Chapter 9
Exploring Cultural Differences in Pictogram Interpretations

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Abstract Pictogram communication is successful when participants at both ends of the communication channel share a common pictogram interpretation. Not all pictograms carry a universal interpretation, however; the issue of ambiguous pictogram interpretation must be addressed to assist pictogram communication. To unveil the ambiguity possible in pictogram interpretation, we conduct a human subject experiment to identify culture-specific criteria employed by humans by detecting cultural differences in pictogram interpretations. Based on the findings, we propose a categorical semantic relevance measure which calculates how relevant a pictogram is to a given interpretation in terms of a given pictogram category. The proposed measure is applied to categorized pictogram interpretations to enhance pictogram retrieval performance. The WordNet, the ChaSen, and the EDR Electronic Dictionary registered to the Language Grid are utilized to merge synonymous pictogram interpretations and to categorize pictogram interpretations into super-concept categories. We show how the Language Grid can assist the cross-cultural research process.

9.1 Introduction

In recent years, advances in information communication technology have enabled people to easily create, publish, and share various images such as photographs, movies, and illustrations on the World Wide Web. Meanwhile, tag-based image management applications such as Flickr and YouTube have come into wide use, allowing users to add tags, a prevalent form of metadata, which are later incorporated into the image search process, to enhance image retrieval (Marlow et al. 2006). Among the various images shared by people, we focus on pictograms or pictorial symbols that carry semantic interpretations. An example of well-known
pictograms are road signs, but in this paper, we look at a special kind of pictogram used in computer-mediated intercultural communication, in particular, those used in a children’s email system (Takasaki 2007).

Pictograms have clear pictorial similarities with some object (Marcus 2003), and a person who can recognize the object depicted in the pictogram can interpret the meaning associated with the object. Pictorial symbols, however, are not universally interpretable. For instance, the cow is a source of nourishment to westerners who drink milk and eat its meat, but it is an object of veneration to many people in India; hence, a picture of a cow could be interpreted quite differently by Protestants and Hindus (Kolers 1969). The pictograms we handle also exhibit such ambiguity in interpretation; they are designed by Japanese college art students who are non-experts in pictogram design, and no strict design process was applied to ensure a universal interpretation. Therefore, using these pictograms in communication may lead to misunderstanding between the communicating parties.

Given such ambiguous pictograms, our goal is (1) to analyze the ambiguities in pictogram interpretation and (2) to propose a way to assist pictogram selection so that communicating parties can achieve better pictogram communication. Our research is motivated by the overarching goal of enabling children from different cultures to communicate with each by using just pictograms; this is not the case when natural language is involved since at least one child (who is monolingual as is often the case) would have to communicate using a second language. We use various language resources such as thesauri, morphological analyzers, and concept dictionaries registered to the Language Grid to process cross-cultural pictogram interpretations.

To achieve our first goal, we conduct a human subject experiment to identify cultural differences in pictogram interpretations. We employ thirty pictograms containing U.S. and Japanese pictogram interpretations as stimuli, and use questionnaires and interviews to ask U.S. and Japanese subjects to identify cultural differences in pictogram interpretations. Synonymous English pictogram interpretations are merged using the WordNet (Fellbaum 1998), an English thesaurus, and variants in Japanese notations are integrated using the ChaSen (Matsumoto et al. 1997), a Japanese morphological analyzer; both language resources are registered with the Language Grid. As a result of the human subject experiment, five criteria for detecting cultural difference in cross-cultural pictogram interpretations are identified.

To achieve our second goal, we propose a categorical semantic relevance measure, which calculates how relevant a pictogram is to a given interpretation, using categorized pictogram interpretations. Our approach first categorizes the pictogram interpretations into five pictogram categories and then calculates the semantic relevance of a word query (or an interpretation) and a set of pictogram interpretations given to a pictogram to rank relevant pictograms. Five first-level classifications in the EDR Electronic Dictionary (Yokoi 1995) registered to the Language Grid are taken as the five pictogram categories. We show that the categorized approach performs better than the uncategorized approach in pictogram retrieval tasks.