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Romanian Standardized Noise Reaction Questions for Community Noise Surveys

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Summary

The International Commission on Biological Effects of Noise, ICBEN, has recommended the use of two standardized annoyance reaction questions for community noise surveys. ICBEN has also published a detailed protocol for translating these questions together with the corresponding response scale into other languages. This paper presents a version in the Romanian language.

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1. Introduction

People's response to noise, i.e. their description of the noise annoyance, is usually studied by means of social surveys. A representative group is asked questions on how they perceive the noise in their neighborhood or home, and the results are typically presented as so-called exposure-response curves; i.e. the percentage that express a certain degree of annoyance versus the noise exposure. It is customary to list the percentage of *highly annoyed residents* as a function of the yearly average time-weighted equivalent noise level, L_{dn} or L_{den} , at their residence.

The first serious attempt to compare the results from different noise surveys was presented by Schultz in 1978. His article "Synthesis of social surveys on noise annoyance", comprised results from 18 different surveys on transportation noise [1].

Although his results were widely criticized, this article remains a ground-breaking attempt to compare the results from different surveys, different noise sources and different communities in different countries.

The surveys had been conducted using different study methods. One of the main obstacles that Schultz experienced was comparing results based on different subjective scales and translating these from different languages.

To simplify comparisons of results across surveys and across language barriers, the "community-response-to-noise team" of the International Commission on Biological Effects of noise, ICBEN, developed a set of recommendations for future noise annoyance surveys. They published a set of guidelines for reporting core information from community noise reaction surveys [2], and a few

years later two standardized questions were recommended together with standardized response scales [3]. These standardized questions and scales were initially presented in nine languages: English, Dutch (Flemish), French, German, Hungarian, Japanese, Norwegian, Spanish and Turkish. A detailed protocol with the method on how to translate the questions and response scales into other languages was also presented. The ICBEN recommendation has later been adopted as an international standard, ISO 15666 [4].

These ICBEN questions and scales have subsequently been developed for six other languages: Polish [5], Chinese, Korean and Vietnamese [6], Danish [7], and Portuguese (Brazilian) [8].

This paper reports the work on the development of a Romanian version of the ICBEN standardized annoyance questions.

2. Method for constructing a verbal scale

The modifiers (adverbs) that are used in the 5-point verbal scale were selected according to the protocol described by ICBEN. The respondents that took part in the selection process could choose from 21 words that express a certain degree of annoyance. These 21 words were chosen so that they covered the whole range from *not at all annoyed* (Romanian: ABSOLUT DELOC) to *extremely annoyed* (Romanian: EXTREM). The test subjects, a total of 125 persons, 68 males and 57 females, were instructed to assign a "value" for each word which would indicate the intensity or degree of annoyance that the word represented. This was done by putting a mark on a horizontal line with end points identified by *not at all annoyed* and *extremely annoyed*. Thus, if the modifier indicated a low degree of annoyance the mark would be placed near the "not at all end" and similarly a word associated with a high degree of annoyance would be marked near the high end. In the

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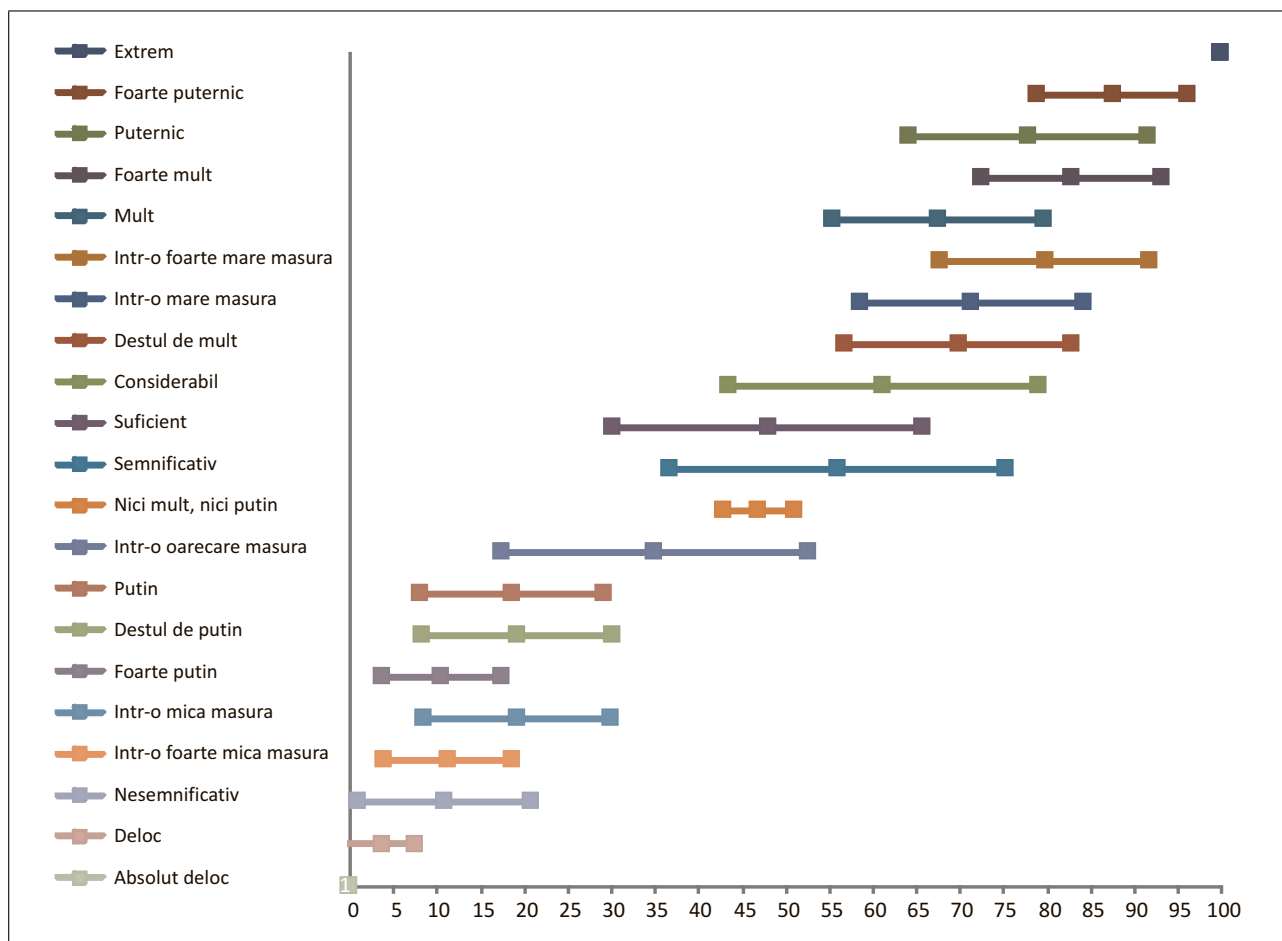


Figure 1. (Colour online) Intensity scores for Romanian modifiers (mean and standard deviation).

subsequent analysis, each position was given a numerical value (in percentage of the total length).

The test subjects were then instructed that the two end points represented the highest and lowest category on a 5-category scale. Their next task was to choose from the remaining words, which three words they would prefer to use to identify the other three annoyance categories.

The initial ICBEN study [3] was conducted using a relatively small number of respondents per language. Except for the Japanese version and the English version, which was conducted on three continents: UK, USA and Australia, the other 7 scales were constructed on the basis of between 45 and 95 respondents. The test subjects included a mixture of university students and employees of research institutions and technical firms. The average age was 35 years but varied from 19 to 44 for different study sites. They were, of course, all native speakers in their respective languages.

For the Romanian study we engaged 125 test subjects, more than twice the average number of the initial ones. The age range was between 25–65 years old. The subjects were mainly recruited from the staff of the research institution. Romania consists of five large geographical regions, and all five regions were represented in the survey panel. This would compensate for possible regional language differences.

3. Results

The results of the “intensity task” are shown in Figure 1. The figure gives the Romanian modifiers with the mean intensity score and the standard deviation. A visual inspection of the figure shows that the set of words is fairly evenly spread out across the whole intensity range.

The results from the task of choosing modifiers to identify the middle categories of a 5-point scale are shown in Table I. The numbers in the three “category columns” indicate how many percent of the respondents that preferred this particular word to identify the category, e.g. six percent of the respondents chose *nesemnificativ* to identify category 2 on the 5-point scale.

The scale values for the 5-point scale are not trivial. Some researchers define the annoyance scale with five equidistant fixed points. The corresponding scale values will be: 0 – 25 – 50 – 75 – 100. Other researchers consider a scale comprising five equally “wide” categories that cover the whole range of the annoyance scale as follows: 0-20, 20-40, 40-60, 60-80, and 80-100. In this case the scale values corresponding to the mid-point of each category will be: 10 – 30 – 50 – 70 – 90. This dilemma is commented on in [3]. Fields *et al.* recommend the first approached with five fixed points.

Table II. Data for choice of modifiers.

	Intensity	σ	$\Delta\#2$	$\Delta\#3$	$\Delta\#4$	NP #2	NP #3	NP #4
Absolut deloc	0							
Deloc	3.67	3.82	-21.33	-46.33	-71.33	5.13	-5.13	-5.13
Nesemnificativ	10.87	9.98	-14.13	-39.13	-64.13	5.98	-5.98	-5.98
Intr-o foarte mica masura	11.33	7.42	-13.67	-38.67	-63.67	1.71	-1.71	-1.71
Intr-o mica masura	19.29	10.77	-5.71	-30.71	-55.71	14.53	-14.53	-14.53
Foarte putin	10.55	6.82	-14.45	-39.45	-64.45	8.55	-8.55	-8.55
Destul de putin	19.18	10.96	-5.82	-30.82	-55.82	11.97	-11.97	-11.97
Putin	18.59	10.53	-6.41	-31.41	-56.41	31.64	-31.64	-33.32
Intr-o oarecare masura	35.02	17.53	10.02	-14.98	-39.98	7.75	-7.75	-14.47
Nici mult, nici putin	46.98	4.08	21.98	-3.02	-28.02	-51.25	49.56	-51.27
Semnificativ	56.02	19.24	31.02	6.02	-18.98	-9.16	-1.01	-14.37
Suficient	48.05	17.78	23.05	-1.95	-26.95	-13.47	8.38	-8.38
Considerabil	61.27	17.86	36.27	11.27	-13.73	-18.56	1.61	-1.61
Destul de mult	69.85	13.01	44.85	19.85	-5.15	-16.07	-7.66	7.66
Intr-o mare masura	71.40	12.83	46.40	21.40	-3.60	-14.39	-9.34	9.34
Intr-o foarte mare masura	79.85	12.05	54.85	29.85	4.85	-3.39	-3.39	3.39
Mult	67.57	12.12	42.57	17.57	-7.43	-25.40	-18.67	18.67
Foarte mult	82.85	10.31	57.85	32.85	7.85	-11.02	-11.02	11.02
Puternic	77.93	13.74	52.93	27.93	2.93	-15.24	-11.88	11.88
Foarte puternic	87.57	8.62	62.57	37.57	12.57	-9.32	-9.32	9.32
Extrem	100							

Table I. Preference for category identifier.

	CAT. 2	CAT. 3	CAT. 4
Absolute deloc			
Deloc	5.1		
Nesemnificativ	6.0		
Intr-o foarte mica masura	1.7		
Intr-o mica masura	14.5		
Foarte putin	8.5		
Destul de putin	12.0		
Putin	32.5	0.8	
Intr-o oarecare masura	11.1	3.4	
Nici mult, nici putin	0.9	51.3	0.8
Semnificativ	7.7	11.8	5.1
Suficient		10.9	2.5
Considerabil		10.1	8.5
Destul de mult		4.2	11.9
Intr-o mare masura		2.5	11.9
Intr-o foarte mare masura		0.0	3.4
Mult		3.4	22.0
Foarte mult		0.0	11.0
Puternic		1.7	13.6
Foarte puternic			9.3
Extrem			

4. Data analysis

The following values are being used in the selection of modifiers according to the ICBEN protocol, see Table II:

Mean Intensity score. The average position on the intensity scale for a word assigned by the test persons.

Intensity score standard deviation. Calculated in the standard way. A large number indicates a lack of agreement on the intensity, i.e. the position on the intensity scale.

Difference from scale intensity. The difference between the intensity score of the word and the intensity criterion for the scale category. Thus for the word “DELOC” the value for category 2 and 3 would be: $\Delta\#2 = 3.67 - 25 = -21.33$ and $\Delta\#3 = 3.67 - 50 = -46.33$, etc.

Net preference score. The difference between the percentage of test persons preferring the word for a specific position and the percentage that prefer a different position. Thus the net preference for the word “PUTIN” for category 2 would be: $NP\#2 = 32.48 - 0.84 = 31.64$, etc.

5. Selection of modifiers

The words to be used for characterization of category #2, #3 and #4 were selected by following these successive steps according to the ICBEN protocol:

1. Net preference score $NP \geq 5\%$.
2. Unsigned difference from scale intensity $|\Delta| \leq 15$.
3. Net preference score within 20 points of most popular remaining candidate word.
4. Standard deviation within 15 points of smallest remaining modifiers' standard deviation.
5. Unsigned difference from scale intensity $|\Delta| \leq 10$.
6. Net preference score within 15 points of most popular remaining candidate word.
7. Standard deviation within 10 points of smallest remaining modifiers' standard deviation.
8. Unsigned difference from scale intensity $|\Delta| \leq 5$.
9. Net preference score within 10 points of most popular remaining candidate word.
10. Standard deviation within 5 points of smallest remaining modifiers' standard deviation.
11. Select the remaining word closest to the intensity criterion.

12. Select highest remaining preference score.
 13. Select lowest remaining standard deviation score.
 Following this procedure the preferred modifier for category #2 will be **putin** (selected after step 6), for category #3 the preferred modifier will be **nici mult, nici putin** (selected after step 3), and for category #4 the preferred modifier will be **mult** (selected after step 8). In addition the modifiers for category #1 and #5 are **absolut deloc** and **extrem** respectively.

6. Method for constructing two standardized annoyance reaction questions

ICBEN recommends two standardized questions, one using a 5-point verbal scale and one using an 11-point numerical scale [3]. The original English versions of these questions are as follows:

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

These questions were translated into Romanian using an iteration of forward and backward translations in order to get a wording as close as possible to the original English text. The modifiers for the verbal scale were taken from the results referred above.

For the standardized questions it was important to find an expression for the location that would include both the indoor and the outdoor area of the residence, without specifically mentioning this. *At home*, in English, refers both to the house in which one lives but also to the immediate surroundings (garden, yard, close neighborhood, etc.). The word *acasă* in Romanian has exactly the same expanded meaning as opposed to *casă* which simply means house.

For the English–Romanian translation a total of 23 persons, 14 males and 9 females were asked to translate the standardized question. For the back translation, persons who utilize daily English language in their work were asked to translate the questions.

After this iteration process, the following Romanian version of the two standard questions has been recommended:

Question for the 5-point verbal scale:

Luând în considerare ultimele 12 luni, pe perioada cât ați fost acasă, cât de mult v-a deranjat, perturbat sau creat un disconfort zgomotul produs de (sursa). Extrem, mult, nici mult nici puțin, puțin, absolut deloc?

Question for the 11-point numerical scale:

La următoarea întrebare, notați pe o scală de la 0 la 10 cât de mult v-a deranjat, perturbat sau creat un disconfort zgomotul produs de (sursa) pe perioada cât ați fost acasă. Dacă nu v-a creat deloc un disconfort alegeți 0, dacă v-a creat un disconfort extrem alegeți 10, iar dacă sunteți undeva între aceste două variante alegeți un număr între 0 și 10.

Gândindu-vă la ultimele 12 luni, ce număr de la 0 la 10 indică cel mai bine cât de mult v-a deranjat, perturbat sau creat un disconfort zgomotul produs de (sursa)?

References

- [1] T. J. Schultz: Synthesis of social surveys on noise annoyance. *J. Acoust. Soc. Am.* **64** (1978) 377–405.
- [2] J. M. Fields, R. G. de Jong, A. L. Brown, I. H. Flindell, T. Gjestland, R. F. S. Job, S. Kurra, P. Lercher, A. Schumer-Kohrs, M. Vallet, T. Yano: Guidelines for reporting core information from community noise reaction surveys. *J. Sound. Vib.* **206** (1997) 685–695.
- [3] J. M. Fields, R. G. de Jong, T. Gjestland, I. H. Flindell, R. Job, S. Kurra, P. Lercher, M. Vallet, T. Yano, R. Guski, U. Felscher-Suhr, R. Schumer: Standardized general-purpose noise reaction questions for community noise surveys: Research and a recommendation. *J. Sound Vib.* **242** (2001) 641–679.
- [4] International Organization for Standardization: Acoustics - Assessment of noise annoyance by means of social and socio-acoustic surveys. ISO/TS 15666:2003 (reviewed and confirmed 2013), 2003.
- [5] A. Preis, T. Kaczmarek, H. Wojciechowska, J. Zera, J. M. Fields: Polish version of standardized noise reaction questions for community noise surveys. *Int. J. Occ. Med. And Env. Health* **16** (2003) 155–159.
- [6] T. Yano, H. Ma: Standardized noise annoyance scales in Chinese, Korean and Vietnamese. *J. Sound. Vib.* **277** (2004) 83–588.
- [7] P. Kvist, T. Holm Pedersen: Translation into Danish of the questions and modifiers for socio-acoustic surveys. EuroNoise 2006, Tampere, Finland, 2006.
- [8] H. Günther, F. Inglesias, J. Moares de Sousa: Note on the development of a Brazilian version of a noise annoyance scale. *J. Sound. Vib.* **308** (2007) 343–347.