

Safety symbols: focus group combined with production test as a research method.

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Abstract

This paper presents a combined application of focus group and production test techniques. This approach is part of a bigger research that aims to evaluate the comprehensibility of one of the risk messages fixed in dangerous products – the risk labels. The focus group consist in a reunion of persons related to the issue that is being investigated, in which they will be allowed to debate their opinions and expertise in that topic. In this case that is focused in the safety symbology, the production test was chosen to initiate the discussion.

Keywords: scientific, safety communications, warnings, focus group, production test

1. Introduction

At a time when it is crucial to provide instant understanding of safety messages worldwide – a task that the visual, language-independent power of the graphical symbol is the best instrument to convey – the need for one clear and unambiguous set of safety signs is key to ensuring the safety message is properly understood. (ISO Bulletin, 2003)

One of the international patterns for safety signs refers to dangerous goods. This pattern represents the dangerous products and intends to facilitate the recognition at a distance for the appearance of the symbols (shape and color), allow fast identification of the danger they represent and promote an initial indication of the precaution that is needed during transport [1]. Some of those labels appear in figure 1. This research questions the comprehensibility of those labels when it comes to pass safety information to drivers and other sorts of people involved with transit.



Fig. 1: Examples of the Risk Labels for Dangerous Products

2. Safety Symbols

Printed information certainly has its role for instructions, booklets and warnings. But illustrations have also their place to transmit instructions or warnings. [2]

Non-verbal symbols, as pictograms are highly recommended and uses in warnings, risk communication, and information related to safety. [3]

Symbols can be more easily read in distance if compared to text information. [4]

Studies indicate that some used pictograms are not understood. [5]

Well-design pictograms are capable to communicate rapidly concepts and instructions. Also can be useful for people that are not able to read printed messages caused by vision problems, incapacity of reading or non-familiar with the language used. For example, in children, old aged, foreigners or illiterate users. [6]

3. Focus Group and Production Test

3.1. Focus Group

Focus Group is a technique in which the researcher join, in the same place and during a certain time, some people that are related to the issue that is being investigated, in which they will be allowed to debate their opinions and expertise in that topic [7].

So, this technique can be seen as a complement for interviews, once the focus group has as finality to obtaining a “debate”, when several topics are discussed, generating concepts, impressions and concepts about a certain theme, between the participants [7].

In this research the group was formed by six people: two car drivers, two graphic designers, two safety engineers.

3.2 Production Test

In this method the participants express through a draw, concepts that were given in written under a blank space [8].

Some objectives of this method are: to analyze variations as symbol repertory, according to cultural, social or intellectual level of the participants; to evaluate if it is difficult or easy to represent each concept; and to analyze contents that allow estimating which graphic elements are used more frequently to reflect each concept.

The definitions presented characteristics of the products when it comes to actions to be avoided and consequences of this type of action. They also presented examples of each product. These products are: explosives, gases, flammable liquids, flammable

solids, Oxidizing Agents & Organic Peroxides, Poisonous (Toxic) and Infectious Substances, Radioactive substances and Corrosive Substances. In Brazil, the pattern (NBR 7500:1999) present the symbols with several different colors, many of them uses the flame for symbols, others the skull.

The radioactive symbol and infectious substances appear too. For the corrosive substances, the symbols demonstrate an action. It was found in a research [9] that the corrosive symbols was interpreted by 21% of the interviewed as “safe place to wash ... hands”. That is, the opposite meaning that it was supposed to have.

4. Applying a new research method

In some cases, Focus Group participants can be instructed to do some “task” before the meeting. This task has as objective to prepare the subjects to discussion, and at same time, improve the relationship between them, once they never had met before [10].

In this research, the task was the production test, in which the participants were asked to draw, individually; the concepts presented in the risk labels. Although they were experts in different areas (car drivers, safety engineers and graphic designers), their drawing ability and acquaintance with the risk labels were different for each one.

The test was applied this way: each participant received a notebook size A5 with the 14 definitions previously explained with a space above them to make the drawing. After thirty minutes to make the drawings individually the participants made use of one hour and a half to discuss and comment about them. During this time it was asked them to decide which drawing represented each product in the best way, this could be a new drawing or a chosen one among the ones they’ve just made.

After that, the group discussed, using their own drawings as background, aiming a consensus about which symbol would be more adequate to the concepts of risk labels in dangerous goods. They were asked to choose between the drawings from that group, or also they could draw a new one. In this case, the drawings acted as the starting point to initiating the discussion about risk labels. As shown in Figure n.2 an example of a blank page of the booklet used by the participants to draw their symbols/ concepts.



Fig. 2: Blank page of the production test booklet

5. Results

5.1. General comments

Looking at the results of the chosen drawings it's clear that for some products the preference of the participants was to draw an action, for example, the explosive was represented by an object half full and the other half exploding. For other products it was more convenient to represent a prohibition, a "forbidden water" sign for the substances, which emit a flammable gas, when wet or react violently with water. In other cases the skull was chosen to represent danger, as in the poisonous (toxic) substances coinciding with what is recommended by the pattern. Safety elements such as the gas mask also appeared for representation.

Analyzing the relation between the drawings of each participant and the one chosen by the group, considered as "consensus", it is possible to observe three kinds of results:

-full consensus: in which the participants drew almost the same idea, and the final drawing was obtained from little "adjustments";

-half consensus: in which participants were divided in two groups (two same ideas) and the debate was about these 2 ideas; and

-non-consensual: each participant had a different solution for the concept and the debate was longer, once each possibility of representation could be adequate.

5.2 Full Consensus

An example of a typical consensual result was the representation of *flammable gas*. The definition presented to participants was "It can be inflamed by heat, sparks or flames. Example: natural gas." The drawings can be observed in figure 3 below.

Designer 1	Designer 2	Safety Engineer
Safety Engineer	Car Driver 2	Car Driver 1
Consensus		

Fig. 3. Drawings representing the risk label of *Inflammable gas*.

In this case, all participants tried to represent gas, and its inflammability. One of the participants said that the use of the word "gas" was considered a common name in many languages, but this opinion was discharged and the idea of the gas representation was conducted to include a gas bottle or a gas cylinder illustration.

This topic also generates a discussion on the fact that in some cultures a gas bottle wouldn't be recognized. How to represent gas universally, or how could be these symbols drawn to be used internationally?

Finally, the participants chose a steam to represent gas, and a flame to represent the concept of flammable. It is possible to compare this consensual drawing to the international standard, in figure n.4.

Risk label for Inflammable gas	Consensual Draw
	

Fig. 4. Comparing the consensual drawing obtained in the focus group for *Inflammable gas* and the international standard

5.3 Half consensus

As an example of half consensual drawing, we have the one obtained for explosives, which definition was: “Causes almost instantaneous liberation of pressure, gas and heat when exposed to mechanical impact, pressure or high temperatures. Example: Trinitrotoluene (TNT).”

Figure 5 show the drawings of each participant and the consensual drawing.



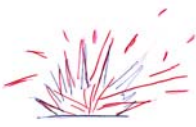




Designer 1	Designer 2	Safety Engineer
		
Safety Engineer	Driver 2	Driver 1
		
Consensus		
		

Fig. 5. Drawings representing the risk label of *Explosive*.

It is possible to verify that participants tried to represent two main concepts: explosives and explosion. During the discussion participants agreed that the product should appear less characterized then

dynamite, but as a nucleus during the explosion. There was a concern about not representing any specific material.

In this discussion some issues on colors usage was solved coloring the explosion as red and the product as black. It was also commented that the symbolic idea of cartoons, represented by the explosion's lines can allow a more perceptive situation.

Figure 6, below, shows the final drawings to the international standard.

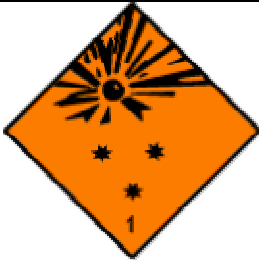

Explosive Risk Label	Specialists Consensual Draw
	







Fig. 6. Comparing the consensual drawing obtained in the focus group for *Explosives* and the international standard

5.4 Non consensual

Finally, a product which concept was no consensual was *Organic peroxide*. The definition used was “Terminally instable, may present one or more properties: susceptible to explosive decomposition, burns rapidly, sensible to hitting or friction, reacts dangerously with other substances, causes severe eye damage. Example: Cumene, main product to produce acetone.”

This product has characteristics, including nomenclature, more complex than others, what may turn the task of drawing more difficult.

So, participants tried to represent the concept in a more humorous way: a product in the hitting moment, for example or left it in blank. Figure 7 shows the drawings of each participant and the final one, obtained as consensus.

Designer 1	Designer 2	Safety Engineer
		
Safety Engineer	Driver 2	Driver 1
blank		
Consenso		

The consensus was firmly influenced by the *Driver 2* participant that draws the final consensual representation. The main idea was hitting between products, causing an explosion - these consensuses also transmit the idea of action.

In figure 8 is shown a comparison between the final drawing of the group and the standard one.



Risk label for Organic Peroxide	Specialists Consensual Draw
	

Fig. 8. Comparing the consensual drawing obtained in the focus group for *Organic peroxide* and the international standard

6. Final Comments

Focus group technique allows the participants to be really “heard” about a certain research theme. It also allows the researcher obtain spontaneous opinions once the subjects are warned about the general theme, but

not specifically.

In this way, commentaries are real questions in the head of the participant. So, the opinions are extremely relevant for the research and can be used as new point of views for new tests and field investigation.

This research observed major topics pointed out by the participants, as usage of colors, humorous representation, the kind of the line used, and the international role of each symbol analyzed, as examples.

Therefore, it is observed that for diverse times the representation adopted by the recommendation differs a lot from those chosen by specialists or the public. Those representations must be reviewed in order to adopt more efficient labels for dangerous products.

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