inter.noise 2000
The 29th International Congress and Exhibition on Noise Control Engineering
27-30 August 2000, Nice, FRANCE

I-INCE Classification: 6.6

ASPECTS CONTRIBUTING TO GLOBAL ANNOYANCE JUDGMENTS IN FIELD INTERVIEWS

R. Guski

Ruhr-University, Fac. Psychology, 44780, Bochum, Germany

Tel.: +49 234 322 2670 / Fax: +49 234 312 4308 / Email: rainer.guski@ruhr-uni-bochum.de

Keywords:
ANNOYANCE, JUDGMENT, FIELD STUDY

ABSTRACT
Global annoyance judgments of respondents in field interviews often are considered to be the most important psychological reactions to environmental noise. Although there is a certain agreement among noise researchers about the definition of annoyance, it is not certain which variables contribute to which extent to the global annoyance judgment during the interview. For instance, the respective roles of the noise source, of single loud events, quiet periods, noise history, noise expectations, day and night interferences with intended activities are not at all understood. A better understanding of these aspects seems necessary in order to predict noise annoyance judgments in future situations, esp. in situations involving a change. This paper considers some of the aspects believed to work during the decision process of respondents leading to the global annoyance judgment. The aspects are presently tested in a field survey.

1 - INTRODUCTION

The best source of data for dose-response relationships between noise and its effects known today is the global rating of noise annoyance, made by residents during an interview in a field setting, together with measurements or calculations of the acoustic load outside the house. I will not discuss the pros and cons of various acoustic procedures here − I simply state that given the same precision of measurement or calculation, many of the acoustic variables used today (e.g., L_{Aeq}, L_{max}, number of loud events) show the same degree of covariation with annoyance judgments, and they can be used interchangeably for predicting annoyance in a quasi-stationary transportation noise situation. But the covariation between acoustic and annoyance variables usually is less than 35 % in the best studies of quasi-stationary situations, and it is considerably less in situations involving a change in the noise situation. In other words: the major part of the systematic variance of annoyance judgments cannot be explained by acoustic variables in quasi-stationary situations, and still less in changing situations. The amount of explained variance in annoyance judgments can be increased by means of moderating variables of the residents [1], but most of these variables cannot be used for planning purposes. We believe that a better understanding of cognitive and situational variables which may influence global annoyance ratings in field situations may help to explain parts of their unexplained variance, it may help to predict noise annoyance in future noise situations, and it may be used in order to select the most effective means for noise reduction.

2 - DEFINITIONS OF NOISE ANNOYANCE

In the past, there have been several attempts to define noise annoyance. An overview has been given in [2], and it will suffice to repeat here that some authors consider noise annoyance as an emotion, others as an attitude, still others as a product of past disturbances, some believe that it is influenced by general knowledge of the source, and Fidell [3] sees annoyance judgments as a product of more or less rational decisions − to name but a few concepts. The popular belief that annoyance is mainly the result of past disturbances has been challenged by data showing that the global annoyance judgment can neither be predicted by the maximum disturbance variable [4], nor be predicted by a series of short-term disturbance judgments [5]. An empirical study of the concept of noise annoyance using 68 noise experts from 7 nations as subjects [6] showed that noise annoyance is a multi-faceted psychological concept,

including behavioral, and evaluative aspects. The two aspects rated highest in similarity to annoyance are "nuisance", and "disturbance". It should also be noted that acoustic characteristics do not play an overwhelming role in the concept of noise annoyance.
That is, noise experts consider both an emotional (helpless) and a behavioral factor (disturbance of intended activities) to contribute in the same degree to noise annoyance. Following this line of thought, we believe that global annoyance judgments of residents reflect a combined evaluation of past disturbances and the emotional situation of being more or less helplessly exposed to noise. We consider these results as a starting point to put further questions, because we still do not know much about the way residents integrate past disturbances and emotional reactions in order to produce a global annoyance rating during an interview.

3 - OPEN QUESTIONS

If residents are asked to give a global annoyance rating, they are asked to give a rather complex judgment, involving many aspects. In the framework of judgment research [7], human beings will form such complex decisions using at least one of three heuristics: (1) representativeness of examples (e.g., remembering the situations occurring most often), (2) cognitive availability of examples (e.g., remembering the recent situations), and (3) adaptation to anchoring (e.g., relating to other annoying situations, or relating to other people in the same situation). During a noise interview, residents will probably start with an internal review of past disturbances of intended activities, such as verbal communication, listening to TV/radio, relaxing, talking outside the house, trying to sleep, and so on. The internal review will be subject to memory processes, and we all know that memory is no objective means of recalling past events. The items recalled are subject to availability, and transformation processes. Availability is best for recent items, and good for items which have been rehearsed often or have very distinct features. Transformation of memories are very likely when memory contents are communicated with other people. Even if memory would be objective, we do not know how residents integrate the past experiences, and in addition, past experience is only one of several factors involved in the judgment process. The following factors probably play a role in the decision process of the resident questioned about global noise annoyance:

1. disturbances (communication, recreation, sleep, outside/inside etc.)
2. daytime and seasonal factors (early morning, late night, summer etc.)
3. evaluation of the sound source (non-acoustic costs and benefits, avoidable sounds etc.)
4. loud events vs. quiet periods
5. noise history vs. expectations of future noise situations
6. power or helplessness with respect to the noise situation (effectiveness of complaints, costs and benefits of a location change etc.)
7. Non-acoustical costs and benefits of the residential area.

This list looks short, and it can easily supplemented by additional points, but even now there are many open questions connected with each item. Four general questions appear at once:

- How are the respective items within each factor integrated?
- How are the different factors integrated?
- Does the integration rule depend on the noise source?
- Does the integration rule depend on the noise level?

For instance, we do not know whether residents simply take an arithmetic mean of all disturbances they can remember, whether higher weights are given to certain disturbances (e.g., sleep interference), whether higher weights are given to certain times during the whole day, or whether they also give some discounts because of quiet situations in between. These are just four of many different integration rules which are possible. In addition, the rules may depend on the noise source, and noise level: People in low noise areas may give the benefits of quiet periods in intermittent noise situations somewhat more weight than people in high noise areas, where peak noise events and the mere number of loud events may play a major role.

To give another example: we do not know much about the influence of past noise history and of noise expectations. We believe concerns and uncertainty with respect to the noise situation in the future to play a major role for global annoyance judgments, but we neither know how to estimate the weight such concerns in relation to present noise effects, nor in relation to the noise history in the past. The weights given may depend on the noise source: while most residents living in the vicinity of a transportation noise source may have experienced a continuous increase in noise levels or at least a decrease in quite periods, residents of airports and of highways mostly have experienced an increase of noisy events above average. These people may give concerns for the future noise development more weight than residents near railroad tracks.

4 - A STUDY IN ANNOYANCE COGNITION

These and related questions have led to a research proposal that is currently done in Germany − and we hope to find partners in other countries too. We start with a feasibility study, using two noise sources (aircraft and railroad), and three levels of noise each. Structured personal interviews will be done with 10 residents in each of the 6 areas. The interviews will start in the same manner as conventional personal noise questionnaires do, coming to a halt after posing the global annoyance question in the way ICBEN Team No. 6 [8] suggested. This question calls for a cognitive integration of noise situations during the past 12 months. Then, respondents will be asked to recall the cognitive processes which just have taken place in their minds − while forming the global annoyance judgment. In order to help recalling, respondents then will be asked to scale the degree of each of the following factors we believe to play a role during the formation an annoyance judgment:

- A very significant disturbance
- A very loud event
- Frequency of disturbance
- Duration of disturbance
- Disturbance of communication
- Disturbance of recreation
- Disturbance of sleep
- Disturbances inside the house
- Disturbances outside the house
- A certain time during the day
- A certain day during the week
- A certain season
- Quiet periods
- Loss of control in the noise situation
- Comparison of costs and benefits of the local noise source
- Comparison with unavoidable noise situation
- Fear of health consequences
- Comparisons with past noise situation
- Expectations of future noise situations
- Opportunities for compensation of the disturbances.

REFERENCES

1. **Guski, R**, Personal and social variables as co-determinants of noise annoyance, *Noise & Health*, Vol. 3, pp. 45-56, 1999

2. **Guski, R**, Conceptual, methodological, and dose-response problems related to annoyance and disturbance, In *Inter-Noise 97*, pp. 1077-1082, 1997

3. **Fidell, S**, Why is annoyance so hard to understand?, In *H.S. Koelega (Ed.): Environmental annoyance: Characterization, measurement, and control. Proceedings of the International Symposium on Environmental Annoyance, Woudschoten (NL). Amsterdam: Elsevier*, pp. 51-54, 1987

4. **Schuemer, R; Schuemer-Kohrs, A**, Lästigkeit von Schienenverkehrslärm im Vergleich zu anderen Lärmquellen - Überblick über Forschungsergebnisse, *Zeitschrift für Lärmbekämpfung*, Vol. 38, pp. 1-9, 1991

5. **Felscher-Suhr, U**, On the difference in the evolution of judgments depending on either retrospective or actual noise annoyance measurement, In *Inter-Noise 97*, pp. 1179-1182, 1997

6. **Guski, R; Schuemer, R; Felscher-Suhr, U**, The concept of noise annoyance: how international experts see it, *Journal of Sound and Vibration*, Vol. 223, pp. 513-527, 1999

7. **Tversky, A; Kahnemann, D**, Judgment under uncertainty: Heuristics and biases, *Science*, Vol. 185, pp. 1124-1131, 1974

8. **Fields, J J; DeJong, R G; Flindell, I H; Gjestland, T; Job, R F S; Kurra, S; Schuemer-Kohrs, A; Vallet, M; Yano, T**, Recommendation for shared annoyance questions in noise annoyance surveys, In *Noise Effects '98, 7th International Congress on Noise as a Public health Problem*, pp. 481-486, 1998