IDENTIFYING EMOTIONAL ELEMENTS OF APARTMENT NOISE

Yoon-Ki Min[1], Hee Joon Eun[2], Moon Jae Jho[2], Jin-Hun Sohn[1]
[1]Department of Psychology, Chungnam National University
[2]Division of Mechanical Metrology,
Korea Research Institute of Standards and Science
jhsohn@hanbat.chungnam.ac.kr

공동주택 소음에 대한 감성 평가

민윤기[1], 은희준[2], 조문재[2], 손진훈[1]
[1]충남대학교 심리학과
[2]한국표준과학연구원 역학 연구부

ABSTRACT

The purpose of this study was to extract emotional dimensions from Korean adjectives relating to apartment noise. Noise-related 296 Korean adjectives were extracted from a dictionary and three evaluators selected 96 adjectives from those by removing very similar ones in meaning. Two types of 96 7-point scales were conducted to college students for evaluating whether each adjective describes apartment noise appropriately. From this evaluation, 28 adjectives having above 4.5 points were selected. Again, 8 different types of 7-point scales on 378 adjective pairs(28 x 27/2) were administrated to separate college students to evaluate the degree of similarity between 28 adjectives. Based upon this evaluation, 14 adjectives were finally selected and scores on similarity were analyzed through two different statistical analyses (Multi-dimensional scale and Cluster analysis). The results showed that three dimensions (displeasure, sensitivity and perceived loudness) exist in peoples' emotional response state to apartment noise. The previous studies have treated annoyance and sensitivity as separate measures to noise. However, this study showed that these two factors were on the same emotional dimension labeled as 'sensitivity.' In addition, new dimension, labeled as 'displeasure,' was found.

INTRODUCTION

Noise has become such a pervasive aspect of working situations and community life that we refer to it as noise pollution. Today, noise is a crucial stressor and changes our psychological, physiological and physical conditions. Particularly, Miller(1980) suggested that physiological changes (i.e., nervous system, cardiovascular system, etc.) induced by noise are highly related to psychological changes (i.e., feelings of annoyance, sensitivity). The psychological factors stimulated by noise will affect our health indirectly, even if the noise is not so strong that it damages our auditory system. Many studies has investigated the effects of noise on peoples' subjective or psychological state. Those studies has mainly focused on annoyance, dissatisfaction and sensitivity as subjective response to noise, particularly traffic and industrial noises (Cohen, Glass, & Singer, 1973; Fidell &. Teffeteller, 1981; Griffiths & Delauzun, 1977). However, most measures were obtained from single item scale, and its

validity and reliability were also not established.

Therefore, this study was intended to develop a valid subjective and emotional response scale of noise. For this purpose, the study identified some structural dimensions into peoples' emotional response to noise, particular apartment noise.

METHOD

1. Collection of Korean Adjectives Relating to Noise

296 Korean adjectives related to various apartment noises, such as running and footstep heard from upstair, traffic sound coming from outside etc., were selected from Korean adjective dictionary. Three experienced evaluators reduced them to 96 adjectives by screening.

2. Appropriateness Evaluation Subject.

The subjects consisted of 105 students enrolled in two psychology courses at Chungnam National university.

Administration of scale. Two types of 7-point scales for 96 adjectives were prepared in order to evaluate how well each adjective describes apartment noise. From this evaluation, 28 adjectives above an average of 4.5 score were selected.

3. Similarity Evaluatio Subject.

Another 136 students were asked to evaluate how similar each pair of adjectives is.

Administration of scale. Eight types of 7-point scales consisting of 378 pairs (28 x 27/2) of 28 adjectives were developed. Based upon similarity scores, representative adjectives were extracted from each similar group in meaning, and 14 adjectives were employed for final statistical analyses. These adjectives were considered separately to reflect peoples' emotional response to apartment noise.

RESULTS

Three statistical analyses(Factor analysis, Multi-dimensional scale and Cluster analysis) were performed on similarity scores of 96 pairs of 14 adjectives.

1. Results of Factor Analysis

Two factors whose eigenvalue (sums of the squares of the factor loadings) exceeded 1.0 were extracted and rotated using oblique rotation method (Table 1). The first factor is identified as 'sensitivity.' The identification was made by listing the adjectives that had fairly high loadings on it: dull, unfavorable, keen, impetuous, serious, nervous, impulsive, terrible. The second factor appears to be 'displeasure' kind of factor. The scales that load on it were rough, unpleasant, tired, uneasy, noisy, loud. Percent variance after rotation were 40% for the first factor and 37% for the second factor. Figure 1 showed a location of each adjective on two dimensional space.

2. Results of Multidimensional Scaling

Based upon a number of measures of dissimilarity, MDS was attempted to represent spatially the proximities between adjectives. A two-dimensional solution (stress= .11, RSQ= .95) is presented in Figure 2. Clusters were also identified as 'unpleasant-pleasant' and 'sensitive-insensitive.' The results were the same as a factor analysis. Table 2 presented each adjective's value loaded on coordinates.

A three-dimensional solution (stress= .08, RSQ= .97) might be better than a two-dimensional solution. The third cluster was identified as 'perceived loudness' loaded by dull, loud, rough.

3. Results of Cluster Analysis

Three clusters were identified as 'displeasure,' 'sensitivity,' and 'perceived

loudness.' Figure 3 showed a dendrogram using average linkage between adjectives. As the results of the previous two analyses, the same emotional structure to apartment noise was identified.

Table 1. Oblique Factor Loadings

Adjective	Factor	
	Factor 1 (Sensitivity)	Factor 2 (Displeasure)
멍하다(dull)	.957	
싫다(unfavorable)	.819	
예민해 진다(keen)	.807	
극성스럽다(impetuous)	.807	
심각해진다(serious)	.773	
신경질 난다(nervous)	.710	
자극적이다(impulsive)	.703	
끔찍하다(terrible)	.479	
거칠다(rough)		- 1.030
불쾌하다(unpleasant)		- .815
피곤하다(tired)		- .807
꺼림직 하다(uneasy)		- .763
시끄럽다(noisy)		- .637
크다(loud)		- .514
Total variance(%)	40.00	37.04

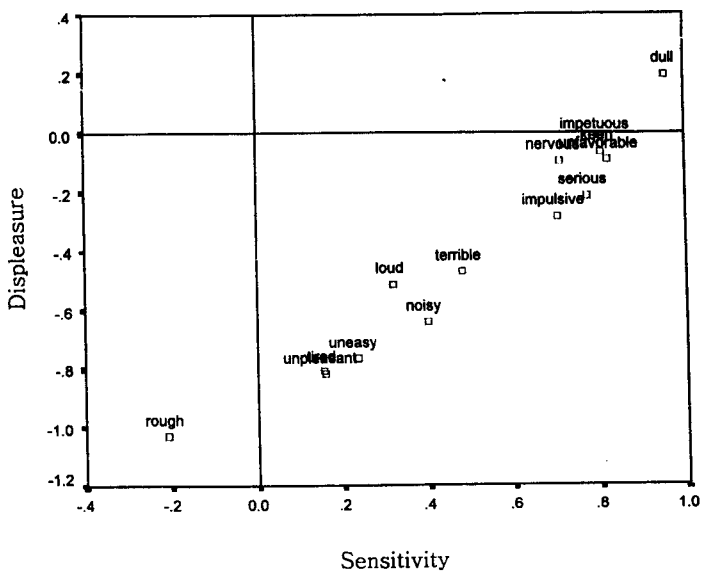

Figure 1. Locations of noise-related adjectives on rotated two-space

Table 2. Stimulus Coordinates Derived in 2 Dimensions

Adjective	Dimensionn	
	Dimension 1	Dimension 2
피곤하다(tired)	- .2653	- .6463
시끄럽다(noisy)	.3939	- .2878
불쾌하다(unpleasant)	.8943	- .5727
예민해 진다(keen)	.6231	.0828
거칠다(rough)	-1.2280	-1.0606
꺼림직 하다(uneasy)	- .1725	- .4226
심각해진다(serious)	- .4572	.2968
끔찍하다(terrible)	.0055	- .3180
크다(loud)	-2.3564	- .4727
싫다(unfavorable)	.5163	1.0917
멍하다(dull)	-1.8051	1.2313
신경질 난다(nervous)	2.7386	.0033
자극적이다(impulsive)	1.4269	.1563
극성스럽다(impetuous)	- .3142	.9184

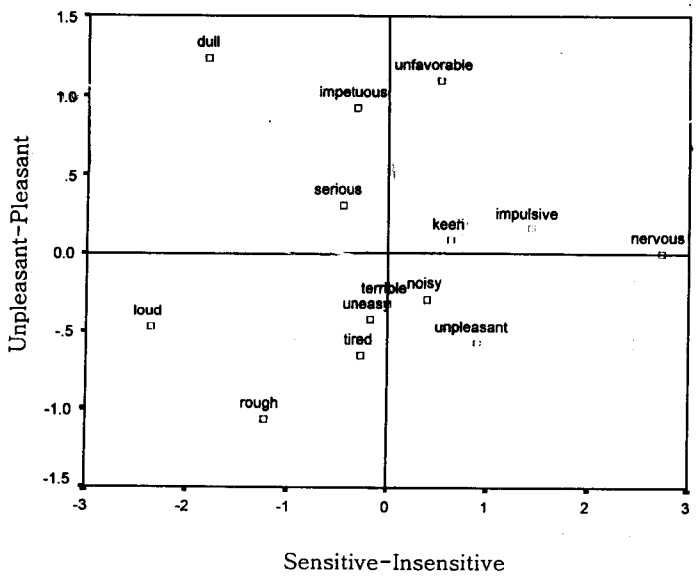

Figure 2. Tow-space multidimensional configurations for noise-related adjectives

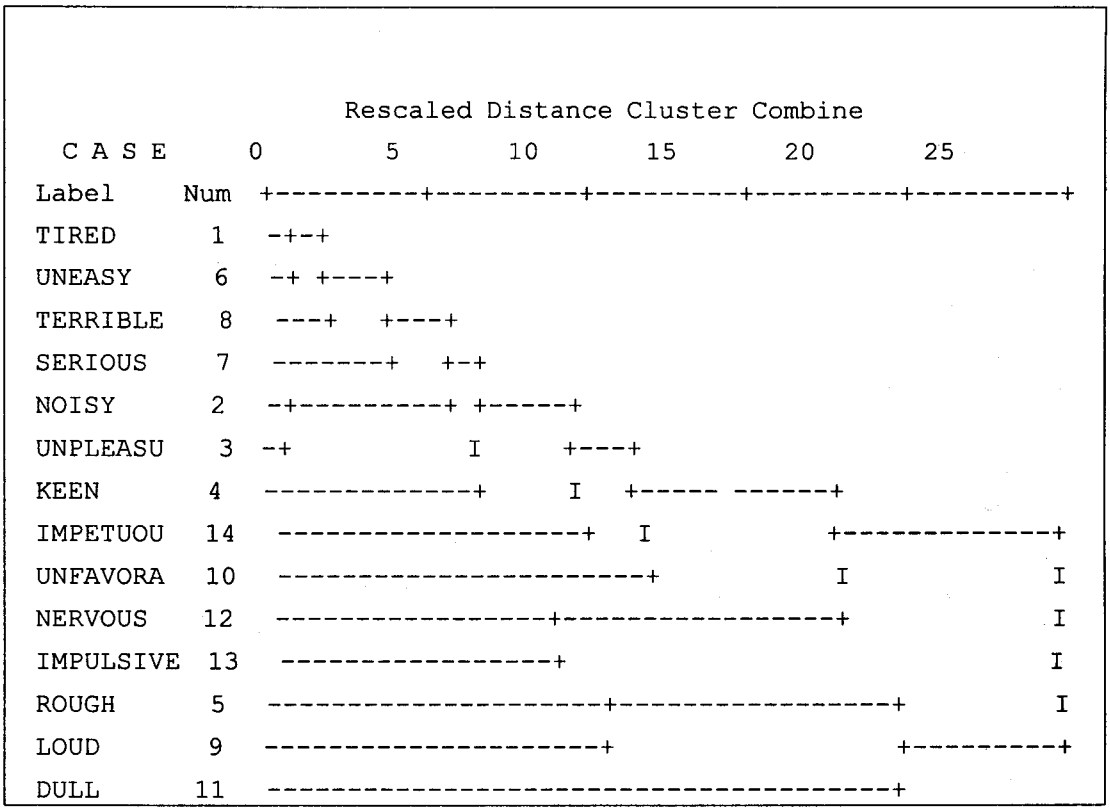

Figure 3. Dendrogram using average linkage between groups

DISCUSSION

The purpose of this study was to provide basic data for measuring emotional response to apartment noise. Overall, emotional response to apartment noise can be measured on three dimensions - displeasure, sensitivity, and perceived loudness. Interestingly, the results showed that annoyance and sensitivity dimensions were not separate concepts but the same concept, even though the previous studies have treated those dimensions as different subjective measures of noise. These different results may be due to the internal semantic differences in expressing emotional state to a certain same stimulus existing in different cultures.

For Korean, emotional response to noise seems to be expressed by 'displeasure,' compared to 'annoyance,' and 'annoyance' appears to integrated to a dimension of 'sensitivity.' Therefore, it is suggested that measures of Korean's emotional or subjective response to noise can be obtained from displeasure and sensitivity dimensions, well.

The study found one more dimension, 'perceived loudness.' This dimension appears to be interrelated to other two dimensions. However, the relationships between those dimensions cannot be declared now. The following study will focus on manifestation of the relationships through path analysis.

ACKNOWLEDGEMENT

This study was supported by MOST Kamsung research grant.

REFERENCES

Cohen, S., Glass, D. C., & Singer, J. E. (1973). Apartment Noise, Auditory Discrimination, and Reading Ability in Children. **Journal of Experimental Social Psychology, 9,** 407-422.

Fidell, S., & Teffeteller, S. (1981). Scaling the Annoyance of Intrusive Sounds. **Journal of Sound and Vibration,** 78, 291-298.

Fidell, S., Teffeteller, R. H., & Green, D. M. (1979). Predicting Annoyance from Detectability of Low-level Sounds. **Journal of the Acoustical Society of America,** 66, 1427-1434.

Griffiths, I. D., & Delauzun, F. R. (1977). Individual Differences in Sensitivity to Traffic Noise: An Empirical Study. **Journal of Sound and Vibration,** 55, 93-107.

Griffiths, I. D., Langdon, F. J., & Swan, M. A. (1980). Subjective Effects of Traffic Noise Exposure: Reliability and Seasonal Effects. **Journal of Sound and Vibration,** 71, 227-240.

Glass, S. W., & Singer, J. E. (1972). **Urban Stress: Experiments on Noise and Social Stressors.** New York: Academic Press.

Hall, F. L., & Taylor, S. M. (1977). Predicting Community Response to Road Traffic Noise. **Journal of Sound and Vibration,** 52, 387-399.

Miller, J. D. (1974). Effects of Noise on People. **Journal of the Acoustical Society of America,** 56, 729-764.

Percival, L., & Loeb, M. (1978). Influence of Noise Characteristics on Behavioral After Effect. **Human Factors,** 67, 617-627.

Sanders, M. S., & McCormick, E. J. (1993). **Human Factors in Engineering and Design**(7th Ed.). New York: McGraw-Hill, Inc.