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Alternative Product Label Designs: Increasing the Surface Area and Print Size

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Abstract

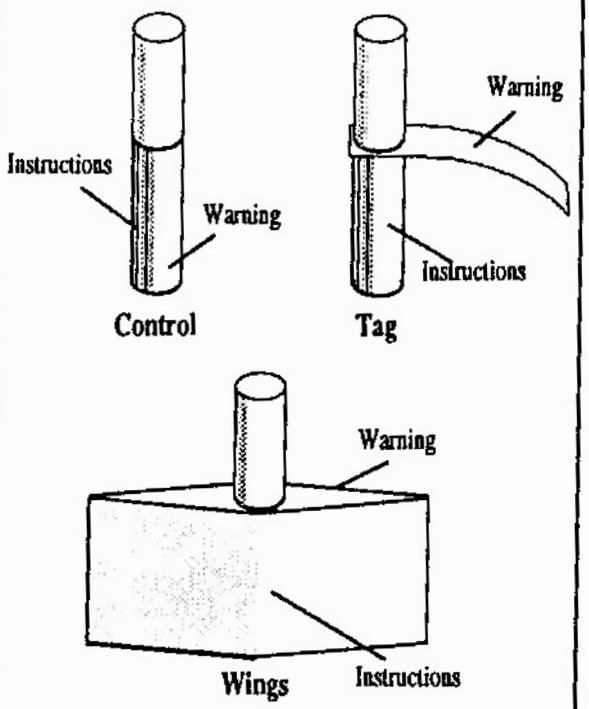
Two alternative (tag and wings) label designs were developed to increase the available surface area for information printed on labels of very small product containers. This study compares the alternative designs to a standard control label and also introduces a print-size manipulation. The results showed that both student (n=30) and elderly (n=30) participants preferred the large-size, large-print alternative labels on information-gaining dimensions. On the other dimensions, the students preferred the control label, whereas the elderly participants consistently preferred the larger-print wings labels. Implications for the communication of product hazards are described.

Introduction

Consumers are often unaware of the hazards of products they use. One way that manufacturers try to communicate hazard information is through on-product instructions and warnings. However, limited space on small containers often forces manufacturers to sacrifice clarity and readability of the information presented. For certain consumers, such as the elderly or thosewith limited visual acuity, small print can reduce the likelihood that information is gained from the labels (Vanderplas and Vanderplas, 1980; Zuccollo and Liddell, 1985). In an attempt to remedy the limited space problem, manufacturers sometimes print additional information on external packaging or include inserts. However, consumers may discard these materials after initial product use, thereby making this information less accessible when the product is used at a later time or by other persons.

Recently, Barlow and Wogalter (1991) began to address the problem of limited label surface area by examining consumers' preferences for six alternative product-label designs for a glue product contained in a very small bottle (8.9 mL). Each of the designs provided a different method of increasing the surface area of the label

Figure 1
Labeling Methods



Note. Bottle circumference was 5.0 cm with a total height of 6.4 cm (3.7 cm and 2.7 cm for the glass and cap, respectively).

relative to a conventional (control) label design. Two of the alternative designs (tag and wings) plus the control are shown in Figure 1.

In the Barlow and Wogalter (1991) study, elderly participants (M=76 years) and college students rated the label designs on the dimensions of attractiveness, ease of use, willingness to purchase, ease of reading the label in general, and likelihood of noticing the warning, and likelihood of reading the warning. The results showed that the wings design was preferred by the elderly participants on most of the dimensions tested. However, the college students preferred the tag design with regard to noticing and reading the warning, the wings design for ease of reading the label in general, and the control design for attractiveness, ease of use, and purchase intentions.

Thus, in general, both the elderly and the students preferred the wings and tag designs on ease of reading the label and noticing and reading the warning. However, print size was held constant for all of the alternative labels in an effort to evaluate only the designs. Some labels had additional space that would allow for larger print. Therefore, some of the labels' potential benefits were not examined.

The present study extends the earlier work by manipulating the surface area and print size of the two most preferred labeling methods, tag and wings, using both elderly and college student participants.

Method

Subjects

Thirty Rensselaer students from introductory psychology courses (M=19.1 years) and 30 elderly volunteers from Albany, NY retirement centers (M=72.3 years) participated.

Materials

Product information and warnings were presented on realistic-appearing, but fictional, glue containers. The product was held in identical 8.9 mL (0.3 fl oz) glass-cylinder bottles with brush-applicator caps. The printed label on the control bottle (CP, control print) occupied all of the available space on the bottle's glass section. A representation of the control label appears in Figure 2.

For both the tag and the wings designs, three labels were constructed: (a) large label with the warning information printed 40% larger than the warning printed on the CP label (*40LP*); (b) small label with the warning

Figure 2

Muro **Quik-Stik™**

Typical uses: Metal, Rubber, Leather, Plastics, China, Fabrics, Vinyl, Ceramics, and Paper.
Note: Do not use with paper, wood, cloth or leather.
Contains: Cyanoacrystlate ester.

DIRECTIONS:

1. Both surfaces must be clean, smooth and dry.
2. Apply sparinglyto one part and spread out.
3. Assemble parts immediately.
4. Apply firm pressure for one minute.
5. Bond strength increases up to 24 hours.

WARNING: Skin and Lung irritant.
Do not allow glue to contact skin. Fumes may cause nausea. Wear protective mask and gloves at all times when using this product.
KEEP OUT OF REACH OF CHILDREN

information printed 20% larger than that of CP (*20LP*); and (c) large label with the same size print as on the control. For the first two tag labels (40% and 20% larger print), the warning occupied all of the available space on the tag. The comparable wings labels had the same size print as the tag labels. However, the print did not fill all of the available space on the wings labels as the wings design produced much larger surface areas than the tag. Representations of the variants of the tag label appear in Figure 3.

The added surface area of the wings was made using foam-core board. The tags were made with stiff paper labels. Labels were laser printed and all surfaces were covered by clear plastic laminate.

Procedure

Students rated the bottles on eight dimensions: attractiveness, ease of use, safety, likelihood of noticing the warning, likelihood of reading the warning, ease of reading the product label, willingness to

Figure 3
Experimental Tag Labels

WARNING: Skin and Lung irritant.
Do not allow glue to contact skin. Fumes may cause nausea. Wear protective mask and gloves at all times when using this product.
KEEP OUT OF REACH OF CHILDREN

Large-tag,40LP label

WARNING: Skin and Lung irritant.
Do not allow glue to contact skin. Fumes may cause nausea. Wear protective mask and gloves at all times when using this product.
KEEP OUT OF REACH OF CHILDREN

Small-tag, 40LP label

WARNING: Skin and Lung irritant.
Do not allow glue to contact skin. Fumes may cause nausea. Wear protective mask and gloves at all times when using this product.
KEEP OUT OF REACH OF CHILDREN

Large-tag, control-print (CP) label

Note. Representations are not drawn to scale.

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:

(a) "*How attractive is each bottle?*" anchored with (0) extremely unattractive, (1) unattractive, (2) somewhat unattractive, (3) somewhat attractive, (4) attractive, and (5) extremely attractive.

(b) "*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.

(c) *"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.

(d) *"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.

(e) *"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.

(f) *"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.

(g) *"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.

(h) *"Please estimate the retail price of the product when packaged in each bottle."* For this question, students 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 they had difficulty with the rating scales, the older participants' task was limited to the selection of the single bottle that best represented each dimension. The questions were:

(a) *"Which is the most attractive bottle?"*

(b) *"Which bottle is easiest to use?"*

(c) *"Which bottle is the safest to use?"*

(d) *"Which bottle has the most noticeable warning?"*

(e) *"Which bottle would you most likely read the warning?"*

(f) *"Which bottle has the easiest label to read?"*

(g) *"Which bottle would you most likely purchase?"*

(h) *"Which bottle would cost the most?"*

Each participant recorded their answers on a separate response sheet with lettered blanks associated with each bottle. The questions were randomly ordered for each participant.

Results

Student ratings

Student ratings for each question were analyzed using repeated-measures analyses of variance (ANOVA), followed by Newman-Keuls multiple-range tests to compare means of the significant effects. Differences with probabilities less than .05 are described. Table 1 contains the means.

The ANOVA on the attractiveness data was significant, $F(1, 174) = 12.02$, $p < .0001$. Students rated the control bottle

Table 1

Mean Ratings of Students for Labeling Methods

Label Type	Most attractive	Easiest to use	Safest	Most noticable warning	Most likely read warning	Easiest label to read	Most likely purchase	Cost
Control (CP)	3.83	4.53	2.60	1.07	1.43	.90	3.33	2.13
Large-tag/40LP	2.80	2.80	2.50	4.60	4.27	2.23	2.93	2.24
Small-tag/20LP	2.43	2.80	2.36	3.83	3.60	1.97	2.93	2.23
Large-tag/CP	2.63	2.80	2.27	3.37	3.13	1.47	2.63	2.22
Large-wings/40LP	1.97	2.43	3.47	4.03	4.20	4.40	2.53	3.05
Small-wings/20LP	2.03	2.40	3.33	3.73	3.80	4.27	2.57	2.98
Large-wings/CP	1.90	2.40	3.23	3.27	3.37	3.33	2.17	3.01

significantly more attractive than the other bottles. The next most attractive was the large-tag/40LP which was rated significantly more attractive than the large-wings/40LP and large-wings/CP.

The ANOVA showed a significant effect using the ease of use scores, $F(1, 174) = 20.84$, $p < .0001$. The control bottle design was rated easier to use than all other designs.

The safeness scores showed a significant effect, $F(1, 174) = 6.66$, $p < .0001$. The three wings designs (which did differ among themselves) were rated significantly safer than the other designs.

Warning noticeability showed a significant effect, $F(1, 174) = 36.81$, $p < .0001$. The students rated the large-tag/40LP as having a more noticeable warning than all other designs. The next most noticeable was the large-wings/40LP which was rated as having a significantly more noticeable warning than the large-wings/CP and the control.

The ANOVA showed a significant effect for likelihood of reading the warning, $F(1, 174) = 29.94$, $p < .0001$. The students reported being least likely to read the warning on the control bottle; its mean was significantly lower than the other bottle designs. The large-wings/40LP and large-tag/40LP bottles received the highest scores on this dimension and both were significantly higher than the large-wing/CP and large-tag/CP design.

Ease of reading the label showed a significant effect, $F(1, 174) = 62.94$, $p < .0001$. The order from highest to lowest was: large-wings/40LP, small-wings/20LP, large-wings/CP, large-tag/40LP, small-tag/20LP, large-tag/CP, small-tag/CP and finally, the control. All differences were significant except between the two larger-print wings labels and between the two larger-print tag labels.

The ANOVA showed a small effect of the willingness to purchase scores, $F(1, 174) = 2.16$, $p < .05$. The only significant difference was that the students were more willing to purchase the control bottle than the large-wings/CP bottle.

Lastly, cost estimates showed a significant

Table 2

Selection Frequencies of Elderly Participants for Labeling Methods

Label Type	Most attractive	Easiest to use	Safest	Most noticable warning	Most likely read warning	Easiest label to read	Most likely purchase	Cost
Control (CP)	2	2	2	0	0	0	0	1
Large-tag/40LP	1	2	2	1	6	4	2	0
Small-tag/20LP	2	3	0	0	0	0	0	2
Large-tag/CP	1	1	2	3	1	2	3	1
Large-wings/40LP	10	10	10	13	14	13	11	15
Small-wings/20LP	10	11	11	7	10	12	12	7
Large-wings/CP	4	1	3	1	1	1	1	4

effect, $F(1, 174) = 12.04$, $p < .0001$. All three wings bottle designs were given significantly higher cost estimates than the other bottle designs.

Elderly choices

The selection frequencies for the elderly participants' bottle choices are shown in Table 2. The data for each question were analyzed using Chi-square tests. All were significant ($ps < .001$). The table shows a clear pattern of results: On all dimensions, the elderly participants selected the large- and small-wing/larger-print bottles more often than the other bottles.

Discussion

Both groups perceived the control bottle to be inferior to the alternative-label designs on the information communication and safety dimensions (i.e., likelihood of noticing and reading the warning, ease of reading the label and perceived safeness). However, the groups differed on the other dimensions. Students rated the control design as the most attractive, and easiest to use, and the design they were most likely to purchase. However, the elderly chose the wings designs for these and the other dimensions.

One implication of these results is that the two populations seem to weigh the importance of certain product-label features somewhat differently. Though manufacturers' may be hesitant to incorporate alternative labeling methods because of the possibility of reduced sales, the results show that the elderly were most willing to purchase a container with the large print/ wings design, irrespective of its higher anticipated cost (cf. Ursic, 1984). In addition, the students' purchase intentions for the control design was not significantly different from the other label designs except for one (large-wings/CP).

A second implication concerns the frequent claim by manufacturers (often after an accident in the context of a product liability suit) that they were unable to include a better warning because of limited label space. Several alternative designs were demonstrated to have potential for increasing the quality and quantity of information on labels.

A third, and most important, implication is that the alternative labeling methods might be useful in preventing accidents and injuries by better communicating instructions and information about potential hazards.

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References

Barlow, T., and Wogalter, M. S. (1991). Increasing the surface area on small product containers to facilitate communication of label information and warnings. In *Proceedings of Interface '91* (pp. 88-93). Santa Monica, CA: Human Factors Society.

Ursic, M. (1984). The impact of safety warnings on perception and memory. *Human Factors, 26*, 677-682.

Vanderplas, J. M. and Vanderplas, J. H. (1980). Some factors affecting legibility of printed materials for older adults. *Perceptual and Motor Skills, 50*, 923-932.

Zuccollo, G., and Liddell, H. (1985). The elderly and the medication label: Doing it better. *Age and Ageing, 14*, 371-376.

Preface

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