

# A MODEL OF RESPONSES TO CHANGES IN NOISE EXPOSURE

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**Introduction** Although there are many studies and a number of theories or models of human reaction to ongoing noise (see Fields, 1992; Job, 1988; Lercher, 1996), reaction to changes in noise exposure has received less theoretical and research attention. There may be several reasons for this relative neglect. First, opportunities for relevant field studies are limited to occasions of clear and predictable changes in noise exposure. Second, many of those working on noise effects are concerned by possible interpretations of data that may suggest that reaction decreases with chronic exposure, and the apparent corollary that people simply get used to noise so that increasing noise levels should not be regarded as a problem. Finally, the term “over-reaction” may be dismissive of these effects, as inappropriate or inexplicable.

A disquieting inconsistency appears to exist between the evidence that people do not habituate to noise (Weinstein, 1982; but see Hatfield et al., 2001), versus evidence of less reaction to ongoing noise than to new noise (the so-called “over-reaction” effect (e.g., Brown et al., 1985; Griffiths & Raw, 1986, 1989).

When noise exposure increases, community reaction (the level of dissatisfaction, disturbance, or annoyance generated by the noise) increases to a level well beyond that which would be expected if the new noise level had existed for many years. The parallel effect exists for reductions in noise exposure, such that the reaction to the reduced noise is less than would be expected if the new low level had existed for many years. These effects are generally termed “over-reaction” to reflect the exaggerated reaction to changes in noise exposure in either direction. The term has the unfortunate implication that there is some level of reaction which is appropriate and that any other level of reaction is inappropriate (over) the ‘correct’ level. In this way, the term “over-reaction” may be dismissive of these effects, as inappropriate or inexplicable.

This paper proposes a model of reaction to changed noise exposure that may guide further theory and research on the issue.

**A model of reaction to changed noise exposure** In order to explain the unusual level of reaction to changes in noise, a model must accommodate a number of features. First, reaction is lower than expected when noise is reduced, as well as higher than expected which noise increases. Second, habituation and adaptation are relatively fast processes (even in self-report: Hatfield et al., 2001) that are likely to have occurred by the time of the initial surveys of reaction in which the unexpected levels of reaction are identified. Thus, these are unlikely to provide an account. Third, there is evidence and theory suggesting a possible role of changes which allow better living with noise (such as changing the most noise exposed rooms from bedrooms to living areas: Griffiths & Raw, 1990). Fourth, there is evidence and theory suggesting a possible role of changes in attitude towards the noise source induced by the changing exposure (Job, 1988a; Job et al., 1996). One of the most important attitudinal factors is misfeasance: the extent to which those responsible for the noise are seen to be uncaring about the noise they cause rather than being concerned about the noise and its effects on the residents. Changing noise exposure could be expected to affect this attitude, such that reducing the noise would induce a better attitude and increasing the noise would induce a more negative attitude. These behavioural and attitudinal mechanisms would both predict the less-than-expected reaction which noise is reduced. Sixth, it seems that attitude and reaction can both

change in anticipation of highly publicized changes in noise (Hatfield et al., 2001a). Finally, it seems that perceptions of uncontrollability also affect extent of reaction (Hatfield, 2002), and increasing the noise exposure (especially if this occurred with community consultation and protest) may induce greater perceptions of uncontrollability and helplessness.

**Figure 1: A model of the factors affecting reaction to changes in noise, with the time.**

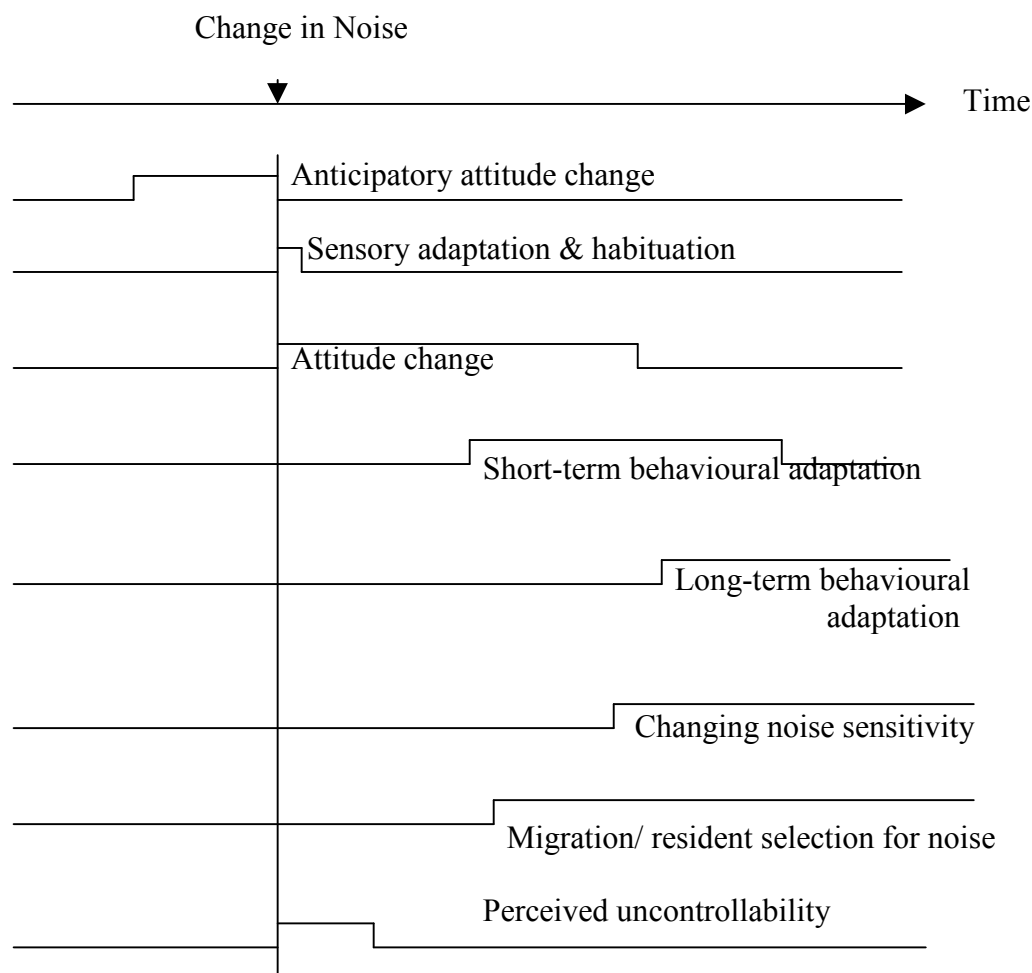


Figure 1 presents a summary of the processes likely to affect reaction to changes in noise exposure, mapped onto a time continuum around the point of change in noise. The identified time courses of action reflect the times over which the factor may change, not the times over which it may have its effects. Thus, for example, adaptation may occur relatively quickly, as depicted, but the effect of this adapted state may be long term. Inevitably, the times at which these processes occur will vary across individuals, and may begin and/or end gradually. The present model is a descriptive approximation.

It is important to note that most community surveys of reaction measure the level of reaction after all these process have occurred (i.e. in the context of steady state noise). Thus, none of these effects should be taken as indicating that people will simply ‘get used to’ an ongoing noise. Rather, most of our data are on people who are as ‘used to the noise’ as they will ever be, and substantial levels of reaction still exist.

More research is needed before we can understand the processes by which changes in noise affect people. Improved understanding of the processes underlying reaction to changes in noise exposure may help us to reduce the effects of changing and of ongoing noise. In addition, we lack information on the extent to which, and the mechanisms by which, the factors affecting reaction to changes in noise may also affect the possible physiological and health effects of noise exposure as it changes.

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