Chapter 2

The Design, Understanding and Usage of Pictograms

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This review of research on the pictogram effect covers theoretical and experimental studies from linguistics, psychology and cognitive ergonomics on the design and validation, comprehension and usage of pictograms. Pictograms form part of our daily lives through their use in medication, transport, computers, etc., because they indicate—in iconic form—places, directions, actions or constraints on actions in either the real world (a town, a road, etc.) or virtual space (computer desktop, Internet, etc.). This chapter is essentially a review of research on the pictogram effect, which can be summed up as follows: a pictogram is better than a label, and recognizing an image is easier than reading text (Norman, 1990). This review covers theoretical and experimental studies from linguistics, psychology and cognitive ergonomics on the design and validation, comprehension and usage of pictograms. Among the various methods, an emphasis is placed on classification and the creation of pictogram taxonomies as tools for homogenization and design.

This chapter summarizes the results of studies investigating how to use pictograms to convey safety information in the workplace, as well as some new insights into how to study the effects of the iconic nature of pictogram information. Here we are talking about signaletics, which we define as being the science of signalization, which is to say the study of external representations of object meanings, of object properties, and of mandatory, warning and prohibitive statements for categories of objects and users in more or less well-defined situations (Tijus, Chêne, Jadot, Leproux, Poitrenaud, & Richard, 2001).

After a short section defining what a pictogram is, this chapter is composed of four main sections. The first section describes empirical data reported in specialized domains.
publications (related to the use of pictograms in public information, pharmaceutics, road signs and the workplace), when assessing the role of pictograms in conveying recommended modes of behavior. The second section concerns the theoretical contributions of semiotics, of cognitive psychology for pictogram readability and understanding, and of the contextual categorization approach, a theory that accounts for the contextual effects involved in the understanding of pictograms. The third section describes the methodology, some examples and some outcomes from studies on the creation of taxonomies and ontologies of pictograms for evaluation and design. This provides a basis for understanding how a signaletic system can more or less help to solve the problem of iconic external representation of categories of objects, as well as of actions, which are two cognitive entities that, on their own, cannot be entirely captured by an image. The final section provides recommendations for the ergonomic conception of pictograms, in order to improve the readability and understanding of pictograms used to convey user safety information in the workplace.

1 Common Definitions and Uses of Pictograms

A pictogram is a stylized figurative drawing that is used to convey information of an analogical or figurative nature directly to indicate an object or to express an idea. Pictograms can fulfill many functions. They are used to replace written indications and instructions expressing regulatory, mandatory, warning and prohibitory information, when that information must be processed quickly (e.g. road traffic signs), when users speak different languages (i.e. non-natives), have limited linguistic ability (e.g. people with low levels of literacy or little education) or have visual problems (e.g. older people), and especially when there is a legal obligation to inform and for the user to comply with the information, mainly for safety purposes (e.g. use of dangerous materials at work). A pictogram needs to capture users’ attention (users’ need to see the pictogram), to improve users’ comprehension of warnings (users’ need to attend to it), and it also needs to increase their awareness of risk, generally by serving as an “instantaneous memorandum” of a risk (Otsubo, 1988).

There are a number of recognized advantages of pictograms in the literature (see the CACP report, 2000, for a summary). First of all, they have the potential to be interpreted more accurately and more quickly than words. Thus, they can serve as “instant reminders” of a hazard or an established message. They improve understanding of warnings for those with visual or literacy difficulties. They can make warnings more noticeable or “attention grabbing”, and they can improve their legibility. Pictograms or brief textual information are suitable when users undertake familiar or routine tasks (although this does not apply for novel or highly complex tasks). In addition, pictograms are more easily processed at a distance compared to textual information, although a distinction should be made between abstract symbols and more explicit icons.

However, there are also a number of disadvantages to relying on pictograms. First, very few pictograms are universally understood; therefore, depending on their use, they may not be interpreted correctly by all groups of consumers and across all cultures. Next, it always takes many years for any pictogram to reach maximum effectiveness. There is also the potential for significant confusion (interpreting the opposite or often inappropriate meaning), which can create an additional safety hazard.