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A System to Promote Communications Independent of Language

Tomoaki Itaba*, Koya Kimura, Ivan Tanev*****
Katsunori Shimohara****

* Department of Information Systems Design, Doshisha University, Kyoto, Japan
(Tel : +81-774-65-6949; E-mail: itaba2015@sil.doshisha.ac.jp).
**Graduate School of Science and Engineering, Doshisha University, Kyoto, Japan
(Tel : +81-774-65-6949; E-mail: kimura2013@sil.doshisha.ac.jp).
*** Graduate School of Science and Engineering, Doshisha University, Kyoto, Japan,
(Tel : +81-774-65-6699; E-mail: itanev@sil.doshisha.ac.jp).
**** Graduate School of Science and Engineering, Doshisha University, Kyoto, Japan,
(Tel : +81-774-65-6973; E-mail: kshimohara@sil.doshisha.ac.jp).

Abstract: An issue we have to challenge here is how to convey our thoughts to foreign people without using any language. The bottom line is that linguistic rules are too different between different languages to achieve perfect translation between them. We propose a new way to promote communications between different languages not by language translation, but by secondarily using images and symbol. Communications denote here to convey each other's thought and to share understanding. A system we have developed by using a programming language Swift runs on iPad. When a user inputs a word that the user wants to express, this system gets images related to the word through Google Custom Search API, allocates these images and displays their relation so that the user could convey what he/she wants to express without using a language. Such interactions intermediated not by words, but by images and symbols, as a result, are expected to achieve communications in which we can convey our thoughts and share understanding beyond the so-called barrier between different languages. We investigated a possibility for the proposed method to promote and enrich communications between people.

Keywords: inconvenience, symbiotic systems, and nonverbal communication

1. INTRODUCTION

Along with worldwide globalization in recent years, the number of foreign people coming to Japan has been increasing. Therefore, the opportunity to have communications between different languages has been getting much more than before. However, some foreigners to visit Japan with the purpose of tourism cannot understand Japanese at all. In addition, some Japanese to serve them are also not fluent in foreign languages.

Traditional language translation has some problems such as difficulty to find the unique meaning of polysemy word, unnaturalness of the connection of qualified relationship, and so forth. Our challenge for these problems is not to improve the performance of translation by statistics learning and natural language processing, but to devise a system to promote communications between different languages through concrete images which we have in mind when recognizing words. This idea is based on the following assumption: an object in the real world symbolized through a variety of languages is represented with different words, but its image that is perceived the visual cortex and before symbolized with a language should be the same between people who use different languages.

Focusing on difference of degree of generality in expression, we investigate experience of nonverbal conversation between different languages without using any language in this paper.

2. CONCEPT

2.1 Independence from Language

In order to explain this concept, let's assume the following situation first. When seeing an apple, you perceive it red and circle stuff. After that, you recognize its symbolized word. For instance, you think it "pomme" if you are a French, even the perception of its appearance itself is universal and independent of any language. Therefore, the concept of this research is to realize communications, independent of linguistic features like sentence structures, by using images that are not yet symbolized to words. Next the user can freely place them on the shared screen of a tablet, and draw connections between them so as to generate some meaning.

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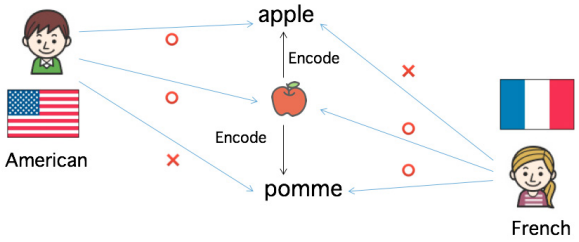

Fig. 1. Encoding Mechanism.

2.2 Degrees of Generality in expression

Here we define “degree of diversity in recognition” and “degree of generality in expression”. “Degree of diversity in recognition” represents a sort of ‘diversity’ in recognition, that is, how we recognize a symbol into its meaning. For example, an image of Fig 1 might be differently recognized to various content depending on individuals. It means that the image has high “degree of diversity in recognition”. On the other hand, a word “cat” denies any other words except of “cat.” The word “cat” has low “degree of diversity in recognition”.

Fig.2. Illustration Resembling Cat

"Degree of generality in expression" represents a sort of diversity in expression. In other words, it means that how much concrete recognition for an expression can be made by a person when the person receives the expression". When the person interprets the expression, the higher degree of generality in expression gives him/her stronger restriction of recognition. For instance, assuming a situation in which there is only an image resembling a cat but somehow ambiguous, we might passively recognize it a sphinx or a lion, and we cannot really determine whether the image is a cat or not. That is, it means that the restriction of recognition in this case is weak. If some other similar images related to a cat are added, on the other hand, we can recognize them referring to images which we have piled us so far, and then our recognition of such expression converges in a ‘cat’ in our mind. This is not a lion because the size differs nor a sphinx because the color differs, for example. In other words, the high degree of generality in expression narrows a possibility of recognition.

In this paper, we venture to create inconvenient environment by not using any language, and analyze users’ conversation experience under the environment, and then investigate influence resulting from the difference of degree of generality in expression.

2.3 Summary of Hypothesis

"Language" is very convenient in a sense that we can effectively and efficiently share interpretation. As discussed above, however, language has a significant aspect to narrow the degree of diversity in recognition. To sum up, a hypothesis we develop in this paper is summarized in Table 1.

Table 1. Summary of hypothesis

	Illustration of ‘cat’		Word of ‘cat’
Degree of Diversity in Recognition	Low	⇔	High
Degree of Generality in Expression	High	⇔	Low

Hence, a symbol, whether it is an illustration or a word, represented based on an individual’s recognition might be recognized differently by others. And, a symbol represented based on many people’s recognition should be recognized in common.

3. SYSTEM

3.1 Working Hypothesis

When we draw an image of cat while imagining it in mind, it converges to the image consistent with the recognition of a cat that we have piled up so far. Other people’s recognition of a cat does not exist there.

In contrast to the above, if we search images of a cat by using the Internet, we can get the images that many other people recognize ones of a cat. According to the context we employ in this paper, the latter case has higher degree of generality in expression than the former.

Thus, we investigate the following hypothesis; the higher the degree of generality in expression would result in the lower degree of diversity in recognition but the higher degree of transmission. The proposed system increases the degree of freedom in image expression for a word which a user wants to express by adding many others’ recognition to the user's word.

3.2 System Architecture

The system is designed to operate on iPad. Fig.3 shows a flow of communications with the system. A user inputs a word which he/she wants to express to the system, and then the system gets the associated images through "Google Custom Search API". The data format is JSON (JavaScript