

Railway-noise annoyance and 'misfeasance' under conditions of change

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Abstract

Several studies under steady state conditions showed relationships between residents' noise annoyance and their attitudes towards the authorities, especially their belief that the noise could be reduced, but that those in authority do nothing about it ('misfeasance'). It was assumed that these relationships are even stronger under conditions of expected changes in exposure. Residents at an already existing railway line, for which extension and broadening were planned, were interviewed before and after the extension. In the *before* condition, those residents, who mistrust the intentions of the planners, have more negative expectations with regard to their future annoyance. Furthermore the greater the mistrust, the more the expected future annoyance exceeds the actual annoyance. In addition, the mistrust in the before condition also correlates with the later actual annoyance *after* the extension. Even stronger correlations between mistrust and expected future noise annoyance were found in a survey in which residents near a planned new railway line were interviewed before the construction of the new line had begun. These results emphasize the importance of strategies, which are effective in informing the residents fully and honestly in an early stage of the planning process, in order to minimize the mistrust of those affected.

1. Introduction

Several studies under steady state conditions showed relationships between residents' noise annoyance and their attitudes towards the authorities, especially their belief that the noise could be reduced, but that those in authority do nothing about it ('misfeasance'; cf. [1] and [2] for a summary of some results). It was hypothesized that these relationships are even stronger under conditions of expected changes in exposure (cf. [3, 4]). These relationships are explored by using data from a field study.

2. Method

A social survey was done at two railway lines [5]. One of these lines (between Hannover and Berlin) was an existing old railway line, for which extension and broadening were planned. 257 residents living in 6 villages near this line were interviewed in 1997 before the extension and 156 of them were then re-interviewed in 1999, after the extension. Noise measurements and calculations were carried out also in 1997 and 1999. There were sound protection barriers already in place in 1997.

The other line (between Nürnberg and Erfurt) had been planned, but has not yet been built. 310 residents living in 6 villages near this planned line were interviewed in 1996 (after public announcement of the planned line).

In the following, the first line will be called 'extended line', the second 'new line'.

Variables assessed by interviews were (among others):

- *actual annoyance* (5-point scale; 1=not / 5= very annoyed) and *disturbance* (11-point scale; 0=not at all / 10=extremely disturbed) in the *before* as well as in the *after* situation;
- *expected future annoyance* and *disturbance*, assessed in the before situation with regard to the situation after the extension / after opening the planned new line;
- *Trust* (before situation): belief that those responsible (German Railway, DB AG; those planning the extended / new line; the manufacturers of the vehicles; the public authorities on local and state level) do all they can to reduce the noise (composite score from 5 items; $\alpha=0.8$);
- *misfeasance*: belief that the noise could be reduced, but that those in authority do nothing about it (composite score from 6 Likert-type items; $\alpha=0.9$).

3. Some Results

Extended line: The average noise level (L_{eq}) was almost the same in the before and after situation: 49.9 vs. 50.1 (day), 51.1 vs. 49.5 (night), and 50.3 vs. 49.9 dB(A) (24h); range of $L_{eq,24h}$: before: 42 – 58 dB(A); after: 42 – 57 dB(A). Correspondingly, the difference in the actual annoyance and disturbance between the before and after situation is very small (t-tests for paired observations; $p > 0.10$, n.s.). But the expected future annoyance (assessed during the before situation with regard to the after situation) exceeds the actual annoyance in the before situation as well as in the after situation (for total annoyance: expected before $M=2.6$; actual before $M=2.2$; actual after $M=2.2$; t-test ‘expected before – actual before’: $t=6.5$; $p<0.001$; $n=153$; t-test ‘expected before – actual after’: $t=5.2$; $p<0.001$; $n=154$; see figure 1).

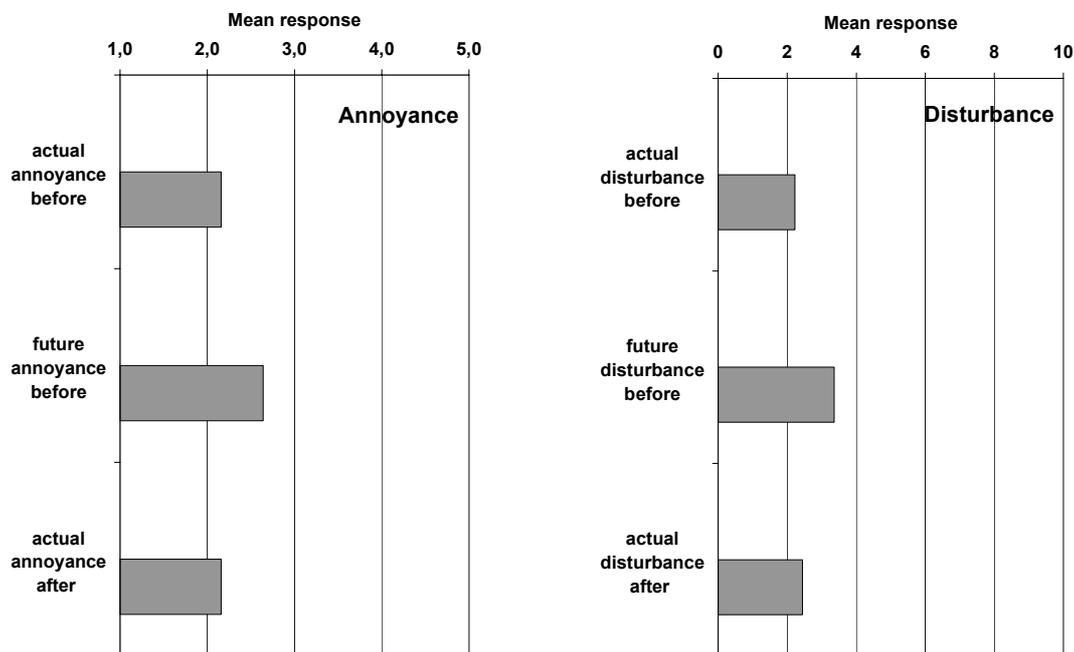


Figure 1: Mean annoyance and disturbance – actual before, expected before, and actual after (for residents near the extended line)

In the *before* condition, those residents who mistrust the intentions of the planners have more negative expectations with regard to their future annoyance ($r=-0.39$ for trust and $r=0.46$ for misfeasance; see table 1) or to the future disturbances ($r=-0.40$ for trust and $r=0.49$ for misfeasance). Because of very low correlations of L_{eq} with trust or misfeasance, controlling for L_{eq} has almost no effect on the above mentioned correlations between trust and

annoyance(e.g. simple correlation: misfeasance/future annoyance $r=0.46$ vs. partial correlation, controlling for $L_{eq,24h}$ $r=0.47$).

	trust (before)	misfeasance (before)
actual before annoyance	-0.29 (n=255)	0.36 (n=256)
actual before disturbance	-0.29 (n=256)	0.35 (n=257)
expected future annoyance	-0.39 (n=250)	0.46 (n=251)
expected future disturbance	-0.40 (n=252)	0.49 (n=253)
actual after annoyance	-0.24 (n=155)	0.35 (n=156)
actual after disturbance	-0.25 (n=155)	0.29 (n=156)

Table 1: Correlations between trust / misfeasance and annoyance / disturbance

Furthermore the greater the mistrust and the lower the trust, the more the expected future disturbance exceeds the actual disturbance (difference ‘expected – actual disturbance’ with trust: $r = -0.26$; and with misfeasance $r = 0.33$; $n=252$).

In addition, the mistrust in the before condition also correlates with the later actual annoyance *after* the extension ($r = -0.24$ for trust and $r = 0.35$ for misfeasance with actual after annoyance; $r = -0.25$ for trust and $r = 0.29$ for misfeasance with actual after disturbance).

In the before situation, the respondents had expressed fears and negative expectations with regard to several aspects of their future life in the after situation (composite scores from 2 – 6 items with 5-point scales: 1=not, 5=very; $0.7 \leq \alpha \leq 0.9$; these fears and expectations are highly correlated with ‘misfeasance’ in the before situation: $0.47 \leq r \leq 0.57$). Ratings of the same aspects in the after situation were much more positive (see table 2). Correspondingly, there was an decrease in misfeasance and increase in trust from before to after (misfeasance: before $M=2.95$ – after $M=2.48$; $t=6.8$; $p<0.001$; trust: before $M=2.96$ – after $M=3.10$; $t=-2.4$; $p<0.02$).

Aspect / variable	before		after		t-test (paired observations)	
	M	std	M	std	t	p <
impairments (annoyance, health risk) by noise	2.13	1.02	1.45	0.70	8.77	0.001
insufficient noise standards and regulations	2.86	1.16	2.17	1.09	6.65	0.001
damages to ecology and landscape, caused by the railway	3.00	1.16	2.51	1.05	6.37	0.001
annoyance and damages caused by vibrations	2.36	1.22	1.69	0.96	7.53	0.001
insufficient noise protection barriers	2.83	1.05	2.29	0.99	6.19	0.001
impairments (e.g. feelings of confinement) caused by the noise protection barrier	3.10	1.41	2.72	1.32	4.60	0.001

Table 2: Expectations and fears in the before situation with regard to several aspects in comparison with ratings of the same aspects in the after situation (t-tests for paired observations; $153 \leq n \leq 156$)

New Line: The predicted noise levels in the villages at this new line have about the same range (40 – 60 dB(A); mean = 51 dB(A)) as the noise levels at the extended line. In spite of this the mean expected future annoyance is much higher ($M=3.7$ at the new line vs. $M=2.6$ at the extended line). The respondents expressed very strong fears with regard to the future situation (after construction and opening of the line); the fears refer not only to noise annoyance, but also to several other aspects (e.g. health, ecological damage etc.).

Under these conditions it is not surprising that the correlation between trust (or misfeasance) and the expected future annoyance (or disturbance) is even stronger: trust /

annoyance: $r = -0.60$; trust/disturbance $r = -0.60$; misfeasance / annoyance $r = 0.67$; misfeasance / disturbance: $r = 0.64$; $n = 309$).

4. Concluding Remarks

The results suggest that strategies, which are effective in informing the residents fully and honestly in an early stage of the planning process, may prevent or minimise mistrust and fears of those affected with regard to the future situation (after realization of the planned measures). This in turn may induce lower degrees of annoyance.

However, a correlation between an attitude (trust / misfeasance) and annoyance does not in itself provide evidence for a causal relationship such that attitude influences annoyance. A reverse causal relationship (annoyance \rightarrow misfeasance) cannot be excluded, nor can the possibility that both variables (annoyance and misfeasance) are influenced by (uncontrolled) third variables (for a discussion see [1], p. 997).

Another study [6] offers what may be relevant evidence: it was found that information may contribute to a lower degree of annoyance even if there is only a little decrease in noise level: After grinding of the rail surfaces, there was a small decrease (about -3dB(A)) in the overall $L_{\text{eq},24\text{h}}$. In one area, information about the grinding measure was given to the residents, in another area no such information was given. There was a small but significant decrease in overall annoyance only in the area where information was given.

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