



# ON THE SIGNIFICANCE OF AN INTENSIVE SURVEY IN RELATION TO COMMUNITY RESPONSE TO NOISE

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The intensive method survey makes detailed descriptions of a small number of cases, while the extensive method seeks to derive general laws from quantitative (in most cases statistical) analysis of the information collected on limited factors from a large number of cases. Although the extensive method has been widely used, the present authors consider the intensive method most significant for social surveys of community responses to noise for the following reasons: More detailed information on people's response can be obtained. Accordingly, (1) hypotheses as to their responses can be found, and (2) extensive methods and results can be verified. Moreover, (3) the method of description of the sonic environment for people can be discussed. The intensive survey of the sonic environment consists of two parts; (1) the investigation of the sonic environment and (2) the investigation of the relation between people and their sonic environment. As for the part (1), items of investigation, spatial density of observation points, and temporal density of observation should be discussed. As for the part (2), although questionnaires consisting of alternative questions are widely used, more appropriate methods for obtaining community responses should be discussed in order to comprehend how people recognize their sonic environment, e.g., using free answer questionnaires or interviewing.

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## 1. INTRODUCTION

Field research workers such as sociologists and anthropologists classify their methods into two categories for convenience: the intensive method and the extensive one. The intensive method intends to make a detailed description of a small number of cases, while the extensive method tries to derive general laws from quantitative (in most cases statistical) analysis of the information collected on limited factors in a large number of cases.

This paper discusses the significance, as well as the method, of the intensive survey on community response to noise.

## 2. SIGNIFICANCE OF INTENSIVE SURVEYS FOR THE SONIC ENVIRONMENT

In the case of community response to noise, the survey is typically carried out as follows. Questionnaires on the effects of noise are delivered to people sampled at random from the population living in a certain area, while the noise level is measured in the area so that the level can be considered to represent sufficiently the noise exposure of the respondents. Thus, the relationship between the noise exposure and the community response is derived from the two independent results.

This method of survey is classified into the extensive method. The idea of this method is based on the law of large numbers of statistics and on the assumption that the

community response to noise is reducible to physical properties and that social and individual factors which could affect results are errors that are canceled between individuals. This method is available for example for calculating equations that express the percentage of the population highly annoyed as a function of the noise level (e.g., see Schultz's work [1]).

As Job [2] has pointed out, however, the sound level is not the major factor affecting people's response to noise, and social and individual factors play an important role as well. The implication of this work with respect to the present discussion is that the sonic environment cannot be sufficiently described by mere physical properties; other social and individual factors must be taken into account.

The present authors believe that one reason why social and individual factors have been eliminated from the conventional noise survey research is the lack of information available as to what social and individual factors are to be examined with respect to the community response to noise. They also believe that the necessary information can be obtained by means of the intensive method.

The significance of the intensive survey applied to studies of the sonic environment is summarized in Table 1 as follows.

(1) The extensive method aims to verify hypotheses made by researchers. The method is available for obtaining the information relating to the factors focused on by researchers, but does not aim to discover would-be important facts concerning the sonic environment which could have been disregarded. The intensive method, on the other hand, tries to form hypotheses from many different minute facts obtained in a field of small size, so that it would enable us to find the information which cannot be found in extensive survey.

(2) The extensive survey assumes that the community response to noise is reducible to a few particular factors, mainly physical ones, such as the noise level. Needless to say, there are many factors concerning the community response to noise that are interrelated. The validity of extracting a few factors in an extensive survey then needs to be examined in a detailed investigation of the relation between responses and environmental factors. The intensive survey presents useful information for the reexamination of the validity and utility of the conventional extensive survey.

(3) In such cases in which the assessment of the change in environment is required in advance, a description of the sonic environment in some particular area is indispensable. The change of noise level has so far been the only concern in terms of the sonic environment, but is just a single aspect of the change. The present authors find it necessary to describe in detail the actual sonic environment in a web of complex factors. In the case of the ecosystem, the intensive method is actually applied to describe the present state of the ecosystem, where for example the numbers of individuals are counted to calculate the diversity index.

On the other hand, it is sometimes pointed out as a shortcoming of the intensive survey that the information obtained by this method lacks in universality. As a matter of fact, the intensive survey cannot examine by itself the validity of generalizations based on the

TABLE 1

*Significance of intensive survey*

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- |   |
|---|
| (1) To find hypotheses out of many different minute facts obtained in a small size of field of survey |
| (2) To re-examine the validity and utility of the conventional extensive survey                       |
| (3) To describe in detail the actual sonic environment including many factors                         |
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TABLE 2

*Topics on investigation of sonic environment*

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- |   |
|---|
| (1) Items of investigation                |
| (2) Spatial density of observation points |
| (3) Temporal density of observation       |
- 

information obtained. The present authors, however, consider that the intensive survey is comparable with the clinical study in medicine, and that respective descriptions in the intensive survey are independently significant, as in cases in clinical medicine. In addition, making comparisons among the results of several intensive surveys and/or extensive surveys would enable us to overcome the shortcoming of the lack of universality.

### 3. METHODS OF INTENSIVE STUDIES OF THE SONIC ENVIRONMENT

Intensive study, in which social and individual factors are considered to be important, as a matter of course focuses on a particular area of comparatively small geographical size. An intensive survey of the sonic environment consists of two investigations, (1) the investigation of the sonic environment understood by the investigator himself and (2) the investigation of the relation between people and the sonic environment. The results obtained in one of the two investigations offer useful information to the researcher when he plans the other investigation, in which case the sonic environment and the community response are not independently investigated, whereas they are in the extensive survey.

#### 3.1. INVESTIGATION OF THE SONIC ENVIRONMENT

Table 2 shows the three topics concerned in the investigation of the sonic environment. Brief discussions are devoted to them in the paragraphs below.

##### 3.1.1. *Items of investigation*

In general, items of investigation depend upon the viewpoints of the researchers of the sonic environment and/or upon the hypotheses they will test through the survey. For example, measurement of the sound level, which has been carried out in most of the social surveys concerning environmental noise, is a reflection of the idea that community response to noise is at least partly reducible to sound level. Thus, a sonic environment understood and described by a researcher is a reality of the sonic environment constructed through his viewpoints, which is likely to be different from those of residents in general. It can be understood that such a reality is not able to adequately explain residents' response to the sonic environment.

The intensive survey intends to reduce the uncertainty although it cannot be completely overcome. Items of investigation in an intensive survey should be determined with due regard to the characteristics of the field, so that the items in different fields are not always identical, and such that they would be modified during the progress of the survey, applying such information as is obtained by the investigation of the relation between people and the sonic environment.

The present authors classify the methods of an investigation of the sonic environment into two categories. One is the quantitative approach to the sonic environment, such as measurement of physical properties by means of instruments, which has frequently been applied. The other is the descriptive approach to the sonic environment presented by investigators, in which items to be described are type of sound source, situation in which

sound is heard, impression caused by sound etc. Although the latter approach has been less frequently applied, both are important for an intensive survey describing the sonic environment in detail with respect to various factors.

Classification of sounds then arises as a necessary issue to face in the description of the sonic environment. When one calls a sound “road traffic noise” or “aircraft noise”, for example, one has already classified the sound into a particular category. The problem of classification of sounds has scarcely been discussed until now.

One rare discussion was presented by Schafer in his book “The Tuning of the World” [3] where he introduced some cataloguing systems for sounds, which are the classification according to physical characteristics, referential aspects, and aesthetic qualities. He censured the convention that sounds were considered in such separate compartments as above, emphasizing “sound contexts” which keep the meanings and/or aesthetic effects of sounds clear for people who hear the sounds.

### 3.1.2. *Spatial density of observation points*

Appropriate spatial density of observation points in an area should be more properly examined when one describes the sonic environment. In the typical extensive survey in Japan, the spatial density of observation points is one or a few points in a 500 m × 500 m grid. Subdivision of the survey area into grids is equivalent to the supposition that, in each grid, sonic environment is taken as homogeneous. In fact, a distance of 500 m is too long when considering the propagation of sound from the source located on the ground, particularly in a densely populated area. The size of the grid comes from that used in the field of city planning, where many kinds of urban information are filed into every grid. This is presumably the only reason why a grid of so large a size has been adopted in the field of noise survey. The size of the grid should be determined from the acoustical viewpoint so that the sonic environment in each grid can be considered homogeneous.

Porteous and Mastin [4] showed an example of surveys with a high spatial density of observation points, setting observation points at the centres of hexagons with a 50 f radius, the length of which was determined by average “earshot” distance. The present authors consider that the spatial density should be determined after discussions based on more detailed investigations.

### 3.1.3. *Temporal density of observation*

For the same reason as above, the temporal density of observation should also be discussed on the basis of the results of surveys of actual sonic environments because it varies at different times of the day or season. Attention should be paid to the events taking place in the field of survey, such as festivals whose sonic environment must have special meanings for the residents [5].

## 3.2. INVESTIGATION OF THE RELATION BETWEEN PEOPLE AND THE SONIC ENVIRONMENT

Extensive surveys have been carried out to investigate the relation between people and the sonic environment, where a questionnaire consisting of alternative questions is used. One merit of this method is that respondents can answer questions without difficulty and that quantitative analysis is possible. There is, however, a demerit in that the answers obtained are in relation only to questions that reflect the viewpoints of the researcher, thus preventing the discovery of unknown problems.

The application of free answer questionnaires is a solution [6]. Answers are less affected by the research framework than are those in questionnaires with alternative questions. The shortcoming of the free answer questionnaire method in that quantitative analysis is difficult has been overcome by Suga *et al.* [7], who developed a method for decomposing

free answers into single words, then discussing which words were described with high frequency, and dividing either words or respondents into several clusters with cluster analysis.

Interviewing is another method of survey. In this method, respondents can give their answers as freely as they like, so that responses to the sonic environment can be described minutely, possibly far beyond what researchers have expected. Attention needs to be paid to the possibility that the answers could be affected considerably by “rapport” between interviewer and respondent, the attitude and/or personality of the interviewer, the situation of the interview, and so forth.

The response of a person to his environment may be concerned with his whole life, even if the response appears to be simple to researchers. Thus the study of the relation between people and the sonic environment can develop into the study of life histories. Psychoanalytic methods would also be available, although the present authors are not qualified to discuss this matter.

#### 4. CONCLUSIONS

The significance of the intensive method of survey on the community response to noise is discussed above. Although the extensive survey needs to be based on the intensive survey, very few intensive surveys have been carried out. The present authors wish for more researchers to carry out intensive surveys and for further discussion of the methodology of the study of the sonic environment.

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