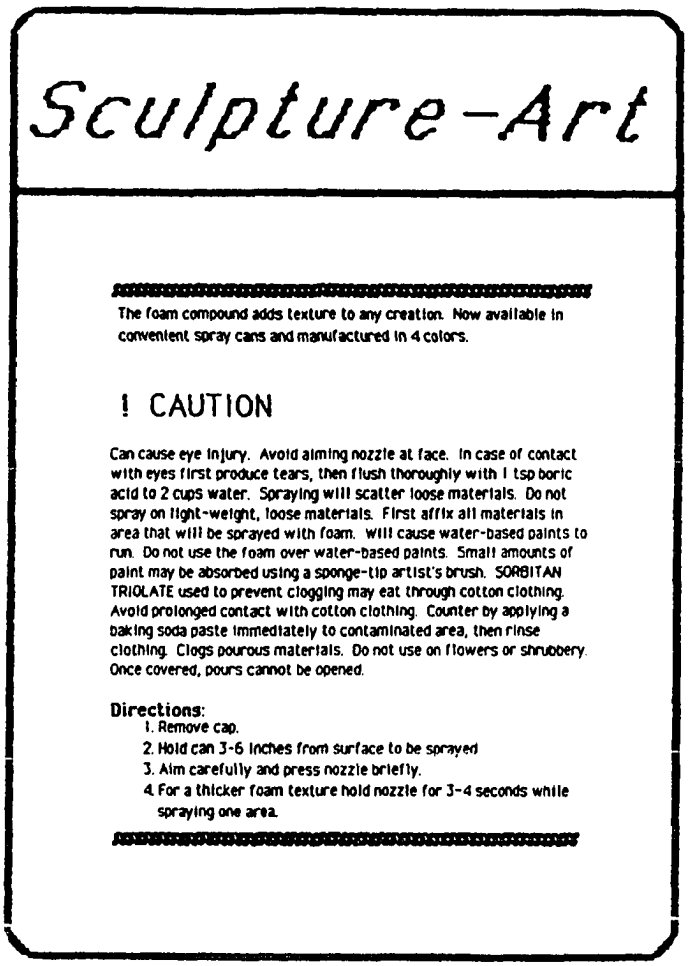

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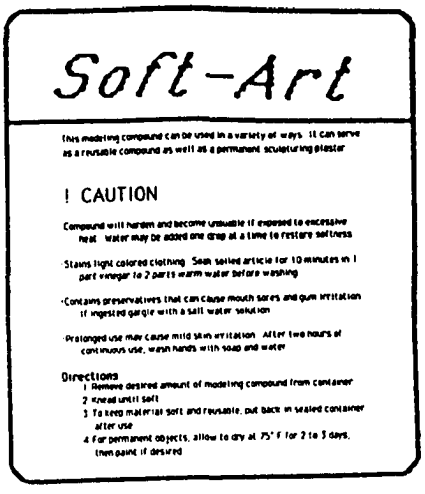

Soft-Art

this modeling compound can be used in a variety of ways. It can serve as a reusable compound as well as a permanent sculpturing plaster

! CAUTION

Compound will harden and become unusable if exposed to excessive heat. Water may be added one drop at a time to restore softness

·Stains light colored clothing. Soak soiled article for 10 minutes in 1 part vinegar to 2 parts warm water before washing

·Contains preservatives that can cause mouth sores and gum irritation if ingested gargle with a salt water solution

·Prolonged use may cause mild skin irritation. After two hours of continuous use, wash hands with soap and water

Directions
1. Remove desired amount of modeling compound from container
2. Knead until soft
3. To keep material soft and reusable, put back in sealed container after use
4. For permanent objects, allow to dry at 75° F for 2 to 3 days, then paint if desired

NET WT. 1 Lb 6 OZ.

Meets or exceeds all requirements of Product Standard 72-76.
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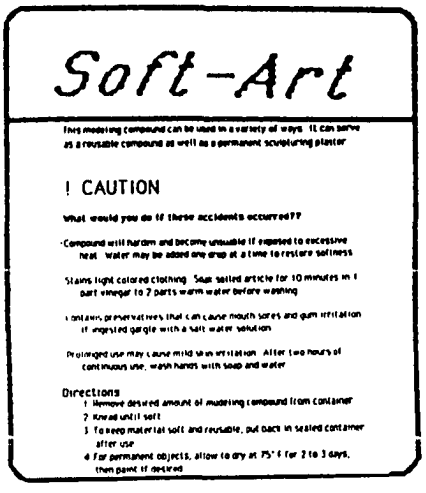

Soft-Art

this modeling compound can be used in a variety of ways. It can serve as a reusable compound as well as a permanent sculpturing plaster

! CAUTION

What would you do if these accidents occurred??

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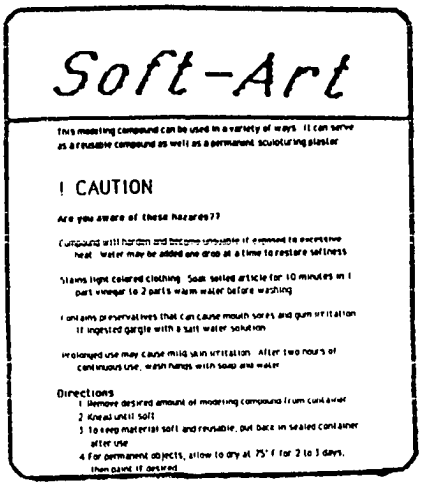

Soft-Art

this modeling compound can be used in a variety of ways. It can serve as a reusable compound as well as a permanent sculpturing plaster

! CAUTION

Are you aware of these hazards??

·Compound will harden and become unusable if exposed to excessive heat. Water may be added one drop at a time to restore softness

·Stains light colored clothing. Soak soiled article for 10 minutes in 1 part vinegar to 2 parts warm water before washing

·Contains preservatives that can cause mouth sores and gum irritation if ingested gargle with a salt water solution

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APPENDIX C

MEMORY EXPERIMENT: SESSION #1

QUESTIONS

1. How much time did you spend planning versus doing this task ?

2. Here is a warning message on this product (shown on facsimile), did you read none, some, or all of this warning ?

3. Which product do you consider easiest to use ?

APPENDIX D

MEMORY EXPERIMENT: SESSION #2

WRITTEN MEMORY TEST

3/85
Experiment #510
Creative Structure Building
Session #2: Test

Thank you for your participation so far. On the forms in front of you please print your name and your major field of study where indicated. Do not turn pages or go to the next sessions before instructed to do so.

Next write what you believe you will be doing this next hour. Write this in the space marked "expectations."

For the next several minutes you will be asked to remember as much information as you can about the four compounds you used in the first session of the experiment. If at any time you do not understand which product I am referring to, then please ask me to clarify.

At this time think about the adhesive product you used (describe and show, especially for baseliners). In the warning section of the label on that product several hazards were mentioned. Write down all of the hazards you remember. A hazard is a problem associated with using the product that can result in some part of you or some thing getting hurt. Again, think of the adhesive product and write down on the next page under "adhesive" all of the hazards you remember. Once you've written all that you remember, then guess. Baseline people write down all of the hazards that you can think of that would be associated with using this kind of adhesive product. Are there any questions?

Now think about the foam product you used (describe and show, especially for baseliners). In the warning section of the label on that product several hazards were mentioned. Write down all of the hazards you remember. A hazard is a problem associated with using the product that can result in some part of you or some thing getting hurt. Again, think of the foam product and write down on the next page under "foam" all of the hazards you remember. Once you've written all that you remember, then guess. Baseline people write down all of the hazards that you can think of that would be associated with using this kind of foam product. Are there any questions?

Now think about the rubber product you used (describe and show, especially for baseliners). In the warning section of the label on that product several hazards were mentioned. Write down all of the hazards you remember. A hazard is a problem associated with using the product that can result in some part of you or some thing getting hurt.

Again, think of the rubber product and write down on the next page under "rubber" all of the hazards you remember. Once you've written all that you remember, then guess. Baseline people write down all of the hazards that you can think of that would be associated with using this kind of rubber product. Are there any questions?

At this time think about the modeling product you used (describe and show, especially for baseliners). In the warning section of the label on that product several hazards were mentioned. Write down all of the hazards you remember. A hazard is a problem associated with using the product that can result in some part of you or some thing getting hurt. Again, think of the modeling product and write down on the next page under "adhesive" all of the hazards you remember. Once you've written all that you remember, then guess. Baseline people write down all of the hazards that you can think of that would be associated with using this kind of modeling product. Are there any questions?

Rotate Order

At this time I will ask you a series of "what would you do to..." questions. You are to write answers according to the recommendations that were made on the labels you read. Be sure to think back to the labels and the recommendations that were made. However, if you cannot remember what was on the label or if you did not read the label, then think about what makes sense and write that (in other words, guess). {Baseline subjects: Think about what makes sense and write that down.}

Think about the rubber string product. What would you do to...

1.avoid a fire?
2.prevent an explosion?
3.avoid addiction to fumes?
4.avoid eye injuries?
5.prevent hair discoloration?
6.avoid infection?
7.prevent ingestion?
8.avoid burning product on hot appliances?

Think about the modeling compound. What would you do to...

1.prevent hardening?
2.prevent staining certain clothes?
3.prevent gum irritation?
4.avoid skin irritation?

Think about the adhesive compound. What would you do to...

1.avoid chemical reactions?
2.avoid eye accidents?
3.prevent finger bonding?
4.prevent nausea?
5.prevent the product from separating?

Think about the foam compound. What would you do to...

1.avoid eye injury?
2.prevent scattering loose material?
3.prevent water-based paints from running?
4.avoid ruining certain clothes?
5.prevent clogging pores?

Now I will ask you a series of "what if..." questions regarding accidents with each of the products we've talked about so far. You are to write down, according to the label you read, what you would do if...
Be certain to write down what you would do according to the label on that product. However, if you cannot remember what was on the label or if you did not read the label, then think about what makes sense and write that (in other words, guess).
{Baseline subjects: Think about what you would do, and write that down.}

Rotate Order

Think about the rubber string product. What would you do if...

1.a fire developed resulting from this product?
2.someone received an eye injury?
3.the string came in contact with an open wound?
4.someone ingested the product?
5.a rash developed?
6.the string touched a hot appliance?
7.there was an explosion caused by this product?
8.someone became dizzy from inhaling the fumes?

Now think about the modeling compound. What would you do if...

1.the compound becomes hard?
2.the compound stains light-colored clothing?
3.the compound is ingested?
4.a mild skin irritation developed?

Now think about the adhesive compound. What would you do if...

1.a reaction occurred with a rubber product?

2.the compound gets in someone's eyes?
3.the compound is ingested?
4.finger bonding occurs?
5.the compound separates?
6.someone becomes nauseas from the vapors?

Now think about the foam compound. What would you do if...

1.the compound gets in someone's eyes?
2.water-based paints begin to run?
3.the compound gets on cotton clothing?
4.the compound gets on flowers or shrubs?

At the bottom of the page by the number 1, write down which product you are most familiar with: the adhesive, the foam, the rubber string, or the modeling compound. Under that, by the number 2, write down the product you are next most familiar with. Then next most familiar, and finally, by the number 4, write down the product you are least familiar with.

In the space provided write the names of the psychology courses you have taken and are taking this semester.

APPENDIX E

EXAMPLE OF ACCEPTABLE ANSWERS

An example of acceptable answers:

QUESTION....

Think about the adhesive product. What would you do to...
1. avoid chemical reactions ?
2. avoid eye accidents ?
3. prevent finger bonding ?
4. prevent nausea ?
5. prevent the product from separating ?

ANSWERS.....

1. Test in small area first.
2. Avoid contact with eyes.
   COUNTED: Keep away from eyes/face.
   NOT COUNT: Use goggles.
   Don't put fingers in eyes.
3. Avoid prolonged contact with unprotected skin.
   COUNTED: Wipe off (rinse) immediately.
   NOT COUNT: Avoid contact.
4. Do not use in small enclosed area.
   COUNTED: Use in well-ventilated area.
   NOT COUNT: Don't inhale product.
5. Mix on clean, dry surface only.
   COUNTED: Don't use on oily surfaces.

APPENDIX F

RAW DATA

Rubber Product: Variable is Message Length

Subj	Cond	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
1	6ab	2	3	0	Y
2	6ab	3	5	2	Y
3	6ab	1	2	1	Y
4	3a	1	3	2	Y
5	3a	2	3	2	Y
6	3a	2	2	0	Y
7	3b	2	3	1	N
8	3b	1	1	4	Y
9	3b	3	3	2	N
10	3c	2	2	2	Y
11	3c	2	3	2	Y
12	3c	3	3	1	Y
13	6ac	3	4	0	N
14	6ac	3	4	2	N
15	6ac	0	3	3	N
16	6bc	4	4	2	Y
17	6bc	1	2	0	N
18	6bc	3	6	2	N
19	9abc	0	1	1	N
20	9abc	2	4	2	N
21	9abc	3	6	2	Y
22	6ab	3	3	1	Y
23	6ab	4	3	2	N
24	6ab	1	4	0	Y
25	9abc	0	1	0	Y
26	9abc	6	5	2	Y
27	9abc	1	2	1	Y
28	6ac	2	3	2	Y
29	6ac	4	4	4	Y
30	6ac	2	3	0	Y
31	9abc	2	1	1	Y
32	9abc	4	6	2	Y
33	9abc	4	6	5	Y
34	3a	1	3	2	Y
35	3a	4	6	1	Y
36	3a	3	3	1	Y
37	9abc	4	5	0	Y
38	9abc	3	4	4	Y
39	9abc	2	5	2	Y
40	3b	1	2	0	Y
41	3b	1	2	1	Y
42	3b	1	0	3	Y
43	9abc	4	4	2	Y
44	9abc	2	5	2	Y
45	9abc	2	2	2	Y

Rubber Product: Variable is Message Length (con't)

Subj	Cond	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
46	6bc	3	6	1	Y
47	6bc	1	5	1	Y
48	6bc	3	3	2	Y
49	9abc	2	4	2	Y
50	9abc	3	4	0	Y
51	9abc	3	4	1	Y
52	3c	3	2	2	Y
53	3c	2	1	3	Y
54	3c	3	6	2	Y
Baseline					
1	base	2	0	2	NA
2	base	2	0	1	NA
3	base	4	4	1	NA
4	base	3	1	0	NA
5	base	0	3	0	NA
6	base	2	2	0	NA
7	base	3	0	1	NA
8	base	0	1	0	NA
9	base	2	3	0	NA
10	base	4	4	2	NA
11	base	5	3	3	NA
12	base	3	2	3	NA
13	base	3	3	1	NA
14	base	3	2	1	NA
15	base	2	2	1	NA
16	base	2	2	2	NA
17	base	2	2	1	NA
18	base	3	4	2	NA
19	base	3	5	2	NA
20	base	3	4	0	NA
21	base	5	3	0	NA
22	base	3	3	1	NA
23	base	2	5	0	NA
24	base	2	3	2	NA
25	base	2	3	2	NA
26	base	1	5	1	NA
27	base	3	2	2	NA

Note. 3 = 3 Warning Statements
6 = 6 Warning Statements
9 = 9 Warning Statements
a, b, c = Different Sets of Statements
Y = Reported Reading Warning
N = Reported Not Reading Warning
NA = Not Applicable

Subj = Subject
Cond = Condition

Adhesive Product: Variable is Serial Position

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
1	5	1	0	0	0	N
1	5	2	1	0	0	N
1	5	3	0	0	1	N
1	5	4	1	0	1	N
1	5	5	0	0	0	N
1	5	6	0		1	N
2	5	1	1	1	1	Y
2	5	2	1	0	1	Y
2	5	3	0	0	0	Y
2	5	4	0	0	1	Y
2	5	5	0	0	0	Y
2	5	6	0		0	Y
3	5	1	0	0	0	Y
3	5	2	0	0	0	Y
3	5	3	0	1	0	Y
3	5	4	1	0	0	Y
3	5	5	0	0	0	Y
3	5	6	0		0	Y
4	2	1	0	1	0	Y
4	2	2	0	0	0	Y
4	2	3	0	0	0	Y
4	2	4	1	0	1	Y
4	2	5	0	0	0	Y
4	2	6	0		0	Y
5	2	1	1	0	1	Y
5	2	2	0	0	0	Y
5	2	3	0	0	1	Y
5	2	4	1	0	0	Y
5	2	5	0	1	0	Y
5	2	6	1		1	Y
6	2	1	1	0	1	Y
6	2	2	0	0	0	Y
6	2	3	1	1	0	Y
6	2	4	0	0	1	Y
6	2	5	1	0	0	Y
6	2	6	1		1	Y
7	2	1	1	0	0	N
7	2	2	0	0	0	N
7	2	3	1	0	0	N
7	2	4	1	0	0	N
7	2	5	0	1	0	N
7	2	6	0		0	N

Adhesive Product: Variable is Serial Position (con't)

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
8	2	1	0	0	1	Y
8	2	2	1	0	1	Y
8	2	3	0	0	1	Y
8	2	4	0	0	1	Y
8	2	5	0	1	0	Y
8	2	6	1		0	Y
9	2	1	1	0	0	N
9	2	2	0	1	0	N
9	2	3	0	0	1	N
9	2	4	1	0	1	N
9	2	5	0	1	0	N
9	2	6	1		1	N
10	1	1	0	0	0	Y
10	1	2	1	1	1	Y
10	1	3	0	0	1	Y
10	1	4	1	1	1	Y
10	1	5	1	0	1	Y
10	1	6	0		0	Y
11	1	1	0	0	0	Y
11	1	2	1	1	0	Y
11	1	3	0	0	0	Y
11	1	4	1	0	0	Y
11	1	5	0	0	1	Y
11	1	6	0		0	Y
12	1	1	1	0	0	Y
12	1	2	0	1	1	Y
12	1	3	1	1	0	Y
12	1	4	1	1	0	Y
12	1	5	0	0	0	Y
12	1	6	0		0	Y
13	3	1	1	0	1	Y
13	3	2	1	1	0	Y
13	3	3	1	0	1	Y
13	3	4	0	0	0	Y
13	3	5	1	0	1	Y
13	3	6	0		0	Y
14	3	1	1	0	1	Y
14	3	2	1	0	1	Y
14	3	3	0	0	1	Y
14	3	4	0	1	0	Y
14	3	5	0	0	1	Y
14	3	6	0		1	Y
15	3	1	1	0	0	N
15	3	2	0	0	1	N
15	3	3	0	0	0	N
15	3	4	0	1	1	N
15	3	5	0	0	0	N
15	3	6	0		0	N

Adhesive Product: Variable is Serial Position (con't)

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
16	6	1	0	0	0	Y
16	6	2	0	1	1	Y
16	6	3	1	0	0	Y
16	6	4	1	0	1	Y
16	6	5	1	0	0	Y
16	6	6	1		0	Y
17	6	1	0	0	0	Y
17	6	2	1	0	1	Y
17	6	3	1	0	1	Y
17	6	4	0	0	0	Y
17	6	5	1	0	0	Y
17	6	6	1		1	Y
18	6	1	0	0	0	N
18	6	2	0	0	1	N
18	6	3	1	0	1	N
18	6	4	0	0	0	N
18	6	5	1	0	1	N
18	6	6	1		1	N
19	6	1	0	0	1	N
19	6	2	0	0	0	N
19	6	3	0	0	0	N
19	6	4	1	0	0	N
19	6	5	0	0	0	N
19	6	6	0		1	N
20	6	1	0	0	0	N
20	6	2	0	0	1	N
20	6	3	0	1	0	N
20	6	4	0	0	0	N
20	6	5	0	0	0	N
20	6	6	1		0	N
21	6	1	0	0	0	Y
21	6	2	0	1	1	Y
21	6	3	1	1	1	Y
21	6	4	0	0	0	Y
21	6	5	1	0	1	Y
21	6	6	1		1	Y
22	2	1	1	1	0	Y
22	2	2	0	0	0	Y
22	2	3	0	0	1	Y
22	2	4	1	0	0	Y
22	2	5	0	0	0	Y
22	2	6	1		1	Y
23	2	1	1	0	1	Y
23	2	2	0	0	0	Y
23	2	3	0	0	0	Y
23	2	4	1	0	0	Y
23	2	5	0	0	0	Y
23	2	6	0		1	Y

Adhesive Product: Variable is Serial Position (con't)

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
24	2	1	0	1	1	Y
24	2	2	0	1	1	Y
24	2	3	1	0	1	Y
24	2	4	1	0	0	Y
24	2	5	0	1	0	Y
24	2	6	1		1	Y
25	4	1	0	0	0	Y
25	4	2	0	0	0	Y
25	4	3	0	0	0	Y
25	4	4	0	0	0	Y
25	4	5	0	0	0	Y
25	4	6	0		0	Y
26	4	1	1	0	0	Y
26	4	2	0	0	0	Y
26	4	3	0	0	0	Y
26	4	4	1	0	0	Y
26	4	5	1	1	0	Y
26	4	6	1		0	Y
27	4	1	1	0	0	Y
27	4	2	0	0	0	Y
27	4	3	0	0	0	Y
27	4	4	1	0	1	Y
27	4	5	1	1	0	Y
27	4	6	1		0	Y
28	6	1	0	0	0	Y
28	6	2	1	0	1	Y
28	6	3	1	1	0	Y
28	6	4	0	0	0	Y
28	6	5	1	0	0	Y
28	6	6	1		0	Y
29	6	1	0	0	1	Y
29	6	2	0	0	0	Y
29	6	3	1	0	0	Y
29	6	4	0	0	0	Y
29	6	5	1	0	0	Y
29	6	6	0		1	Y
30	6	1	0	0	1	Y
30	6	2	0	0	1	Y
30	6	3	1	0	1	Y
30	6	4	0	0	0	Y
30	6	5	0	0	0	Y
30	6	6	1		1	Y
31	5	1	0	1	0	Y
31	5	2	0	0	1	Y
31	5	3	0	0	0	Y
31	5	4	0	0	0	Y
31	5	5	0	0	0	Y
31	5	6	1		0	Y

Adhesive Product: Variable is Serial Position (con't)

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
32	5	1	1	1	1	Y
32	5	2	1	0	1	Y
32	5	3	0	1	0	Y
32	5	4	0	0	0	Y
32	5	5	0	0	0	Y
32	5	6	1		1	Y
33	5	1	1	0	0	Y
33	5	2	1	0	0	Y
33	5	3	0	1	1	Y
33	5	4	1	0	1	Y
33	5	5	0	0	0	Y
33	5	6	0		0	Y
34	4	1	1	0	1	Y
34	4	2	0	0	0	Y
34	4	3	0	0	1	Y
34	4	4	0	0	0	Y
34	4	5	0	0	0	Y
34	4	6	0		1	Y
35	4	1	1	0	1	Y
35	4	2	0	0	1	Y
35	4	3	0	0	0	Y
35	4	4	0	1	1	Y
35	4	5	1	1	0	Y
35	4	6	1		1	Y
36	4	1	1	0	1	Y
36	4	2	1	0	0	Y
36	4	3	0	1	0	Y
36	4	4	1	1	1	Y
36	4	5	1	0	1	Y
36	4	6	1		0	Y
37	4	1	1	0	1	Y
37	4	2	0	0	0	Y
37	4	3	0	0	1	Y
37	4	4	0	1	1	Y
37	4	5	1	0	1	Y
37	4	6	0		1	Y
38	4	1	1	0	0	Y
38	4	2	0	0	0	Y
38	4	3	0	0	1	Y
38	4	4	0	0	0	Y
38	4	5	0	1	1	Y
38	4	6	1		1	Y
39	4	1	0	0	0	Y
39	4	2	0	0	1	Y
39	4	3	0	0	0	Y
39	4	4	0	0	0	Y
39	4	5	1	1	0	Y
39	4	6	1		0	Y

Adhesive Product: Variable is Serial Position (con't)

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
40	1	1	0	0	0	Y
40	1	2	1	1	1	Y
40	1	3	1	0	1	Y
40	1	4	0	0	1	Y
40	1	5	1	0	0	Y
40	1	6	0		0	Y
41	1	1	0	0	0	N
41	1	2	0	0	0	N
41	1	3	0	0	0	N
41	1	4	1	1	1	N
41	1	5	1	0	1	N
41	1	6	0		0	N
42	1	1	0	0	0	Y
42	1	2	1	0	1	Y
42	1	3	1	0	1	Y
42	1	4	1	1	1	Y
42	1	5	0	0	1	Y
42	1	6	0		0	Y
43	1	1	0	0	0	Y
43	1	2	1	1	1	Y
43	1	3	1	0	1	Y
43	1	4	0	1	0	Y
43	1	5	1	0	1	Y
43	1	6	0		0	Y
44	1	1	0	0	0	Y
44	1	2	1	1	0	Y
44	1	3	1	0	0	Y
44	1	4	1	0	0	Y
44	1	5	1	0	1	Y
44	1	6	0		0	Y
45	1	1	0	0	1	Y
45	1	2	0	1	1	Y
45	1	3	0	0	0	Y
45	1	4	1	1	0	Y
45	1	5	1	0	1	Y
45	1	6	0		1	Y
46	3	1	1	0	0	Y
46	3	2	1	1	0	Y
46	3	3	1	0	1	Y
46	3	4	0	1	0	Y
46	3	5	1	0	1	Y
46	3	6	0		0	Y
47	3	1	1	0	0	Y
47	3	2	0	0	0	Y
47	3	3	1	0	1	Y
47	3	4	0	0	1	Y
47	3	5	0	0	0	Y
47	3	6	0		0	Y

Adhesive Product: Variable is Serial Position (con't)

Subj	Cond	Pos	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
48	3	1	0	0	0	Y
48	3	2	1	1	0	Y
48	3	3	1	0	1	Y
48	3	4	0	1	0	Y
48	3	5	1	0	1	Y
48	3	6	0		0	Y
49	5	1	1	1	0	N
49	5	2	0	0	0	N
49	5	3	0	1	0	N
49	5	4	0	0	1	N
49	5	5	0	0	0	N
49	5	6	1		1	N
50	5	1	0	1	1	Y
50	5	2	1	0	0	Y
50	5	3	0	1	0	Y
50	5	4	0	0	1	Y
50	5	5	0	0	0	Y
50	5	6	1		1	Y
51	5	1	0	0	1	Y
51	5	2	1	0	1	Y
51	5	3	0	1	0	Y
51	5	4	0	0	0	Y
51	5	5	0	0	0	Y
51	5	6	1		0	Y
52	3	1	1	0	1	Y
52	3	2	0	0	0	Y
52	3	3	0	0	0	Y
52	3	4	0	1	1	Y
52	3	5	1	0	1	Y
52	3	6	0		0	Y
53	3	1	0	0	0	Y
53	3	2	0	0	0	Y
53	3	3	0	0	1	Y
53	3	4	0	1	0	Y
53	3	5	1	0	0	Y
53	3	6	0		1	Y
54	3	1	1	1	1	Y
54	3	2	1	0	0	Y
54	3	3	0	1	0	Y
54	3	4	0	1	0	Y
54	3	5	1	0	0	Y
54	3	6	0		0	Y

Note. See notes on following page.

Note. Each condition number represents a different sequence of sentences on the warning label (i.e., one of the Latin square designs).

Note. Only 5 questions were asked in the "What to..." questions.

Pos = Position
Subj = Subject
Cond = Condition
Y = Reported Reading Warning
N = Reported Not Reading Warning
1 = Correct Answer
0 = Incorrect Answer

Foam Product: Variable is Message Format

Subj	Cond	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
1	L	0	2	0	Y
2	L	0	2	1	Y
3	L	1	2	0	Y
4	P	1	2	3	Y
5	P	1	2	0	Y
6	P	0	3	0	Y
7	L	1	0	0	N
8	L	0	0	0	Y
9	L	1	1	0	N
10	P	2	2	0	Y
11	P	1	3	0	Y
12	P	1	3	0	Y
13	L	2	1	1	N
14	L	1	3	0	N
15	L	1	2	1	N
16	P	1	3	0	Y
17	P	0	0	0	N
18	P	1	4	0	N
19	P	0	0	0	N
20	P	1	3	0	Y
21	P	2	3	0	Y
22	P	1	3	0	Y
23	P	2	2	1	N
24	P	1	4	0	Y
25	L	0	1	0	Y
26	L	3	3	1	Y
27	L	1	2	0	Y
28	P	1	1	0	Y
29	P	1	3	1	Y
30	P	1	4	0	Y
31	L	1	0	1	Y
32	L	1	5	0	Y
33	L	3	3	0	Y
34	P	2	3	0	Y
35	P	3	3	1	Y
36	P	1	3	0	Y
37	L	2	4	1	Y
38	L	1	2	1	Y
39	L	2	2	0	Y
40	P	1	3	0	Y
41	P	1	2	0	N
42	P	1	2	2	Y
43	L	1	3	0	Y
44	L	2	3	2	Y
45	L	1	2	0	Y

Foam Product: Variable is Message Format (con't.)

Subj	Cond	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
46	P	2	2	1	Y
47	P	0	1	0	Y
48	P	2	3	1	Y
49	L	3	3	1	Y
50	L	1	2	0	Y
51	L	2	2	1	Y
52	L	1	2	0	Y
53	L	1	1	0	Y
54	L	3	4	1	Y
Baseline					
1	base	3	0	1	NA
2	base	1	0	1	NA
3	base	2	4	1	NA
4	base	2	1	0	NA
5	base	3	1	0	NA
6	base	2	2	1	NA
7	base	1	1	0	NA
8	base	0	1	1	NA
9	base	1	0	0	NA
10	base	1	3	0	NA
11	base	1	1	0	NA
12	base	1	1	0	NA
13	base	1	3	0	NA
14	base	2	3	0	NA
15	base	1	2	0	NA
16	base	1	3	1	NA
17	base	1	1	1	NA
18	base	1	1	0	NA
19	base	2	3	0	NA
20	base	2	2	0	NA
21	base	2	0	0	NA
22	base	1	2	0	NA
23	base	4	0	0	NA
24	base	2	1	0	NA
25	base	1	2	1	NA
26	base	1	2	1	NA
27	base	0	2	1	NA

Note. L = List Format
P = Paragraph Format
Y = Reported Reading Warning
N = Reported Not Reading Warning
NA = Not Applicable
Subj = Subject
Cond = Condition
base = Baseline

Modeling Product: Variable is Pre-Questioning

Subj	Cond	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
1	N	1	1	0	N
2	N	0	2	2	Y
3	N	1	0	1	Y
4	2	0	1	1	Y
5	2	0	1	1	N
6	2	1	1	0	Y
7	N	1	1	1	N
8	N	0	1	1	Y
9	N	1	1	1	N
10	2	0	1	1	Y
11	2	0	1	2	Y
12	2	1	2	0	N
13	N	0	1	2	N
14	N	1	1	1	N
15	N	0	1	1	N
16	2	1	2	1	Y
17	2	0	1	0	N
18	2	1	1	1	N
19	N	0	0	0	N
20	N	1	1	0	N
21	N	1	2	1	Y
22	2	2	1	2	N
23	2	1	2	1	Y
24	2	3	2	2	Y
25	1	0	0	0	Y
26	1	2	1	0	Y
27	1	0	2	1	Y
28	2	1	1	1	Y
29	2	1	1	1	Y
30	2	0	0	2	N
31	N	1	0	0	Y
32	N	1	2	2	Y
33	N	2	1	1	Y
34	N	0	1	1	Y
35	N	2	2	2	Y
36	N	2	2	1	Y
37	1	2	2	1	Y
38	1	0	1	1	Y
39	1	2	2	1	Y
40	1	1	2	2	Y
41	1	1	1	1	N
42	1	1	2	0	Y
43	1	1	2	1	N
44	1	1	2	1	Y
45	1	0	2	2	N

Modeling Product: Variable is Pre-Questioning (con't)

Subj	Cond	Number of Stmts Recalled	Number of To's Correct	Number of If's Correct	Read
46	1	2	3	1	Y
47	1	1	2	2	Y
48	1	1	1	2	Y
49	1	1	2	1	Y
50	1	1	1	2	Y
51	1	1	1	1	Y
52	2	1	1	0	N
53	2	0	1	0	Y
54	2	1	1	0	Y
Baseline					
1	base	1	1	2	NA
2	base	1	0	1	NA
3	base	1	1	2	NA
4	base	0	1	1	NA
5	base	0	1	2	NA
6	base	0	1	0	NA
7	base	1	0	1	NA
8	base	0	0	0	NA
9	base	2	2	0	NA
10	base	0	0	1	NA
11	base	1	1	0	NA
12	base	1	1	2	NA
13	base	1	0	0	NA
14	base	2	1	0	NA
15	base	1	1	0	NA
16	base	1	1	0	NA
17	base	1	1	0	NA
18	base	2	1	0	NA
19	base	1	1	1	NA
20	base	1	0	0	NA
21	base	1	1	0	NA
22	base	0	1	0	NA
23	base	0	1	1	NA
24	base	2	2	0	NA
25	base	0	1	0	NA
26	base	0	1	0	NA
27	base	2	1	0	NA

Note. N = No Question
1 = Question "Are you aware of the following hazards??"
2 = Question "What would you do if these accidents occurred??"

See additional notes on following page.

Note. Subj = Subject
Cond = Condition
NA = Not Applicable
Y = Reported Reading Warning
N = Reported Not Reading Warning