

PROPOSAL FOR A SCIENTIFIC PROGRAM

Gulian, E. and Cohen, S.

Department of Psychology, University of Warwick, Coventry, England.

Department of Psychology, Carnegie-Mellon University, Pennsylvania, USA.

In the last two reviews on noise and performance Gulian (1975) and Loeb (1980) have remarked, sadly, that despite a great number of studies very little progress has been achieved in understanding the effects of noise on human behaviour. It is, therefore, gratifying to be able to say, at last, that the situation appears to be slowly changing. As was shown in Broadbent's review and in the papers presented in our session we are beginning to form a clearer picture of the intervening factors which account for the human behaviour in response to noise. The reason for this lies primarily, we think, in a change of emphasis in noise research. Until the mid-seventies the bulk of research was on the effects of noise on perceptual-motor skills, and the main variables taken into consideration were the physical characteristics of noise. Currently, research on noise, following the overall trend in psychology, has become cognitive-oriented. Attention has been focused on the way in which many cognitive activities mediate the effects noise has on performance as well as on the strategies people employ in coping with noise.

Much work is still to be done and the discussions of our team about

priorities in future activities have highlighted the following main areas: (I) development of a broad theoretical approach to research on noise and behaviour; (II) determining the underlying cognitive processes of performance tasks; (III) elucidating the role of the meaning of noise, and of (IV) coping strategies in determining noise effects on behaviour, and (V) collecting data to establish a broader range of generality across both environment and populations.

Theoretical Development

There is a need for an integrated multiple theory approach to understanding the effects of noise on performance. It is recognized that noise may affect performance in a number of ways including masking important performance cues, modifying the level of arousal, influencing information processing strategies, and altering feelings of helplessness, affect and motivation. The principle question now is how do these different components interrelate theoretically? We need to identify which theories focus on independent processes and which overlap. We also need to establish criteria for understanding when each theory applies and how the theories interact with one another when multiple theories apply in the same situation. Such an integration of theoretical approaches would allow for a more accurate prediction of the effects of noise on performance across situations.

Task Characteristics

We need to develop a taxonomy of tasks based on the cognitive processes that underly their performance and to choose our experimental tasks based on this taxonomy. Recent work suggests that many noise effects on performance can best be understood in terms of the specific processes that are either interfered with by noise or are apparently unaffected by noise. A taxonomy would allow existing tasks to be

classified according to their similarities and differences in required information processing. This approach suggests that future work may be most useful to the extent that it manipulates and/or assesses the processes involved in experimental tasks. The development of a taxonomy of tasks can be aided by recent work in cognitive psychology on distinguishing various processes in task performance.

Emphasis on Meaning

More emphasis should be placed on the meaning of the noise for the exposed person. The meaning of a sound is influenced by the social and physical context in which it occurs and by individual differences in coping and personality. Context issues are of special import in performance experiments and have received little attention up to now. For example, the experimenter's dress and demeanor, the exact instructions given to the subject, and the physical layout of the laboratory may have important implications for subjects' interpretation of loud disruptive sound. Studies manipulating context and noise independently and determining how noise and context interact to affect performance would be a welcome addition. At a different level, comparisons of the predictive validity of self-reported threat and annoyance with sound level, and other physical parameters of the noise would provide a first approximation of the role of meaning in the relationship between noise and behaviour. However, even this step is a difficult one in that it requires the use of psychometrically valid measurement instruments for assessing self-reported levels of stress.

A closely related issue is the determination of the information content of a noise stimulus. Information content of the sound may similarly play an important role in determining the meaning of the noise

for the respondent and hence its impact on behaviour.

Coping Strategies

The purposive strategy (or coping style) that a subject uses to cope with noise while performing a task is often a central mediator of the effects of noise on behaviour. It is proposed that future research both manipulate and measure these strategies and relate them to performance outcomes. The main directions to pursue in this area include documenting the differences between strategies used under short and long-term exposure, and under intermittent and continuous exposure.

Also of interest are the costs of pursuing particular strategies. Work on the psychological and physiological costs of coping with noise could provide evidence of noise effects that occur for those who are apparently successfully dealing with the noise, i.e. their performance is not affected. Further work on post-noise aftereffects especially as occurring in real-life settings appears to be particularly interesting.

Issue of Generality

There is a serious concern that research on noise and performance does not allow adequate generalization to the work place. This concern follows from the criticisms that research has been conducted almost entirely in laboratory settings, used a restricted range of tasks that often were not related to tasks used in real-life noise-impacted settings, and employed young, healthy adults as subjects. Future work should utilize tasks that are more representative of real-life situations, conduct field research to compliment laboratory investigations, and recruit subjects from a wide range of ages in order to cover the life span. Of special interest in this regard are the effects of noise on the performance of children and of the elderly. These two groups may be more

susceptible to noise and hence be more likely to show noise induced effects on performance.

Future research should also concentrate on the interaction between various objective and subjective factors which, presumably, concur in determining performance in real-life conditions. Among these the interactions between time-of-day, gender, task complexity, physical characteristics of noise and its meaning for the individuals exposed to it, seem the most relevant.

To summarize: we feel that further development of theory, work on the meaning of the sound rather than just its physical parameters, work on process oriented task taxonomies, and on the role of strategies adopted under noise will cumulate to provide a substantial advance in our knowledge about the effects of noise on performance. Further emphasis on expanding the generality of this research to other environments and populations will help increase its import for real-life work settings.

REFERENCES

- Gulian, E., 1975. Psychological consequences of exposure to noise : facts and explanations. Proceed. 2d. Inter. Congress on Noise as a Public Health Problem, Dubrovnik.
- Loeb, M., 1980. Noise and performance : do we know more now? Proceed. 3d. Inter. Congress on Noise as a Public Health Problem, Freiburg.

SOURCE

Proceedings of the Fourth International Congress on

Noise as a Public Health Problem

Turin, Italy
June 21-25, 1983

Volume 2

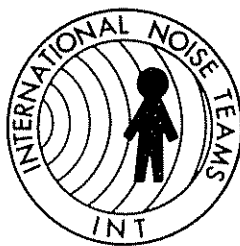
RA

772

N7I56

1983

V.2



Editor

Giovanni Rossi, M.D.

Edizioni Tecniche a cura del
CENTRO RICERCHE E STUDI AMPLIFON
Milano, Italy
Novembre 1983