POLISH VERSION OF STANDARDIZED NOISE REACTION QUESTIONS FOR COMMUNITY NOISE SURVEYS

ANNA PREIS[1], TOMASZ KACZMAREK[1], HANNA WOJCIECHOWSKA[1], JAN ŻERA[2] and JAMES M. FIELDS[3]

[1]Institute of Acoustics

Adam Mickiewicz University

Poznan, Poland

[2]Central Institute for Labour Protection

Warsaw, Poland

[3]Silver Spring, MD, USA

Abstract

Objectives: This article presents the Polish version of two standardized noise reaction questions for community noise surveys. An internationally comparable noise reaction measure for social surveys was published by Fields et al. as a result of work performed by the Community Response to Noise Team of the International Commission on the Biological Effects of Noise. This measure consists of two recommended noise reaction questions: a 5-point verbal scale question and a 0–10-point numeric scale question. **Methods:** The Polish words for a 5-point noise annoyance verbal scale were selected by respondents from a group of 21 potential adverbs following the method described by Fields et al. The same standardized empirical study protocol was used to select annoyance scale words (a 5-point verbal scale question) for the nine different languages. **Results:** The following words for a 5-point noise annoyance scale were obtained: not at all, a little, rather, substantially, extremely annoying. **Conclusions:** The Polish version of the scale described in this paper has international counterparts. It means that our data expand the world database on human reactions to noise in different communities and become more comparable with the data from other countries.

Key words:
Community noise survey, Annoyance, Noise reaction questions, Questionnaire

INTRODUCTION

Differences in questions used in noise annoyance surveys interfere with a direct comparison of the results from different surveys. It is very difficult to describe the factors that affect social response to noise if non-comparable questions are used in different studies. One of the most important results produced by the noise annoyance surveys is a possibility to determine the percentage of respondents who could be considered to be highly annoyed (%HA) [1,2,3]. Since this number is regarded as a univer-

sal, comparative measure of annoyance, it should be based on comparable noise reaction questions. In 2001, the Community Response to Noise Team of the International Commission on the Biological Effects of Noise (ICBEN) published a paper [4], in which they described a method for creating two internationally comparable noise reaction questions. They recommended one verbal and one numeric scale questions for rating words to be used in noise annoyance surveys. By following a common protocol [4], comparable words have been chosen for scales and used in

noise annoyance judgments for each of the nine languages that have thus far been investigated. Such obtained words have been used to create a noise annoyance scale.

This paper describes the results of the investigation used to develop a Polish version of the noise annoyance scale.

METHOD OF CREATING A VERBAL AND NUMERICAL NOISE ANNOYANCE SCALE

The words for a 5-point noise annoyance verbal scale were selected by respondents from a group of 21 potential adverbs following the method described by Fields et al. [4]. The group consists of the following adverbs: not at all, insignificantly, barely, hardly, a little, slightly, partially, somewhat, fairly, moderately, rather, importantly, considerably, substantially, significantly, very, highly, strongly, severely, tremendously, extremely.

The study population was composed of two groups (from Poznań and Warsaw) each of 30 respondents. The respondents received a questionnaire containing three parts.

In the first part, the task of a respondent was to allocate each of 21 words in up to 9 categories ordered from the lowest to the highest level of annoyance labeled "No/the lowest degree of bother/annoyance" to "The highest degree of bother/annoyance". This part was designed to make the respondents familiar with the adverbs under investigation. The results of this experiment were not used in the analysis.

In the second part, the task of a respondent was to assign one word to each point of a 5-point verbal scale. The lowest point of this scale was labeled with the phrase "Not at all bothered or annoyed". The respondent was asked to select first the best expression for the highest point of the scale among adverbs allocated to the 9th category in the first part of the task. The respondent was instructed to select an expression "Which he/she would most likely use for describing the highest level of bother or annoyance". Then each respondent was asked to select one representative word for the three remaining inner points of a 5-point rating scale. The respondents were instructed to select the adverbs to obtain, according to self-assessment, equal steps between the lowest "Not annoying at all" and the highest "Your expression indicating the highest level of annoyance" point on the scale.

In the third part of the questionnaire, the respondent's task was to rate the intensity of annoyance for each investigated word on a graphic interval given on a separate sheet of paper. The respondent was asked to indicate the intensity of annoyance for each word by making a mark anywhere on the horizontal interval (10 cm long). The left end represented " No/the lowest degree of annoyance", and the right end "The highest level of annoyance".

POLISH STUDY-DATA ANALYSIS

The data collected by means of the questionnaire in the Polish version were analyzed in the same way as those provided by other participating countries. Figure 1 shows the annoyance intensity scores and corresponding standard deviations for 21 Polish words grouped according to a 5-point rating scale.

According to the ICBEN protocol [4], five ratings were calculated for each word. The numerical values of these ratings are presented in Table 1. The description of these ratings is as follows:

■ Mean intensity score: the average position, the respondents place a mark on a 10-cm interval (0 to 100 millimeters). The intensity score is given in the second column of Table 1 for each of the 21 Polish words. The intensity scores are also shown in Fig.1.

■ Intensity score standard deviation: the root mean square of the intensity scores. The standard deviation (σ) is given in the third column of Table 1.

■ Scale point candidacy: the single scale point (1, 2, 3, 4, 5) for which the word is a candidate. This is the scale point for which the word was most often chosen as a preferred one on a 5-point scale. Each word's candidacy is shown by its grouping in the fifth column of Table 1 and in Fig. 1.

■ Net preference score: the percent of respondents preferring the word for that word's "candidate" position decreased by the percent of those preferring the word in other position(s). The net preference score for the complete sample are shown in the seventh column of Table 1.
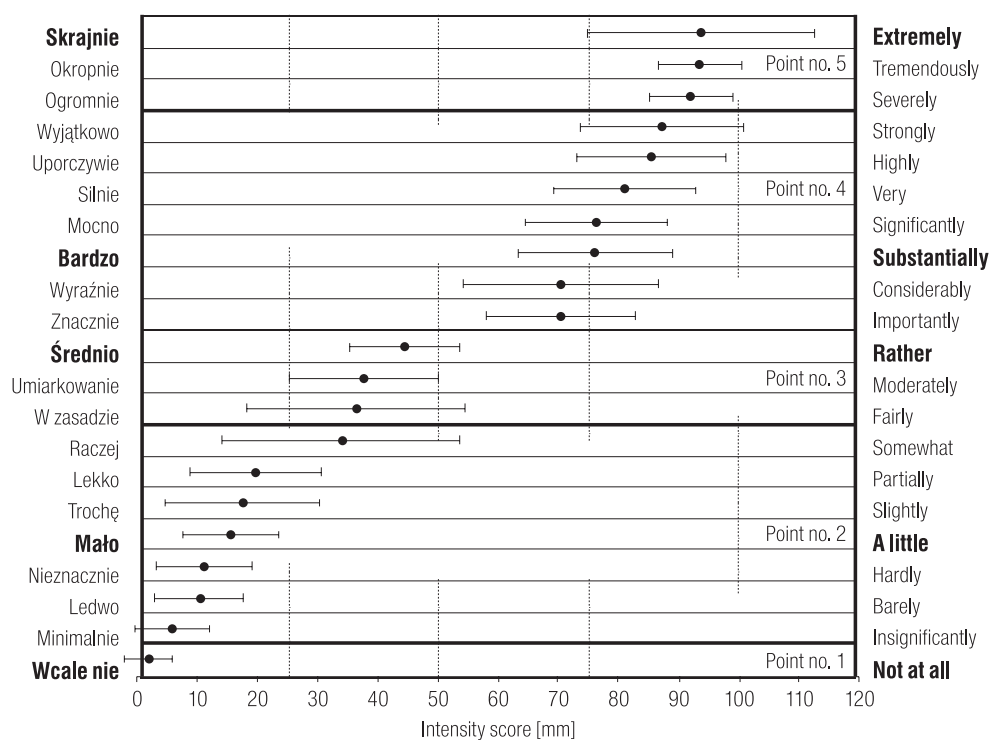
Fig. 1. Intensity scores for 21 Polish words grouped by the 5-point scale group. Vertical lines are the 5-point scale criteria of 0, 25, 50, 75, and 100.

- The intensity criteria (IC) for a 5-point scale are 0, 25, 50, 75, 100 for points 1 to 5, respectively are given in the fourth column of Table 1. They are also indicated as the dotted vertical lines in Fig. 1.
- Difference between the scale point intensity criterion: the difference between the word's intensity score and the intensity criterion for that word's candidate scale point. Differences are given in the sixth column of Table 1.

The best candidate for each point was chosen from words included in the same scale point candidacy. The best candidate was the word, which has the maximal net preference score, the minimal difference between the scale point intensity criterion and minimal intensity score standard deviation. In the case when the different criteria favored different words, the weaker candidates were excluded. The following 13 successive steps [4] were used to find the best word. The word to be used as descriptors in five categories were selected according to the following criteria:

- Net preference score > 5%
- Unsigned difference from the scale point intensity criterion < 15

- Net Preference score within 20 points of the most popular remaining candidate word for the scale point (Δ% Pref < 20)
- Standard deviation within 15 points of the smallest remaining modifier's standard deviation (Δσ < 15)
- |Δ| = IC-Inten < 10
- Δ% Pref < 15
- Δσ < 10,
- |Δ| = IC-Inten < 5
- Δ% Pref < 10
- Δσ < 5
- Select the remaining word closest to intensity criterion
- Select the highest remaining preference score
- Select the lowest remaining standard deviation score.

There were three conditions under which the selected descriptors could be excluded. First, if the language investigators found the word extremely awkward linguistically. Second, if the word had a regulatory or other meaning that could lead to misinterpretation. Third, if the word was given different intensity scores by respondents representing different age, cultural or other groups. For the Polish word selection none of these exclusions were needed.

Table 1. Questionnaire data and ratings obtained from two study groups (Poznań and Warsaw)

Wording	Intensity (mm)	σ (mm)	Intensity criterion (mm)	Scale point candidacy	|Δ| = IC-Inten (mm)	Net Preference (%)
Not at all	**1.81**	**3.88**	0	Point no.1	**2**	**100**
Insignificantly	5.87	6.09			19	3.33
Barely	10.37	7.29	25	Point no. 2	15	8.33
Hardly	11.27	8.08			14	6.67
A little	**15.50**	**8.11**			**10**	**31.67**
Slightly	17.58	12.88			7	15.00
Partially	19.80	10.94			5	21.67
Somewhat	33.95	19.67			11	3.33
Fairly	36.42	18.24	50	Point no. 3	16	1.67
Moderately	37.73	12.33			12	11.67
Rather	**44.53**	**9.31**			**5**	**65.00**
Importantly	70.33	12.37			5	13.33
Considerably	70.50	16.09	75	Point no. 4	5	11.67
Substantially	**76.05**	**12.74**			**1**	**28.33**
Significantly	76.40	11.77			1	15.00
Very	81.07	11.82			6	6.67
Highly	85.47	12.42			10	1.67
Strongly	87.10	13.53			12	1.67
Severely	92.13	6.95	100	Point no. 5	8	1.67
Tremendously	93.52	6.87			6	18.33
Extremely	**93.75**	**18.75**			**6**	**71.67**

RESULTS

As a result of the above criteria, the following words for a 5-point noise annoyance scale were obtained: "not at all", "a little", "rather", "substantially", "extremely". As seen in Table 1 the word placed at the highest point of the scale "extremely" has a large standard deviation (18.75), however, it is clearly more often preferred (net preference score = 71.67) than the nearest word "tremendously" (18.33%). The large standard deviation for the place marked on the graphic interval may be partly because the word "extremely" can mean either extremely high or extremely low, depending on the context. It is assumed that this ambiguity will not be relevant when the word is presented at the end of the ordered scale. The word may also be somewhat less familiar to less educated people.

The original standardized questions proposed by the ICBEN for a 5-point verbal scale and a 0–10-point numeric scale are:

"Thinking about the last (12 months or so), when you are here at home, how much does noise from (noise source) bother, disturb, or annoy you; Extremely, Very, Moderately, Slightly or Not at all?"

"Next is a zero to ten opinion scale for how much (source) noise bothers, disturbs or annoys you when you are here at home. If you are not at all annoyed choose "zero", if you are extremely annoyed choose "ten", if you are somewhere in between choose a number between zero and ten.

Thinking about the last (12 months or so), what number from zero to ten best shows how much you are bothered, disturbed, or annoyed by noise from (noise source)?"*

The above questions have been translated into Polish and following the procedure given by the ICBEN [4], a native English speaker has translated them back into English. The back translation is consistent with the original questions. This fact and the observation that the wording is clear in Polish is the evidence that the meaning will be clearly and uniformly understood in both languages.

CONCLUSIONS

A Polish version of a noise annoyance scale is a result of the participation of Poland in the world network of countries, which are using the same method for the estimation of noise annoyance. The Polish version of the scale described in this paper has international counterparts. Using this scale in noise annoyance surveys, it is possible to gain at least two advantages:

(a) our data become more comparable with the data from other countries;

(b) our data expand the world database on human reactions to noise in different communities.

ACKNOWLEDGMENTS

REFERENCES

1. Schultz THJ. *Synthesis of social surveys on noise annoyance*. J Acoust Soc Am 1978; 64: 377–405.

2. Fidell S, Barber DS, Schultz THJ. *Updating a dosage effect relationship for the prevalence of annoyance due to general transportation noise*. J Acoust Soc Am 1991; 89: 221–33.

3. Miedema HME, Vos H. *Exposure-response relationships for transportation noise.* J. Acoust Soc Am 1998; 104: 3432–45.

4. Fields JM, De Jong RG, Gjestland T, Flindel IH, Job RFS, P Kurra, et al. *Standardized General-Purpose Noise Reaction Questions for Community Noise Surveys: Research and a Recommendation*. J Sound Vibr 2001; 242(4): 641–79.

---

* To obtain the Polish version of standardized noise reaction questions please contact the authors (e-mail: apraton@amu.edu.pl).