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Local Opposition to the Construction of a Nuclear Power Station: Differential Salience of Impacts[1]

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This study examined attitudes among 290 residents of three villages in South-West England toward proposals to build a nuclear power station nearby. Respondents were split into four groups according to whether they were neutral or in favor of a new power station either locally or elsewhere in the UK (Group PN), against one locally but neutral or pro elsewhere (LO), or moderately (MO) or extremely (XO) against a new power station both locally and elsewhere. The perceived impact of a nuclear power station on local life was assessed by 30 items. The PN group expected most benefit or least damage on all 30 items. On a majority of items the mean ratings of the LO group resembled those of the XO's more than did those of the MO's. A stepwise discriminant analysis yielded two interpretable functions. The first reflected a trend over the groups in the order PN-LO-MO-XO and was marked particularly by concern with impact on *personal peace of mind.* The second fuction discriminated the LO's from the other groups, suggesting that they were relatively less concerned with specifically nuclear risks, but more concerned with environmental conservation.

Nuclear power stations often seem to produce a conflict between local and national interest in that major costs, in terms of danger and environmental damage, fall disproportionately on those living near such developments. For this reason, many local residents may be opposed to having a power station in their neighborhood without being antinuclear in principle. In a study conducted in the South-West of England—a region of great natural beauty and little industry—van der Pligt, Eiser, and Spears (1986) found that there were twice as many people who were *very strongly opposed* to a new nuclear power station in their neighborhood as there were of those who felt just as strongly about one elsewhere in the UK.

The van der Pligt et al. (1986) study was conducted in June 1982 among residents of three villages, each within about two or three miles of sites appearing on the electricity industry's announced shortlist for a new nuclear power station. The present study used the same sample, but reported analyses

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that discriminated between individuals specifically on the basis of their attitudes toward new power stations both locally and elsewhere in the country.

Method

Sample

A random sample ($n = 450$) was drawn in equal proportions from the electoral registers of the three communities closest to the proposed sites. Of these, 24 had died or moved, but of the remainder, 300 (70%) responded to a postal questionnaire either immediately, or after a reminder sent two weeks later. They were not required to pay for the cost of return postage. Since analyses reported elsewhere required follow-up questionnaires, 10 who responded anonymously were excluded. Of 285 who indicated their sex, 145 were male. Their average age was 47.5 years and 63% owned their own homes.

Questionnaire

The questionnaire contained eight pages preceded by a cover letter explaining the purpose of the study and the independence of the research team. The questions relevant to the present paper were as follows.

Attitude measures. Respondents were asked how they personally felt about building more nuclear power stations in the UK, a new nuclear power station in their neighborhood, and four hypothetical non-nuclear local developments which would take up the same area of land (a coal-fired power station, any industrial development, windmills for electricity generation, and a chemicals factory). Responses ranged from *very strongly opposed* (1) to *very strongly in favor* (7). In addition, respondents indicated how personally involved they were in the issue of a new nuclear power station and how much they cared if one were built locally; they used four categories ranging from *not at all* (1) to *very much* (4). They also were asked if they had attended a public meeting on the issue.

Expectations of local impact. Respondents were asked 30 questions (selected on the basis of previous research and interviews with local residents) concerning the possible impact of a new nuclear power station in their neighborhood. Items A1 to A15 (*direct* impacts) asked respondents to estimate how much life in their neighborhood generally would be changed "for the better or for the worse" as a consequence of particular (presumably inevitable) aspects of the building or operation of a new power station. Items B1 to B15 (*indirect* impacts) were worded so as to deal with aspects of life locally that might or might not be expected to be benefitted or compromised by such a development; respondents were asked how much they thought

each aspect would be affected locally by the building and operation of a new nuclear power station in their neighborhood (see Table 2). Responses were in terms of a scale scored from *very much for the worse* (1) to *very much for the better* (9).

Importance of different aspects. Respondents then had to circle the 5 *direct* and 5 *indirect* impacts they personally regarded to be most important. Additionally, they were asked to rate, on a scale from *no importance at all* (1) to *extreme importance* (7), how much importance should be attached to each of the five aspects listed in Table 4, in the event of a Public Inquiry.

Results

We first categorized the respondents into four groups of comparable size on the basis of their self-ratings of attitude concerning a new nuclear power station.

Group PN (pro/neutral) consisted of 73 individuals who were opposed neither to building more nuclear power stations in the UK, nor to a new nuclear power station in their neighborhood.

Group LO (locally opposed) included 68 people who were not opposed to building more nuclear power stations in the UK, but who were opposed to a new nuclear power station in their neighhood.

Group MO (moderately opposed) consisted of 66 individuals who indicated that they were opposed to more nuclear power stations both in their neighborhood and in the UK generally.

Group XO (extremely opposed) included 83 who were very strongly opposed to more nuclear power stations both in their neighborhood and in the UK generally.

There were some differences between the attitude groups in terms of demographic characteristics. Broadly, those who were least antinuclear were more likely to be male and employed, and were less likely to be retired, to own their own home, or to have most of their family living in the area. They tended to be younger and they saw themselves as having greater job mobility. As may be seen in Table 1, group LO showed the strongest overall opposition to nonnuclear development (note group XO's somewhat stronger objection to a chemicals plant but relative tolerance of windmills). Group PN reported being less involved in, and concerned least about, the issue of a new nuclear power station. These results are borne out by the fact that only 19% of group PN said that they had attended a public meeting on the issue, compared with 60%, 52%, and 61% of groups LO, MO, and XO, respectively, $\chi^2(3) = 34.42, p < .001$. For comparison purposes, Table 1 also shows the means for attitudes

Table 1

Mean Attitude Scores for Each Group

Attitude toward:	PN	LO	MO	XO	$F(3,275)$
Nuclear power station	4.40	1.65	1.62	1.00	—
Coal-fired power station	3.60	1.80	2.71	2.61	18.48
Any industrial development	4.11	2.06	2.70	2.16	31.52
Windmills	4.39	2.68	3.65	4.08	12.95
Chemicals factory	2.76	1.49	1.87	1.33	29.86
N	72	68	63	76	
					$F(3,283)$
How involved in issue of local nuclear plant	1.84	2.79	2.25	2.91	16.52
How much care about local nuclear plant	2.17	3.81	3.66	3.86	93.01
N	75	68	64	80	

Note. Scale for attitude items: very strongly opposed (1), very strongly in favor (7); for involvement and care items: (1) not at all, (4) very much. All *F*s significant at $p < .001$.

toward a new local nuclear power station. A multivariate analysis of variance on data for the four non-nuclear developments yielded a Pillai's multivariate $F(12,822)$ of 11.50, $p < .001$, for the group effect. Also presented in Table 1 are the mean *involvement* and *care* scores, which show that groups LO and XO were the most involved. Combining these two items in a multivariate analysis of variance yielded a Pillai's multivariate $F(6,566)$ of 34.85, $p < .001$, for the group effect.

The differences between the groups of the 30 impact items are shown in Table 2 and are based on a reduced sample of 262 with complete data on all these items. While the overall means for LO and MO are indistinguishable, a majority of the items show a non-monotonic trend across the four groups, with the difference between groups LO and XO being less than that between groups MO and XO. Also shown in Table 2 are the mean scores for each group based first on the five *direct* impacts selected as important by each individual, and then on the five *indirect* impacts so selected (excluding any individuals selecting fewer than five impacts in the relevant set).

In order to consider these group differences on the 30 items in combination,

Table 2

Mean Ratings of Expected Impacts by Each Group

	Impact	Group				$F(3,258)$
		PN	LO	MO	XO	
A1	Excavation for pipelines	3.91	1.98	1.92	1.57	32.06
A2	Construction traffic	3.23	1.42	1.59	1.33	26.62
A3	Road building	5.44	2.53	2.39	2.04	32.65
A4	Conversion of land from agricultural use	3.54	1.81	1.37	1.26	41.80
A5	Noise of construction	3.66	1.78	2.03	1.58	30.22
A6	Workers coming into the area	5.81	2.02	2.73	2.23	43.99
A7	Noise of station in operation	4.41	2.86	2.92	2.28	23.10
A8	General appearance of the power station buildings	3.79	1.41	1.83	1.19	48.91
A9	Area of land fenced off	3.96	1.61	1.85	1.25	51.17
A10	Steam or water vapor from station when operating	4.10	2.14	2.22	1.54	41.76
A11	Increased security and policing	5.53	3.16	3.03	2.07	38.13
A12	Warming of nearby sea water	5.49	3.06	3.32	2.16	33.79
A13	Transportation of nuclear waste	3.37	2.03	1.32	1.19	32.79
A14	Overhead power cables/pylons	3.27	1.69	1.76	1.45	23.16
A15	Overall height of buildings	3.46	1.28	1.71	1.17	49.20
B1	Employment opportunities	7.89	5.80	6.54	5.68	26.13
B2	Tidiness of the village	4.76	3.27	3.02	2.68	18.00
B3	Standard of local recreational facilities	6.21	4.44	4.61	3.75	21.62
B4	Social life in the neighborhood	6.13	4.22	4.00	3.64	22.23
B5	Wild life	3.44	1.53	1.71	1.38	28.25
B6	Marine environment	4.23	2.41	2.19	2.14	19.81
B7	Farming industry	3.67	2.22	1.89	1.52	28.73
B8	Security of local electricity supplies	6.46	5.28	5.33	4.67	11.85
B9	Health of local inhabitants	4.60	3.55	2.58	1.81	41.15
B10	Landscape	3.30	1.19	1.73	1.14	38.28
B11	Holiday trade	4.47	2.67	2.71	2.04	24.27
B12	Business investment	6.26	4.55	4.63	3.71	17.85
B13	Your personal peace of mind	4.70	2.25	1.59	1.22	89.94
B14	Standard of local transport and social services	6.43	5.11	5.29	4.52	11.83
B15	Standard of shopping facilities	6.03	5.25	4.86	4.67	8.56
	Mean	4.72	2.82	2.82	2.30	3.93[a]
	N	70	64	59	69	
	Mean of 5 important *direct* impacts (A1 to A15)	3.88	1.26	1.47	1.12	61.98[b]
	Mean of 5 important *indirect* impacts (B1 to B15)	5.34	1.92	2.07	1.48	86.74[c]

Note. Scale from *very much for the worse* (1) to *very much for the better* (9). All Fs are significant at $p < .001$.
[a]Pillai's Multivariate F with $df = 90,693$. [b]$df = 3,242$. [c]$df = 3,224$.

continued

(Table 2. *Continued*)

we performed a step-wise discriminant analysis (without rotation) using the method of maximizing the change in Rao's V. Limiting the number of variables entered into the analysis to 15 enabled 66.3% of the sample to be correctly classified. The first discriminant function, accounting for 85.1% of the shared variance, reflected a monotonic trend across the four groups (canonical discriminant functions were: PN 2.14, LO -0.49, MO -0.54, and XO -1.26). The second function, accounting for 11.5% of the shared variance, essentially discriminated group LO from the remainder (canonical discriminant functions were PN -0.09, LO 0.83, MO -0.46, and XO -0.29).

The relationship between the discriminant functions and the individual items is shown in Table 3. All 15 items entered correlated positively with the first function. However, the standardized coefficients of the items suggested

Table 3

Stepwise Discriminant Analysis (No Rotation, 15 Items Entered): Relation of Items to Functions

Step	Items		Change in Rao's V	Standardized canonical discriminant function coefficients		Correlations between items and discriminant functions	
				function 1	function 2	function 1	function 2
1	B13	Peace of mind	269.8***	0.66	0.12	0.75	0.27
2	A15	Height	80.9***	0.21	−0.23	0.55	−0.29
3	B1	Employment	48.4***	0.28	−0.21	0.39	−0.30
4	A11	Policing	34.6***	0.28	0.15	0.49	−0.08
5	B9	Health	22.4***	0.06	0.51	0.47	0.55
6	A4	Land conversion	11.4**	0.18	0.19	0.51	0.14
7	B15	Shopping	9.7*	−0.23	0.26	0.23	0.16
8	B3	Recreation	9.0*	0.28	−0.14	0.37	−0.02
9	A5	Construction noise	8.6*	−0.12	−0.27	0.44	−0.16
10	A6	Workers	7.8	0.05	−0.39	0.52	−0.34
11	A13	Nuclear waste	7.8	−0.09	0.40	0.44	0.30
12	B2	Tidiness	7.6	−0.17	0.25	0.34	0.08
13	B10	Landscape	10.2*	0.10	−0.44	0.48	−0.32
14	A9	Fenced area	7.1	0.19	−0.00	0.58	−0.16
15	B5	Wild life	8.7*	−0.17	−0.08	0.42	−0.15

*$p < .05$; **$p < .01$; ***$p < .0001$.

that this function could almost entirely be defined in terms of item B13 (*Your personal peace of mind*) on which the more pronuclear respondents showed the least pessimism. The second function yielded more interesting distinctions between the individual items. As reflected in both the standardized coefficients and the separate correlations, high scores on this function (as shown by group LO) were associated particularly with higher scores on items B9 and A13, but lower scores on items such as B10, A6, A5, A15, and B1. In other words, the *locally opposed* respondents were distinguishable by their relative lack of concern for what may be thought of as specifically nuclear-related impacts (*Health of local inhabitants, Transportation of nulcear waste*). On the other hand, they showed a particularly great concern for a number of specific aspects of environmental conservation versus disruption (*Landscape, Workers coming into the area, Noise of construction, Overall height of buildings*). They also were less convinced of the likelihood of a beneficial impact in terms of local employment opportunities.

Similar conclusions were implied by the ratings of the importance to be

Table 4

Importance That Should be Attached to Various Aspects in Event of a Public Inquiry; Mean Ratings by Each Group

Aspect	Group				$F(3,274)$
	PN	LO	MO	XO	
Local environmental impact	5.48	6.66	6.15	6.54	9.92***
Political implications of a nuclear energy policy	3.52	3.03	4.13	3.88	3.51*
Economic arguments	4.93	4.57	4.68	4.46	0.83
Risks of a nuclear accident and pollution	5.99	5.97	6.11	6.71	4.11**
Feasibility of other energy technology	5.05	5.30	5.68	6.32	7.01***
Mean	4.99	5.10	5.35	5.58	4.37_a***
N	73	67	62	76	

Note. Scale from *no importance at all* (1) to *extreme importance* (7).
[a]Pillai's multivariate F with $df = 15,816$.
*$p < .05$; **$p < .01$; ***$p < .001$.

attached to various aspects in the event of a Public Inquiry. Group LO gave the highest ratings of importance to *local environmental impact*, and the lowest to *political implications of a nuclear energy policy*. On *risks of a nuclear accident and pollution*, the means for groups PN and LO fell close together (see Table 4).

Discussion

These findings indicated that the four attitude groups differed widely in their perceptions of the likely impact of a new nuclear power station in their neighborhood. On every one of the 30 items, the most pronuclear respondents indicated that they expected the impact to be most beneficial or least damaging. However, on a majority of items the *locally opposed* group was more similar to the *extremely opposed* group than to the *moderately opposed* group.

Our research may be somewhat atypical in the relative lack of emphasis we have given to the concept of risk and risk perception. Nonethless, item B13 (*Your personal peace of mind*) emerged as the major predictor of overall pro versus antinuclear attitudes (see also van der Pligt et al., 1986). It seems fair to conclude that many in our sample shared a generalized fear of nuclear power stations as potentially threatening and dangerous to some degree.

Particularly in the aftermath of Chernobyl, our purpose is not to comment on whether people's fears of nuclear accidents were reasonable or exaggerated, but rather to question whether such fears were in fact the main basis for much of the opposition shown by local residents at the time of our study. Our questionnaire did not ask specifically about possible catastrophes, but concentrated instead on much more tangible eventualities. Many of these eventualities were not peculiar to nuclear power stations but would apply to any industrial development of comparable size.

Consistent with this argument were the responses of the LO group which showed the strongest opposition to other non-nuclear industrial developments. These *locally opposed* residents also were somewhat sanguine (in comparison with the two other anti groups) about more specifically nuclear-related risks; they based their opposition instead on the expectation of more immediate disruption and environmental damage. When rating the importance of different aspects for a Public Inquiry, they gave lower scores than the remaining groups on items concerning nuclear risks and political implications, but the highest score on local environmental impact.

Therefore, there is no single set of outcomes to be included in any cost-benefit analysis of nuclear power, nor any single set of reasons that can lead individuals to support or oppose a specific proposal. As Marsh (1981) argued, environmentalist causes appeal both to a kind of pre-industrial conservatism

and to a post-materialist radicalism. When such systems of values form a coalition, it is scarcely surprising that local opposition is not assuaged by assurances from the industry that nuclear plants are "as safe as houses." Even houses can be intrusive if they are built in one's own back yard.

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