

# Design Guideline of Pictorial Symbols for Communication Support Based upon Subjective Evaluation of Comprehensibility

Kazunari Morimoto<sup>1</sup> and Kengo Matsumoto<sup>1</sup>

Graduate School of science and Technology, Kyoto Institute of Technology, Kyoto, 606-8585, Japan  
<morix@kit.ac.jp, kengo4630@yahoo.co.jp>

## ABSTRACT:

In this paper, we propose design guidelines of comprehensive pictorial symbols for communication support [1]. We conducted the questionnaire survey for evaluating understandability of pictorial symbols reproduced by JIS (Japanese Industrial Standard) committee. Then, we examined features of pictorial symbols whose percentage of questions answered correctly was high. According to these features, we established design guidelines of the pictorial symbols and the standardization of the design [2]. Then, we redesigned confusable pictorial symbols of JIS committee based on our proposed guidelines, and evaluated the improvement of these symbols' understandability.

## I. DESIGN GUIDELINES INDUCED BY SUBJECTIVE EVALUATION

In order to establish design guidelines of comprehensive pictorial symbols for communication support, we conducted the questionnaire survey for evaluating understandability of pictorial symbols reproduced by JIS committee [3]. We cannot deny that these symbols depend on our culture. Total 350 pictorial symbols were tested in the questionnaire. We asked the meaning of individual pictorial symbol to 100 subjects of Japanese and Chinese (50 males and 50 females who were about 20 years old). Figure 1 shows the results of questionnaire survey. Then, we examined features of pictorial symbols whose percentage of questions answered correctly was high. Based on these features of comprehensive pictorial symbols, we established design guidelines as follows.

To reduce the use of the combination of pictorial symbols as less as possible.

To avoid the use of impressive symbols in case where symbols are combined.

To give connection of individual symbol, not only to arrange the combination of pictorials.

To enhance the morphological similarity among pictorial symbols to the real objects.

To present examples for raising the morphological similarity of less representative objects.

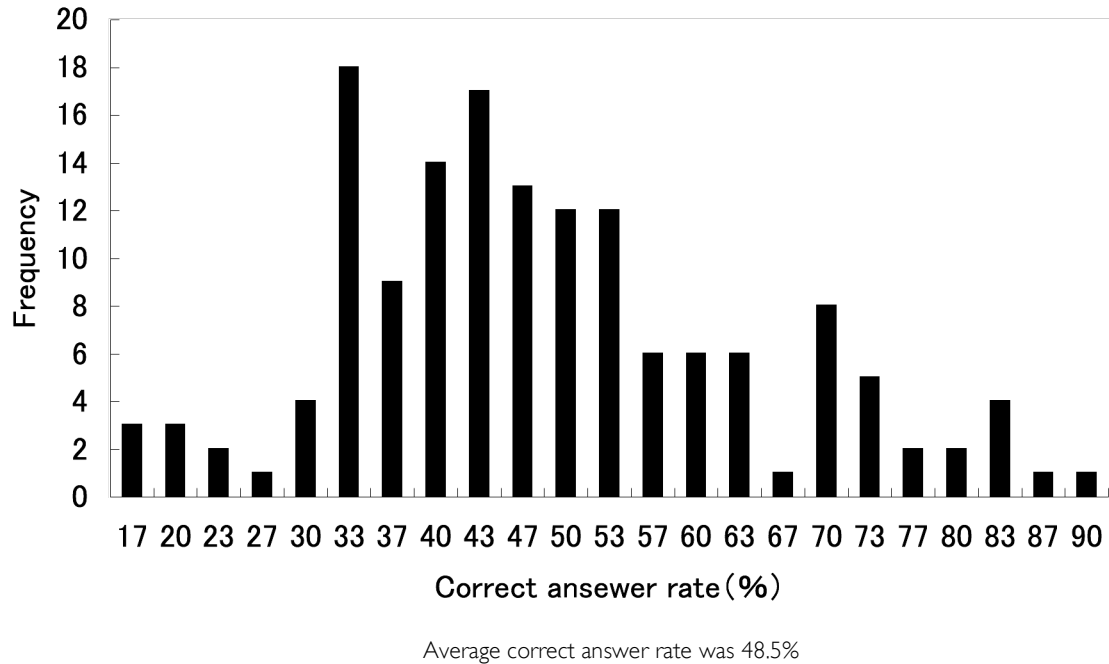


Figure 1: Frequency of average correct answer rate

## 2. RATING SYMBOLS REDESIGNED BY THE DESIGN GUIDELINES

In order to access our proposed design guidelines, we redesigned thirteen pictorial symbols as shown in Fig. 2 whose percentage of questions answered correctly was less than 30 % in the questionnaire mentioned before, and 100 subjects carried out the subjective evaluation of understandability of these symbols using 5-point scale. Examples of redesigned symbols are shown in Fig.3.

Table 1 shows the result of this evaluation. As shown in Table 1, our proposed guidelines improved the understandability of pictorial symbols in many cases, because almost average score indicated positive values. However, when we followed the fifth guideline presented in chapter 1, designers need to be careful for choosing examples, because these samples sometimes mislead subjects into wrong interpretation by variety of human's metaphors [4,5].

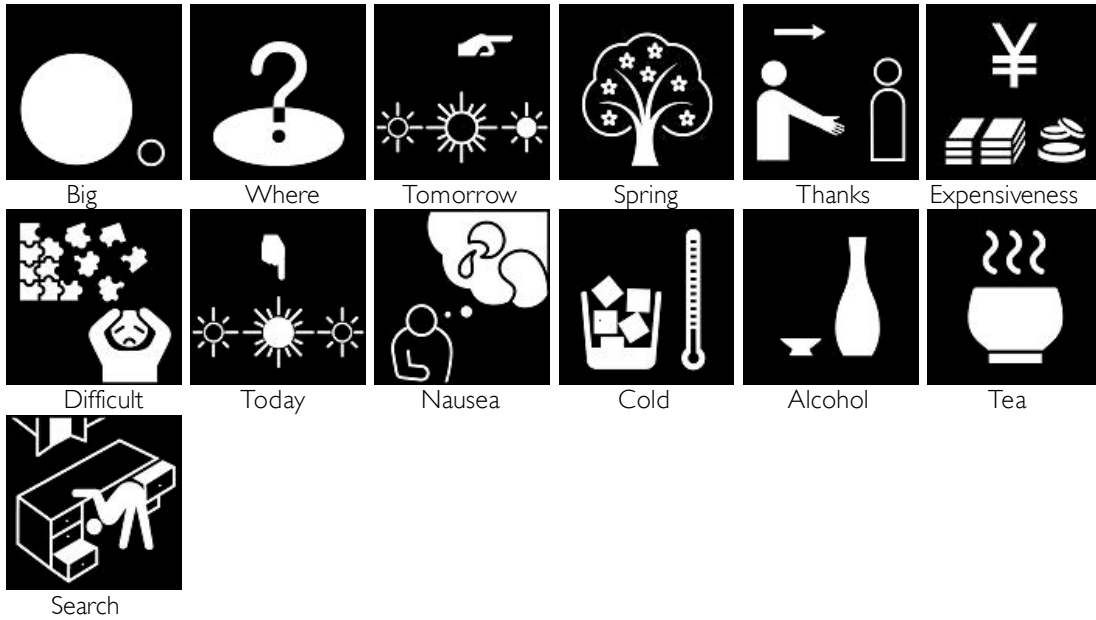


Figure 2: Examples of confusable pictorial symbols

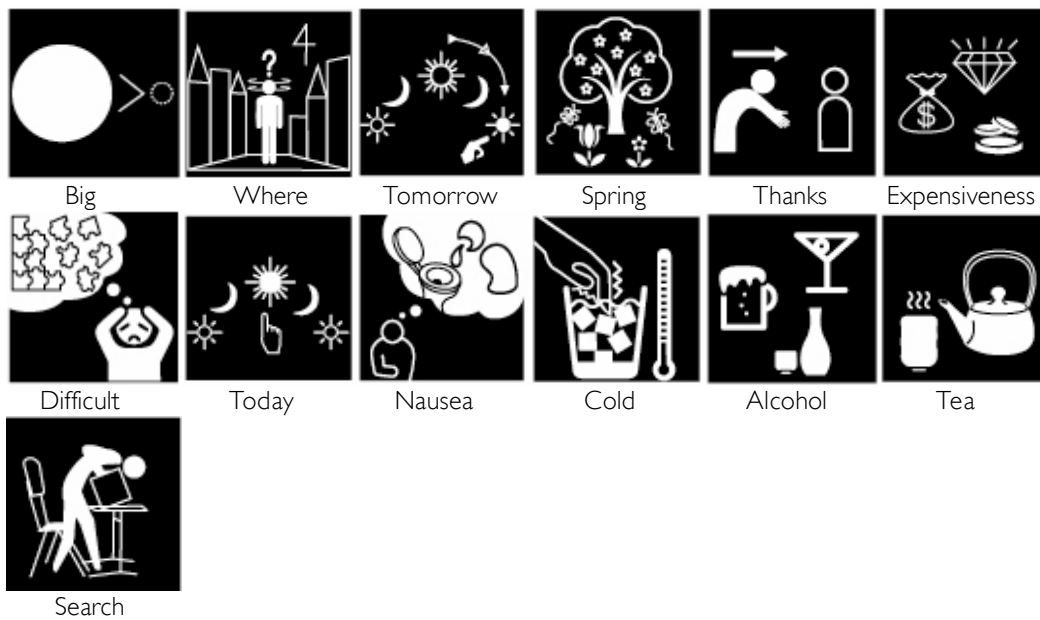


Figure 3: Examples of redesigned pictorial symbols in conformity with design guideline propose

Meaning of symbol	Average score (redesigned - previous)	t value	Significant probability
Big	1.7	10.9	.000
Where	2.6	20.5	.000
Tomorrow	1.0	7.9	.000
Spring	0.8	5.9	.000
Thanks	0.9	6.0	.000
Expensiveness	1.0	7.7	.000
Difficult	0.7	4.8	.000
Today	0.4	4.1	.000
Nausea	1.1	8.3	.000
Cold	1.3	9.4	.000
Alcohol	0.2	1.7	.087
Tea	1.1	9.2	.000
Search	-0.1	-6.1	.000

Table 1: Average score of difference between previous and redesigned samples

### 3. CONCLUSION

We clarified that some symbols that JIS presents were difficult to understand. Then we redesigned new symbols based on the design guidelines proposed, and verified that the comprehensibility of the symbols was improved for assisting communication. However these just showed that it was easy to understand as an independent symbol. It is necessary that further examination concerning the composition that was made combining individual symbol.

### REFERENCES:

- [1] Hiroyuki Shimizu: Psychology of Visual Symbols: Basic and Applied Aspects of PIC Symbols, Brainshuppan (2003)
- [2] Hisaaki Kato: Standardization of Graphical Symbols, Special Issue Of Japanese Society for the Science of Design, Volume 11, Number 4, pp.17-25 (2004)
- [3] Japanese Industrial Standards Committee: Design principles of pictorial symbols for communication support, JIS T 103 (2005)
- [4] Loma Uden, Alan Dix: Iconic Interface For Kid on The Internet, World Computer Congress- ICEUT2000 Educational Uses of Communication and Information Technologies, pp. 270-285 (2000)
- [5] Sarah J. Isherwood, Sine J.P. McDougall, Martin B. Curry: Icon Identification in Context: The Changing Role of Icon Characteristics With User Experience, The Journal of the Human Factors and Ergonomics Society, Vol. 49, No.3, pp. 465-476 (2007)