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Increasing the Surface Area on Small Product Containers to Facilitate Communication of Label Information and Warnings

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ABSTRACT

College students and elderly subjects rated a fictional glue product contained in seven differently-labeled bottles. Six involved alternative methods of increasing the label surface area relative to a standard, control bottle. The results indicated that both groups of subjects preferred two of the alternative labeling methods (tag and wings) on ease of reading the label, and noticing and reading the warning compared to other methods. On most of the other dimensions, the students preferred the control label, while the elderly subjects preferred the wings label. Increasing the label surface area on very small products appears to be a viable method of enhancing communication of product information and warnings.

INTRODUCTION

Many products available in the marketplace contain hazards that are not readily apparent and are often unknown to consumers. The way manufacturers usually communicate hazard information is through on-product instructions and warnings. However, limited space on small product containers often forces manufacturers to sacrifice the clarity and readability of information presented on the affixed label. In trying to be concise, the information may be too brief and terse making it less understandable. The print may be too small and illegible for many consumers to read. Important information is often omitted because of lack of space.

One solution to the problem of limited on-product label space used by many manufacturers is to print additional information on the product packaging or on accompanying package inserts. However, many consumers upon opening and using the product for the first time are likely to discard both of these supplements, making the information unavailable for reference during subsequent product use.

For certain consumer populations, such as the elderly, small print can present problems. Elderly persons are less able to focus on and distinguish small details, and are more likely to develop visual impairments. With uncorrected vision, visual acuity in the elderly may approach 20 times less than in their youth. But even with corrected vision, most persons over 60 years of age are less able to focus on objects as well as they did 40 years earlier (Kaufman & Christensen, 1978). Thus, there is a strong chance that very little or no information is gained from on-product labels by the elderly (Vanderplas & Vanderplas, 1980; Zuccollo & Liddell, 1985).

The purpose of this study was to explore and evaluate several unique ways of presenting information on labels of very small bottles. In particular, we investigated ways in which the surface area of a small container could be increased or

extended relative to the common method of presenting on-product label information. The testing was performed on two potential populations of users, college students and elderly individuals.

METHOD

Subjects

Thirty-five Rensselaer students (M = 19 years) participated for credit in their introductory psychology courses. In addition, a sample of 29 elderly volunteers (M = 76 years) from the various retirement centers in the Albany, New York area participated.

Materials

Product information and warnings were presented on realistic-appearing, but fictional, quick-bonding glue containers. The "glue" was held in identical 0.3 fl oz glass-cylinder bottles with brush-applicator caps. The basic bottle circumference was 5.0 cm and had a total height of 6.4 cm (3.7 cm and 2.7 cm for the glass and cap, respectively). The printed label on the control bottle occupied all available space on the glass section of the control bottle: (1) the product name and logo appeared on the front, (2) the instructions appeared on the back, and (3) the warning was wrapped around the lower section of the label, centered under the product name.

Six experimental labeling methods (wings, tag, cap, box, disc, and wrap-around) were developed for the purpose of increasing the available surface area. Illustrations of the control and the six experimental labeling methods appear in Figure 1. Because greater surface area was available, the size of each label element on the experimental bottles was made 20% larger than on the control bottle and held constant across all six experimental labels. The size increase was limited by the available space on two of the experimental labels, the cap and disc. A label containing all of the printed elements on the glue label is shown in Figure 2. It is shown in the actual size as it appeared on the experimental labels. The guiding principle for the placement of label elements was to locate the warning information in a prominent place on the extended part of the label.

The added surface area of the experimental bottles (except the cap and tag) were made using foam-core board. Labels were printed on a laser printer and all surfaces were covered by lamination. All text was oriented horizontally (perpendicular to the bottle's length). On top of each bottle was a randomly-assigned letter that served to identify the bottles during testing.

Procedure

The college students rated the bottles on the following dimensions: attractiveness, ease of use, safety, likelihood of noticing the warning, likelihood of reading the warning, ease of reading the product label, willingness to purchase the product, and perceived cost. Ratings were made on 6-point Likert scales (0=low, 5=high). The specific questions and ratings scales were:

- "How *attractive* is each bottle?" anchored with (0) extremely unattractive, (1) unattractive, (2) somewhat unattractive, (3) somewhat attractive, (4) attractive, and (5) extremely attractive.
- "How *easy is it to use* each bottle?" anchored with (0) extremely difficult, (1) difficult, (2) somewhat difficult, (3) somewhat easy, (4) easy, and (5) extremely easy.
- "How *safe* is each bottle to use?" anchored with (0) extremely unsafe, (1) unsafe, (2) somewhat unsafe, (3) somewhat safe, (4) safe, and (5) extremely safe.

Figure 1. Labeling Methods

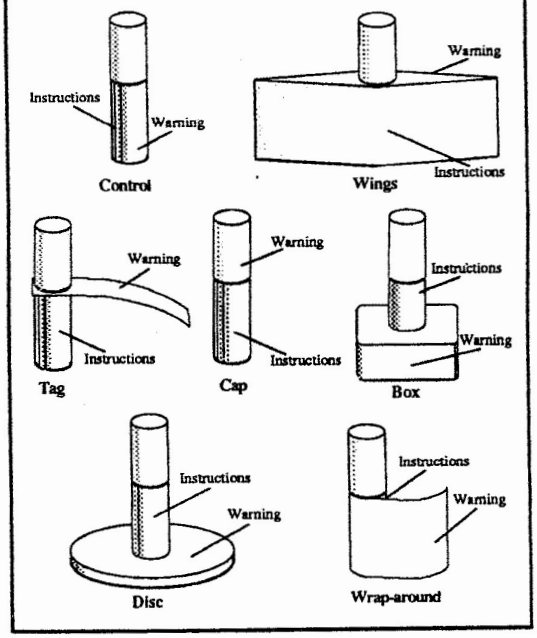

Figure 2

Bottle Label Elements in Size that Appeared on all Experimental Labels. The Control Label was 20% smaller.

- "How likely would it be that you would *notice the warning* on each bottle?" anchored with (0) extremely unlikely, (1) unlikely, (2) somewhat unlikely, (3) somewhat likely, (4) likely, and (5) extremely likely.
- "How likely would it be that you would *read the warning* on each bottle?" anchored with (0) extremely unlikely, (1) unlikely, (2) somewhat unlikely, (3) somewhat likely, (4) likely, and (5) extremely likely.
- "How easy is it to *read the label* on each bottle?" anchored with (0) extremely difficult, (1) difficult, (2) somewhat difficult, (3) somewhat easy, (4) easy, and (5) extremely easy.
- "How likely is that you would *purchase* each bottle?" anchored with (0) extremely unlikely, (1) unlikely, (2) somewhat unlikely, (3) somewhat likely, (4) likely, and (5) extremely likely.
- "Please estimate the retail *price* of the product when packaged in each bottle." For this question, subjects gave cost estimates in dollar/cents for each bottle.

The elderly adults participated in a similar sets of evaluations. However, because a preliminary study indicated that elderly subjects had difficulty with the rating scales, the older subjects' task was limited to the selection of the single bottle that best represented each dimension. The questions were:

- "Which is the *most attractive* bottle?"
- "Which bottle is *easiest to use*?"
- "Which bottle is the *safest to use*?"
- "Which bottle has the *most noticeable warning*?"
- "Which bottle would you *most likely read the warning*?"
- "Which bottle has the *easiest label to read*?"
- "Which bottle would you *most likely purchase*?"
- "Which bottle would *cost the most*?

Each subject answered the questions in a unique random order and recorded their answers on a separate response sheet with lettered blanks associated with each bottle. The college students rated all bottles on one question before moving to the next question.

RESULTS

Student ratings

The student ratings for each question were analyzed using separate repeated-measures analyses of variance (ANOVAs). Tukey's Honestly Significant Difference test (HSD) was used to make post hoc comparisons between means of significant effects. Only differences with probability levels less than .05 are described.

The ANOVA on attractiveness was significant, $F(6, 210) = 12.91$, $p < .0001$. The order of the bottles in descending order was: control, cap, tag, wrap-around, box, disc, and wings. Post hoc comparisons showed that the control was rated significantly more attractive than the other bottles except for the cap and tag. The cap was significantly more attractive than the remaining bottles except for the tag and wrap-around. The tag was significantly more attractive than the remaining bottles except for the wrap-around and box.

The ANOVA on ease of use was significant, $F(6, 210) = 50.49$, $p < .0001$. The order of the bottles in descending order was: control, cap tag, wrap-around, disc, box, and wings. Post hoc comparisons showed that the control bottle was rated significantly more attractive than the other bottles except for the cap. The cap was significantly more attractive than the remaining bottles. The tag was significantly more attractive than the lower rated bottles except for the wrap-around. Moreover, the wrap-around was significantly more attractive than the three lower rated bottles. Finally, the disc was rated significantly more attractive than the wings.

The ANOVA on warning noticeability was significant, $F(6, 210) = 44.27$, $p < .0001$. The

order of the bottles in descending order was: tag, disc, wrap-around, wings, box, cap, control. Post hoc comparisons showed that the tag was rated as having the most noticeable warning compared to the other bottles. At the other end, the control bottle warning was significantly less noticeable than all of the other bottles. The cap, having the second least noticeable warning, was significantly different from the other bottles except for the box and wings.

The ANOVA on likelihood of reading the warning was significant, $F(6, 210) = 18.14$, $p < .0001$. The order of the bottles in descending order was: tag, disc, wings, box, wrap-around, cap, and control. Post hoc comparisons showed that the students said that they would be significantly more likely to read tag warning compared to the others, and that they would be significantly less likely to read the warning on the controlcompared to the others.

The ANOVA on ease of reading the label was significant, $F(6, 210) = 18.16$, $p < .0001$. The order of the bottles in descending order was: wings, tag, cap, disc, wrap-around control, and box. Post hoc comparisons showed that the wings label was rated significantly easier to read than all of the other bottle labels. The tag label was rated significantly easier to read than the remaining bottles except for the cap.

The ANOVA on purchasing intentions was significant, $F(6, 210) = 29.66$, $p < .0001$. The order of the bottles in descending order was: tag, cap, wrap-around, box, wings, control, and disc. Post hoc comparisons showed that the control was significantly more likely to purchased than all other bottle types except for the cap. The cap was significantly more likely to be purchased than the remaining bottles except for the tag. Moreover, purchase intentions for the tag was significantly higher than all of the lower rated bottles except for the wrap-around. Finally, the wrap-around was significantly more likely to purchased than the remaining bottles except for the box.

The ANOVA on the cost estimates was significant, $F(6, 210) = 29.66$, $p < .0001$. The order of the bottles in descending order was: wings, box, disc, tag, wrap-around, cap, and control. Post hoc comparisons showed that the wings was perceived as significantly more costly than the other bottle types except for the box and disc, both of which were perceived significantly more costly than both the control and cap.

The ANOVA on the ratings of safety was not significant, $F < 1.0$.

Elderly subjects

The elderly participants' bottle choices were analyzed using chi squares. The choosing rates can be seen in Table 2.

No significant effect was found for attractiveness, $\chi^2 (6, n = 29) = 4.07$, $p > .05$, or purchasing likelihood, $\chi^2 (6, n = 29) = 8.42$, $p > .05$.

Table 1

Mean Student Ratings of the Bottle Label Methods.

Label Type	Attractive	Ease of use	Safe	Notice warning	Read warning	Ease of reading label	Likely purchase	Cost
Control	3.81	4.47	3.25	1.86	2.06	2.19	4.39	2.04
Wings	1.75	1.56	2.97	3.58	3.33	4.39	1.58	2.94
Tag	3.00	3.25	3.31	4.89	4.53	3.44	3.42	2.44
Cap	3.39	4.17	3.42	3.06	3.11	2.67	3.92	2.08
Box	2.25	2.11	3.19	3.36	3.31	2.08	2.25	2.60
Disc	2.11	2.39	3.17	3.75	3.56	2.61	2.00	2.53
Wrap-around	2.53	3.19	3.14	3.64	3.17	2.58	2.92	2.32

Note. n = 36. Ratings were made on 6-point Likert scales (0=low, 5=high).

The chi square on ease of use was significant, χ^2 (6, n = 29) = 25.99, $p < .001$. Table 2 shows that the cap and wings were chosen most often as the easiest to use.

The chi square on safety was significant, χ^2 (6, n = 29) = 21.46, $p < .001$. The box and wings were most frequently chosen as the safest.

The chi square on warning noticeability was significant, χ^2 (6, n = 29) = 21.46, $p < .001$. The wings and tag were most frequently chosen as having the most noticeable warning.

The chi square on likelihood of reading the warning was significant, χ^2 (6, n = 29) = 24.86, $p < .001$. The wings, and to a lesser extent the tag, were most frequently chosen for having a warning that they would most likely read.

The chi square on ease of reading the label was significant, χ^2 (6, n = 29) = 15.67, $p < .001$. The wings followed by the wrap-around and tag were most frequently chosen for having the easiest label to read.

The chi square on the cost of the bottles was significant, χ^2 (6, n = 29) = 125.81, $p < .001$. Virtually all of the elderly participants selected the wings as the most expensive, followed distantly by the box.

DISCUSSION

The college students perceived the control bottle as more attractive, easier to use, less expensive, and they were more likely to purchase it than the other bottles. In general, the next best labels were the tag and cap. The worst along these dimensions was the wings. However, for ease of reading the label, the students judged the wings label to be significantly better than the others, followed by the tag. Students also judged the warning to be most noticeable and readable on the tag, and the least noticeable on the control, while the others were intermediate.

In accord with the students, the elderly adults preferred the wings as being the label easiest to read. They judged the wings to have the most noticeable warning and the warning that they would be most likely to read. Moreover, the elderly adults had high regard for the wings method on the other dimensions as well. The wings method was second to the box for safety and second to the cap for ease of use. The elderly subjects also judged the wings to be the most expensive (as did the students). However, the elderly participants showed no preference whatsoever for the control bottle. Indeed, they selected the control least often on the dimensions of safety and noticing the warning, and selected it second to last on the dimensions of ease of use, ease of reading the label, and likelihood of reading the warning. Thus, for dimensions associated with gaining information from the label (e.g., warnings), both groups most preferred the wings and/or tag, and they most disliked the control.

The results suggest that for the elderly popu-

Table 2

Elderly Subjects' Choices of the Bottle Label Methods.

Label Type	Most attractive	Easiest to use	Safest	Most noticable warning	Most likely read warning	Easiest label to read	Most likely purchase	Most cost
Control	2	2	1	0	1	1	4	0
Wings	6	9	9	10	12	9	6	25
Tag	4	0	1	9	7	6	2	0
Cap	5	11	4	3	3	3	8	0
Box	6	5	10	3	4	3	3	4
Disc	2	1	3	1	0	0	2	0
Wrap-around	4	2	1	3	2	7	3	0

Note. n = 29.

lation, reading the label is apparently more important than cost. Whereas, the wings method was consistently selected as the most expensive, it was favored not only for its information-gaining aspects (e.g., on noticing and reading the warning) but also on most other dimensions as well. Furthermore, the elderly subjects showed no preference among the bottle types on purchasing intentions. In other words, they exhibited no aversion to purchasing the wings bottle despite the fact that they considered it most expensive. The students judged some of the alternative labels to be better on the information-gaining dimensions than the conventional label, but their purchase intentions and their other judgments were quite different from the elderly participants.

Why did the two groups differ with respect to the noninformation-gaining aspects? Several possible reasons can be offered.

First, the differences could be due to differences in the judgment tasks employed between the two populations. The younger subjects responded by rating all of the bottles and the older subjects gave single choices. Different strategies might have been invoked by the two tasks.

Second, the younger participants are probably less concerned with safety than the elderly subjects. Indeed, industrial and automobile accident rates are highest for this age group (Oborne, 1987). The elderly are probably more aware of the negative consequences of product-related injuries. Furthermore, the elderly's perceptual and motor abilities have begun to degrade, so a kind of prostheses such as provided by the alternative labels might weigh more heavily in their decisions than the younger subjects. It is interesting to note that a number of the elderly participants commented that another reason they preferred the wings method was that it was easier to hold and grip.

Third, the younger subjects might have had greater limitations in what they could afford to purchase and this might have biased some of their judgments on the other dimensions. Furthermore, the younger subjects might have failed to see any additional benefit of increased surface area since they could probably read the print on the control label and could handle all of the bottles equally well.

These results suggest that the two populations weigh product-label features differently on certain dimensions. The findings illustrate the importance of considering different populations of users when designing product packaging.

Finally, mention should be made regarding a disadvantage of increased label surface area. As mentioned above, cost may be a factor for certain populations (e.g., the college students). Thus, manufacturer's may be hesitant to incorporate alternative labeling methods because of the possible prospect of lowered sales. However, as we have seen with the elderly subjects, purchasing intentions were not directly related to expected cost or the other dimensions. Indeed, well-designed labeling may increase satisfaction with the product and create a positive association with the manufacturer and its products (Ursic, 1984). Clearly, manufacturers and consumers must balance the benefits and costs of alternative on-product labels.

In summary, the present study was an exploratory investigation that had the primary purpose of demonstrating that the available surface area of small bottle containers can successfully be extended. The results showed that the labeling of small bottles need not be constrained to the bottle surface area. By increasing the surface area, more information and/or larger print can be placed directly on the container, and thus, better serve users by communicating information that might otherwise be left off the product container or would be too small to read. Thus, labeling can be enhanced to facilitate noticing and reading important information.

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