1. Background

Election studies both in Britain (as elsewhere) have been criticised for neglecting the complexity of voter preferences and behaviour (e.g. Dunleavy, 1990). Our research has built on previous work that elaborated theory and models of discrete choice (Skrondal and Rabe-Hesketh, 2003); that uses multilevel modelling approaches to take into account geographical context (e.g. Jones et al, 1992); and research based on longitudinal data using various methods including structural equation and multilevel models (e.g. Evans and Andersen, 2006; Barbosa and Goldstein, 2000). More recently our conceptual understanding has evolved to suggest connections to other areas of research. Two in particular have been identified. The first concerns the contrast between *stated* or *expressed* preference and *revealed* preference (Ben-Akiva et al. 2002; Mark & Swait, 2004), and how tactical voting may be usefully considered as an example. The second concerns the concept of latent ignorability used in some approaches to missing data where preference-dependent electoral turnout provides an example.

Understanding of voting behaviour has been hampered by a number of methodological constraints, which have a particular bearing on analysis of centre parties and third parties and on the treatment of non-voters. First, methods of analysis for binary choices are both generally available and widely understood. Consequently much analysis is cast as analysis of a target party versus the remainder. For third parties especially in the 'centre ground' this is problematic. Recent electoral trends, including the rise in third party voting and in abstention, make this problem more acute.

Second, standard models for polytomous choice, i.e. multinomial logit models, assume that, when choosing from a set of alternatives, the odds of choosing between pairs of alternatives should be independent from the preference for other alternatives in the set (Luce, 1959). In a political context this assumption of Independence of Irrelevant Alternatives (IIA) means that, except through the effects of included covariates, preference for one party over another should not be related to preference for a third (see also Alvarez and Nagler, 2000; Dow and Endersby, 2004). In practice this is unlikely to be the case as voters view certain parties (e.g. Labour and Liberal Democrats) as being 'closer' to one another than to others (e.g. the Conservatives).

Third, the common practice of analysing the party voted for even where party-ranking information may be available is inefficient for smaller political parties. In a single member simple plurality system, the voter is normally faced with (at best) two realistic options both nationally and locally (Duverger, 1954; Cox, 1997). Because of this, and the inevitable potential for strategic rather than sincere decision-making, votes cast do not necessarily fully reflect the true distribution of preferences (see McKelvey and Ordeshook, 1972).

Fourth, there is now widespread recognition that local context plays an important part in the voting decision (e.g. Cox, 1969; Agnew 1987; Johnston et al, 1988). Coupled with the apparent growth of tactical voting this trend emphasizes the need to take into account local factors when modelling voting behaviour including the tactical situation or marginality in an electoral district or constituency.

Our research draws on data from the British Election Panel Study (BEPS), the British Election Survey (BES) and also the European Social Survey (ESS) and uses Generalized Linear, Latent and Mixed Models (GLLAMM) in order to deal with the issues above in an integrated modelling framework. As noted above, by examining both voter preferences and voting behaviour we are able to explore the more general problem of understanding the relationship between expressed preferences (in this case party ratings) and revealed preference (vote), and the circumstances in which the two diverge.

2. Objectives

The objectives as stated in the proposal were:

1. To develop methods that properly reflect choice in a multi-party system and to assess the limitations of analyses of voting based on dichotomous outcomes
2. To provide a better understanding of the various factors affecting party preferences and changes in party preference, especially in relation to centre parties
3. To improve understanding of factors affecting non-voting

4. To use longitudinal data to better understand the relationship between changing party preference and ideological proximity, whilst allowing for unobserved political propensities
5. To explore the role of contextual factors on party preferences and preference changes using a multilevel framework

In relation to objectives 1 and 2 the `gllamm` framework is used to more faithfully model polytomous choice amongst political parties. We used ranked preference data within this framework to improve estimation of preference for centre parties (compared to using vote alone). Joint models of preference and vote also allowed us to measure the extent of 'insincere' or non-preference voting, reported in a paper submitted to *Political Analysis*. This is further developed in a paper to be submitted to *Journal of the Royal Statistical Society (Series A)* which simultaneously models voter preference, vote choice and abstention. Objective 2 is also dealt with in this paper, and also in an extension of this work in a paper submitted to *Political Geography* that looked more explicitly at the impact of strategic considerations in the conversion of preference into vote. These models are reported in more detail in section 4 below.

Objective 3 is dealt with in three articles. In the *JRSS(A)* article (section 4.3) non-voting is modelled as a choice that may be related to political preference and constituency context, an approach which corresponds to an assumption of latent ignorability, a tractable and structured form of non-ignorable non-response.

Non-voting is also dealt with in a paper in press in the *European Journal of Political Research* (EJPR) which examines the abstention of young people in a multilevel comparative context; and in a paper which uses latent class analysis to identify sources of heterogeneity in non voters (a CCSR working paper, to be submitted to *Journal of Elections, Public Opinion and Parties;* see section 4.2). Multilevel structure was taken into account in all our models by the development of the `gllamm` program to estimate robust standard errors that reflect clustering in the sample (objective 5). Objective 5 is

also dealt with in the EJPR paper which was based on a multilevel analysis of data from the European Social Survey.

The analytical task that we have attempted has been a complex one, requiring careful consideration of available measures, substantial extension of our conceptual understanding, frequently extended periods of computation and much experimental analysis to determine the requirements for sound empirical identification of all model parameters. The modelling framework we applied was structured around latent political propensities indicated by various expressions of party preference. For many analyses this made the explicit consideration of issue proximity unnecessary, and so we have not explored this objective (4) in the detail we had initially thought necessary. Further work is ongoing that incorporates issue positions, using alternative spatial models of voting.

3. Methods

The modelling framework required the ability to analyse incomplete multivariate discrete choices. The `gllamm` program (Rabe-Hesketh, Pickles and Taylor, 2001) was used, a Stata procedure that implements the GLLAMM framework elaborated by Skrondal and Rabe-Hesketh (2004). This allows multilevel structural equation modelling of multivariate responses drawn from the GLM family and where the latent variables may be multivariate normal or discrete. This covers an enormous range of standard models and in addition a range of comparatively unexplored and novel possibilities. In the course of the project we found that we needed to make use, often simultaneously, of many features of `gllamm`. These included multinomial choice with alternative specific covariates, latent classes with covariate-dependent class probabilities, and adjustment of standard errors for clustering of data by electoral district.

We constructed models to analyse jointly 3-party ranked stated preference, 3-party vote choice (not ranked) and the binary choice to vote or abstain. The association among these responses was explained by their common dependence upon latent preference distributions, in addition to covariates. The latent preference distributions were then examined in respect of both their association with potential covariates, and their form – in

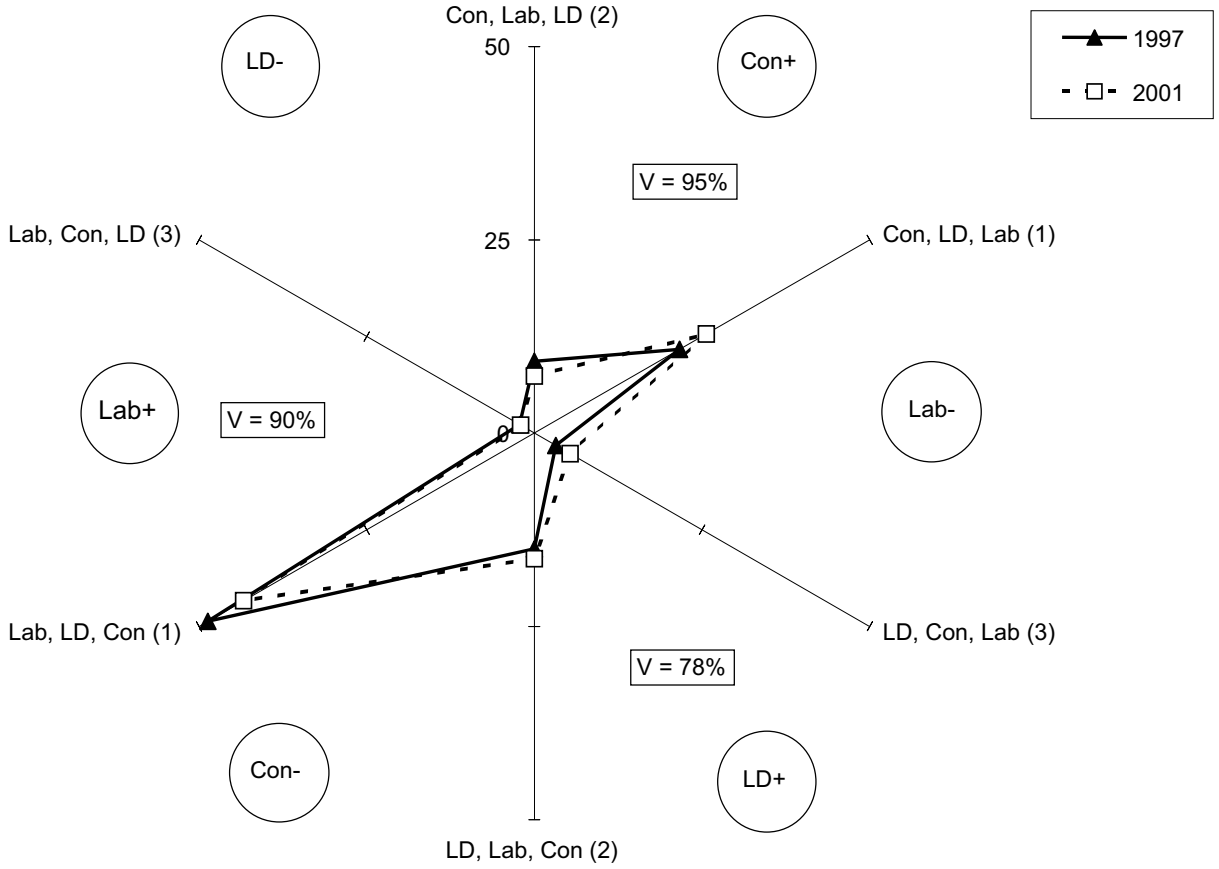
particular whether latent classes provided an improved representation over normal latent variables. The reason for joint analysis of these variables was two-fold. First, through the use of the missing data properties of maximum likelihood, to account for selective non-response (i.e. non-voting). Second, to exploit the distinctive association with covariates of one response as compared to another, both to improve model identification and to estimate particular effects of interest (e.g. tactical voting can be conceived of as the contrast between vote and latent preference).

4. Results

Complex data structures can be investigated in many ways. A permutahedron (e.g. Zhang, 2004), a graphical representation of Kendal's τ correlation coefficient for ranked data, is used in Figure 1 to display party rankings by voters from the 1997 and 2001 BEPS. Each of the six potential rank orders is assigned a radius and the percentage with this ranking is plotted. Axis (1) is the dominant Lab-Con axis, axis (2) the secondary LD-Con axis. The circles indicate the primary party orientation of each sector. This clearly shows the anti-Conservative (Con-) sector dominating the others at these elections. The "V" boxes show the percentage voting for their top-ranked party. The Liberal Democrats have a much lower vote-return, given their preference share, than the other parties.

Appealing as they are, such methods do not provide an objective basis for inference, however. In Figure 1 for example, it is not clear whether preference structure changes significantly over elections. Statistical modelling does provide such a basis. The modelling approach has the advantage of allowing estimation of covariate effects and structured contrasts, dealing with missing data and selection, and providing an inferential framework with test statistics and confidence intervals.

Figure 1. Variation on a permutahedron showing percentages of party preference rank orders for BEPS-2 waves 1997 and 2001, and percentage of vote for most preferred party (from Political Geography article)



The applications of the modelling approach fall into three main areas. First we examined the relationship between expressed political preferences and revealed preferences as indicated by vote (cf. Figure 1). We also explored the contextual circumstances in which expressed preferences differed from revealed preferences, in particular looking at insincere or strategic voting. Second we examined the decision to vote, looking in particular at the heterogeneous nature of non-voters. Finally we attempted to integrate these two dimensions by jointly modelling abstention, preference and vote in an integrated modelling framework. These final models in particular are complex and have required considerable thought and experimentation in their specification and estimation, and further work to elaborate their interpretation. In a number of instances we have been

able to confirm the basic structure of the models using older more ad hoc methods of representation such as shown in Figure 1. We now summarise the main findings in each of the three areas in more detail.

4.1 Models of preference and vote

The first phase of the project was concerned with developing a joint, mixed logit model of expressed preferences (as measured by ranked party-liking scores), and revealed preference as measured by vote. Mixed logit is a model of multinomial choice which is more general and imposes fewer restrictive assumptions than other common discrete-choice models, such as multinomial logit or probit (Glasgow, 2001; Train, 2002). We demonstrate the flexibility of mixed logit with an approach which jointly models discrete-choices and rankings, and which specifies the resulting model with latent classes of unobserved preference rather than the more usual continuous distributions. The models are applied to data from the 1997 and 2001 BEPS, where they provide a novel way of modelling strategic voting. Vote choice and ranked party preference are jointly modelled, and the discrepancies between these indicators of underlying partiality are accounted for with variables reflecting the strategic situation in each electoral constituency.

Skrondal and Rabe-Hesketh had proposed the addition of random effects (η) to the Luce multinomial decomposition of ranked data (i.e. party ranking) to give

$$\Pr(\textit{Ranking}123 \mid \mathbf{x}_j, \eta_j^a)$$

$$\iint_{\eta_j^1 \eta_j^2} \frac{\exp(\boldsymbol{\beta}^1 \mathbf{x}_j + \eta_j^1)}{1 + \exp(\boldsymbol{\beta}^1 \mathbf{x}_j + \eta_j^1) + \exp(\boldsymbol{\beta}^2 \mathbf{x}_j + \eta_j^2)} \cdot \frac{\exp(\boldsymbol{\beta}^2 \mathbf{x}_j + \eta_j^2)}{1 + \exp(\boldsymbol{\beta}^2 \mathbf{x}_j + \eta_j^2)} \mathrm{d}h(\eta_j^1 \eta_j^2) .$$

As illustrated in Figure 2 we extended this to consider not just stated preference (ranked party preference) but reported vote as an additional response variable. Both responses are indicators for party-specific latent variables that model the stable party-political traits underlying observed preferences, allowing correlation between choices and so avoiding the restrictive IIA assumption. Ranked approval ratings were used to characterize the

underlying political preferences in the presence of insincere (non-preference) voting. Our primary interest was in examining the factors that lead to discrepancy between stated preference and vote. (This involved vote-specific covariate effects, analogous to direct effects within a MIMIC structural equation model.) In particular we examine how tactical motivations affect the relationship between underlying political preferences and vote choice, and examine the role of constituency context in determining the scope for strategic voting. As well as allowing for the objective conditions which might be expected to encourage strategic voting, we also explore the role of subjective motivations for vote choice using self-reported tactical voting.

In addition, in the absence of a large numbers of covariates we found that any assumption of Gaussian random effects was implausible, and much improved fits were obtained by a two-dimensional discrete distribution.

Figure 2. Illustration of model specification (figure 1 from Political Analysis article)

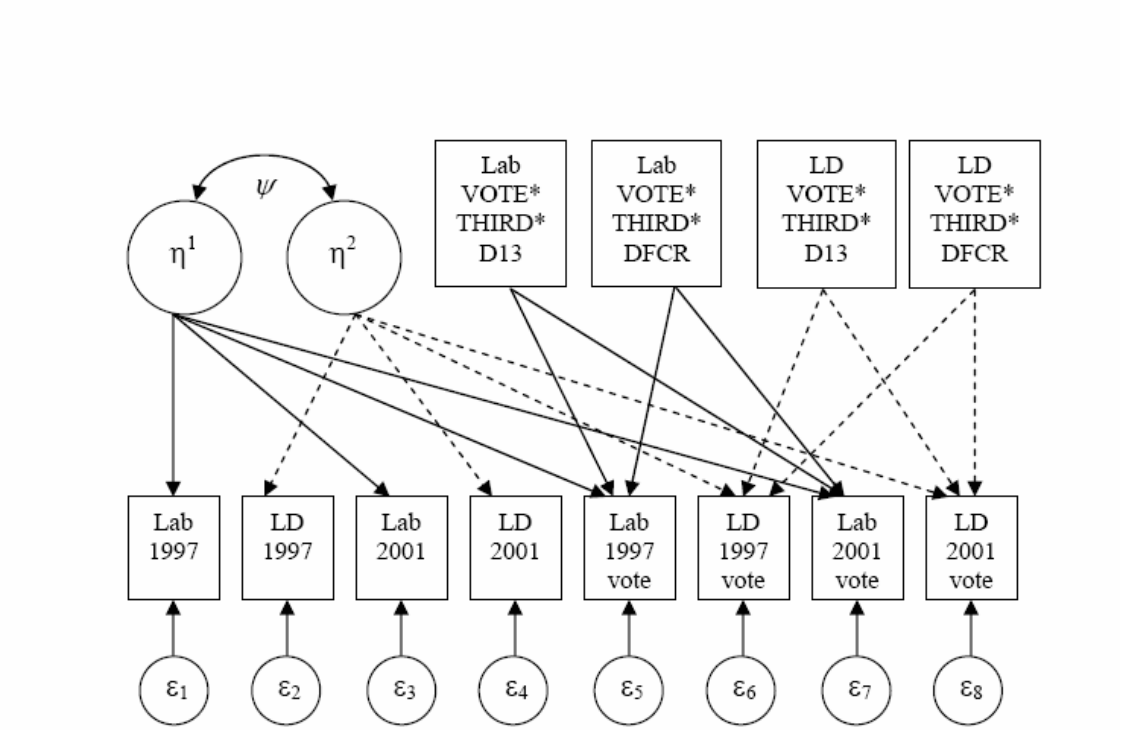


Figure 1: Mixed Multinomial Logit model of Labour (Lab) and Liberal Democratic (LD) parties (in relation to the Conservative party) in 1997 and 2001. Arrows denoting Lab effects are solid, LD arrows are dashed. Larger circles represent latent party political traits for Lab (η_1) and LD (η_2) (their correlation is denoted ψ); smaller circles (ε_1-ε_8) represent error in the fixed effects estimates (not models parameters, as fixed by logistic distribution). D13 = vote share distance between party in first place and party in third place. DFCR = Distance from contention ratio (i.e. D23/D12)

Specifying the latent variables with discrete distributions produced four distinct latent classes. The Labour and Liberal Democrat classes were found to be distinct members of a predominately centre-left bloc whose members seemed prepared to share votes strategically against the Conservatives (cf. Figure 1). Although the Liberal Democrat class was found to exist between the two major parties in preference-space (and "nearer" to Labour than the Conservatives) it was found to be an oversimplification to place the parties on a single, left-right political continuum (see Figure 3). Rather, a significant minority who did not have "single-peaked" preferences meant that models with two (albeit highly correlated) dimensions of latent political traits were required.

Figure 3 Latent political space (figure 2 from Political Analysis article)

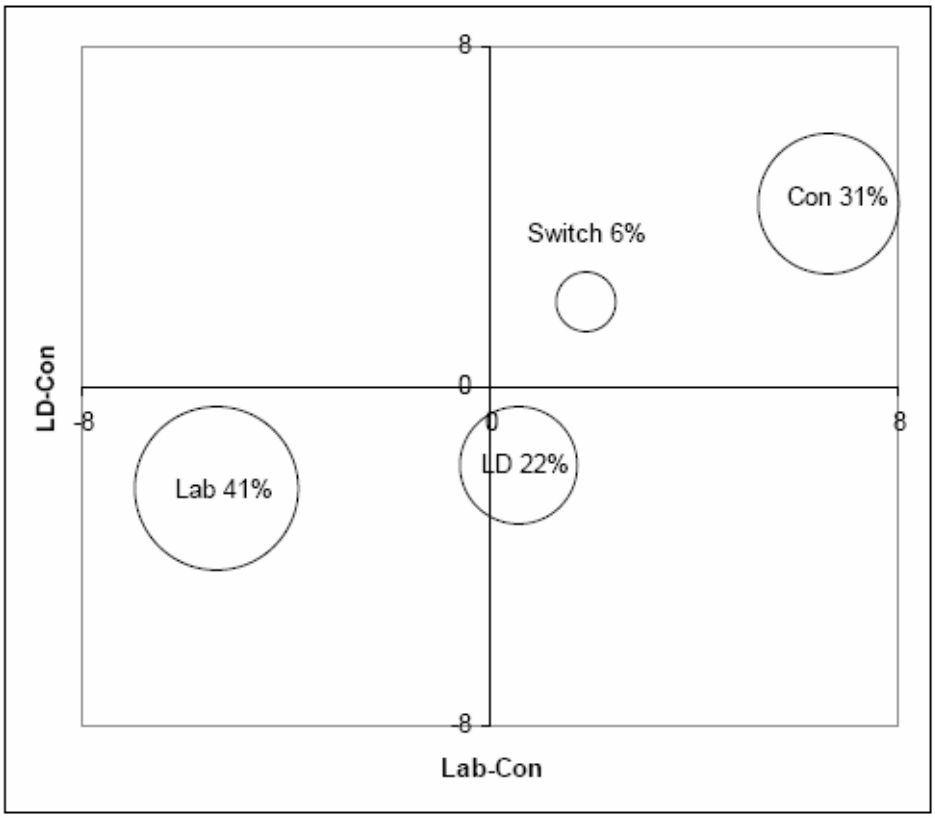


Figure 2: Graph of latent political party trait space from Model 3. The x-axis is the Lab-Con dimension, the y-axis the LD-Con dimension. The four latent classes are plotted in this space, labeled with plausible party / ideological affiliation (Lab = Labour, LD = Liberal Democrat, Switch = Party Switchers, Con = Conservative) and the percentage of respondents in the class.

This multidimensionality was attenuated with the addition of strategic-voting and demographic information into the models. A naïve model of preference and vote that did not take the strategic local situation into account was found to be mis-specified. Information regarding strategic context was found to be more informative of the discrepancy between preferences and vote than was a self-reported measure of strategic voting. Whilst it is important to acknowledge that not all non-preference voting need be strategic, as other non-strategic motivations may exist (e.g. protest voting) the clear association between non-preference voting and objective conditions for strategic voting

suggests that even where voters cannot or will not articulate a strategic motivation when asked, voters are less likely to vote for their preferred party where it has no chance of winning. This implies strategic voting may be more widespread than estimates based on subjective measures alone would suggest (Niemi et al, 1993).

A comparison of predicted votes based upon the full model and a model with no 'strategic' variables suggested that 9% of the votes were sensitive to these variables. This provided an estimate of strategic voting that combines non-preference voting, self-reported motivation as well as the objective contextual conditions. The estimate is rather lower if we only consider the objective conditions for strategic voting (see nominated output 1). As hypothesized, and consistent with the Duvergian model of strategic voting, it was the vote of the smallest of the three main parties, the Liberal Democrats that was found to be most sensitive to strategic factors, and the net losers of strategic voting.

4.2 The decision to vote

Very often models of abstention are based on a rather restrictive assumption that factors affecting the decision to vote operate in a uniform way across electorates. In reality electors are heterogeneous, placing different weights on different considerations and arriving at decisions via different routes (Sniderman et al, 1991; Bartle, 2006). For example it has been widely argued that relatively sophisticated voters differ in how they reach their decisions compared to less sophisticated voters. In regard to abstention, this means very simply, different people have different reasons for not voting. Despite this there have been relatively few attempts to describe the heterogeneous nature of non-voters (exceptions include Ragsdale and Rusk, 1993; Pattie and Johnston, 1998), and where this has been attempted, non-voters have been treated as a discrete subset of the electorate.

Latent class analysis is useful for modelling unobserved heterogeneity, i.e. when there exist different sub-groups within a population that are not defined by simple functions of their measured characteristics. In a standard latent class analysis the observed class

indicators are assumed to be conditionally independent (i.e. uncorrelated) given the latent class variable. The presence of correlations between the indicators that are not accounted for by the latent class variable can lead to models with spurious additional classes providing the best fit to the data. Fortunately the conditional independence assumption can be relaxed. We employ a factor mixture model, fitted in MPlus, in which dependence among indicators is structured within classes by a common factor model (Lubke and Muthén, 2005). In this case the factor structure is specified in advance based upon prior theory (i.e. a confirmatory factor model). An advantage of this approach is that it decomposes the scores on the observed questionnaire items into factors representing the 'pure' constructs of interest, free from measurement error. The classes are then based upon clusters of respondents with similar profiles of scores on the latent factors.

Our analyses confirm our hypothesised dimensions of what we call electoral disposition, which reflect electors' orientation towards (i) the political system; (ii) political parties; (iii) their level of political support and (iv) their level of cognitive engagement. We identified five distinctive classes of electors which display different attitudes towards these underlying dimensions, and also have different socio-demographic and social characteristics and, perhaps most notably, different propensities to abstain both voluntarily or due to circumstances. Because our analyses include both voters and non-voters alike, the propensity to vote varies across classes. There is, in other words, no a priori assumption that non-voters are a discrete subset of the electorate, but rather they are drawn disproportionately from sections of the electorate which are characterised by particular attitudes and characteristics. Two of the five classes were predominantly voters and three represented different types of non-voter.

The differences among the two classes made up mainly of voters were not our main concern. Suffice to say these classes are differentiated by their level of cognitive engagement (reflecting the extent to which they are interested in, discuss and know about politics), their social class and their level of education. They are also differentiated by the extent to which they report having been contacted by political parties prior to the election.

Turning to the three predominantly non-voting classes, our analyses reveal some important differences among non voters. First, not all abstainers are uniformed and uninterested in politics. In keeping with Inglehart's (1977) identification of a 'post-materialist' agenda and the link between this and declining political support (Dalton, 2004) a small but interesting sub-group of the electors are highly engaged in politics in general at a cognitive level, but have little sense that it is their duty or obligation to vote, and they exhibit low levels of political support for authorities and institutions. Electors in this class have little instrumental motivation to vote as they are not party oriented, and nor do they vote out of duty to the democratic system since they are not system oriented.

This high level of cognitive engagement is in stark contrast with the stereotypical non-voter, the perception of which is probably much more in keeping with another class, members of which are both the least likely to vote and the least cognitively engaged. What this class does share with the 'non-conformists' is a low level of system orientation, political support and party orientation. The latter indicates that members of this class are more likely to be indifferent towards or alienated from the major parties. Indeed, this class has the lowest levels of party orientation of all classes, emphasising the important link between indifference, alienation and abstention (cf Brody and Page, 1973).

A third group of non-voters in many ways resemble the 'dutiful voter': they share a sense of duty and a reasonable level of cognitive engagement, and also have some distinct preferences for one party over another. Although their level of political support is low they are not detached from the party system and in many cases may vote. When they do not vote it is (ostensibly) because of circumstantial reasons. This may be genuine, thus explaining their similarity to voters in other respects. Equally this may be a case of 'finding an excuse' for not voting, or rationalising their abstention to prevent any discordance with their affinity to the democratic system. Either way this would suggest that this group is potentially open to the mobilisation efforts of political parties. Indeed it may be that under the right circumstances (e.g. in a close run election) this group would vote in much greater numbers. There is potential for further exploiting the flexibility of the latent class factor analysis approach to test such hypotheses directly.

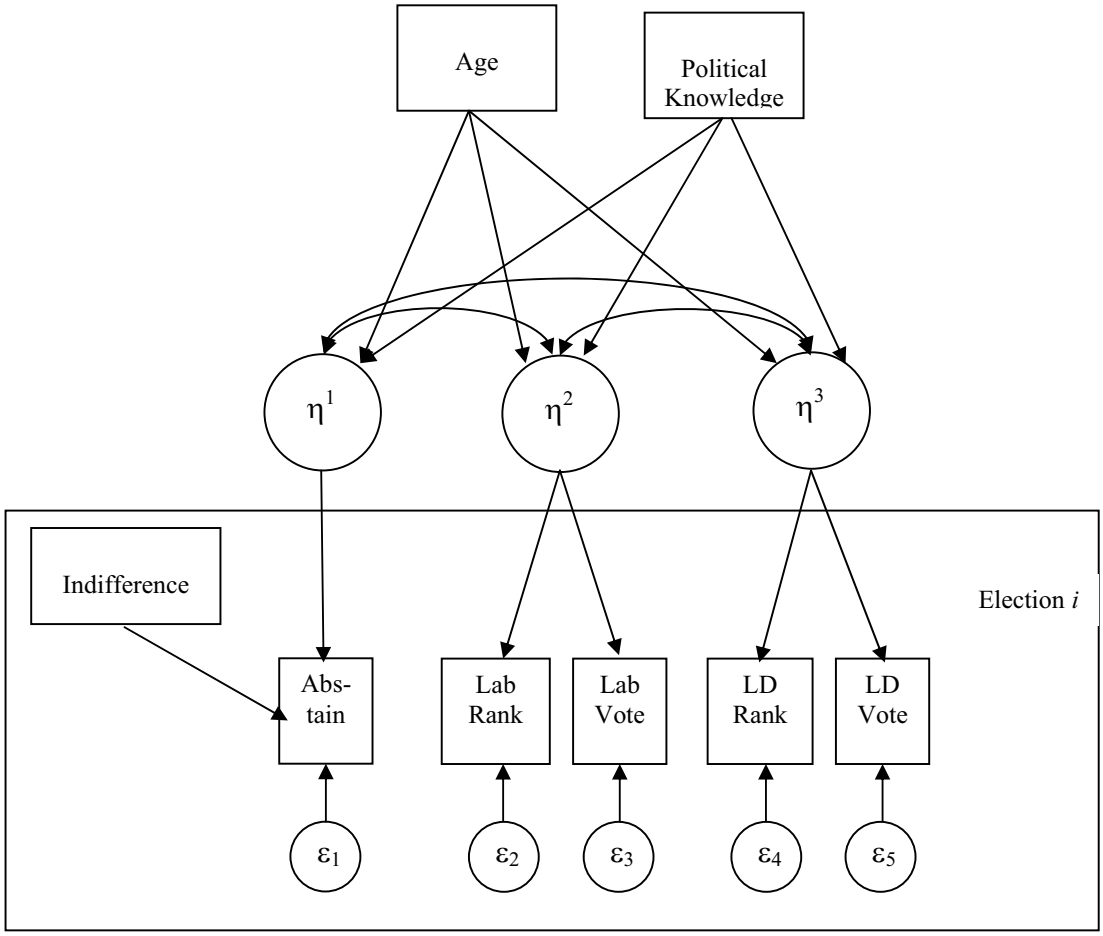
A second strand of research into modelling non-voting focussed on the multilevel dimension. This part of the research examined national variations in turnout for young people across Europe using data from the ESS, and multilevel logistic regression models (fitted in MLWiN) to understand these differences. Greater variation was found between countries amongst younger voters than older ones and the models suggested that there were greater differences in the impact of being young where turnout was lower. This suggests that young people are more sensitive to factors affecting turnout across countries. The characteristics of young people were measured in relation to three major theories of political participation: rational choice theory, social capital theory and civic voluntarism. The impact of electoral context was measured by the general level of turnout in each country. The models also allowed us to examine the extent of country level variation in young people's turnout, and whether this was explained by individual level and/or country level factors (Franklin, 2004). We found that whilst variation between countries for young people was related to the overall level of turnout, significant variation still remained after accounting for this. This variation was partly attributed to different individual-level characteristics and attitudes.

4.3 Integrating voting decision and preference

The final analyses extended the party preference and voting models to consider the impact of abstention. Whilst all electors may hold attitudes concerning the relative desirability of each party, for some electors these preferences are not expressed by voting. Rather than ignoring the preferences of non-voters we attempt to build them into a single integrated modelling framework. This was done by including abstention as a further response variable in the joint likelihood and in its simplest form corresponds to the latent variable setup of the Hausman and Wise non-ignorable non-response model, also described by Muthen as latent ignorability. The initial model considers party preference, party vote and abstention across the 1997 and 2001 elections (Figure 4). Abstention, as well as party preference, is now represented by a latent variable (large circles). The indifference variable, strongly predictive of vote but, of course, unrelated to party preference, helps identify the abstention latent variable. The best fitting model used

discrete distributions for the latent variables, 5 latent classes in all. Latent class membership was significantly predicted by age and political knowledge.

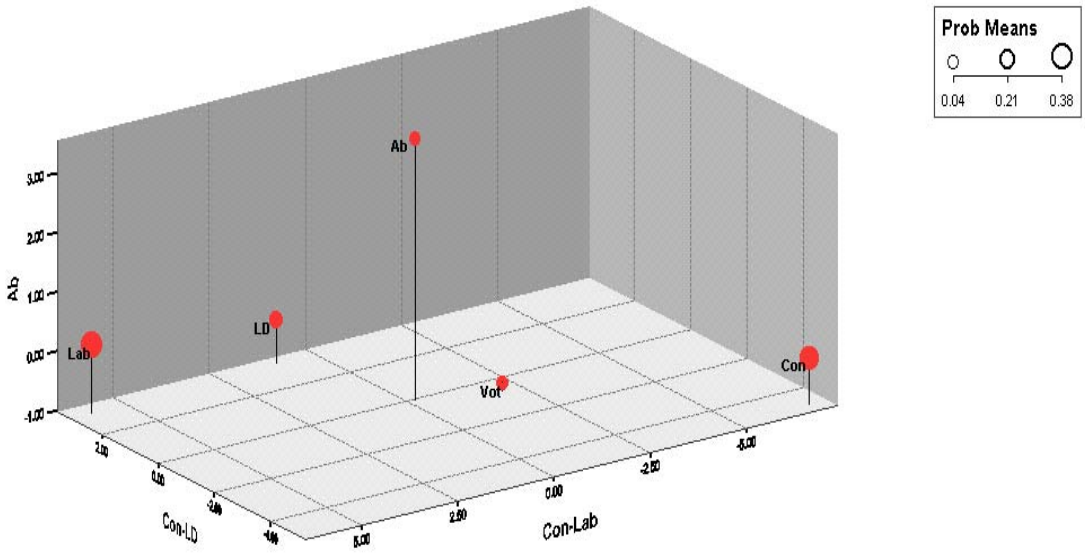
Figure 4. Model structure incorporating abstention as a latent trait



The locations of the five latent classes are plotted in latent "party-preference/abstention" space in figure 5. The x-axis (left-right) is the Lab-Con dimension, the z-axis (in-out) the LD-Con dimension. The y-axis (up-down) is the abstain-vote dimension. The party-specific classes Lab, Con and LD were the largest, with Lab and Con polarised across preference space and LD nearer to Lab. Two classes were identified near the centre of the preference space, indicating those who switched party allegiance across elections. One of these classes was very unlikely to vote, the other exceeding likely. The former tended to

be younger and less politically informed, the latter were undistinguished by these variables from the stable partisan classes. The model provides further evidence of a link between the propensity to abstain and indifference between the major parties.

Figure 5. Latent political party trait space with abstention.



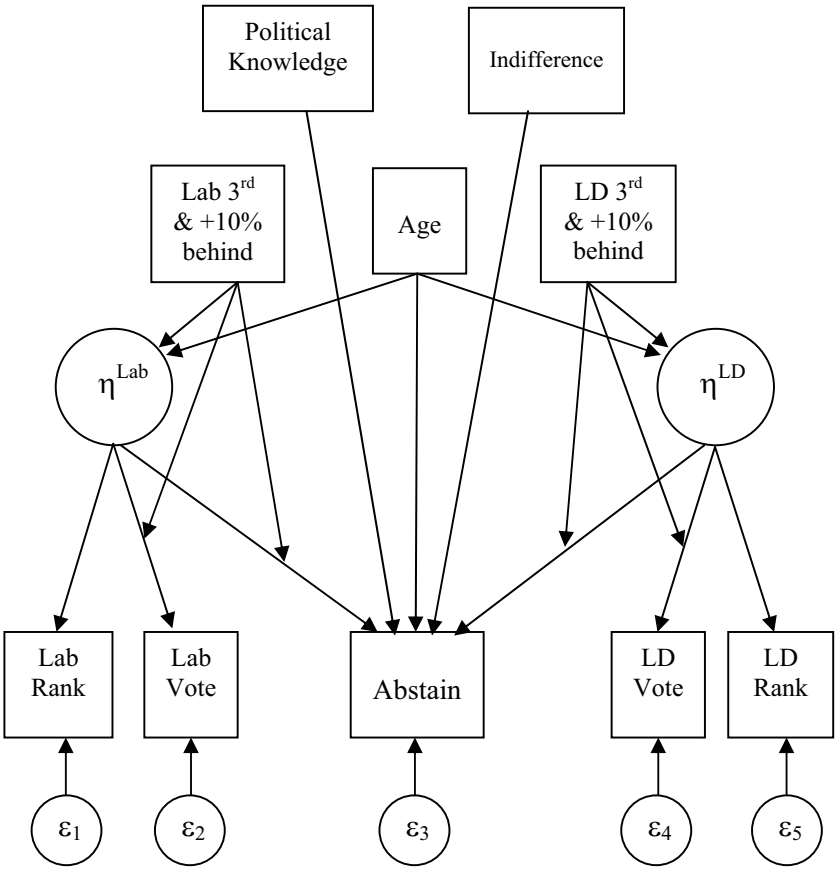
Key (class labels): Lab = Labour, LD = Liberal Democrat, Ab = non-partisan abstainers, Vot = non-partisan voters, Con = Conservative.

However, as in the contrast of vote and preference, constituency conditions were likely to influence not just the amount of abstention but the strength of the association between party preferences and abstention. An extension that is possible within `gllamm` models is to allow covariate-moderated factor loadings. Thus in the most novel and challenging of our models we examined the effect of measures of the local constituency electoral environment that were allowed to influenced the strength of association between party preference latent variables and the vote and abstention responses. In other words we

examine the possibility of tactical abstention as well as tactical switching in a psychologically plausible fashion.

In this model, shown in Figure 6, we treat abstention as a moderated outcome of party preference and other covariates, not as a latent trait (thus the model is based on one election only). The model makes the novel innovation of using the strategic contextual variables to moderate the link between the latent variables and abstention, as well as loading directly on latent preference (the latter to control for the greater likelihood of finding, for example, Labour identifiers in areas where Labour is strategically well positioned). Initial results indicate three latent classes clustered around support of each of the three main parties with political knowledge differentiating between Labour support (low) and Liberal Democrat support (high). As hypothesised, the link between preference and vote is greatly weakened where electors' preferred parties are not in a position where they are likely to win the constituency contest. This work is ongoing and will be reported in full in a paper to be submitted to JRSSA.

Figure 6. Model of preference, vote and abstention with constituency context



4.4 Concluding remarks

This project was not intended to deliver detailed analysis comparing the relative predictiveness of an extensive range of covariates. Instead, the focus has been on examining alternative model structures for dealing with the analysis of selectively available and context-dependent expressions of party preference. We have built on elements from structural equation, discrete choice, latent class and multilevel modelling, have implemented a number of novel elements that arise from their combination, and have shown how this allows the estimation of various examples of well-defined specific effects of particular interest. Models richer in covariates will follow. Context-dependent expressions of preference are found in many other fields and we believe these structures to be relevant well beyond our immediate area of application.

6. Activities and outputs:

We have been active in disseminating results from out work through regular conference presentations and through submitting papers to academic journals and publication of working papers. These are detailed below.

6.1 Conferences and seminars

- A project overview was presented to the EPOP annual conference, Cardiff, 12-14th September, 2003.
- An exposition of the modelling framework and some initial data was presented to invited seminars at the Department of Architecture and Plannning, University of Manchester, March 2005 and to the Department of Maths and Statistics, University of Wollongong, Australia, December 2003
- Preliminary modelling results of party preference and voting were presented to a seminar at CCSR, University of Manchester, UK, March 2004
- Fieldhouse, E. Shryane, N., Pickles, A. Johnson, J. and Purdam, K. 'Party preferences and vote in a multi-party, simple plurality system: an analysis of Liberal Democrat support and vote using the generalized linear, latent and mixed models framework.' Presented at the PSA annual conference, University of Lincoln, 5-8th April, 2004
- Fieldhouse, E. Shryane, N. and Pickles, A. '*Modelling voter preferences: a multilevel, longitudinal approach*' presented to the EPOP annual conference, University of Oxford, 10-12th September, 2004
- Johnson, J. (2004) "Identification, preference or tactical vote? Liberal Democrat support 1997-2001" Paper given at the Graduate Workshop in Electoral Behaviour, Nuffield College Oxford, 19th May 2004.
- Pickles, A., Shryane, N. & Fieldhouse, E. 'Joint analysis of ranked preferences and electoral voting to identify patterns of tactical voting' Presented at 'Recent Advances In Multilevel Modelling Methodology And Applications', a Joint

Meeting of the Royal Statistical Society, Social Statistics Section/ General Applications Section. October 19th 2004,12 Errol Street, London, EC1Y 8LX.

6.2 training

The research conducted for the project has made a significant contribution to developing training materials for other researchers. These covered materials explaining and illustrating the analysis of ranked responses and alternative-specific covariates.
Training events using materials generated by project:

- Generalized Linear Latent and Mixed Models (3-days). September 2005. University of Manchester.
- Generalized Linear Latent and Mixed Models (5-days). 33rd Spring Workshop, ZentralArchiv für empirische Sozialforschung, Cologne, Germany. (2004)
- Introduction to Panel data Analysis (2-days). ESRC Spring School, University of Oxford (2005)

6.4 Proposed and submitted papers

Fieldhouse, E. Shryane, N. and Pickles, A. *Modelling multiparty elections, preference classes and strategic voting.* CCSR working paper 2006-01.. http://www.ccsr.ac.uk/publications/working/2006-01.pdf

Fieldhouse, E., Pickles, A. and Shryane, N. Strategic voting and constituency context: modelling party preference and vote in multiparty elections. *Political Geography* (under review)

Fieldhouse, E., Shryane, N. and Pickles, A. (forthcoming). Mixed logit modeling of vote and party preference using latent classes: An application to strategic voting. *Political Analysis* (under revision)

Fieldhouse, E., Tranmer, M. and Russell, A. (2006). Electoral participation of young people in Europe: evidence from a multilevel analysis of the European Social Survey. *European Journal of Political Research* (in press)

Shryane, N. Fieldhouse, E. and Pickles A (2006) *Abstainers are not all the same: A Latent Class Analysis of heterogeneity in the British electorate in 2005*. CCSR Working papers, 2006-3. http://www.ccsr.ac.uk/publications/working/2006-03.pdf (Planned submission to *Journal of Elections, Public Opinion and Parties)*.

Pickles, A., Shryane, N. and Fieldhouse, E. Preference, vote and abstention: an integrated analysis of UK electors, 1997-2001. In progress: planned for submission to Journal of Royal Statistical Society (series A).

6.5 Other

A gllamm option for robust standard errors for complex, weighted multilevel data was implemented and made generally available as part of a consultancy funded by the project with Sophia Rabe-Hesketh.

7. Impacts

As noted above, the potential impact of this work extends beyond political science as the context-dependent expressions of preference we model are found in many other fields. The impacts arise not just through the insights gained from the results from application of the models but more generally in the clarity gained from formalization of ideas that modelling necessitates. We are disseminating our work as widely as possible, including use of this project as a platform for extending our training in gllamm. One of the positive long-term impacts of our work, therefore, will have been to contribute towards a more general step change in the sophistication of modelling in social science research in the U.K in general and political science in particular.

Gllamm is freeware and has consistently achieved among the highest monthly downloads of Stata procedures and has been used in over 200 books and journal articles. The revised programming of the robust procedure is likely to find widespread use (many hundreds).

8. Future research

The research described above has revealed the flexibility of the modelling approach for better explaining the relationship between expressed and revealed preferences in research on voting. We have only been able to scratch the surface of this area of considerable potential. In particular there is great scope for further developing models that allow contextual variables and covariates to mediate the links between unobserved latent variables and behaviour, as well as influencing that behaviour directly, thus helping us to understand the heterogeneity of electors and the contextual drivers of their decision making processes.

Appendix 1: References for main research report

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