Impact and Potential Use of Attitude and Other Modifying Variables in Reducing Community Reaction to Noise

R. F. S. Job

A large number of variables in addition to noise correlate with community reaction, yet to date virtually the only method used to reduce reaction is to reduce noise exposure. It is suggested that this obvious and effective countermeasure may be supplemented with additional measures. Modifying variables may be manipulated to reduce reaction if they meet three criteria: the variable must have a sufficiently strong relationship with reaction to be of practical value; the variable must be a causal factor in reaction (or turn out to be part of reaction); and the variable must be potentially manipulable. Available data suggest that a number of modifying variables may meet these criteria (attitude, reduction in rates, direct sight of the noise source, and fear of crashes). It is suggested that more research is needed to establish with greater confidence the direction of causality and the impact of modifying variables on reaction. In particular, the manipulation of modifying variables in order to reduce reaction (either alone or in combination with noise reduction) deserves direct testing.

Socioacoustic investigations provide valuable data on the correspondence (correlation) between reaction and noise. It has been accepted universally that these correlations represented a causal sequence from noise to reaction such that a reduction in noise would lead to a reduction in reaction. This assumption is supported by data on community reaction associated with changes in noise exposure (*1–4*). However, the notion of an untainted correspondence between noise level and reaction level is a substantial oversimplification of events (*5*). Indeed, the fact that only around 18 percent of the variance in reaction is explicable in terms of noise exposure (*6*) indicates that noise is not remotely the whole story.

Many other factors (attitude to the noise source, sensitivity to noise, age of the hearer, etc.) influence reaction to noise. However, these factors are often seen as inconveniences that obscure the real noise-reaction relationship. The point is to suggest that some of these other factors themselves may be just as real as noise in accounting for reaction, and may also be useable in terms of reducing community reaction. That is, the general argument may be made that if any variable (say x)—not just noise—correlates with reaction, it is possible that changes in x will cause changes in reaction. (Of course, a correlation does not indicate causation, but may only be suggestive of a causal link.)

There is a good reason to expect that a number of features of the noise, the hearer, and other physical factors (e.g., time of day, sight of the noise source) will influence the degree of reaction occasioned by the noise. That some of these factors have a genuine possibility of being causal agents in reaction may be seen in the following examples. Consider hearing a neighbor playing a synthesizer. All the following factors could be expected to influence the level of reaction.

1. The loudness and duration of the synthesizer music may influence reaction (i.e., basic features of the noise as measured by L_{eq}).
2. Changes in the noise (making it a random sequency of notes instead of a melody) may increase reaction (disturbance, annoyance) because it is more likely to be heard as noise rather than music, yet such changes would not be reflected by measures like L_{eq} or any typical measure of noise exposure.
3. Knowledge of and attitude to the noise may have an impact. The synthesized music may be perceived as noise or music depending on whether the hearer knows and likes synthesized music or not, as well as the hearer's opinion of the neighbor (i.e., attitudes to the noise source).
4. The reason for the noise may have an impact—is the noise perceived as useful or frivolous? This factor can be seen more clearly in say, reaction to military aircraft: are overflights seen as joyrides that waste the taxpayers money or as a necessary part of defense (i.e., the value of the noise source, as a part of attitude).
5. Is the noise loud because it is unavoidable, or is the producer simply being inconsiderate? Again, this factor is important in relation to aircraft, road, and rail noise: do the authorities in charge care about the noise (i.e., misfeasance as another part of attitude).
6. Time of day—at 1:00 p.m. it may be music but at 1:00 a.m. it is noise.
7. Features of the hearer that vary over time may have an additional impact—at the time of the noise the hearer may be mowing the lawn or reading a book in the quiet. The influence on reaction of such factors as level of concentration is supported by laboratory studies (*5*).
8. In some cases, reaction may vary with whether or not the hearer can see the source of the noise.
9. Degree of control over the noise: can the hearer move to a less exposed room, or close the windows?
10. How distracted by noise is that particular hearer (i.e., sensitivity to noise).
11. Demographic variables (age, sex, socioeconomic status, length of residence) may influence reaction either indepen-

Department of Psychology, University of Sydney, Sydney, New South Wales 2006, Australia.

dently or as a consequence of the above factors (e.g., a 25-year-old may be more likely to hear a synthesizer as music than a 70-year-old). Home ownership may have an influence through perception of loss of property value.

12. Finally, these factors may interact: for example, loss of melody (Factor 2) may interact with value of the noise source (Factor 4). If the melody is poor because the neighbor is drunk, this may have a worse effect than if the melody is poor because the neighbor's 9-year-old son is learning to play; or more obviously, sensitivity to noise (Factor 9) may interact with loudness (Factor 1).

In these examples, it seems quite plausible to suggest that a variety of factors have an important role in the causation of reaction to noise.

MODIFYING VARIABLES

The previous factors (called modifying variables because they modify reaction to the noise) are often measured in the more sophisticated studies of community reaction to noise. Social surveys may include questions that assess attitudes to the noise source, sensitivity to noise, and a variety of demographic variables. Additional physical information may be collected on windows, visibility of noise source, and age of the dwelling.

A large number of variables, other than noise, have been shown to have a significant relationship with reaction. These include the following: sex (*7*); age (*8–11*); marital status (*7,12*); education (*12*); socioeconomic status or income (*8,13*); personality (*14*); psychiatric status (*15*); home ownership (*9,16*); whether local groups are seen to have done anything about the noise (*12*); whether the neighborhood has complained about the noise (*12*); reductions in rates (taxes) because of the noise (*12*); duration of residence (*7,12,13,16,17*); satisfaction with the neighborhood (*12,13*); age of the dwelling (*12*); satisfaction with life (*12*); fear of aircraft or railway crashes (*10,12,13*); open and closeable windows and control over the noise (*18*); number of people in the household (*12*); being able to see the noise source (*19,20*); annoyance with dirt, air pollution, lights, and loss of privacy (*12*); discussion of noise with friends and neighbors (*21*); belief that noise can harm health (*12*); attitude (*6*); and sensitivity (*6*).

Another variable that has received research attention is complaint behavior (*12,22*). However, although the variable of complaint by the neighborhood (*12*) will be considered as a modifying variable, individual complaints will not be so considered. Individual complaints have not been considered because such complaint behavior is influenced by many factors extraneous to present considerations, such as level of verbal or written skill, or knowledge of to whom the complaint should be directed. Complaints are also known to be elicited more by changes in the noise (i.e., unusual noise) rather than usual but excessive noise (*22*). Complaints also indicate no clear relationship to noise exposure except for the possibility that complaints are more likely in lower noise exposure areas (*22*).

This review has presented a prima facie case for possible causal connection between a large number of factors and reaction to noise. However, much more than a significant statistical relationship such as a correlation is required to provide argument for a causal connection. The next section considers the criteria necessary for a modifying variable to be potentially usable in reducing community reaction to noise.

UTILITY OF MODIFYING VARIABLES

For a modifying variable to be useful in reducing reaction to noise, that variable must satisfy three criteria.

1. The modifying variable must have an impact on reaction that is of sufficient size to be of practical value.

Many of the given variables do not appear to have sufficiently powerful statistical relationships with reaction. In the cases of sex, education, local groups being seen to have done something, socioeconomic status, home ownership, and marital status, the sizes of effect are typically able to account for only 0.2 to 0.5 percent of the variation in reaction. Indeed, studies have often failed to find statistically significant effects for some of these modifying variables: education (*10,16,19*); sex (*10,16*); and home ownership (*10,16*).

In a few cases, the results diverge considerably. For example, duration of residence has sometimes not had a significant effect despite a large sample size (N = 3,575) (*10*), whereas Fields and Walker (*12*) calculated the effect of duration of residence as equivalent to a 12 dB variation in noise [with noise controlled by its inclusion in the regression analysis (*12*)]. This may reflect differences between the studies such as culture (Australia versus Great Britain) or noise type (aircraft versus railway). However, duration of residence does not seem to have a consistently large effect. The effect of age varied similarly across the same two studies—the correlation with reaction was 0.50 with noise controlled (*12*) versus 0.10 (*10*). However, a number of studies have reported small effects of age (*8,11*), or even no significant effect (*16,19*). Finally, number of people in the household has produced results ranging from a correlation of 0.45 (*12*) to a nonsignificant effect (*16*).

The sizes of effect for personality, psychiatric status, and the effect of more openable and closable windows are either small and difficult to determine precisely because few studies have examined these variables. In the latter case, the study was of work rather than residential buildings (*18*). However, in principle any control over the level of noise actually heard in the house should bring substantial psychological benefits, judging from the extensive literature on learned helplessness, uncontrollability, and its stress effects (*23,24*). This variable deserves further investigation.

A total of 11 variables appear to have correspondences with community reaction that are of practically significant size. These variables, along with evidence of their sizes of effect, are presented in Table 1.

2. The modifying variable must be a causal factor in community reaction, or eventually be considered to be part of reaction.

In either of these cases, the variable is usable because a decrease in the modifying variable will either cause or constitute a decrease in reaction. However, there are two other ways in which a correlation between an apparent modifying variable and reaction could arise. First, the correlation could occur as an inadvertent consequence of mutual correlations with a third variable. That is, the modifying variable and

TABLE 1 THE 11 MODIFYING VARIABLES HAVING CORRESPONDENCES WITH REACTION

Variable	dB Equivalent Size of Effect	Correlations with Reaction
Attitude to the noise source	15 (*2*)	0.50[a] (*12*) and 0.41 (*6*; review of 12 studies)
	8 (*12*)	0.46[a] (*12*); 0.43 (*19*); 0.34[a] (*25*); and 0.33 (*19*)
Sensitivity to noise	9 (*12*)	0.45[a] (*12*); 0.30 (*6*; review of 11 studies) 0.27 (*21*); and 0.18 (*19*)
Reduction in rates	15 (*12*)	0.46[a] (*12*); 0.43 (*19*); 0.34[a] (*25*); and 0.33 (*19*)
Satisfaction with neighborhood	13 (*12*)	0.51 (*26*)
Fear of crashes	6 (*12*)	0.52/0.45[a] (*25*); 0.61 (*10*); and 0.46 (*12*).
Whether the neighborhood has complained	9 (*12*)	
Satisfaction with life	10 (*12*)	0.46[a] (*12*)
Sight of the noise source	10 (*20*)	
Dissatisfaction with dust, air pollution, lights, loss of privacy	26 (*12*)	0.6[a] (*12*)
Belief that noise harms health	14 (*12*)	0.38/0.33[a] (*25*) and 0.48 (*12*)

[a]Noise controlled for.
NOTE: Corresponding sources of data are given in parenthesis.

reaction could correlate because both are independently caused, at least in part, by some third variable. Second, reaction may be a causal agent to the modifying variable. In both these cases, the modifying variable is of no value in reducing reaction.

Correlations in no way identify the chain of causality. So, the size or the direction of the correlation is not informative on this matter. In fact, with most of the variables in Table 1 there are few data that indicate the likely causal sequence. However, a few studies presented data that bear on this issue. Bullen et al. (*9*) found an initially significant correlation between duration of residence in the area and reaction. However, when the effects of age and home ownership were statistically controlled, the reaction–duration of residence correlation disappeared, suggesting that its impact only arose from the age and home ownership factors. Similarly, the correlation between reaction and education disappeared (*9*). Finally, in a comprehensive study, Fields and Walker (*12*) assessed the modifying variables independently and simultaneously, so as to take into account the complex interrelationships. They found that the impacts of the modifying variables were generally greatly reduced. These results suggest that many of the modifying variables intercorrelate in a manner that allows that their apparent impacts on reaction arise in part from the impacts of other modifying variables with which correlations are shared. Because the required statistical analysis (e.g., regression) to establish correlations independent of the other identified potential factors is rarely done, it is possible that quite a number of the relevant factors do not have independent correlations with reaction.

However, it is possible to speculate that a number of correlations exist between the modifying variables. People no longer studying or further advanced in their careers are likely to earn more (so, age is an income correlate); middle-aged people are more likely to be married than young adults say 18 to 25 years (so, age and marital status will be related); older people have had more time to save money, and earn more money [so, home ownership is related to age as supported by the data (*9*)]; age is also known to influence attitude; older people have had more time to live in one place, and are more likely to own their home so they will move around less often (so, age and length of residence will correlate); home ownership influences duration of residence [again supported by the available data (*9*)]; a person who likes the neighborhood is more likely to stay (so, satisfaction with the neighborhood and duration of residence will correlate); people are more likely to buy a house in an area they like (so, satisfaction with the neighborhood and home ownership will correspond); dissatisfaction with dust, air pollution, and intruding lights could be expected to influence satisfaction with the neighborhood, so these factors should correlate; age of dwelling could be expected to correlate with age of the occupants and length of residence. Further, unmeasured factors may cause some of the observed relationships. For example, it may be speculated that a general predisposition to feel dissatisfied or to express dissatisfaction could lead to correlations between reaction, level of satisfaction with the neighborhood, and level of satisfaction with life (*12*). Finally, additional correlations could arise from the previous correlations: if factor A correlates with factor B and factor B correlates with factor C, a correlation between A and C may result. A number of possibilities of this form exist in the given instances.

The lack of data on intercorrelations of modifying variables and the lack of comprehensive regression analysis have necessitated these speculative arguments. This problem would be reduced if future socioacoustic studies reported regression analysis or the correlations between modifying variables. Given the absence of complete data, the best procedure may be to proceed with only those variables for which there is no obvious alternative explanation, or for which the size of the effect is

so large as to be inexplicable in terms of the possible alternative variables through which the impact may occur. The variable of age of dwelling may be eliminated on these grounds. It also seems likely that a substantial part of the impact of satisfaction with the neighborhood and satisfaction with life (and perhaps even some parts of attitude) may be explained in terms of general predisposition to be dissatisfied or satisfied, and the general predisposition to express that feeling. However, these variables remain in contention because there is no evidence on the size of this hypothetical effect and the variables all have strong relationships with reaction (see Table 1).

Although other cases may be unclear and future data and analysis may eliminate more variables on these grounds, overinclusion at this point is likely to be a less costly error than missing potentially usable variables in the battle to reduce community reaction to noise.

The second half of the present criterion involves elimination if it is likely that reaction affects the modifying variable rather than vice versa. Of course it is possible that a complex interaction is occurring: for example higher reaction to the noise may cause more neighborhood complaints and more political pressure, and lead to reduced taxes; then reduced taxes may lead to greater satisfaction and acceptance of the noise [although cognitive dissonance (*27*) could cause an effect in the opposite direction]. Thus, in the case of reduced taxes it seems likely that the variable is influenced by and influences reaction. However, in the case of neighborhood complaints it seems likely that they are caused by reaction rather than vice versa.

It also seems plausible to suggest that dissatisfaction with noise would cause dissatisfaction with the neighborhood and to some extent with life in general. Therefore, the latter two variables are eliminated because they may be caused in some part by reaction itself as well as by dissatisfaction with other aspects of the area—dust, air pollution, etc.—covered in another variable that has a stronger relationship with reaction (*12*). Additionally, as mentioned earlier, dissatisfaction with neighborhood and life may correlate with reaction through a general predisposition to be dissatisified or to express dissatisfaction.

Some relevant data are available on the variables in Table 1 not yet considered in relation to direction of causality. First, as indicated in Table 1, the variables not yet considered have statistically significant correlations (generally 0.3 to 0.5) with reaction even when the effect of noise exposure is statistically controlled by inclusion in the regression analysis. If these variables were themselves influenced by reaction (which correlates with noise exposure), the correlation between the modifying variable and reaction might be expected to drop substantially when the variance attributable to noise is removed. Thus, the significant correlations (independent of the effects of noise) are consistent with the possibility that these variables modify reaction, rather than are caused by it. Nonetheless, these data are suggestive rather than compelling. More detailed analysis would be useful. The necessary data are often unavailable and in the absence of data to the contrary it will be assumed that reduction in rates and the belief that noise harms health may be genuine modifiers of reaction. However, additional analysis is possible for several variables.

- Attitude. The data on attitude are complicated by the fact that a number of different types of attitude have been tapped in the various studies and it is possible that these different variables behave differently. Furthermore, two (and sometimes three) distinct attitude variables have been identified in single studies using factor analysis (*9,10,19*). Thus, the different attitude scales do not appear to reflect a simple underlying general attitude. Nonetheless, across the studies the low mean correlation between attitude and noise suggests that attitude is not simply part of or caused by noise-induced reaction. However, the slight but positive noise-attitude correlations [mean = 0.15 (*6*)] suggest that a small proportion of attitude may be part of, or caused by, reaction.

Although the possibility that reaction affects attitude rather than vice versa cannot be eliminated directly by correlational data, McKennell's data (*28*) are informative. McKennell's analysis of regression slopes indicated that patriotism regarding the Concord was associated with reduced annoyance with Concord overflights to an equal extent, regardless of noise exposure. Thus, the patriotism effect does not appear to be caused by greater noise exposure (through greater reaction, which could then cause less patriotism). However, it is still possible that more noise-sensitive respondents were more annoyed to begin with and, therefore, became less patriotic regarding the Concord. However, McKennell's data also tell against this possibility because the effect of sensitivity, unlike patriotism, changed with noise exposure. On the other hand, in a study of artillery noise (*9*), attitude and sensitivity were related in a manner that suggested that reaction may affect attitude, although other explanations are possible. Overall, it would appear that attitude can be a genuine factor influencing reaction, but on occasion attitude may also be influenced by reaction. In recognition of the potentially powerful impact of attitude on reaction, attitude has been suggested as a cause of the different levels of reaction to the same equal-energy noise exposure levels (*29*) and as an account of the larger-than-predicted changes in reaction that occur with changes in noise exposure (*30*).

- Sensitivity. If sensitivity to noise is caused by reaction, a positive correlation between reaction and sensitivity combined with a positive correlation between reaction and noise could be expected to lead to a positive correlation between sensitivity and noise. On the other hand, if sensitivity is a genuine underlying factor of the respondent, it should bear no relationship to noise exposure, or its only relationship to noise exposure should arise from self-selection. That is, more noise-sensitive people are less likely to live in high-noise areas, leading to a negative noise-sensitivity correlation. A recent review (*6*) revealed a near-zero average noise-sensitivity correlation (-0.01). Similar results have been reported since, with the two sensitivity factors having insignificant correlations of -0.05 and -0.003 with noise exposure (*19*). The conclusion that sensitivity is a genuine modifier of reaction is not new (*10,31*).

- Fear of Crashes. Fear of crashes generally exhibits a high correlation with reaction even with effects of noise exposure statistically removed (0.46 and 0.45) (*12,25*). In another study of aircraft noise, the fear-reaction correlation was 0.61 compared with a fear-noise correlation of 0.22 (*10*). However, an additional positive fear-sensitivity correlation complicated the

issue. If fear was a feature of respondents, a zero-to-negative fear-noise correlation might be expected because of self-selection, as with sensitivity. However, this is not the case. Further, the fear-sensitivity correlation suggests that fear arises at least in part from reaction (or is part of reaction), which is then exacerbated by sensitivity to the noise. Fear would seem, in principle, to be an unpleasant state for a respondent to live in as a result of hearing aircraft or railway noise, and therefore it is suggested that fear be considered part of reaction.

• Seeing the Noise Source. The study by Fidel et al. (*20*) found that respondents who could see the source of the noise from their home were more affected by the noise. Because this study was conducted with noise exposure deliberately held constant across respondents, this finding cannot be explained in terms of noise-induced reaction.

The finding that dissatisfaction with air pollution, intruding lights, and loss of privacy has a large impact on reaction (equal to 26 dB) may reflect largely the same variable. That is, only in line of sight would loss of privacy and intruding lights occur. Therefore, these factors are treated as one variable.

3. The modifying variable must be potentially manipulable.

If a modifying variable is to be used to reduce reaction, it must be possible to manipulate the level of that variable in an individual. The remaining candidates after the second criterion are now considered from this point of view.

• Attitude. It is clear that attitude can be manipulated. A great deal of successful propaganda and advertising in the commercial sphere and in health promotion (*32,33*) attests to the manipulation of attitude and behavior change. This could also be achieved in relation to noise sources, but would be best achieved with research into the target population and the underpinnings of their current attitudes. However, examination of the known attitude variables in socioacoustic investigations yields some possible attitude altering messages.

McKennel (*28*) found that degree of patriotism influenced reaction to Concorde overflights in Great Britain. In such cases, patriotism may be increased by pro-British advertising, and the direct connection to the Concorde as a British product may also help.

The most commonly measured attitude variables appear to be the following:

—Misfeasance. The belief that those in a position of authority regarding the noise source do not care about the noise they cause.

—Value. The extent to which the noise source is seen as providing a valuable function. For example, is the airport seen as an unnecessary luxury for the wealthy, or a valuable transport link for holiday makers, goods, and the influx of tourist dollars? Is an artillery range seen as pointless and outdated in modern warfare or a critical link in national defense?

—The extent to which the noise souce is seen as having costly disadvantages to the community (intrusion into privacy, air pollution, etc.) is also sometimes measured as an attitude variable. (This variable will be covered separately in a later section.)

A media or mailbox campaign could be designed to counter these attitudes. For example, in the case of an airport, misfeasance may be reduced directly by having letters addressed to noise-exposed residents from the relevant authorities. These letters could state the awareness and concern of the authorities with the noise, and the measures being taken to alleviate noise (noise reduction measures in aircraft, night-time curfews if they exist, etc.). Further, the letter could explain noise events that are seen as pointless: the safety value of engine spool-up, the determination of runway use by prevailing weather conditions, etc.

The perceived value to the community of an airport may also be addressed in terms of the community's common use of air transport, air mail, goods transported in or out, employment, and tourists carried with the consequent flow of money to that community. A similar case could be made for railway use in terms of employment, goods transported, commuter travel, saving energy, and air pollution. Although some of these points apply to road noise, it is probably more difficult to defend in terms of community value because excessive noise is often seen as the responsibility of particular drivers. This viewpoint may in fact, explain the higher level of community reaction to road noise (*29*).

• Sensitivity. It would seem unlikely that noise sensitivity can be readily manipulated.

• Reduction in Rates (Taxes). Clearly, a reduction in rates is possible for those in high-noise areas. However, it may be better to supply a rebate that goes to the resident rather than to the landlord in the case of rented property, even though home owners are more affected by noise than tenants.

A better mechanism may be to relate the monitary benefit more directly to the noise source. This procedure would mean that the noise maker pays for the measure, and the compensation for the noise is more saliently associated with the noise source. The compensation may really be small in monetary terms, but potentially effective in terms of reduced reaction according to the available data (*12*). Such a psychological effect may arise in part because of reduced misfeasance, as discussed earlier. As examples of more directly connected compensations, noise-exposed residents may be offered reduced airfares or departure taxes, reduced train ticket prices, or reduced vehicle registration depending on the noise source of concern.

• Fear of Crashes. Fear of crashes may be reduced by appropriate education or propaganda. A detailed analysis would indicate that the chance of a train or aircraft crashing into any given house is exceedingly remote. Driving home may be far more dangerous than living in the house. However, because the use and reduction of fear are often difficult to achieve in mass media campaigns (*33*), this suggestion would require further research.

• Seeing the Noise Source or Intruding Lights and Loss of Privacy. Because it appears that these factors are relevant to community reaction, visual barriers such as trees around power plants, factories, or along roads and rail lines may be effective in reducing reaction at much less expense than alternative measures. The effectiveness of such a measure may be increased by messages (mass media campaigns or letters to residents) to the community that the measure is being implemented for them.

• Noise Harms Health. The belief that noise harms health is a difficult issue to deal with, because categorical statements to the contrary cannot be substantiated. Although some data

point to stress-related effects of noise, the issue of pathology as a consequence of noise has not been settled, largely because of the lack of rigorous large-scale studies (*34*). Therefore, explicit reassurance of the lack of health effects of noise is not justified at this time.

COST EFFECTIVENESS

An apparent advantage of attempting to reduce community reaction by the means suggested rather than by noise reduction or insulation has the potential for real gains at considerably reduced cost. It is much less costly to send letters and information to a residence than to sound-attenuate that residence. It is likely to be less expensive to offer reduced fares or relevant taxes than to attenuate sound. Planting trees for a line of sight barrier (with very slight sound attenuation) is likely to be less expensive and more ecologically sound than constructing noise barriers.

The potential disadvantage of attitude manipulation is that the manipulation may have to be repeated from time to time if the effects dissipate or when new residents enter the area. The level of benefit achieved by the means suggested, and, in the case of attitude, the longevity of the effect require direct future investigation.

Two counterarguments may be anticipated. First, it may be suggested that these effects are not real, and indeed there is no absolute evidence for the causal link suggested. Although it is true that the evidence is not absolute, there is no reason to believe that psychological effects are any less real than acoustic effects. The sizes of effect for attitude and other variables indicate that they have the potential to produce substantial reductions in reaction. The potentially high cost effectiveness justifies trials on this issue. At the least, emphasis on measures to change attitude and line of sight to the source should, where possible, accompany any noise reduction measures. This tactic is likely to increase the size of the reaction reduction achieved.

Second, it may be suggested that the onus to reduce reaction should be on the noise makers; they have an obligation in principle to reduce the noise. The measures suggested here would not remove whatever onus exists on the noise maker. However, the ultimate aim (in the absence of evidence for harmful effects of community noise other than through reaction) is to reduce reaction. Any available means should be explored to achieve that end. Although changing the hearer (in the case of attitude) may seem an odd way to achieve this end, it may be better than doing nothing because of the extreme expense involved in noise reduction. Furthermore, environmental considerations (energy and resource conservation) may be better served by the means suggested here than by engineering sound attenuation construction additions. Finally, countermeasures such as insulation against house noise may actually have a significant part of their impact through attitude (misfeasance) change rather than noise change. This possibility is supported by the obvious concern about noise indicated by noise-insulating the residence, which may therefore substantially alter misfeasance, and the not uncommon finding that outside noise levels are better predictors of reaction than inside noise levels.

CONCLUSIONS

The strong relationships between a number of modifying variables and community reaction suggest that these variables may be useful in reducing reaction. Although more research is needed to identify with greater confidence the direction of causality, the data suggest that some modifying variables do modify reaction. Therefore, the manipulation of these variables is likely to reduce reaction. This possibility warrants direct testing.

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Publication of this paper sponsored by Committee on Transportation-Related Noise and Vibration.