

# EQUIVALENCE OF ENGLISH AND JAPANESE ANNOYANCE SCALES

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**Introduction** In 1993, ICBEN's Team 6 initiated a project to develop standards for the construction of noise annoyance scales and questions in multiple languages. The project resulted in the development of a procedure for constructing comparable scales, which was implemented in parallel in nine languages [1]. A key premise of this procedure is that the upper extreme of the range of possible annoyance imagined by subjects is essentially the same in the various cultures and languages. In this study, 73 bilingual subjects were used to test this hypothesis thereby to evaluate the equivalence of the English and Japanese scales produced by Team 6.

**Experiment** The procedure was essentially the same as the ICBEN study [1] except that all subjects chose modifiers for use in both English and Japanese scales and evaluated the intensities of both English and Japanese modifiers. Moreover, a paired comparison test of 12 English and Japanese modifiers was appended though paired comparison was not part of the original ICBEN procedure. Seventy-three subjects between the ages of 20 and 71 who were fluent in Japanese and English participated in the study. English was the first language (L1) of 19 males and 20 females while Japanese was the first language of 17 males and 20 females. The nationalities of the subjects who spoke English as their first language were as follows: American, 21; Australian, 4; British, 3; Irish, 2; French, 1; New Zealand, 1; Japanese, 1. There were two types of questionnaires. "Annoyed" was used as the base descriptor in one while "urusai" was used in the other. Both types were bilingual. In the questionnaires in which "annoyed" was used as the based descriptor, English text appeared in a column of the left side of each page and the corresponding Japanese appeared in a column on the right. This arrangement was reversed in the questionnaires in which "urusai" was the base descriptor.

**Scale Construction Results** Table 1 compares the data for the five-point scales constructed in this study with those constructed in the ICBEN study. The letter "B" shown in parentheses after a modifier indicates that it was selected as the degree label in this bilingual study while the letter "I" indicates that the modifier was selected for that degree in the ICBEN study. The numbers in the "Bilingual" and "ICBEN" columns indicate the averages intensity scores produced in the two studies for the listed modifier.

Table 1 Intensity scores of selected modifiers

Degree	English	Bilingual	ICBEN	Japanese	Bilingual	ICBEN
5	extremely (B, I)	96.9	94.9	kiwamete (B)	93.3	91.9
				hijoni (I)	92.2	93.8
4	very (B, I)	78.4	75.6	totemo (B)	79.9	83.9
				daibu (I)	71.2	75.3
3	moderately (B, I)	48.1	43.7	hikakuteki (B)	50.9	55.9
				tasho (I)	35.6	44.5
2	a little (B)	17.2	13.2	sukoshi (B)	20.3	34.8
	slightly (I)	16.3	15.4	sorehodo...nai (I)	17.6	21.0
1	not at all	0.6	0.8	mattaku...nai	0.8	1.0

In contrast to the English results, the Japanese scale produced by this study is completely different from that of the ICBEN study (“mattaku...nai” was fixed as the lowest category from the outset). This result stems in part from differences between Japanese and English. In each of five intensity ranges English seems to have one clearly dominant modifier whereas in Japanese two or more modifiers of similar quality are available in each intensity range [2].

**Evaluation of interpretations of “highest degree”** Under the ICBEN protocol, subjects evaluate the intensity of individual modifiers in a line-marking exercise. They are instructed that the “highest degree” point on the line is the “highest degree of annoyance imaginable.” This imaginary “highest degree” then becomes the standard against which the intensity of each modifier is measured. Though the imagined “highest degree” level cannot be assessed directly, the use of bilingual subjects in this study allowed us look for indirect indications of differences among English L1 and Japanese L1 subjects. If there were a significant difference in the “highest degree” imagined by the two groups of subjects, that difference should lead to a significant difference in average intensity scores assigned. Moreover, the difference should be most apparent in the modifiers of high intensity because they are closest to “highest degree” standard.

Table 2 shows the average intensity scores for L1 and L2 subjects in this study for the six modifiers of highest intensity. The six modifiers constituted the highest cluster of five that resulted from the application of cluster analysis to the intensity scores of the 42 modifiers. Intensity scores produced for the same modifiers in the ICBEN studies are also shown for comparison. Although Japanese L1 and English L1 subjects differed by as much as nearly 5 points in their interpretations of individual modifiers, the average difference in their intensity scores is less than 1 point. This indicates that the two groups of subjects did not interpret the “highest degree” standard in significantly different ways. Moreover, the results of the paired comparison test for these six modifiers agreed with the intensity scores, providing additional evidence that a difference in the interpretation of “highest degree” did not corrupt the intensity data.

Table 2 Average intensity scores for six modifiers of highest intensity

Subjects	hid- oku	kiwa- mete	hij- oni	sev- erely	tremen- dously	extre- mely	Japanese Average	English Average	Average
English L1	92.0	90.8	93.1	92.7	94.2	95.5	92.0	94.1	93.1
Japanese L1	89.2	95.7	91.3	91.1	96.9	98.2	92.1	95.4	93.7
English ICBEN				90.7	92.3	94.9		92.6	
Japanese ICBEN	91.0	91.8	93.8				92.2		

**Conclusion** Results of this study support the hypothesis that the upper extremes of annoyance imagined by English L1 and Japanese L1 subjects do not differ substantially. Accordingly, these results indicate that the English and Japanese scales produced by Team 6 are equivalent. This study was supported financially by a Grant-in-Aid for Scientific Research (C)(2)(Project No. 12650599) from the Japanese Ministry of Education, Culture, Sports, Science and Technology. We gratefully express our appreciation to Dr. James M. Fields for inspiring this research and for his useful suggestions.

**Keywords:** Bilingual, noise annoyance scale, equivalence, English and Japanese

## References

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