

THE PREDICTION OF VOTING BEHAVIOUR
IN A NUCLEAR ENERGY REFERENDUM*

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PREFACE

Risks have emerged as an important constraint in the evaluation and selection of energy strategies. The work of the Joint IAEA/IIASA Research Project (IAEA: International Atomic Energy Agency) is oriented toward providing information on technological risks, and their social aspects, for use in decisions related to the management of risks. The emphasis of this research is upon energy systems.

This research memorandum presents results of a survey undertaken to predict voting behaviour, in a referendum on nuclear energy, based upon the underlying beliefs about the consequences of a pro or con vote and the voters' perceptions of how those others important to him would wish him to vote. The method is an extension of that used in two earlier studies, reported in RM-76-80 and RM-77-54.



ABSTRACT

This report describes an application of Fishbein's model of intention formation to a study of voting choice in a nuclear energy ballot in the USA. The sample was randomly selected from the general public (N = 89). The model successfully predicted voting intention (multiple regression coefficient = .92) using two major variables: attitudes to the act of voting CON and subjective norms, i.e. the voters' perceptions of how the people or groups important to them (referents) would want them to vote. Both of these components contributed significantly to voting choice although the attitude was the primary determinant. The attitudes to the act of voting and the subjective norms were, in turn, well predicted from underlying beliefs, thus allowing identification of the specific issues which differentiated between those intending to vote PRO and CON nuclear energy.

In general both groups of voters agreed on their evaluations of the possible consequences of the ballot. Further, they were both well informed about the basic issues and potential legal consequences of the proposal. What ultimately appears to have influenced the direction of their vote was their disagreement (i.e. their contrary beliefs) about the likely effects of the proposal on three major issues: the economy, the energy crisis and improvements in nuclear safety. The positions taken on these issues clearly differentiated those intending to vote PRO and CON. It should be noted, however, that the other issues about which there was considerable debate, e.g. the question of the constitutional status of the proposal, did not significantly differentiate the two groups of voters.



INTRODUCTION

Decision makers faced with the assessment of new or rapidly developing technologies are increasingly aware of the need to take into consideration a wide range of social variables. For instance, public attitudes, which until relatively recently were tacitly assumed to be in favour of technological advance, are now in question. This is particularly true for decisions relating to nuclear power. In many countries the verbal and behavioural expression of preferences by pressure groups has already affected development programmes. If technological assessment is to be sensitive to social issues then the decision makers require tools to measure the preferences of the public in general and those sub-groups to whom the issues may be of particular relevance. And further, if these publics are to participate to any degree in the eventual decision, then such a dialogue requires, on both sides, an understanding of the beliefs and values which determine the preferences of the various interest groups.

The general public has become quite vocal in expressing its concerns particularly as energy decisions impact upon the price of energy, the safety and environmental consequences of the power production methods proposed, and the requirements for a change in lifestyle. Politicians are finding that acceptance by the public of an energy proposal is quite vital to its success; this has been especially true in the case of nuclear power. More specifically, in 1976 a number of states in the USA scheduled voter referendums concerning restrictions upon the operation and construction of nuclear power plants. One of these, California's Proposition 15, if passed, would have made the construction of new plants and the operation of present ones contingent upon the removal of utility liability limits and the legislative approval of safety and waste disposal systems. Such propositions could lead to a halt in the development of nuclear power in the concerned states and consequently to a possible energy shortage. Despite the fact that last year's measures were defeated, it is quite likely that more voter referendums on nuclear power will be held in the future, for instance such a referendum is planned in Switzerland for late 1978.

The concept of a referendum implies that voting behaviour is an indicator of preference and to some extent attitude toward

the issue in question.* Two recent reports (Otway and Fishbein, 1976;1977) have used an expectancy-value model to predict attitude and to describe the beliefs which differentiate those in favour and those against the use of nuclear energy. A different model (Fishbein and Ajzen, 1975) also incorporating an expectancy-value formulation can be used to predict intentions to perform a specific behaviour such as voting choice, and to examine the underlying cognitions. This version of the model has already been applied to voting intentions and voting behaviour in the USA and the UK (Fishbein and Coombs, 1974; Fishbein, Thomas and Jaccard, 1976). In this report we describe the use of the extended attitude model to study voting on the Oregon Nuclear Safeguards Initiative (Ballot Issue No. 9) during the 1976 General Election in Oregon, USA. In this referendum the voter was required to vote in favour ("yes") or against ("no") the placing of restrictions on future nuclear power plants. In order to avoid confusion with the intuitive expectation that "yes" corresponds to a vote in favour of nuclear energy, throughout this report those who voted (or intended to vote) in favour of restrictions on the nuclear power plants will be referred to as being CON nuclear power, and those who voted (or intended to vote) against restrictions will be termed PRO nuclear power.

THE INTENTION PREDICTION MODEL

Fishbein's model for the prediction of behavioural intention is based on three major points. First, although the performance of overt behaviour is subject to the vagaries of unexpected and unpredictable contingencies, a basic proposition of the approach is that most human behaviour is under volitional control, and thus it is assumed that the primary determinant of a given behavioural act is the person's intention to perform that act. More importantly, an intention to perform a given behaviour is viewed as a function of measurable attitude and belief variables. Second, the attitudinal contribution to an intention is a function of the expected consequences of the overt behaviour, where each consequence is weighted by its value. Thus the attitude in question is toward the behaviour (A_{act}) rather than some object (or person) toward which the behaviour is

* The relation between attitude toward an issue and general behaviour in response to that issue raises problems which are beyond the scope of this report (see Thomas, 1971; Fishbein and Ajzen, 1975).

directed.* Third, the relation between a person's attitude toward a behaviour and his intention to perform that behaviour is subject to modification by his perceptions of how people or groups important to him (his relevant referents) want him to behave. This is known as the subjective norm (SN). These points are summarized in Figure 1 and are expressed more formally thus:

$$B = BI = (A_{act})_{w_1} + (SN)_{w_2} \quad (1)$$

where B is the behaviour in question; BI is the behavioural intention; A_{act} is the attitude toward performing the act or behaviour; SN is the subjective norm, a summary of beliefs about the perceptions of relevant referents; and w_1 , and w_2 are weighting parameters which reflect the relative importance of A_{act} and SN. These weights are expected to vary across individuals and across behaviours. In practice the values of the weights for any given behaviour are derived for the entire sample of individuals by multiple regression:

$$BI = \alpha + \beta_1 (A_{act}) + \beta_2 (SN) + \mu \quad (2)$$

In this particular application of the model the behaviour in question was 'voting in favour of restrictions on nuclear power plants' (the CON position) in the Oregon referendum. The behavioural intention was the respondents' intention, stated in advance, to vote in favour of restrictions (CON) in the ballot.

The attitude to the act of voting, that is, the attitudinal component of the behavioural intention to vote can be expressed in terms of the underlying beliefs thus:

$$A_{act} = \sum_i^n b_i e_i \quad (3)$$

where A_{act} is the attitude toward performing the behaviour or action (here casting the CON vote), b_i is the strength of the

* The relation between A_{act} and constituent beliefs is directly equivalent to the expression used in earlier studies to describe the relation between attitude toward an object and the attributes associated with that object:

$$A_o = \sum_i^n b_i e_i$$

belief that performing the behaviour (casting the CON vote) will lead to consequence i ; e_i is the evaluation of consequence i ; and n is the number of salient beliefs about performing the behaviour (the salient consequences of casting the CON vote).

The normative component of the model (SN) is construed as an overall representation of what most important referents would advocate. This generalisation is, in turn, based on the person's perceptions of what specific referents would believe to be the 'right/correct or best' course of action to take, and his willingness to accept the advice, viewpoint or pressure of these referents. Thus:

$$SN = \sum_j^m Nb_j Mc_j \quad (4)$$

where Nb_j is the normative belief about referent j (here the respondent's belief that referent j thinks he/she should cast the CON vote on the ballot); Mc_j is the respondent's willingness to accept or comply with the normative prescription of referent j ; and m is the number of relevant referents (relevant with respect to casting a vote on the Nuclear Safeguards Initiative issue).

The model summarised in the formal statements (1) through (4) not only predicts voting intention and behaviour, but provides a framework for the collection and analysis of belief and value data which can contribute a great deal to the understanding of the underlying reasons for voting choice. The intention to vote in a given direction, or for a particular issue, may be determined by either attitudinal or normative factors, or by both; and their relative contributions can be assessed from the size and statistical significance of the regression weights derived from statement (2). The attitudinal component can be further explored by examining the strengths of salient beliefs about the expected consequences of a particular vote, and the values placed on these outcomes. In an analogous way, using statement (4), the general normative term (SN) can be explored further by comparing the strengths of perceived prescriptions of relevant others (the normative beliefs) and motivations to comply with these relevant referents.

It should be noted that the model is essentially concerned with the prediction of behavioural intention, as opposed to behaviour. The implication is, that while people generally do what they say they will do, a wide range of unforeseen contingencies may, in theory, intervene between the statement of intention and the performance of the behaviour. The shorter the time interval between the measurement of the intention and the overt act, the more accurate the prediction of behaviour will be. Thus, for example, if in the present study, in the

interval between the measurement of beliefs, attitudes and voting intention and the actual ballot, a major nuclear power accident had occurred, or a renewed campaign had been mounted by either side in the Nuclear Safeguards Initiative, then it is possible that beliefs and attitudes and hence voting intentions may have been changed. In such a case the original measures could not be expected to predict the eventual voting behaviour with the same accuracy.

METHOD

Elicitation of Salient Beliefs and Relevant Referents

In theory, the model requires that only salient beliefs about the consequences of behaviour, and only the perceived expectations of relevant referents are used. Both 'salient' and 'relevant', in the context of the model, are operationally defined as those beliefs or referents which are quickly and easily elicited by subjects in a free response situation. In practice, however, when the issue (the behaviour or attitude object) in question is of any complexity it is assumed that respondents will have difficulty in articulating their beliefs and their responses are, therefore, supplemented by belief items from content analysis of the relevant literature, from campaign media and, for voting behaviour, from election campaign materials.

In this study of the Oregon Ballot, elicitation interviews were conducted by telephone with 19 potential voters, randomly selected from telephone directories. The results of these interviews together with the supplementary sources, provided a list of 20 outcome beliefs (consequences of voting CON) and 7 referents relevant to opinions on the Nuclear Safeguards Initiative. These beliefs are listed as part of Tables 2, 3 and 4 and the referents as part of Table 5.

The Sample

Financial limitations prevented face-to-face interviews and restricted the size and nature of the sample used. Approximately one to two weeks before the November 1976 election, questionnaires were mailed to 500 addresses randomly selected from the current telephone directory for Portland, Oregon. Of the 500 questionnaires, 47 were returned by the Post Office as 'undeliverable' and 89 useable replies were received*.

*When viewed within the context of comparable mail surveys this response rate of 18%, in the absence of an incentive for responding, is not atypical, although it is slightly lower than average. For example, in seven studies observed return rates for no-incentive groups ranged from 10% to 40% (Kanuk and Berenson, 1975).

These respondents tended to be somewhat older (mean age = 51.9) and better educated (mean educational level = some college or business school) than the general population. Subsequent voting data showed that this sample was almost equally divided between those who voted PRO and CON. Thus, although non-representative of the general population (where the majority of Oregon voters (58%) opposed the referendum, i.e. supported the PRO position), almost equal numbers of PRO and CON voters are optimal for exploring the decision process and uncovering relationships between voting behaviour and other variables. Clearly the sample was not ideal; however, it was adequate to demonstrate the utility of the model in this substantive area of application.

The Questionnaire

Measures of the model's theoretical constructs were obtained in a closed-format questionnaire. Briefly, attitudinal variables (A_{act} and e) were measured on semantic differential scales assessing 'goodness-badness' on a 7-point scale (+3 to -3). All belief strengths were measured on similar scales which referred to the likelihood that the belief item in question (or more precisely the associative relation expressed by the belief statement) was 'true'. The order of presentation of items in the questionnaire was as follows: attitude toward the act of voting CON, (A_{act}); evaluation (attitudes) toward 20 consequences of the CON vote (e); belief strength for each consequence (b); belief strength of the general subjective norm (SN); strength of normative belief (Nb); motivation to comply (Mc); and behavioural intention to vote CON.* Table 1 shows the format of each of these types of question.**

Follow-up Interview

A follow-up telephone interview conducted shortly (2 to 4 days) after the election asked three questions about actual voting behaviour: "Did you vote in the November General Election?", "Did you vote on the Oregon Nuclear Safeguards Initiative-Ballot Measure No. 9?", and "How did you vote on the

* Note that intentions are expressed as beliefs in one's own intended action; therefore, intention varies on a belief strength dimension.

** Several other measures external to the model were also obtained. These will be discussed in a paper presently in preparation for publication.

Nuclear Safeguards Initiative?".

RESULTS

The overall aim of this study of voting in a nuclear energy referendum is to understand voting choice in terms of beliefs, values, and important reference groups; but the validity of such descriptive findings depends on the performance of the model as a whole. The predictive accuracy of the model will therefore be reported first.

Prediction of Voting Intention and Voting Behaviour

As expected, voting intention was strongly related to voting behaviour ($r = .89, p < .001$). In turn, voting intention was accurately predicted from attitude toward the act of voting (A_{act}) and the general subjective norm (SN). The multiple regression coefficient was $.92 (p < .001)$. Thus, together, the attitudinal and normative components account for 84.6% of the variance in voting intention. Moreover, although both components have statistically significant standardised regression coefficients, A_{act} accounts for considerably more variance than does the general norm (for $A_{act}, \beta = .80, p < .01$; for SN, $\beta = .17, p < .01$).

The Estimates of A_{act} and SN from Underlying Beliefs

The salient beliefs within the population about consequences of voting in the Nuclear Safeguards Initiative Ballot, supplemented by beliefs taken from the media and campaign literature, were used to estimate the global components of the model, A_{act} and SN from equations (3) and (4) respectively. The correlation

between $\sum_i^n b_i e_i$ and A_{act} was $.74 (df = 80, p < .01)$;

and $\sum_j^m N b_j M c_j$ and SN was $.79 (df = 80, p < .01)$. Given these

high correlations the belief-based estimates may be used in place of A_{act} and SN in the prediction of voting intention.

When this is done, the multiple regression coefficient R is still highly significant ($R = .86, p < .001$). As with the global measures the estimates of both A_{act} and of SN received significant weights in the regression equation and again it was the attitudinal component which accounted for the greater part of the variance in voting intention.

The Cognitive Basis of Voting Choice

The predictions of A_{act} and SN from beliefs provide some evidence that we have identified those cognitive elements that underlie our respondents' intentions to vote, or not to vote, CON on the referendum issue. Together with the earlier validation of the model of intention formation at its global level, our findings can be taken as support for the following explanation of voting behaviour:

- (1) People form beliefs about the consequences of voting for or against the referendum issue in question from information obtained from the media and from their social interactions with others. People also form beliefs about the advocacy or wishes of relevant others, with respect to the referendum.
- (2) On the basis of these beliefs they form positive or negative attitudes toward voting (PRO or) CON; and they also form a subjective norm with respect to voting in a given direction, i.e., a summary position of their beliefs about whether most others, important to them, think they should vote (PRO or) CON.
- (3) Although both the attitude and the subjective norm contribute to their intention to vote CON, this particular intention seems to be more strongly determined by attitudinal considerations (i.e. by beliefs about the consequences of voting CON) than by normative considerations (beliefs that others think they should vote CON). Thus, for example, the more a person believes that a CON vote will lead to outcomes he personally values and/or will prevent outcomes he views as 'bad', the more favourable he will be to voting CON and the greater the likelihood that he will intend to (and will actually) vote CON. It is important to note that in other elections and/or with different populations voting choice may not be primarily a function of attitudinal considerations. That is, for different issues or in different cultures normative factors may be equally or more important.
- (4) Thus, to more fully understand the basis for a CON vote we must look both at the beliefs that underlie the attitudes and at those that underlie the subjective norms.

Differences in Beliefs and Evaluations between PRO and CON Voters

It is important to note that when making a comparison between groups in terms of their cognitive structures, there are several ways in which the beliefs may differ. For example, individuals or groups may differ in the direction and/or intensity of their evaluation of a set of attributes or consequences; they may also differ in the direction and strengths of their beliefs about those attributes or consequences. Tables 2, 3, and 4 show the mean beliefs and evaluations for the PRO and CON voters. In this study we have distinguished between the two voting groups in terms of three categories of beliefs: those for which both groups of voters hold similar beliefs and similar evaluations (Table 2); those where there is consensus about their likelihood of occurrence but on which the PRO and CON voters place different values (Table 3); and those where there is common evaluation across the voting group but where they disagree about the likelihood of the outcome following from the passage of the referendum proposal (Table 4). These three types of beliefs are discussed below.

It should be clear that when voters hold similar beliefs and evaluations it cannot be these beliefs which account for differences in voting behaviour. Observed differences in attitudes toward voting for the CON position must reflect differences in voters' beliefs about the consequences of a successful CON vote and/or differences in their evaluations of those consequences. That is, if a person believes that casting a vote for the CON position will lead to good consequences and prevent bad ones, he should have a positive attitude toward voting CON; and, similarly, if a person believes that casting a vote for the CON position will lead to negatively valued outcomes and prevent positive ones, he should have a negative attitude toward voting CON.

It is important to realize, however, that a CON voter need not necessarily believe that a CON vote will only lead to 'good' consequences or prevent 'bad' ones. The public is better informed than it is often given credit for and even CON voters would have been aware that passage of the proposal could lead to some negative outcomes; similarly, the PRO voters may have believed that a CON vote would lead to some advantages. Through information provided by media coverage and discussing the referendum proposal with family, friends and co-workers, the voting public learned about the essential issues of the referendum, and this is shown in our data.

From Tables 2 and 3 it can be seen that the public was correctly informed (i.e. believed) that a CON vote would mean a change in Oregon's present system for regulating nuclear power; they were aware that the success of the proposal

(the CON position) would require new tests of nuclear safety systems and a decision on a permanent nuclear waste disposal method. They knew that passage of the proposal would mean that regulatory control of nuclear power would be given to state legislators and they inferred that this would make it more difficult for companies to obtain legislative approval for new nuclear power plants. Further, they also knew that supporting the CON position would make nuclear power plant operators financially responsible for nuclear accidents and would essentially give full compensation to victims of a nuclear accident. Knowing the potential impact of such financial and legislative requirements on the industry, most voters inferred that if the referendum proposal were passed this would be equivalent to banning the construction of nuclear power plants. Finally, although not directly part of the referendum proposal, media coverage and general public debate had made it clear to most voters that the passage of the proposal would not ensure low-cost electricity and would probably lead to a court battle over the constitutional validity of the proposition.

While the public agreed on the evaluation of the consequences shown in Table 2, this was not so clearly the case for outcomes shown in Table 3. In fact, of the 20 possible outcomes considered in the present study, the PRO and CON voters evaluated only the three outcomes listed in Table 3 in opposite directions; in only one of these cases was the difference statistically significant. That is, as expected, the PRO group felt that a ban on more nuclear power plants would be a 'bad' thing while the CON group positively evaluated this outcome. Similarly (although not statistically significant), the PRO group positively evaluated Oregon's present system for regulating nuclear power, while the CON group felt that maintaining the present system would be 'bad'. Finally, although the difference is very slight, the PRO group tended to negatively value a court battle over the referendum's constitutionality, while the CON group was neutral to slightly in favour of such a confrontation.

Of the 17 remaining outcomes (see Tables 2 and 4), 10 were viewed as 'good' by both groups of voters (e.g. setting up realistic standards for nuclear waste management systems, decreasing the danger from radioactive materials and wastes, making new plants safer than present ones, ensuring low-cost electricity, making nuclear power plant operators fully responsible financially for nuclear accidents); and 7 were consensually evaluated as 'bad' (e.g. denying full compensation to the victims of a nuclear accident, giving regulatory control of nuclear power to state legislatures, reducing funds for development of alternative energy sources, eliminating a needed energy source, increasing unemployment).

Thus far we have outlined areas of belief where the PRO and CON voters agreed and where this consensus realistically reflects the issues at stake. Further, given the similarity in the respondents' evaluations of the beliefs shown in Table 2, these beliefs cannot account for differences in voting behaviour. In contrast, the beliefs shown in Table 3 do start to provide some insights into differential voting behaviour. Clearly those who negatively evaluated the current regulatory system in Oregon and who favoured the banning of new nuclear power plants would have stronger 'CON' attitudes than those who held the opposite views.

But, perhaps even more important than these differences in evaluations, there was considerable public disagreement in beliefs about the consequences of casting a CON vote. It appears that these belief differences were the major factors which distinguished those intending to vote PRO from those intending to vote CON. Table 4 shows that there was considerable disagreement about the effects of a CON vote. These disagreements are related to 3 basic issues: (1) the state's economy; (2) the energy crisis; and (3) the safety of nuclear power plants. Some people believed that adoption of the CON position would harm economic development in Oregon and increase unemployment, while others were uncertain about its effects on economic development and believed it would not increase unemployment. Not surprisingly those in the first group were much more likely to vote PRO while those in the second group were more likely to vote CON.

There was also considerable disagreement about the effects of the referendum on the energy crisis in general. There were some who believed that passage of the proposal (the CON position) would reduce funds for development of alternative energy sources, would eliminate a needed energy source, and would ultimately lead to a future energy shortage. Others felt that these outcomes were unlikely. As expected, those in the former group were much more likely to vote PRO while those in the latter group were much more likely to vote CON.

The final area of disagreement concerned the likelihood that success of the referendum proposal (the CON position) would make new nuclear plants safer than present ones, set up realistic standards for nuclear waste management, decrease danger from radioactive materials and wastes and reduce the threat of nuclear sabotage. It is interesting to note that it is in this area that some of the strongest differences in beliefs were found. In general, if a person believed that passage of the proposition (the CON position) would accomplish these goals, he or she was very likely to vote CON. On the other hand, if the person felt that risk reductions were unlikely outcomes of supporting the CON position, they were very likely to vote PRO.

What the analysis of the underlying cognitive structure of

attitude toward voting choice clearly indicates is that the central questions that seemed to decide the vote were those concerning safety (or avoidance of risk), economic benefits, and long-range implications for the energy crisis. In general, voters who believed that a CON vote would reduce nuclear hazard and increase safety without harming the economy or increasing the probability of an energy crisis supported the referendum proposal (i.e. voted CON). On the other hand those who believed that a CON vote would harm the economy and increase the likelihood of a future energy shortage without reducing nuclear risk or increasing safety, voted against the proposal (i.e. voted PRO).

Normative Beliefs and Voting Choice

It was shown above that in the present study attitudinal considerations were the primary determinants of voting intentions and behaviour. Though not as important, the subjective norm did contribute significantly to the prediction. Therefore, it is worthwhile to examine the determinants of the subjective norm in some detail. Moreover, it should be emphasised that for other populations and/or other issues subjective norms could be equal or more important than attitudes. In a manner similar to the previous attitudinal analysis the determinants of the subjective norm (the normative beliefs and motivation to comply with particular referents) were examined separately for the two voting groups. The mean values for the belief strengths (i.e. the strength of the perceived expectation that each referent would advocate a CON vote) and the mean level of motivation to comply with each of these referents are shown in Table 5. There are significant differences in the voters' perceptions of personal referents (family, friends and co-workers), each group believing that their own PRO/CON position is supported by these referents and each group equally motivated to comply with their expectations.

For the four public reference groups associated with the ballot issue, the voting groups agreed in all cases on the direction of the perceived advocacy. Both PRO and CON voters believed that 'the power companies', 'most government officials' and 'most nuclear experts' would expect them to vote PRO, while 'the environmentalists' would think that they should vote CON. There was, however, a significant difference between the voters in the strength of the perceived advocacy of the 'nuclear experts'. Those intending to vote PRO believed their position was strongly supported by the nuclear experts, whereas the CON voters (as a group) were barely convinced that the nuclear experts would advocate the PRO position, that is, would advocate a vote against restrictions on nuclear power plants. This finding suggests that voters accurately perceive the divided opinions among nuclear scientists.

Motivation to comply with the public referents was significantly different across the two voting groups for all referents except the environmentalists; and, again with this one exception, it was the PRO voters who had the greatest motivation to comply. The CON group were more motivated to comply with the environmentalists although this was not a statistically significant difference. Further, it appears that there was some ambivalence among the PRO voters with regard to the advocacy of the environmentalists. Consistent with this, previous studies have shown that those PRO nuclear energy take this standpoint despite significant concern about the hazards associated with nuclear waste. The finding here that the PRO voters clearly perceive the normative pressure from the environmentalist lobby in the direction contrary to their own position, and nevertheless express some level of motivation to comply with this expectation may be interpreted as an indication of their conflict with regard to environmental issues.

The differences between referents in their power to evoke compliance from the respondents, irrespective of voting intention, are also interesting. For the overall sample a comparison of the mean levels of compliance with the different referents were, in order of increasing compliance: (a) 2.54 - power companies; (b) 2.75 - co-workers; (c) 2.82 - most government officials; (d) 2.89 - close friends; (e) 3.39 - most members of my family; (f) 3.93 - environmentalists; and (g) 4.31 - most nuclear experts. This ordering is similar to that obtained by Harris (1975). For the public at large, scientists were rated the highest in inspiring 'a great deal' of confidence on matters relating to nuclear energy development. And, as in the present study, power companies elicited lower confidence rating than various government regulatory agencies. Confidence ratings for environmentalists were below scientists and above government agencies for the public at large, also consistent with the findings here. It seems that the general public is heavily influenced by the positions taken by scientists and nuclear experts, although environmentalist groups also effect voter decision-making.

DISCUSSION

The present study has demonstrated the predictive power of the Fishbein model when applied to voter decision-making in the nuclear energy area. The major predictions of the model were confirmed and it was shown to account for most of the variance in voting intention and voting behaviour. The two major components of voting intention, attitude toward the act (A_{act}) and the general subjective norm (SN) were well estimated by their subcomponents, $\sum_i^n b_i e_i$ and $\sum_j^m N b_j M c_j$ respectively. In

this study the attitudinal components of the model contributed considerably more to the prediction of voting intention and behaviour than did the subjective norm.

Detailed analysis of the cognitive structures underlying the attitudes of the two voting groups revealed important differences and similarities between those intending to vote PRO and CON nuclear energy. In general both groups of voters agreed on the values they placed on the possible consequences of the ballot, with the one obvious exception that the CON voters were considerably more in favour of the outcome 'a ban on more nuclear power plants'. Both groups of voters were well informed about the basic issues involved in the proposal, and the legal consequences of its passage (e.g. giving decision making power to state legislators and making plant operators financially responsible).

What ultimately appears to have influenced the direction of voting was disagreement (i.e. contrary beliefs) about the potential effects of the success of the proposal on three major issues: the economy, the energy crisis and improvements in nuclear safety. The positions taken on these issues clearly distinguished between the two groups of voters. It should be noted, however, that these were not the only issues which entered the public debate. The question of the constitutional status of the proposal was the subject of considerable discussion but did not, in the event, significantly differentiate those intending to vote PRO and CON.

Examination of normative beliefs and motivation to comply with referents perceived as relevant to nuclear energy issues also revealed some important similarities and differences between the two groups: PRO and CON voters each perceived those close to them as advocating a stand consistent with their own. In general they were also in agreement on the public stands taken taken by reference groups in positions of authority.

Application of the Fishbein model to the prediction of voting choice on a nuclear energy issue has provided considerable information on the cognitive structures of those intending to vote PRO or CON; and the findings are consistent with earlier studies. Clearly the scope of this preliminary study was geographically limited and the sample small, but the quality of the data suggest that the approach could usefully be applied on a larger scale to the exploration of beliefs and values underlying voting behaviour on energy issues and to the choice and importance of expert and normative referents. The model identified the real issues which distinguished between those intending to vote PRO and those intending to vote CON nuclear energy: a significant step forward for the understanding of voting choice.

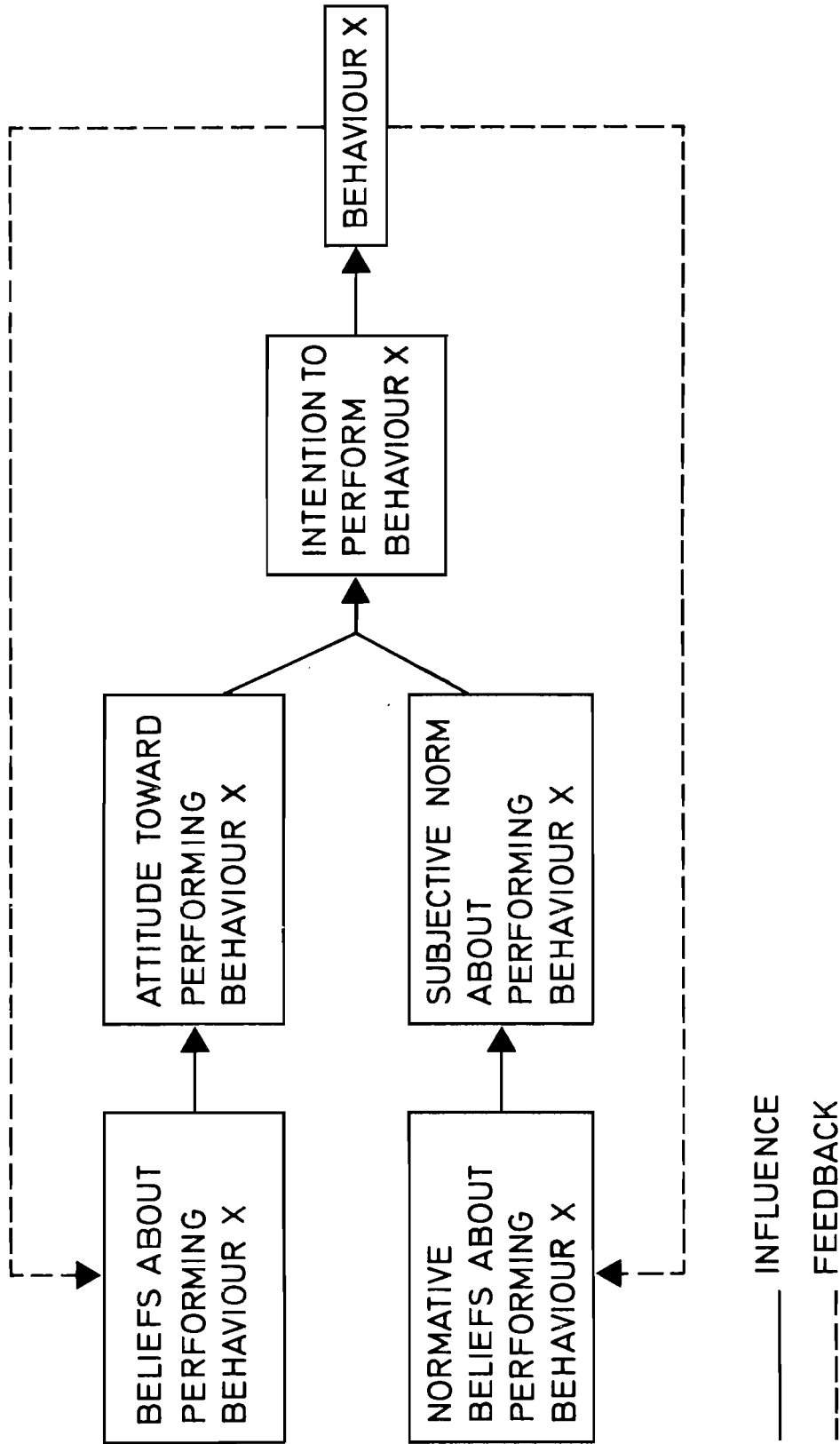


Figure 1 Schematic Representation of Conceptual Framework for the Prediction of Specific Intentions and Behaviours

TABLE I

EXAMPLES OF QUESTIONNAIRE ITEMS

1. Behavioural or voting intention (BI)

I INTEND TO VOTE "YES" ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE, BALLOT MEASURE NO. 9.

likely _____ : _____ : _____ : _____ : _____ : _____ : _____ unlikely
extremely quite slightly neither slightly quite extremely

2. Attitude toward the act of voting "Yes", (CON position, A_{act})

VOTING "YES" ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE, BALLOT MEASURE NO. 9.

good _____ : _____ : _____ : _____ : _____ : _____ : _____ bad
extremely quite slightly neither slightly quite extremely

wise _____ : _____ : _____ : _____ : _____ : _____ : _____ foolish
extremely quite slightly neither slightly quite extremely

harmful _____ : _____ : _____ : _____ : _____ : _____ : _____ beneficial
extremely quite slightly neither slightly quite extremely

3. Evaluations of the consequences (e_i)

MAKING NEW NUCLEAR PLANTS SAFER THAN PRESENT ONES

good _____ : _____ : _____ : _____ : _____ : _____ : _____ bad
extremely quite slightly neither slightly quite extremely

4. Belief about the act (b_i)

VOTING "YES" ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE, BALLOT MEASURE NO. 9, WOULD MAKE NEW NUCLEAR PLANTS SAFER THAN PRESENT ONES.

likely _____ : _____ : _____ : _____ : _____ : _____ : _____ unlikely
extremely quite slightly neither slightly quite extremely

5. Subjective norm (SN)

MOST PEOPLE WHO ARE IMPORTANT TO ME THINK I SHOULD VOTE "YES" ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE, BALLOT MEASURE NO. 9.

likely _____ : _____ : _____ : _____ : _____ : _____ : _____ unlikely
extremely quite slightly neither slightly quite extremely

6. Normative belief (Nb_i)

MOST MEMBERS OF MY FAMILY THINK I SHOULD VOTE "YES" ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE, BALLOT MEASURE NO. 9.

likely _____ : _____ : _____ : _____ : _____ : _____ : _____ unlikely
extremely quite slightly neither slightly quite extremely

7. Motivation to comply (Mc_i)

GENERALLY SPEAKING, WITH REGARD TO NUCLEAR POWER AND NUCLEAR POWER REGULATION, I WANT TO DO WHAT MOST MEMBERS OF MY FAMILY THINK I SHOULD DO.

likely _____ : _____ : _____ : _____ : _____ : _____ : _____ unlikely
extremely quite slightly neither slightly quite extremely

Table 2 Consequences of the CON Vote on which Voters Agreed on Both Beliefs and Evaluations

PERCEIVED CONSEQUENCES OF VOTING AGAINST NUCLEAR POWER ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE	AVERAGE BELIEF STRENGTH		AVERAGE EVALUATION	
	-3	\bar{B}	-3	\bar{E}
REQUIRE NEW TESTS OF NUCLEAR SAFETY SYSTEMS	2.0		1.5	
REQUIRE A DECISION ON A PERMANENT NUCLEAR WASTE DISPOSAL METHOD	1.8		1.8	
INCREASE PUBLIC PARTICIPATION IN NUCLEAR DECISIONS	0.5		0.6	
MAKE NUCLEAR POWER PLANT OPERATORS FULLY RESPONSIBLE FINANCIALLY FOR NUCLEAR ACCIDENTS	0.2		1.1	
ENSURE LOW-COST ELECTRICITY	-2.2		2.3	
GIVE REGULATORY CONTROL OF NUCLEAR POWER TO STATE LEGISLATORS	1.5		-1.4	
MAKE IT EASY FOR COMPANIES TO OBTAIN LEGISLATIVE APPROVAL FOR NEW NUCLEAR POWER PLANTS	-1.8		-0.1	
DENY FULL COMPENSATION TO THE VICTIMS OF A NUCLEAR ACCIDENT	-1.3		-2.1	

* DIFFERENCE SIGNIFICANT AT 0.05% LEVEL OR BEYOND  GROUP VOTING PRO  GROUP VOTING CON

Table 3 Consequences of the CON Vote where Voters Agreed on Beliefs but had Different Evaluations

PERCEIVED CONSEQUENCES OF VOTING AGAINST NUCLEAR POWER ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE	AVERAGE BELIEF STRENGTH		AVERAGE EVALUATION	
	-3	\bar{B}	-3	\bar{E}
A BAN ON MORE NUCLEAR POWER PLANTS	2.2		-2.4*	
(LEAD TO) COURT BATTLES OVER THE BALLOT MEASURE'S CONSTITUTIONALITY	1.6		-0.6	
MAINTAIN OREGON'S PRESENT SYSTEM FOR REGULATING NUCLEAR POWER	-1.3		1.0	



* DIFFERENCE SIGNIFICANT AT THE 0.05% LEVEL OR BEYOND  GROUP VOTING PRO  GROUP VOTING CON

Table 4 Consequences of the CON Vote on which Voters had Similar Evaluations but Disagreed on Beliefs

PERCEIVED CONSEQUENCES OF VOTING AGAINST NUCLEAR POWER ON THE OREGON NUCLEAR SAFEGUARDS INITIATIVE	AVERAGE BELIEF STRENGTH		AVERAGE EVALUATION	
	-3	\bar{B}	-3	\bar{E}
HELP STATE'S ECONOMIC DEVELOPMENT	-2.3*		2.1	
	-0.2		0.9	
INCREASE UNEMPLOYMENT	0.4		-0.7	
	-1.1		-1.4	
REDUCE FUNDS FOR DEVELOPMENT OF ALTERNATIVE ENERGY SOURCES	0.4		-2.2	
	-1.9		-2.7	
ELIMINATE A NEEDED ENERGY SOURCE	1.0		-1.7	
	-1.2		-1.1	
(LEAD TO) A FUTURE ENERGY SHORTAGE	1.8		-1.5	
	-0.6		-1.4	
SET UP REALISTIC STANDARDS FOR NUCLEAR WASTE MANAGEMENT	-1.3*		2.4	
	1.6		2.6	
DECREASE DANGER FROM RADIOACTIVE MATERIALS AND WASTES	-0.7*		2.3	
	2.0		2.8	
REDUCE THE THREAT OF NUCLEAR AND SABOTAGE	-1.1		2.5	
	0.7		2.7	
MAKE NEW NUCLEAR PLANTS SAFER THAN PRESENT ONES	-0.2		2.1	
	2.0		2.4	



* DIFFERENCE SIGNIFICANT AT 0.05% LEVEL OR BEYOND

GROUP VOTING PRO

GROUP VOTING CON

Table 5 Mean Scores of Normative Beliefs and Motivations to Comply for Those Intending to Vote PRO and CON Nuclear Energy.

REFERENTS WHO MAY BE PERCEIVED AS ADVOCATING A VOTE AGAINST NUCLEAR POWER (CON)	MEAN NORMATIVE BELIEF SCORE		MEAN MOTIVATION TO COMPLY SCORE	
	-3	0	+1	+4
MOST MEMBERS OF MY FAMILY	-1.8*		3.3	
	1.3		3.5	
MY CLOSE FRIENDS	-1.5*		3.0	
	1.6		2.7	
MY CO-WORKERS	-1.8*		2.8	
	0.8		2.6	
THE POWER COMPANIES	-2.2		3.6*	
	-2.6		1.4	
THE ENVIRONMENTALISTS	1.8		3.3	
	2.3		4.7	
MOST GOVERNMENT OFFICIALS	-0.9		3.5*	
	-0.7		2.0	
MOST NUCLEAR EXPERTS	-2.2*		5.4*	
	-0.4		3.3	

* DIFFERENCE SIGNIFICANT AT 0.05% LEVEL OR BEYOND  GROUP VOTING PRO  GROUP VOTING CON

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