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Fairness, risk and risk tolerance in the siting of a nuclear waste repository

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Abstract

In this paper, risk tolerance with regard to nuclear waste is investigated. It is shown that Swedish respondents did not readily accept a local high-level nuclear waste repository, contrary to claims based on polling data. The important role played in Sweden by misleading survey questions is pointed out and demonstrated on empirical data where formulations and procedures are varied. The acceptance of a local repository (measured as intention to vote in its favour in a local referendum) could not be explained well by a cost-benefit approach, neither by an individual risk perception model. Concern about the local community was an important determinant, however, and so were moral aspects. When these aspects were included in a model, about 60% of the variance of risk perception and risk acceptance was accounted for. Cultural Theory scale items, however, added virtually nothing to the explanatory power of the models. In further analyses, NIMBY respondents were identified, defined here as people who rejected a local repository in spite of having acknowledged substantial utility of nuclear power. NIMBYs constituted, however, only a small minority of all opposition to a local repository. Few respondents stated that they would accept a local repository if they were to be given financial compensation. This fact may be related to nuclear power issues being conceived as general, rather than personal, matters. Those who saw it as a politically important issue also conceived of it in general rather than personal terms.

1. Introduction

In risk debates, moral values are frequently emphasized. What is fair? Do we have a moral right to interfere with Nature? What moral obligations do we have to future generations? These are a few examples of the many issues invoked, and considered by many people to be very important and relevant to risk management questions.

It is quite natural that moral issues are brought up in the debates, since risk debates are often about life and death. People accept risks more readily if the risk distribution is perceived as fair (Keller and Sarin, 1988). Fairness is a major factor in risk acceptability and risk tolerance (Sjöberg, 1987). In previous empirical work on the

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acceptability of risk it has been found that the moral value of action (i.e. if an action was considered to be morally good or bad) was an important predictor of the acceptability of the risk involved, even more important than the probability of a positive or negative outcome, or the values of such outcomes (Sjöberg and Winroth, 1986; Sjöberg and Torell, 1993). This result was found to hold for widely different groups of people, and for three groups of children, the youngest being 10 years old.

In the present paper we investigate a societal risk currently under much discussion in many countries, viz. the risk associated with a high-level nuclear waste repository. In so doing, we face two issues: the substantial one of what are the important factors driving risk attitudes in this case, and the methodological one how these matters are to be investigated. We have felt it to be advantagous to investigate the two themes in parallel, since they tend to be strongly related in real-world applications and policy debates.

It is well known, there is strong local opposition towards the siting of nuclear waste facilities in most, or all, of the world (see e.g., Shrader-Frechette, 1991 and Frey, 1993), and this debate is at its core largely a debate about moral issues. In the USA, the state of Nevada is strongly opposed to the federal siting plans, and complex and lengthy legal proceedings are taking place (Rissmiller, 1993). The US public is even reported to perceive nuclear and toxic waste to be the worst environmental threat (Franker, 1992). Sweden is, however, frequently mentioned as an exception to this general rule (Flynn, *et al.*, 1992, 1995). The basis for this statement is probably polls made by the Swedish polling firm SIFO, based on a single crucial question, which allegedly show that a majority of Swedes accept a nuclear waste repository in their local community (SIFO, 1992). In the present paper, we report data from administering the same question in a mailed questionnaire and from prompting uncertain respondents in various ways. A newer question format used by SIFO is subjected to a small variation and its effects are also reported here.

It is, of course, essential in policy making to have a valid picture of public opinion. Validity can only be expected when the questions posed to people are designed to give them a chance to freely express their opinions, without leading cues and other distortions. The present paper pays attention to methodological questions since they are absolutely crucial for the quality of policy conclusions. We will show that the SIFO questions fail when assessed on these grounds. They have probably misled policy makers grossly. The use of such questions is also unethical.

It should be mentioned that Sweden has had some success with the siting of other nuclear waste facilities, such as a low-level nuclear waste repository close to the Forsmark nuclear power plant (Sjöberg *et al.*, 1998); in most countries even this problem has turned out to be intractable (see e.g. Kearny and Smith, 1994; McGinnis, 1994).

Moral aspects frequently enter the debate about repository siting, especially via the well known NIMBY (Not in My Backyard) concept (Armour, 1984; Gervers, 1987; Peelle and Ellis, 1987; Edelstein, 1988). People who are described as driven by NIMBY motives are supposed to acknowledge and profit from the benefits of a technology such as nuclear power, at the same time as they refuse to carry any of the associated risk burden. This NIMBY 'theory' may even be used to justify drastic reductions of local self determination (Wolsink, 1994). Opponents to a suggested repository site are often written off as such cynical and selfish 'NIMBY's' – but the question is if that analysis of their motives and beliefs is correct. We analyse the structure of opposition to a repository in order to answer that question.

Why do people perceive a risk the way they do? The moral dimension has been mentioned above. Other possible aspects have been suggested by Slovic and co-workers who suggested a number of risk dimensions (Fischhoff *et al.*, 1978; Sjöberg, 1996a). Trust is another aspect of possible importance (Sjöberg, 1996b) whenever a risk is caused by agents which cannot be sensed (Kasperson *et al.*, 1992). All these aspects will be investigated here, and improved models of risk perception will be formulated and tested.

In sociology and social anthropology, the so-called Cultural Theory of risk perception is currently much celebrated as an alternative explanation of risk perception (Douglas and Wildavsky, 1982; Wildavsky and Dake, 1990). Since we wanted to have as full an explanation of risk perception as possible, we decided to include some items measuring its core concepts. According to this theory, people 'choose' what risks to worry about on the basis of their cultural orientation, which can be egalitarian, hierarchical, individualistic, or fatalistic. Scales were devised by Wildavsky and Dake for measuring these orientations (Wildavsky and Dake, 1990) and according to them the scales were found to have substantial correlations with perceived risks, in a pattern predicted by the theory. A short form of the scale will be used here in order to investigate if the perception of nuclear waste risks can be understood on this basis. A previous attempt to replicate the Wildavsky–Dake findings, using their scales in their unabridged form, failed (Sjöberg, 1991). A survey of the literature showed that only some 5% of the variance of perceived risk is accounted for by scales based on Cultural Theory (Sjöberg, 1997a; Sjöberg, 1998a). For a recent British example showing the same thing, see Marris *et al.* (1998).[1] Marris *et al.* reached more optimistic conclusions than their data warranted (Sjöberg, 1999a).

2. Study 1

The purpose of this study was to check the statement that people in Sweden accept a local repository for nuclear waste and to investigate the importance of moral and economic factors for risk perception and risk acceptance. In addition, we wished to investigate related matters such as the explanatory power of Cultural Theory and the prevalence of so-called NIMBY attitudes. An important factor was assumed to be the attitude to nuclear power – its structure was also investigated.

2.1 CHOICE OF METHODOLOGY

Since the statement that a majority of Swedes now accept a local repository is rather sensational, and has been widely spread in the media and even in the scientific literature (Flynn *et al.*, 1995), we decided to check it. In doing so, we considered the methodological issues involved in studying public opinion. Almost all work on these issues in Sweden is based on in-home interviews. These seem to have a high level of face validity. Interviewer influence is, however, well known to be of importance in face-to-face and telephone interviews.

In in-home interviews, interviewer variability can be very large (Berk and Bernstein, 1988). Telephone interviews are no better. Sample errors were increased by 50% in a telephone interview study, due to interviewer variability (Tourangeau *et al.*, 1989). Berk and Bernstein failed to find any characteristics (except to some extent age) which correlated with nonresponse and item validity of the responses collected by separate interviewers. It is frequently believed that training of interviewers will have the effect

of decreasing interviewer variability but it thus appears that training has only marginal effects (see also Fowler and Mangione, 1985). A claim that interviewers can and should be allowed a lot of leeway in interacting with the respondents (Suchman and Jordan, 1990) was met effectively by Schlegloff's argument that such a policy would greatly increase variability due to the interviewers (Schlegloff, 1990). Goyder (1985) found, when analysing a large number of previously published surveys, that the response rate advantage of face-to-face interviews as compared to mailed surveys was a moderate 7.5%.[2] Hence, mailed surveys tend to do rather well, certainly better than the reputation they have in many quarters.

Response rates around 65–70% have been achieved by the Center for Risk Research with mailed questionnaires up to 40 pages long and asking for some 400 responses. Dillman has strongly advocated mailed surveys and made a similar claim, although for much shorter questionnaires (Dillman, 1991). The fact that so much longer questionnaires can be used with success is consistent with the finding that length of a questionnaire has only a weak effect on response rate (Heberlein and Baumgartner, 1978; Burchell and Marsh, 1992), the effect being about a 0.4% drop per page of questionnaire. Furthermore, it is quite possible that Swedish data are easier to collect than data in many other countries since Swedes are apparently not as fed up with polls, and perhaps also because the Swedish culture still is rather homogenous.

We had noticed that SIFO often has reported very low percentages of 'don't know' (DK) answers, suggesting that respondents are explicitly or implicitly guided by the interviewers to come up with a commitment even if they are very uncertain. Polling firms appear often to adopt such a strategy (Mitchell, 1980). On the other hand, it is well known that the inclusion of an explicit 'don't know' category can increase the number of such responses drastically (Schuman and Presser, 1981; Schuman and Kalton, 1985).

One can debate which is most likely to give a valid picture of public opinion: methods allowing freely for DK responses or methods which implicitly or explicitly prompt people to commit themselves. The answer depends on the purpose of the study. Attitudes may well be expressed in a valid manner by the commitments made by people who are uncertain, but their opinions are not well represented by such data. In particular, it is unfortunate if policy makers are to be guided by 'opinion' data which to a large extent reflect the vague preferences expressed by people who really would prefer to say that they don't know.

A telephone survey would be an alternative to a mailed survey but probably would be marred by problems of reaching the respondents, the difficulty of using a long series of questions, and interviewer effects. Note, e.g., the study by Kunreuther *et al.* (1990) of nuclear waste risk perception, who reached only a 37.4% response rate with telephone interviews. In another study using telephone interviews, a response rate of 23.7% was reported and the results published without any analysis of the refusals (Flynn *et al.*, 1996). A telephone survey is also very expensive.

Telephone interviews are regarded as especially unsuitable for obtaining sensitive information (Groves, 1979), people being reluctant to disclose undesirable information in that medium. Such a tendency could interact with background variables, further increasing the complexity of the issue. Aquilino and LoSciuto (1990) found the effect most clearly in a low socio-economic stratum. Dillman (1991) cites a number of studies

showing that people give more extreme responses in telephone interviews than in mailed surveys – in particular they give more socially desirable answers. Respondents seem to be sensitive to what they expect that the interviewer wants to hear, and to respond accordingly (Hutchinson and Wegge, 1991). Interviewer variability is large and probably unavoidable, even in phrasing the smallest details of the verbal interaction (Johnstone, 1991). Standardization of in-home or telephone interviews is seldom achieved in social interaction.

What, then, about the validity of a mailed survey? It is usually believed that mailed survey responses are less prone to be affected by interviewer influence. However, it is also commonly believed that mailed surveys give unacceptably low response rates. But in-home interviews in Sweden appear rarely to give better than 65% response (data on in-home interview response rate are hard to come by), assuming a complete lack of fraud (some interviews reported may in fact have not been carried out) by interviewers. If fraud is as common in our country as in the USA, at least another 5% should probably be deducted (Aaker and Day, 1990).

In addition, in-home interviews carried out by SIFO do not reach strictly random samples of the whole population, but selected areas. Since Sweden has a very good population database from which random samples of names and addresses can be bought, the mailed survey researcher is in an excellent position to compete with in-home interviews. Suspicions about duplicate responses with anonymous mailed questionnaires, sometimes voiced, have not been substantiated (Steele *et al.*, 1992). In passing, we note the happy circumstance that the more valid method (mailed survey) costs only 5–10% of the cost of in-home interviews. Furthermore, respondent anonymity can be assured.

We conclude that a mailed survey approach, when it yields a decent response rate, is likely to give more valid data than in-home or telephone interviews. Our check of the claims that Swedes now accept a nuclear waste repository in their local region was therefore to be made with this preferred methodology. Interviewer cues, prompting uncertain people to respond, may well have produced a very misleading picture of the public opinion on this important issue.

2.2 METHOD

In the beginning of 1993, a random sample ($N = 1200$) of the Swedish population 18–65 years old were approached with a mailed questionnaire covering many topics concerned with nuclear waste. Several scales and questions were taken from a previous study (Sjöberg and Drottz-Sjöberg, 1993a) carried out in 1987 in order to make it possible to investigate any changes over time. Some questions were repeated from the SIFO interviews, as given by SIFO (SIFO, 1992). A full description of the questionnaire is not included here due to space restrictions but can be found in Sjöberg and Drottz-Sjöberg (1994).

The Wildavsky-Dake dimensions were measured by six items[3], two for each of the three dimensions. Two reminders and telephone contacts with nonrespondents resulted in a 69% response rate. Fifty-four per cent of the respondents were male, and their mean age was 41.9 years. The respondents were close to the population in most background variables, except level of education. They had a higher level of education, on average but that variable had little correlation with risk perception data.

2.3 RESULTS

2.3.1 What determines nuclear attitude?

The first question to be answered here was what determines nuclear attitude. We had included, in the questionnaire (a) Dependent variable: attitude to nuclear power; and (b) Explanatory variables: general risk of nuclear power, personal risk of nuclear power, general utility of nuclear power, personal utility of nuclear power, the salience of risk of nuclear power as compared to its utility. A linear model was estimated; results are given in Table 1. In this table it is seen that the model fitted very well – it is likely that virtually all true variance was explained. It is noticeable that personal aspects were not important – only the general aspects and the salience of risk. When the salience of risk versus utility variable was not included in the model, personal risk and utility entered, but still weaker than general aspects.

2.3.2 How acceptable is a nuclear waste repository?

SIFO has asked the following questions: 'If it is judged that the best place for a high-level waste repository is in your municipality, can you accept or can you not accept that waste is deposited in your municipality?'[4]

Table 1. A regression model for attitude to nuclear power.

Explanatory variable	*Beta weight*	*P-value*
General risk	–0.219	< 0.05
Personal risk	–0.074	–
General utility	0.518	< 0.0005
Personal utility	0.000	ns
Salience of risk	0.483	< 0.0005
R^2	0.641	–

Table 2. The distribution of answers to the question 'If it is judged that the best place for a high-level waste repository is in your municipality, can you accept or can you not accept that waste is deposited in your municipality?, in in-home interviews carried out by the polling firm SIFO, a mailed survey and two follow-up samples (see study 2). Version C follow-up allowed only for two responses, Version B included explicitly two DK response alternatives. Version A included an explicit prompt urging for commitment. Data given here refer to results following the prompt. Data were collected in Sweden in 1992 and 1993.

Response	*Percentage of respondents in in-home interviews*	*Percentage of respondents in a mailed survey*	*Percentage of respondents in a follow-up, Version A*	*Percentage of respondents in a follow-up, Version B*	*Percentage of respondents in a follow-up, Version C*
I can accept it	58	33	22	24	39
I cannot accept it	32	35	58	47	61
Doubtful, don't know	10	32	20	29	–

This question has been put to samples of the Swedish population a number of times. Typical SIFO data, as well as the present results, are given in Table 2.[5] The SIFO data have been widely quoted as supporting the thesis that Swedes are now ready to accept nuclear wasteland a SIFO press release made exactly that assertion ('A majority of Swedes now accept a repository in their municipality'; SIFO, 1992). As can be seen in Table 2 and Fig. 1, the number of 'don't know' answers increased drastically when the question was administered in our mailed questionnaire. Hence, it is by no means clear that Swedes accept a nuclear waste repository in their local community. Besides, very few indicated that they would vote in favour of such a repository in a local referendum. Only 20% said they would surely or maybe vote in favour of a local repository.

These results are quite important, because at the same time, a local referendum was a preferred mode of decoding the issue: 39% chose it as a decision mode. About equally many (38%) wanted the matter to be decided by experts in the nuclear industry, while very few (5%) liked the idea that the central government should decide.

2.3.3. The importance of lack of fairness

The level of the nuclear waste risk and acceptance (voting intention) questions were correlated with the morality dimension (whether the risk was immoral and unfair). The correlations were 0.500 and 0.509, respectively. Hence, morality had an important power in explaining variance of risk perception and risk acceptance.

Though these correlations are quite high, there were some other items which gave even higher correlations. The single item correlating most strongly with nuclear waste

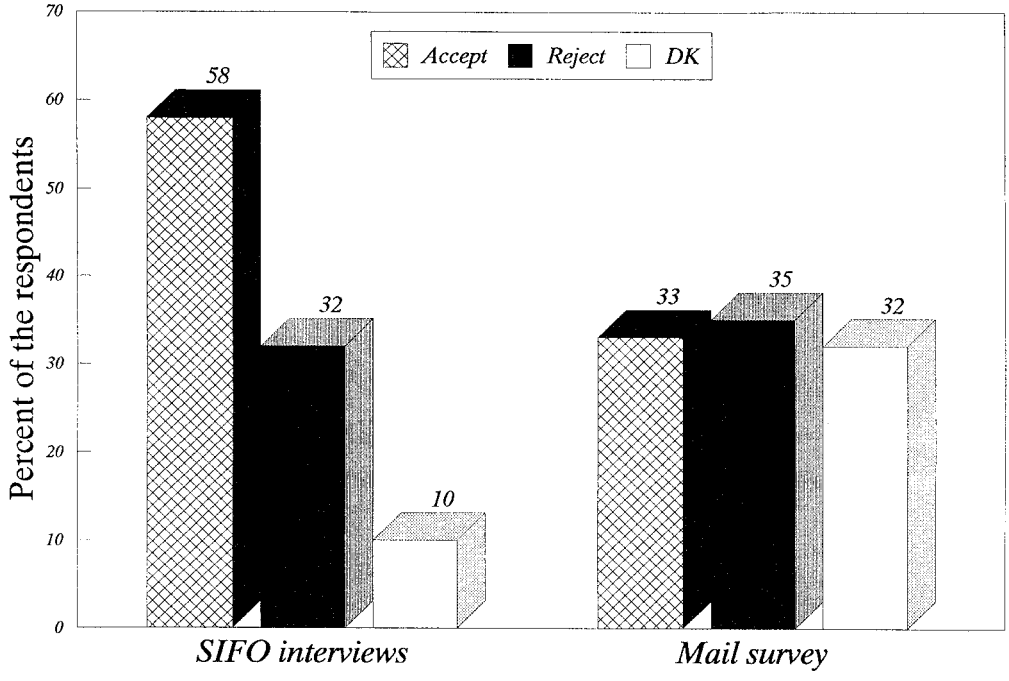

Fig. 1. Acceptance of a local repository as a function of data collection model.

risk perception was 'the risk comes from an activity which is contrary to nature'. There were several other similar items having to do with the 'unnatural' character of the risk which correlated strongly with the level of perceived risk and so did the judgment that the risk could injure children and future generations.

2.3.4 Cultural Theory and some related variables

The correlations between Cultural Theory items and risk perception and acceptance are given in Table 3, and so are multiple *R*'s for predicting risk perception and acceptance from all 6 items. In this table it can be seen that several of the items correlated significantly with risk perception and acceptance, but quite weakly. The multiple correlations were less than 0.05.

As a further check, risk perception and acceptance was related to party preference. The amount of variance accounted for by party preference was 0.155 and 0.149 for perceived risk and acceptance, respectively. Hence, a single question about political preference, while not a very interesting explanatory variable *per se*, was about 3 times better than the 6 Cultural Theory measures in explaining risk perception. This is important since Wildavsky and Dake (1990) claimed that Cultural Theory scales explained risk perception much better than political values. Of course, political preference data may be more powerful in Sweden than in the USA since Swedes have many more parties to choose from.

It may be noted that these figures are *per se* quite modest and that claims that political preference is the strongest explanatory variable (Nationelle samordnaren på kärnavfallsområdet, 1998) are false.

2.3.5. Cost-benefit and risk perception models

Kunreuther *et al.* (1990) compared a cost-benefit and a risk perception approach to the explanation of risk acceptance. We carry out a similar analysis.

To analyse for cost-benefit, the following explanatory variables were entered in a multiple regression model with voting intention in a local referendum as the dependent variable, measuring risk acceptance:

Table 3. Correlations between items based on Cultural Theory of risk perception and perceived risk and risk acceptance (voting intention in a local referendums).

Item no.	*Perceived nuclear waste risk*	*Acceptance of a local repository, voting Intention*
1 (Hierarchical)	–0.004	0.054
2 (Individualistic)	–0.100*	0.132*
3 (Hierarchical)	–0.002	–0.026
4 (Individualistic)	–0.051	–0.058
5 (Egalitarian)	0.220*	0.189*
6 (Egalitarian)	–0.029	0.012
R^2	0.028	0.043

Notes: * $p<0.05$

- local economy,
- general risk (i.e., risk to people in general) from a nuclear waste repository,
- the risk being certainly fatal,
- risk leading to large disasters

The multiple R^2 of this model was 0.323.

Next, we tried a risk perception model in the sense of Kunreuther *et al.* (1990). Here, the explanatory variables were:

- personal risk from a repository,
- risk to children and future generations,
- trust in government experts,
- the risk being hard to avoid,
- risk giving rise to anxiety and dread.

The multiple R^2 was somewhat better than for the cost-benefit model: 0.391. This finding is in line with the results of Kunreuther *et al.*, who also found a risk perception model to be superior. Still, much variance remained to be explained.

In a final step, both models were combined, and we added

- lack of fairness (whether the risk was immoral and unfair),
- the health risk to people in the community,
- the stigma of the community.

The multiple R^2 now increased to 0.570.[6] The significant predictors were:

- risk to future generations,
- lack of fairness,
- the risk being certainly fatal,
- the stigma of the community from a repository,
- the health risk to people in the community.

Note that only one variable from the cost-benefit analysis survived in the final analysis, and that the economic advantage of the community did not enter at a significant level. The most important explanatory variable was the health risk to people in the community.

2.3.6. NIMBY analysis

NIMBY is often alleged to be the motivation behind opposition to repository siting in one's community. NIMBY is not simply opposition, but selfish opposition: a will to let others suffer from a risk and oneself benefitting, at the same time, from the utility of, in this case, nuclear power. How many NIMBY respondents did we have? An initial analysis was performed by cross-tabulating voting intention and attitude to nuclear power, see Table 4.

It is seen in Table 4 that 59 of 242 who intended to vote against a repository were positive to nuclear power – 24.3%. These are potential NIMBY respondents but not all of them. It is possible to be positive to nuclear power for personal or general reasons. In further analysis, use was made of responses to questions about the utility of nuclear power, both for the country as a whole and for the respondent personally.

Of the 59, 18 felt that nuclear power had no substantial utility, neither personal nor general. It is reasonable to say that they are not NIMBYs. Why should you accept a

Table 4. A cross-tabulation of nuclear power attitude and intention to vote in a local referendum about the siting of a nuclear waste repository.

Nuclear power attitude	*Voting Intention: pro*	*Voting intention: uncertain*	*Voting intention: con*
Negative	2	5	127
Neutral	5	13	44
Positive	71	47	59

repository if you feel that nuclear power is on the whole useless? Another group, consisting of 12 respondents, felt that nuclear power was of no use to them personally but of some use to the country as a whole. They cannot be regarded as NIMBYs either. Only the final group which saw advantages of nuclear power both personally and for the country as a whole, 29 in all, could be seen as true NIMBYs. They constituted only 12.0% of the total nonacceptance of a local repository. (There were no respondents in this analysis who saw personal but no general utility of nuclear power – they would also have been potential NIMBYs).

Using the same logic, but including respondents who were negative or neutral to nuclear power gage 51 out 242 cases who said they would vote against a repository, i.e. 21.1%.

Summing up: a strict criterion of NIMBY requires a person who rejects a local repository to be (a) positive to nuclear power, and (b) see nuclear power as substantially useful both generally for the country as a whole and personally. With this strict criterion, only 12.0% of the rejecters of a local repository were NIMBYs. With a more relaxed criterion, also respondents who were negative or neutral to nuclear power were included. Then, 21.1% of the rejecters qualified as NIMBYs.

2.3.7. The importance of personal versus factors in nuclear attitude

The lack of NIMBY respondents suggested that many people did not conceive of nuclear issues as personal. The sample was divided into subgroups on the basis of how they responded to the task of judging the importance of nuclear power attitude for their general political preferences. As a check on the validity of the question, a one-way ANOVA was run for each subgroup on the relation between nuclear power attitude and party preference. The R^2 values are plotted against the importance of nuclear power for political attitude in Fig. 2. It is seen that there is a very clear relationship in the expected direction.

In each subgroup, a regression model similar to the one of Table 1 was estimated. The beta weights for general and personal risk are plotted in Fig 3. (The corresponding values for utility judgments showed the same trend, but somewhat less clear). It is seen in the figure that there is a shift from personal to general aspects as the issue is judged to be more politically important.

2.4 DISCUSSION

First, the present data did *not* support the widespread notion that Swedes are ready to accept a local nuclear waste repository. The reason why our data differ from the

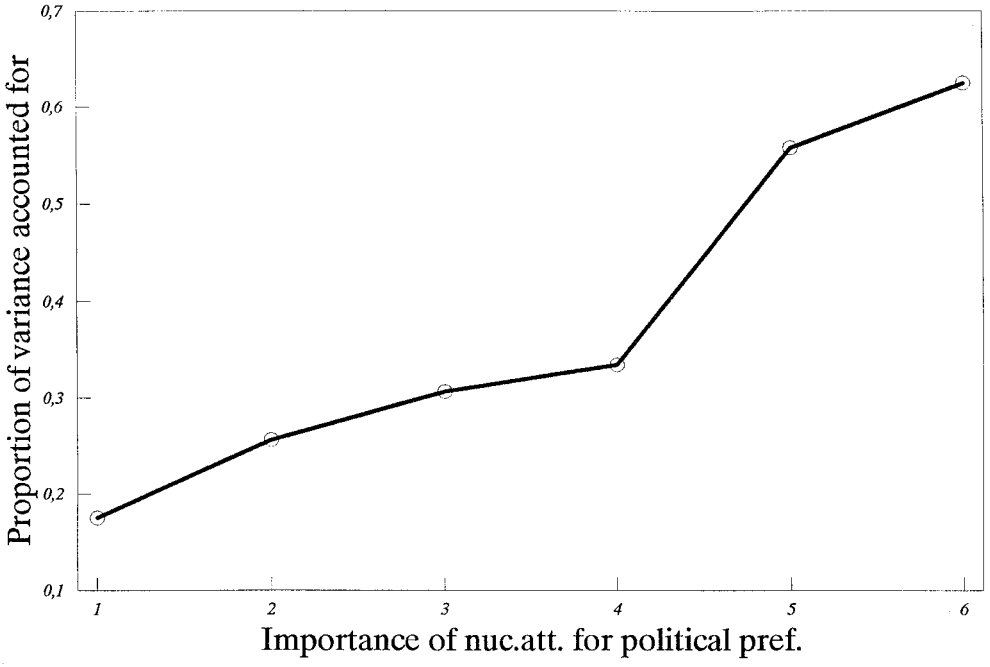

Fig. 2. Proportion of variance of attitude to nuclear power accounted for by party preference for different levels of importance of nuclear attitude.

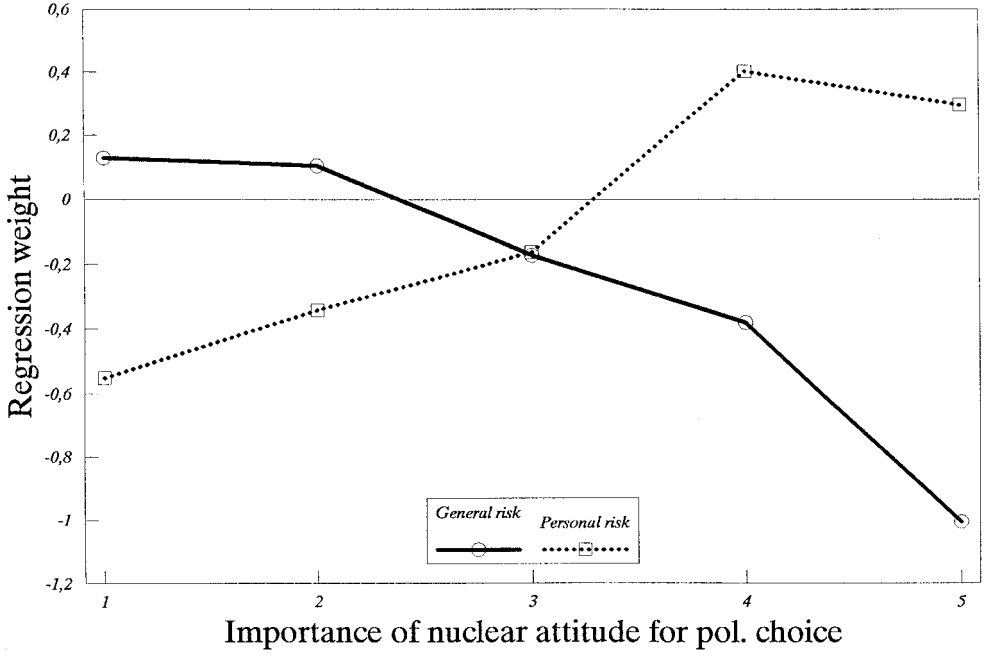

Fig. 3. Regression weights of personal and general risk of nuclear power for predicting attitude varying as a function of stated importance for political choice.

in-home interview polls is probably that interviewers prompt the respondents to reply, either explicitly or implicitly. This matter will be further analysed in the next study to be reported in the present paper.

Second, the moral aspect came out as a very important one in a list of 22 risk dimensions. Still more important was the judgment that the risk was 'unnatural' and that it could harm children and future generations. This is well in line with Shrader-Frechette's analysis of the ethical problems of nuclear waste storage (Shrader-Frechette, 1993).

Third, items based on Cultural Theory of risk perception, while significant, contributed only very marginally to the prediction of risk perception and acceptance. This finding is completely in line with previous work in Sweden, using the Wildavsky-Dake approach, but inconsistent with some published American data (Wildavsky and Dake, 1990). It is, in our judgment, unlikely that the explanation for this inconsistency is poor quality of the translation (these are quite simple items), lack of variation among the respondents (they varied) or a drastic cultural difference between Sweden and the USA, involving profound differences in the matters of concern to people. While Sweden and the USA surely differ, we cannot see that the difference is dramatic and modern mass media and means of communication have surely made our societies come closer to each other. Besides, other American (Renn *et al.*, 1992; Peters and Slovic, 1996) and Canadian data (Slovic *et al.*, 1992) have also failed to replicate the original Dake-Wildavsky findings in the sense that the correlations they found were much weaker than the original ones. The findings of Wildavsky and Dake partly could be artefactual since they reported only correlations which were found to be significant. It is therefore not surprising that their correlations were particularly large. We conclude that Cultural Theory does explain a minor share of the variance in risk perception, but that it offers little in addition to other, much more powerful explanatory variables, such as moral aspects, trust in experts and institutions and, of course, real risk (Sjöberg and Drottz, 1987; Drottz-Sjöberg and Sjöberg, 1990).

Fourth, a cost-benefit approach to risk perception and acceptance did poorly. A risk perception model was somewhat better. Drastic improvement was found when concern with the community was added. The model is, in fact, quite powerful, in particular when compared with other published attempts to account for the perceived risk of nuclear waste. In a recent study by Bassett *et al.* (1996), only about 10% of the variance of perceived risk was accounted for. They argued that the reason was that their index of perceived nuclear waste risk was unreliable but did not attempt to assess the effect of lack of reliability. It seems unlikely that lack of reliability could account for the major share of the lack of power of their model.

Fifth, the NIMBY syndrome, often referred to (Armour, 1984; Brion, 1988; Daggett, 1989; Brion, 1991; Kraft, 1991), is not salient in these data. What people responded to most strongly was the health of others and the stigma of their community. It was found that only a rather small fraction (12–21%) of the opposition to a repository could be classified as NIMBY. Even this is probably a gross over-estimation since, in most cases, a local repository has never been seriously considered. It would be interesting to analyse in detail responses from people living close to proposed sites. The present data are insufficient for such an analysis. A study by Biel and Dahistrand showed that perceived risk and dissatisfaction with siting increased in respondents living closer to a proposed site (Biel and Dahlstrand, 1995) Similar findings have been

reported elsewhere, with the added phenomena of polarized attitudes in areas closest to a site (Benford *et al.*, 1993) and a faster tapering off of behavioural than attitudinal responses as a function of distance (Lober, 1995). Back on the Swedish scene, it has been argued that concerned groups have shown a much larger involvement than merely in stopping a local siting, hence not fitting the NIMBY label (Lidskog and Elander, 1992).

What, indeed, *is* a NIMBY attitude? The idea is that people accept that waste must be deposited *somewhere*, but that they do not accept it in their own community. This is often regarded as irrational or selfish. It could be seen as a quite rational attitude, however, and little is gained from a condescending attitude here, just as little as the 'psychiatric' explanation of nuclear risk perception as 'radiophobia' has contributed to our understanding of public opinion concerning nuclear power, as pointed out by Drottz-Sjöberg and Persson (1993). It has been shown that opposition to siting is neither uninformed nor overly emotional (Kraft and Clary, 1991). Bassett *et al.* (1996) reported that people quickly withdrew initial NIMBY responses (putting the waste somewhere else) when they learnt that the ones to be affected by a repository did not want it. However, a very common interpretation of applications of the psychometric model is that people are irrational and emotional; 'fear' and 'dread' are interpreted literally.

It could be argued that since we now have nuclear waste we must also accept a repository. Then, all opposition would be NIMBY and the concept would be quite empty and unnecessary. Alternatively, all local opposition which does not accept a technical argument in favour of a certain site would be NIMBY. But part of such opposition would surely involve a challenge to the technical analysis, and alternative sites would normally be available. Thus, not even in this case would it be reasonable to equate all opposition with NIMBY and more analysis would be necessary.

Pollock *et al.* (1993), see also Bassett *et al.* (1999), defined a NIMBY attitude as involving acceptance that hazardous waste must be deposited *somewhere*, and at the same time rejecting having it in one's own community. But it is hard to see how this definition does not coincide with just the latter part, since waste by definition must be disposed of in one way or another. They defined a NIMBY attitude operationally as accepting that *new* facilities for waste disposal should be built, and rejecting such facilities in one's neighbourhood. However, people who rejected that notion may well have felt that existing, old, facilities could have their capacity increased, rather than build new ones.

The present data show that people's risk attitudes were most affected by their perception of the fate of the community they lived in – either the health of people living there or the stigma that they believed a repository might bring about. There is nothing irrational about this, but waste facilities must of course be placed *somewhere*. Perhaps an economic compensation approach might solve the problem – we turn to this possibility in the next study.

3. Study two

Inhaber (1992) suggested that a nuclear waste repository could be made more acceptable if people of the local community were to be offered economic advantages for accepting it (see also Contreras, 1992). This sounds like a reasonable suggestion, even

if the results of previous research, including the present Study 1, do not support it and it seems doubtful in view of the strong moral convictions that people apparently have concerning this type of risk.

In the present study, we asked people whether they would accept a nuclear waste repository in their local municipality, what economic compensation they would require, and what other demands they would make. The study is also a methodological follow-up performed in order to check on the effect of prompting people to make a choice, either by excluding 'doubtful' or 'don't know' as suggested response alternatives, or by means of a special prompt question.

3.1 METHOD

A random sample of 1125 persons of the Swedish population was asked a set of questions concerning nature (not described or analysed here) in a mailed survey. In the end of the questionnaire, there was a section covering nuclear power. Data were collected in 1993.

There were three versions of the nuclear power questions, distributed to three subgroups which had been formed by randomization. All three versions asked the following set of questions.

(1) A judgment of over-all attitude to current Swedish nuclear power on a 7 step scale from –3 to +3.
(2) A judgment of whether questions concerning the deposit of nuclear waste have been answered in a satisfactory manner, on a similar 7 step scale from 'No, certainly not' to 'Yes, definitely'. These two questions had been used in previous work of our own (Sjöberg and Drottz, 1988; Drottz-Sjöberg 1991).
(3) A comparison question asking whether the Swedish manner of nuclear waste deposit was safer than that in other western European countries, i.e. disregarding Russia, Central and Eastern Europe.
(4) A question whether the respondent had the impression that we can successfully deposit nuclear waste in bedrock in Sweden.
(5) The question quoted in Table 2 about the acceptability of a nuclear waste repository in one's own municipality. However, in version C there were only two response alternatives: acceptance or not acceptance (i.e. 'doubtful' or 'don't know' as used in the other two versions were excluded).
(6) Then followed a prompt question in version A (see below).
(7) A final question asking the respondent to imagine that the inhabitants in a municipality would be economically compensated if they were to accept a nuclear waste repository. The respondents were asked to reply whether they would accept it with an economic compensation of X SEK per year (X to be stated), or would demand X SEK and in addition have other demands, to be stated.

The prompt question in version A followed immediately after question 5. The prompt question urged the respondents who had chosen 'doubtful' or 'don't know' as replies to question 5 to reconsider and to try to make a choice between accepting or not accepting.

In summary, the design was as follows:

- Version A: 'doubtful and 'don't know' were possible alternative responses to question no. 5, but this question was followed by a prompt, urging people to make a choice.
- Version B: 'doubtful' and 'don't know' were possible alternative responses to question no. 5, and there was no prompt.
- Version C: 'doubtful' and 'don't know' were not suggested as possible alternative responses to question no. 5 and there was no prompt.

3.2. RESULTS

The number of respondents for versions A, B and C were 233, 218 and 216, respectively. There were 328 male and 332 female respondents. Their mean age was 41.5 years. The response rate was 56%. The sample in Study 1 was scaled to the same percentage by including respondents on the basis of response time (the last few per cents were excluded). Figure 4 reports the distribution of responses in version which asked the acceptance question in the same manner as in Study 1. As can be seen in Fig. 4, the proportion of respondents opposed to a waste repository was much larger in Study 2 than in Study 1,[7] while the percentage of uncertain respondents was the same. Hence, the data of Study 2 should probably not be interpreted as representative of the population, but the comparison between the three versions is still of interest.[8]

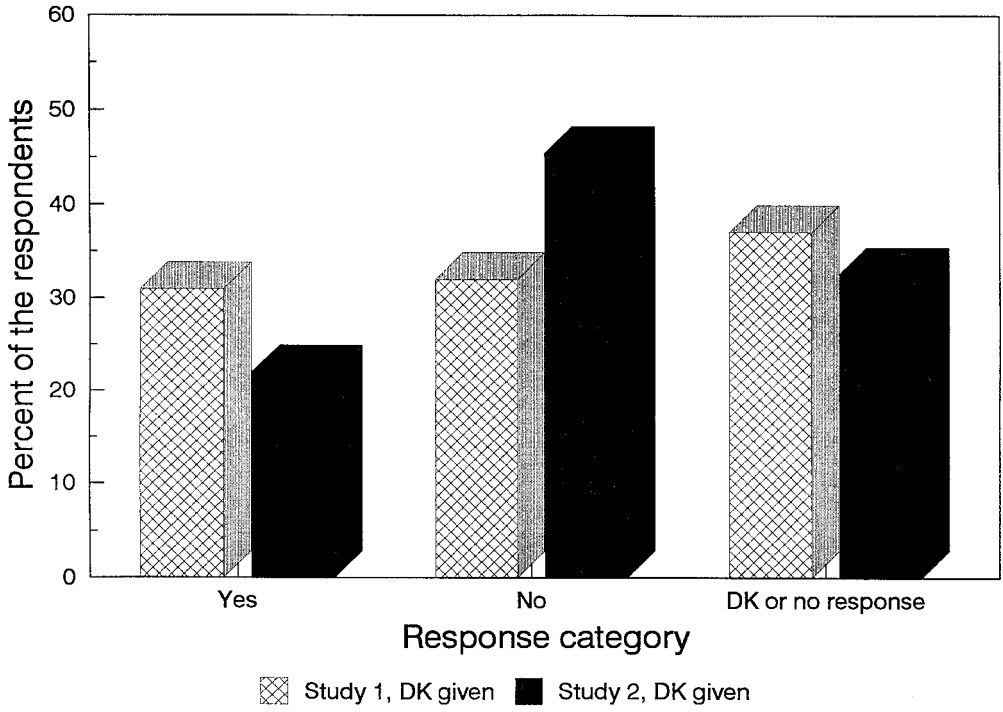

Fig. 4. Distribution, version B

3.2.1 Economic compensation for acceptance of a repository

Only 60 of 667 respondents (9%) indicated that they would accept a repository given economic compensation. The median yearly income demanded was SEK 5000, corresponding to a capital of SEK 50000 with a 10% rate of interest. In a moderate size municipality with a population of 100 000 this would correspond to a one-time payment of SEK 5 billions (approximately US$ 0.7 billions). The sum can be compared with the offer made in 1987 to the state of Nevada of US$ 10 million (Frey, 1993). It seems likely, furthermore, that the estimate is much too small since it is based on the small minority who said they would accept economic compensation.

Twenty-one of the 60 respondents who accepted economic compensation raised demands in addition to money; several comments of some interest were made. The most common demand was for safety, the second most common was for information and an attitude of openness. Other comments, some made by respondents who did not accept economic compensation, stated that the matter was not economic at all, that the respondent was willing to accept a repository not for personal gain, but for the country, or that the whole idea was one of bribery. 'I am not for sale', one respondent wrote. Some respondents said they would move. One person demanded that nuclear establishment people and their families should have to live close to the repository.

3.2.2. Effects of prompting

The powerful implicit prompt of version C, where the DK alternatives were simply not resulted in 39% of the respondents choosing acceptance and 61 rejection of the repository. Hence, the implicit prompt made the population look more positive, in the sense that considerably more people chose to accept. (At the same time, somewhat more also chose to reject). It is interesting to note that only 12 (of 216) respondents to version C chose to skip the question, in spite of 1/3 choosing one of the DK alternatives when they were provided explicitly (versions A, before the prompt question, and B). Answers to the acceptance question thus appear to be quite vulnerable to response alternative variation and to prompting.

Version A included a prompt question directed to those who had chosen one of the DK alternatives. Out of 86 uncertain respondents, 36 did commit themselves in response to the urging to do so in the prompt question. However, they did so mostly in favour of rejecting the repository.

3.3 CONCLUSIONS

The notion of economic compensation for accepting a waste repository was not at all supported by the present results. Few people were willing to even consider the idea, and those that did demanded excessive economic compensation far beyond realistic levels. It could be interesting, however, to test how people react to the idea of economic compensation to the community as a whole rather than to them as private citizens. The latter is probably also a more realistic compensation strategy.

4. Study three

What the public believes about siting is obviously of crucial importance. But what the public *really* believes can only be found out by means of unbiased questions answered

under conditions of guaranteed anonymity. Wentland and Smith (1993), for example, found in an extensive meta-analysis that mailed surveys were superior to interviews for sensitive questions, and had the same validity as other methods for other types of questions (in spite of their being drastically cheaper). Unfortunately, this is a conclusion which does not seem to be universally accepted. Pollsters make repeated use of leading questions and face-to-face interviews to 'verify' that people have already accepted the idea of a local repository – but all that they show is that respondents can be manipulated to appear to have done so (Sjöberg and Drottz-Sjöberg, 1993b, 1994). In the present study, we present some results giving yet another example of this trend.

4.1 METHOD

4.1.1 Respondents

A random sample, N = 1000, of the Swedish population of the ages 18–74 was approached with a mailed questionnaire in May 1995. Respondents were deleted if they stated they were not the person initially addressed, of if they were not Swedish citizens (almost 6% of those living in the country are not citizens). The net response rate was 53.2%. Comparing the respondents with national data we found that they were quite close in terms of most demographic variables.

4.1.2. Questionnaire

We used two different versions of a questionnaire. They were distributed to an equal number of respondents. The two versions used different wordings of the following crucial question, given here as a translation of a question used in in-home interviews by SIFO. The question has been worded thus by SIFO (our translation):

> High level nuclear waste from the nuclear power plants will be deposited somewhere in Sweden. To find a suitable site it is necessary to obtain facts about geology, soil conditions, transportation facilities and other information from different municipalities in Sweden. Is it your opinion that your municipality should agree to such studies or is it not?

According to SIFO, 83% agreed in a poll carried out in November of 1994. Only 6% were hesitant or did not know. The result was widely disseminated in the media.

In the present study, the above question was modified for half of the sample. The last sentence was made more explicit and read: 'is it your opinion that your municipality should agree to such studies in the municipality or is it not?' The response alternatives repeated the added contents as well, making it very clear to the respondent that the preliminary investigations under discussion would be carried out in their own community.[9]

This study was part of a larger investigation which concerned many aspects of nuclear risks and has been reported elsewhere (Sjöberg, 1996c).

4.2. RESULTS

The results of using the original and explicit versions of the question are given in Table 5. Two things are immediately clear, on the basis of these results:

Table 5. Distribution of responses to a question about a pilot study of siting a high-level nuclear waste repository in one's community

	Original version	*Explicit version*	*SIFO poll data (original version of question)*
Yes	37.6	24.3	83
No	28.9	44.5	11
Don't know	33.5	29.9	6

- The SIFO in-home interviews gave an exaggerated view of the certainty of people in forming an opinion. This is a very common finding. It is likely that the interviewers have been instructed to urge people strongly to take sides, until they get a response.
- The explicit version gave a decidedly different picture than the original version; many more were against a pilot study when it was made quite clear that their own community might be subjected to such a study.

4.3 CONCLUSION

If the purpose of the SIFO poll was to get a true picture of public opinion, it failed. In Study 1 we have reported a similar finding with another leading SIFO question – the 'classical' question about whether one is ready to 'accept' a local repository. This question is also posed in in-home interviews. It has several more or less subtle leading cues and it gave a very different response distribution when used in a mailed questionnaire. Furthermore, the massive opposition to a high-level waste site is well documented on the basis of responses to other questions and other, behavioural, data (Sjöberg and Drottz-Sjöberg, 1994).

5. General discussion

Let us begin with a few methodological remarks. It has long been known that even very small changes of the formulation of questions can have large effects on the responses (Rasinski, 1989; Schuman and Presser, 1981). Wording effects tend to be larger with respondents with a low level of involvement (Bishop, 1990).

The inclusion of DK as an explicit choice alternative usually results in rather strong increase of the number of DK responses, according to Schuman and Presser (1981). They claimed that the increase amounted to about 20% of total sample for a set of rather heterogenous questions. Aydiya and McClendon (1990) found smaller effects, of the order 10%. In the present data, the tendency was even stronger: about 30% chose DK when it was explicitly offered as a response alternative. It can be noted that Mitchell criticised polls in the USA following the TMI accident for not allowing for DK responses (Mitchell, 1980).

We suggest that some people are ambivalent about whether to accept a risky option such as a nuclear waste repository. If the option of expressing uncertainty is not explicitly offered, as here in our mailed survey where that alternative was not mentioned, or in an in-home interview where stated alternatives are not displayed,

people are driven by acquiescence response bias or other cues to agree. The prevalence of response styles of acquiescence and social desirability has been amply documented in psychometric research (Messick, 1991). If, on the other hand, people are *first* allowed to clearly state that they are uncertain and *then* urged to take a stand, they may become more risk averse. It is easier to avoid the issue by rejection of a course of action and the respondents have already invested some prestige in stating that they were uncertain and not ready to accept the risky alternative at this point in time.

The reason why SIFO obtained much higher acceptance rates seems to reside in the face-to-face interaction process of their in-home interviews. Another reason was the use of subtle leading cues, assuming that the 'best' siting has been found,[10] or lack of an explicit reminder about a policy being pertinent for the respondent's own community. It should be noted that the SIFO polls have shown about 50% acceptance for a number of years. But even if the present data are doubted, they agree well with overall rejection a local waste repository as revealed, e.g., in the voting intentions (only 20% said they would vote in favour of a repository).

The outcome of the Storuman referendum in September 1995 of course gives further support to our conclusions, and so does the more recent Malå referendum of September 1997.[11] Indeed, post-referendum studies of Storuman and Malå by Drottz-Sjöberg (1996, 1998) show how opposition to a repository is very firmly based in central beliefs and values of many respondents, to the point where supporters at times felt ostracized and socially rejected. The economic arguments (new jobs etc.) were either not believed or rejected outright as unrealistic or met by speculations that other types of economic opportunities would arise, e.g. in tourism, if the repository was to be rejected. International experience with nuclear waste facility siting supports the importance of risk perception (Kuhn, 1998).

The most important determinants of nuclear waste attitudes and risk perceptions in the present work were the notions of 'naturalness' and various aspects of morality. Several other studies have shown that the traditional Psychometric Model (Fischhoff *et al.*, 1978) is a very incomplete model of perceived risk, explaining a mere 20% of the variance (Sjöberg, 1996a), and that the dimension of 'tampering with nature' improves greatly on the model (Sjöberg, 1997b). A high level of explanation of the perceived risk of nuclear waste, some 60%, has been achieved (Sjöberg and Drottz-Sjöberg, 1994), with explanatory variables such as attitude and specific risk factors. Similar results on the explanation of opposition to a proposed site have been reported for communities in the western United States (Krannich and Albrecht, 1995), and the importance of studying beliefs was stressed by Groothuis and Miller (1994). Demographics usually explain only a few percentage points of attitudes and risk perception (see e.g Pollock *et al.*, 1992 and Groothuis and Miller, 1994). Political preference also is a variable with only modest explanatory power, as shown above.

When it comes to moral notions, people seem to feel that the nuclear industry is involved in taking health risks for present and future generations, and that a repository would stigmatize a community, cp. Slovic *et al.* (1991). A large majority appear to be quite unwilling to consider economic compensation in order to accept a repository, and indeed in some cases saw the very suggestion as an insult ('I am not for sale') or as a bribery attempt, cp. Frey (1996). It has been argued that narrow self-interest is not the only or even the most powerful determinant of behaviour and attitudes

(Lober, 1993; Lober and Green, 1994). Perhaps this negative attitude towards economic compensation was partly due to an impression that economic compensation implies an admittance of a real risk. However, such an impression could just as easily arise in the context of a real rather than a hypothetical offer.

We found little evidence for a high prevalence NIMBY attitudes. This derogatory term is often used rhetorically and superficially to dismiss opposition to local siting. The concept is notoriously vague and used in many ways (Luloff *et al.*, 1998). However, when we operationalized it in a specific manner, and not just equated it with *any* opposition, it turned out that few respondents were NIMBYs in the sense of being cynical and egotistic about nuclear power and its waste. The issue is important since the NIMBY concept can be used as a justification for cancelling local power of decision over certain kinds of facilities (Groothuis and Miller, 1994). If opposition is just cynical and egotistic, why should a local referendum be held at all? In Sweden at the present, after two local referenda have rejected the prospect of a nuclear waste repository, three or four town councils appear to consider going ahead without a referendum (Sjöberg *et al.*, 1998). Comments by some politicians suggest that they consider local opinion a NIMBY phenomenon. We think this is unjustified, and other empirically based analyses have reached the same conclusion (e.g. Hunter and Leyden, 1995; Lober, 1996).

Risk and benefit do not appear to function in a symmetrical manner (Sjöberg and Drottz-Sjöberg, 1993a; Groothuis and Miller, 1994). Risk aversion may be a more potent motive than perceived economic opportunities. In addition, there are always social risks in displaying one's basic values and beliefs. It is possible that larger social risks are connected with displaying risk tolerance than risk aversion; tolerance may be seen as a reflection of egotistic cynicism while risk aversion could signal true concern about the well-being of others. Indeed, the experience of Storuman showed a prevalence of social rejection of proponents of the waste facility, but as far as it is known not of the opponents. Note that the proponents were a fairly small minority in Storuman; belonging to a small minority may be risky. (In Malå where ostracism was not noted the two camps were much more equal in size).

Cultural Theory, as operationalized here, could not explain risk perception and acceptance to any noticeable extent. Indeed, it added virtually nothing to the more powerful alternative determinants discussed above (only 2.7% of the variance), and it did considerably worse then a simple measure of party preference. The reason why replications of the Wildavsky–Dake findings have failed several times is unclear – we know of no successful replication, however. Part of the problem may be connected with hypothesis testing habits of many researchers, who report significance levels and base their conclusions on them rather than on the amount of variance of dependent variables which has been explained (Oakes, 1986; John, 1992). As we have pointed out, many of the minuscule effects of Cultural Theory were significant here. Similar findings were reported by Pollock *et al.* (1993) who also did not report any direct estimate of explanatory power. Peters and Slovic (1996) reported a number of very low correlations between perceived risk and Cultural Theory variables, finding them to be statistically significant in many cases (with an N of more than 1000), and labelling them as 'strong'. For example, their measure of the egalitarian world view correlated between 0.04 and 0.27 with 25 risk items (general risk). Describing this result, they stated that 'egalitarian factor scores correlate *strongly* . . . with almost all of the perceived risk items' (p. 1443, italics added). We find this statement surprising and entirely unjustified.

Trust in the risk assessment carried out by government agencies and nuclear industry has been suggested as an important factor in risk perception (Kasperson *et al.*, 1992; Hine *et al.*, 1997). Here it added some 4% in explained variance, i.e. clearly better than Cultural Theory, but still a rather modest improvement. General trust, by itself, appears to account for about 10% of the variance of perceived risk (Sjöberg, 1996b). In addition, trust in corporations was found to be much more important in accounting for risk perception than trust in government or government agencies (cp. Frewer *et al.*, 1996).

Trust is an important concept in many current discussions of risk perception and risk management (see e.g. Giddens, 1991; Earle and Cvetkovich, 1995). Yet, empirical data give little support a major role for trust (see e.g. Sjöberg, 1999b).

Giddens relates trust to personality (basic trust as provided by caregivers in childhood) in a psychodynamic framework. While this may sound plausible, in normal populations both worry and fear have been found to be only weakly reacted to perceived risk (Drottz-Sjöberg and Sjöberg, 1990; Sjöberg, 1998b; Sjöberg, in press). Of course, psychodynamics is better suited to the analysis of psychopathology and risk perception and here many possible connections to traditional theory, such as the Jungian one, remain to be explored (Fritzsche, 1995).

The failure of economic compensation to lead to risk acceptance may be related to the present finding that people mostly regard the nuclear power issue in general rather than personal terms, and that this is true especially if it is an important political issue for them. We suggest that people construe of a politically salient issue as one of *general* rather than personal importance. Compensation in general terms, to a community, may therefore be more acceptable than personal compensation.

The 1993 SEAB report entitled *Earning Public Trust and Confidence: Requisites for Managing Radioactive Wastes* (Secretary of Energy Advisory Board Task Force on Radioactive Waste Management, 1993) is oriented towards strategies for enhancing trust as a crucial element in public acceptance. Similar ideas have been published by a number of authors (e.g. Rabe, 1994; Rabe *et al.*, 1994; Richardson, 1997; Kuhn and Ballard, 1998). The strategies appear to be quite sensible (involvement, openness, voluntariness (Gerrard, 1994) etc.) but obviously do not constitute a sure way of gaining acceptance. For example, Summers and Hine found only slight effects of participation on, acceptability and were more inclined towards an incentives approach (Summers and Hine, 1997. Indeed, as pointed out by Drottz-Sjöberg (1996) in her study of the Storuman case, trust may exist and people may still reject a siting proposal. People may well trust the technical expertise of industry or an agency, for what it is worth, but they may have many reasons for rejection just the same. Easterling and Kunreuther (1995) argue that public acknowledgement that a facility is needed is necessary for acceptance. Of course, such acknowledgment does not necessarily lead any local community to take on the burden. In addition, there is the problem of neighbouring communities where people may oppose the prospect of having radioactive waste transported through their communities; little social science research on that topic is available (McBeth and Oakes, 1996) but shows problems similar to those arising in siting proper (Binney *et al.*, 1996).

The present data suggest that most people who oppose a repository face no moral conflict in doing so: they simply consider nuclear power to be useless or worse. It is commonly found that people construe social dilemmas in this manner – the world becomes black and white and preferred options, such as opposing a repository, tend to

be seen as having mostly advantages and few disadvantages (Montgomery, 1989). The problem, thus, is not that people are unethical but rather the difficulty in promoting a risky project when benefits are uncertain and distant in time, while there is always skepticism, reluctance to change, and at best only marginal social and moral approval of a risky project.

Notes

1. With large samples, even weak relationships will be statistically significant and some investigators seem content with having established significance in spite of accounting for only a very small fraction of the observed variance.
2. Fraud would probably reduce this advantage to nil.
3. We are grateful to Karl Dake for providing us with these items.
4. Note that it is said that a judgment has been made (but not stated by whom or on what grounds).
5. The table gives SIFO data from 1992, several later polls have given very similar results.
6. Adding the 6 items based on Cultural Theory increased the proportion of explained variance by only 0.027, although some of the beta weights were significant. Adding trust in risk assessments by government agencies and nuclear industry explained another 4% of the variance, almost twice as much as Cultural Theory items.
7. The proportions of acceptance were 0.33 in Study 1 and 0.24 in Study 2. The *N*'s were large, 952 and 218, and hence the standard errors of these proportions were very small: 0.015 and 0.029. The difference of 12% is highly significant.
8. A check of differences within genders showed that the difference between Studies 1 and 2 in level of acceptance was reduced by 1/3, i.e. 1/3 of the difference was accounted for by differences in over-all male and female response between the two studies. The first 35% of the 70% response in Study 1 did not show a lower level of acceptance, however, making it less likely that increased response rate in Study 1 would have changed the picture drastically.
9. It seems clear that the original version indeed intended that meaning to be communicated and so have the results been interpreted. It would not be clear at all what could be meant by one's community 'accepting' studies to be carried out somewhere else. Yet, when the implication was not explicitly mentioned it may simply not have been in the minds of many respondents.
10. In real life, best siting is a moot issue, of course. If it could be found, it might give rise acceptance (Easterling, 1992).
11. In Storuman, 71% voted no to a proposal of further feasibility study, while the corresponding figure in Malå was 54%. Voter turnout was very high. In Malå, the referendum took place in isolation from any other election, yet 87% of the electorate participated In Stourman, 76% participated in the election.

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