

The noticeability of safety pictograms on different packaging shapes

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Abstract

Customer willingness to buy and use a product is influenced by brand trust, which can be built with noticeable and clear warning messages applied on product packaging. Pictorial safety information on the packaging has an important role in conveying information to consumers, who should be warned and protected from the dangers that may arise as a result of the misuse of a product. This study manipulated the placement of safety pictograms on candle packaging (front, top, side and back) that differed according to packaging shape (angular vs. rounded). The noticeability of pictograms was evaluated by 34 participants using 8 samples of candle packaging. The results indicated that changes in pictogram noticeability were observed with the influence of placement, which also varied due to the shape of packaging. The pictograms were most easily noticed on the top of rounded packaging and on the front side of angular packaging. A set of guidelines is proposed in accordance with these findings, which aims to enhance the salience of pictorial safety messages and thus better communication and trust between the marketer and the consumer.

Keywords: packaging shape, consumer safety, pictorial warnings

Main Conference Topic: Consumer product safety

1. Introduction

Producers use various packaging shapes in order to emphasize the visual attractiveness of a product to increase sales and achieve brand recognizability. However, the attractiveness of the packaging is not the only factor that has a positive effect on consumer purchasing decisions and trust in the brand. Consumer perception of the producer also plays an important role. To strengthen a consumer's trust in a brand it is necessary to provide all the important information about a product, both directly and indirectly [1]. Consumers prefer brands that place prominent and clear warnings about the product that is being advertised [2]. Advertising is not in general as effective in providing warning information as point of warning labels which are visible during the use of a product. So, instead of delivering detailed warning information, ad should motivate consumer to consult the warning label that is applied on the product or packaging [3].

When applying warning information on packaging, producers often use warnings in the form of pictograms rather than text. Safety pictograms are stylized illustrations that present the appropriate handling of a product. Their role is to prevent and to warn of the consequences that may result from the misuse of a product. Frequent use of pictograms is based on their dual function of attracting attention and transferring information [4]. They attract attention easily because of their simple structure, and because of their pictorial form, they can transmit information to more people, e.g. to illiterate people or people with reading difficulties, and also to those who do not understand the language used on the packaging [5]. Moreover, the use of pictograms enhances the memory of the warning messages [6], and that increases the possibility of consumer behavior in accordance with the message that it addresses (e.g., keep the candle away from flammable objects). The superiority of pictograms over text is especially beneficial for producers in need of displaying as much data on the

packaging as possible, since an image can "speak" louder than words, and thereby take up a much smaller area on the packaging than text [7].

This benefit is often used in cases when candle packaging has a strong decorative function. It has been recognized by manufacturers who, according to EN 15494:2007, must apply warning signs on packaging, either in the form of text or pictograms [8]. The standard contains mandatory safety messages which must be included on packaging labels. They include four main statements, and a warning sign preferably on a yellow background. The warning sign (a triangle with a black exclamation mark in the center) should be located near the other warning messages. Given as a pictogram or as text, mandatory phrases suggest the following actions: never leave a burning candle unattended, burn candle out of reach of children and pets, always leave at least x cm between burning candles, do not burn candles on or near anything that can catch fire (Figure 1).

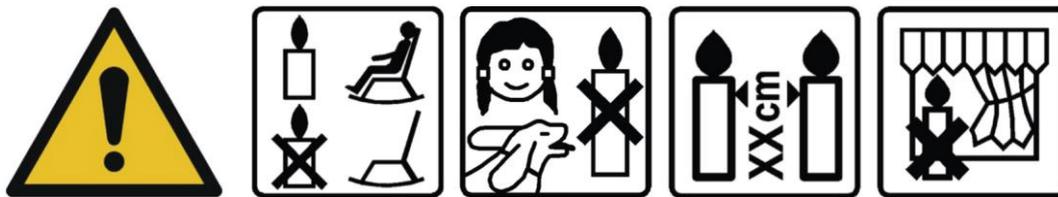


Figure 1. Pictorial form of the mandatory safety messages

When observing pictograms as formatted messages within the communication process between the producer (who points to the proper handling of the product) and the consumer (who should act in accordance with the instructions), it is necessary to emphasize the importance of the noticeability of the pictograms. Getting noticed is an essential requirement for an effective safety pictogram, because if the pictogram is not detected it cannot have any effect on consumer behavior [9]. The term noticeability is often used to describe the extent to which pictograms attract attention more than other visual elements on the packaging [5]. In accordance with that, in this study, the noticeability is defined as one of the characteristics of the pictograms that indicate the possibility of them being noticed.

The scope of this study is the candle packaging. The specificity of this product is its dual function. The basic function of candles is illuminating the area by fire. Its flame can cause fire and catastrophic, even life-threatening consequences that endanger not just the user who is unaware of the risks, but also his environment. To inform users about the potential risks, the appropriate warnings are being applied on packaging. Another function of candles is the decoration of the interior. Producers tend to stress the decorative function of candles by emphasizing decorativeness in the design of the product or in the design of the packaging. In an effort to keep the aesthetic properties of the packaging and its decorativeness, the area defined for the warning signs is often reduced. Additionally, the decisions regarding the positioning of the warnings on the packaging are guided by the tendency to highlight the positive characteristics of the product (durability, fragrance, candle ingredients) on the most visible parts of the packaging. It is expected that producers prefer to highlight those visual elements that make the packaging attractive on the market, but doing so should not diminish the importance of those elements of the packaging which make the product safe for use.

The main goal of this study is to determine the extent to which the noticeability of safety pictograms on the candle packaging depends on the packaging shape.

2. Methodology

Noticeability is based on the psychological principles of attracting attention, so it is very difficult to measure it directly. This study is based on the results obtained from the

subjective evaluation of candle packaging. Participants were average consumers with medium purchasing power who often use the product whose packaging is the object of observation. 34 people participated in the study; 56% of which were female and 44% were male. Their ages ranged from 20 to 59 years old (M=33,18 years, SD=11,46 years). Participants were self-reportedly right-handed for writing and grabbing. They had normal or corrected-to-normal vision.

For the measurement of the noticeability of the pictograms 8 samples of packaging were used. The samples were of equal size (60 x 60 x 80 mm). They were classified into two categories: angular (rectangular prism) and rounded (cylindrical shape). The samples also differed according to the position of the applied pictograms. Each of the packaging shape contained pictograms on different parts of the packaging relative to the starting point of observation - on the front, left, back and top side. The pictograms on each sample were designed in accordance with EN 15494:2007. Schematic representation of each sample is shown in Figure 2. which illustrates the elements of graphic design that are the most prominent, and present the most important information. These elements are explained in more detail by the accompanying legend. The observed samples can be found in most supermarkets in the city of Zagreb.

Observers were asked to take the Ishihara Color Vision Test before the experiment to ensure they did not have any color defects. The experiment took place in the XRite Macbeth Judge II-S Light Booth located in a dark windowless room. Macbeth D50 lighting source, having 5230 K color temperature, was used for lighting the viewing booth. Luminance level was 1227 lux. Overhead lighting was turned off. The observers were asked to adapt to the illumination for 60 seconds. They viewed the samples at an angle of approximately 45° at a distance of around 30 cm.

Before they started with the evaluation, participants were briefed about the experimental procedure by using one sample of the packaging that is not included in the analysis. They had to take each sample in their hands, and observe it freely. The observation time was unlimited. The participants' main task was to evaluate the safety pictograms on the packaging by rating their noticeability on the basis of the following criteria:

- 1 - excellent noticeability of pictograms
- 2 - very good noticeability of pictograms
- 3 - good noticeability of pictograms
- 4 - poor noticeability of pictograms
- 5 - extremely poor noticeability of pictograms

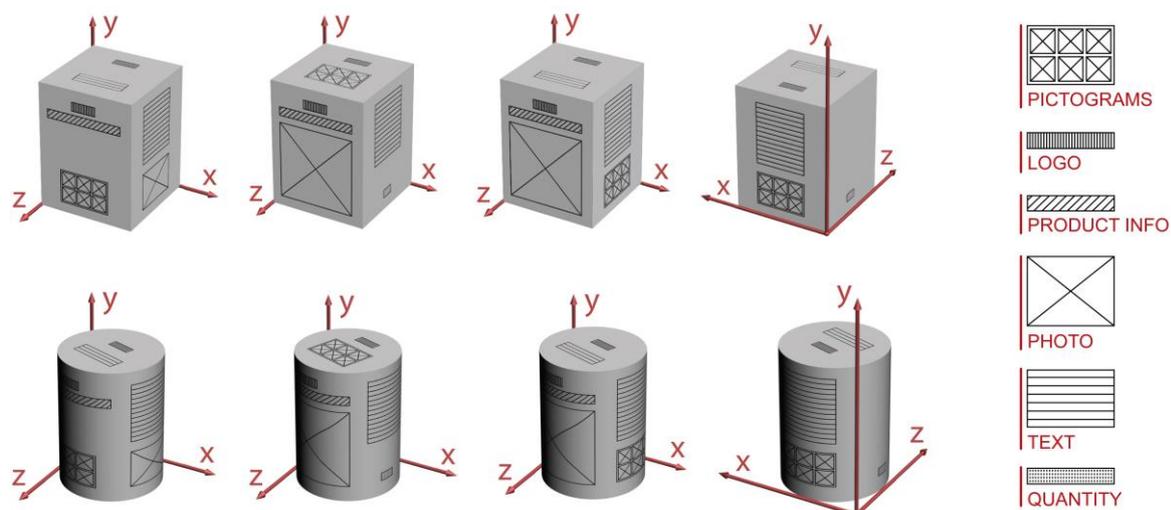


Figure 2. Schematic representation of packaging samples

3. Results

A 2 (shape) x 4 (location) analysis of variance (ANOVA) was conducted on the noticeability of pictograms. A significant level of 0,05 was observed for this analysis. The ANOVA showed a significant main effect of the packaging shape $F(1,264)=15,21$, $p<0,05$. In general, pictograms applied on rounded packaging are more noticeable ($M=2,98$, $SD=1,26$) compared to those applied on angular packaging ($M=3,23$, $SD=1,01$). The location of the pictograms had a significant main effect $F(3,264)=305,35$, $p<0,05$. Comparisons among the means using the Bonferroni test showed that the noticeability of pictograms located on the front side of the packaging ($M=2,16$, $SD=0,56$) and pictograms located on the top side of the packaging ($M=2,29$, $SD=0,69$) did not significantly differ ($p>0,05$), but both locations enabled better noticeability of pictograms compared to the left side ($M=3,43$, $SD=0,60$) and the back side ($M=4,56$, $SD=0,58$) of the packaging. The left positioned pictograms had significantly better noticeability compared to the pictograms positioned on the back side of the packaging ($p<0,05$).

The ANOVA additionally showed a significant (shape) x (location) interaction $F(3,264)=27,11$, $p<0,05$ (Figure 3).

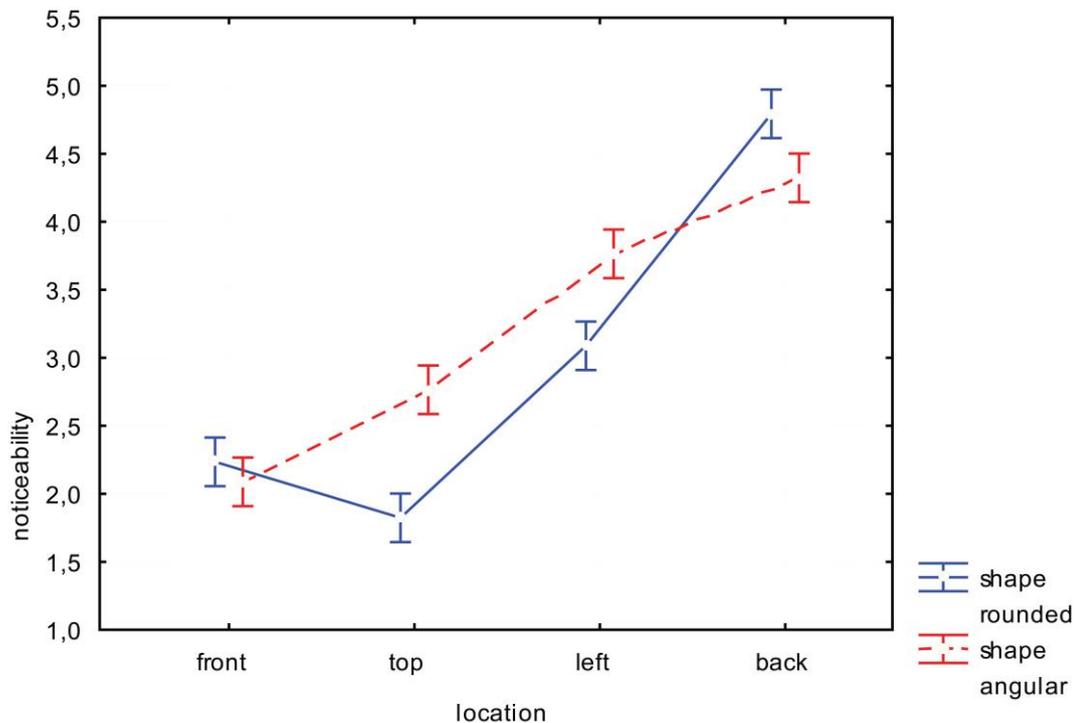


Figure 3. Interaction of the packaging shape and the pictogram location

4. Discussion

This study investigated the influence of the packaging shape and the location of the pictograms on their noticeability. The results showed that the positioning of pictograms on a certain side of the packaging (front, top, left side and back) had the greatest effect on their noticeability. This effect was expected due to the three-dimensional structure of the packaging form. For the overall experience of a three-dimensional object it is necessary to observe it from a few different viewpoints, which presents difficulties in noticing differently placed visual elements on the packaging. While observing the three-dimensional object from just one viewpoint, it is possible to see the information applied to one surface of the object that is visible only from that point of viewing [10]. By changing the viewing geometry it is possible to see other surfaces of that object, and thus to identify information that is applied on them.

The results indicated that there is no difference in noticeability of pictograms applied to the front and the top of the packaging. Namely, the viewpoint which is directed to the front side of the packaging also covers its top side (with the assumption that the packaging is sufficiently small, as was the case in this experiment). This is due to the human tendency for asymmetric viewing of three-dimensional objects, due to the experiences of everyday life where most of the objects sit on surfaces below eye level [11]. The results indicated lower noticeability of the pictograms applied on the left and the back of the packaging, which is a result of the need for changing viewpoints during the observation of the packaging. The greater the distance to the pictograms in relation to the starting point of the viewing of the packaging, the more viewing perspectives of the packaging are required, thereby prolonging the time needed to notice the pictograms. So it is not surprising that the results showed lower noticeability of the pictograms on the back than on the left side, as the latter side is closer to the starting point of viewing than the back side.

According to the results, there was an interaction between the packaging form and the location of the pictograms. One of the possible explanations for this could be the geometric structure of the packaging shapes. Surfaces of the angular packaging have precise boundaries while rounded packaging has no clear boundaries between the front, left and back sides. Its smooth surface enables visibility of the greater amount of information, which leads to a greater dispersion of attention. Interestingly, in the case of rounded packaging, pictograms are more noticeable on the top than on the front side. This is probably the result of the circular form of the top side. Unlike angular packaging, which consists of six planes with similar quadratic characteristics and none of its shape stands out among other planes, the top side of rounded packaging differs greatly from the rest of the packaging.

Generally, the pictograms applied on rounded packaging are more noticeable than those applied to angular packaging. One of the possible explanations could be the main difference in the contours between the angular and rounded packaging. It refers to the edges and the points where the planes of object intersect, which have been found to be the most salient features of three-dimensional forms [12]. An angular object contains a greater number of edges and vertices, which makes its form more complex than that of rounded ones. The increasing amount of visual elements that the observer pays attention to increases the cognitive load of the observer in the process of perception of all the content on the packaging, which results in longer time required for the identification of pictograms. Unlike the angular packaging, where the perception of the edges of the object depends on the geometrical structure of the form, in the case of rounded packaging it depends on the viewpoint [10]. The process of perceiving the content on the rounded packaging flows without interruption, providing for a greater possibility of noticing the pictograms.

5. Conclusions

The results of the study showed that the pictograms are more noticeable on the rounded than on the angular packaging. Accordingly, when deciding about positioning pictograms, packaging designers should primarily take into account the packaging shape. On the smooth cylindrical packaging, which has no dominant vertical dimension, pictograms are most noticeable on the top side. In practice, the top side of the packaging for candles is often transparent, or even left out, so the consumer could have a better insight into the product before buying it, by the assessment of the candle fragrance or its color. In such cases it is advisable to apply safety pictograms on the front side. If, due to the technological characteristics of the packaging, pictograms need to be applied on the left or the back side, it is advisable to make them visually more salient by using color, contrast enhancement or increasing their size.

In the case of angular packaging shape, the pictograms are the most noticeable if they are applied on the front side, so this location is the best option when a designer wants to ensure their noticeability. If it is necessary to position them on the left or the back side, then it is recommended to emphasize their visual salience, as in the case of rounded packaging. Increasing visual salience of security information reinforces the communication process directed on users' safety. Thus, by informing and protecting a consumer, brand trust could be enhanced.

This study obtained conclusions about noticeability of pictograms by using candle packaging samples taken from real supermarkets. The samples were equal in size, but they differed according to material and the producer. Further research should be conducted by using samples designed solely for the purpose of the experiment, so more precise results could be obtained. This will ensure the uniformity of packaging design in all stages of observation, which was not possible in this study due to the variety of designs made by different candle producers. Future research should use new methods for measuring the noticeability of pictograms (e.g. eye-tracking) to reduce the subjectivity of the results.

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Teaching assistant currently teaches courses in graphic design and graphic technology at Department of Art History and Graphic Design at Faculty of Graphic Arts of the University of Zagreb. Her research interests focus on visual signs and pictograms and their role in graphic communication in the print media. Her special interests are in the areas of packaging design and consumer safety.

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References

1. Salaün, Y., & Flores, K. (2001). Information quality: meeting the needs of the consumer. *International Journal of Information Management*, 21(1), 21-37.
2. Torres, I. M., Sierra, J. J., & Heiser, R. S. (2007). The effects of warning-label placement in print ads: A social contract perspective. *Journal of Advertising*, 36(2), 49-62.
3. Bettman, J. R., Payne, J. W., & Staelin, R. (1986). Cognitive considerations in designing effective labels for presenting risk information. *Journal of Public Policy & Marketing*, 1-28.
4. Laughery, K. R. (2006). Safety communications: Warnings. *Applied ergonomics*, 37(4), 467-478.
5. Wogalter, M. S., Conzola, V. C., & Smith-Jackson, T. L. (2002). Research-based guidelines for warning design and evaluation. *Applied Ergonomics*, 33(3), 219-230.

6. Young, S. L., & Wogalter, M. S. (1988). Memory of instruction manual warnings: Effects of pictorial icons and conspicuous print. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting (Vol. 32, No. 15, pp. 905-909). SAGE Publications.
7. Bačun, D.: Priručnik o znakovima na proizvodima i ambalaži, Hrvatski poslovni savjet za održivi razvoj, Zagreb, 2009
8. EN 15494:2007 Candles - Product safety labels, 2007., <http://www3.hants.gov.uk/tradingstandards/product-safety/candles.htm> (accessed 23.09.2013.)
9. Young, S.L., Lovvoll, D.R. (1999). Intermediate processing stages: Methodological considerations for research on warnings, in: Wogalter, M.S., DeJoy, D.M., Laughery, K.R. (Eds.), Warnings and Risk Communication. Taylor & Francis, London, pp. 27–52
10. Tarr, M. J., & Kriegman, D. J. (2001). What defines a view?. Vision Research, 41(15), 1981-2004.
11. Dobbins, A. C., & Grossmann, J. K. (2010). Asymmetries in perception of 3D orientation. PloS one, 5(3), e9553.
12. Plaisier, M. A., Tiest, W. M. B., & Kappers, A. M. (2009). Salient features in 3-D haptic shape perception. Attention, Perception, & Psychophysics, 71(2), 421-430.