

Issues Matter: A Case Study of Factors Influencing Voting Choices

Robert B Smith

Social Structural Research, USA

For an intended audience of applied statisticians and public opinion analysts who have a basic knowledge of statistics, this case study exemplifies the multivariate dependencies strategy of Cox and Wermuth. It develops graphical models of the voting choice in the 1992 Clinton-Perot-Bush presidential election. It documents how investigators can apply subject matter knowledge and statistical methods to election surveys, producing novel insights. It clarifies how social attributes, philosophical self-designation (liberal, centrist, conservative), party identification (Democrat, Independent, Republican), and the issues influence the voters' choices. The issues form a left-center-right latent structure. The right is more ideologically consistent than the left but Clinton got much of the center's vote and this led to his victory over Bush. Interactions among the issues indicate that Democratic advocacy of environmental protection may have weakened the effect of a negative campaign directed against Clinton's character.

1. Background

As Nobel Prize winner Paul Krugman has opined (1/28/2008), understanding the 1992 election may provide insights about the 2008 Obama-McCain election:

It's starting to feel a bit like 1992 again. A Bush is in the White House, the economy is a mess, and there's a candidate who, in the view of a number of observers, is running on a message of hope, of moving past partisan differences, that resembles Bill Clinton's campaign 16 years ago.... [But] from Day 1 they faced an all-out assault from conservatives determined to use any means at hand to discredit a Democratic president....No accusation was considered too outlandish: a group supported by Jerry Falwell put out a film suggesting that

the Clintons had arranged for the murder of an associate, and The Wall Street Journal's editorial page repeatedly hinted that Bill Clinton might have been in cahoots with a drug smuggler.

The 1992 election ushered in the Bill Clinton era and, presumably, a new political culture focused more on such social issues as the environment, health, education, social equality, and morality, rather than on such class-relevant materialist issues as economic equity, countervailing powers, and poverty. Haynes Johnson referred to these years as the best of times because of their economic prosperity, advances in technology, and the internet boom; and the worst of times because of television's

culture of celebrity, sensationalism, and gossip, and the continuous attacks on the president's character that culminated in the Monica Lewinsky scandal and impeachment proceedings. These scandals, which Johnson in part attributes (2001, 260-265) to ultra right-wing, anti-Clinton activists, may have diverted the public's attention from the unsolved problems of economic inequality and poverty, health care uninsurance, environmental conservation, and the threat of terrorism. The Clinton years were a turning point because his administrations marked the end of the twentieth century and new directions for domestic politics. After the disputed election of George W. Bush in 2000, a new period began in which the war against terrorism, homeland security, budget deficits, and now economic recession are central.

Contrary to the thesis of the new political culture (Clark and Hoffman-Martinot 1998), in 1992 all three candidates—Bill Clinton, Ross Perot, and George Bush—emphasized various aspects of the weak economy, a materialist issue. James Carville's pithy slogan—"It's the economy, stupid!"—guided the Clinton campaign successfully, but this slogan may have masked the importance of other issues. This study thus asks: Was the materialist economic issue of paramount importance, or were social issues—health care reform (Clinton promised universal access), the environment (Al Gore, Clinton's running mate, promised amelioration of problems), and the character of the candidates (pro-life Bush promised morality)—equally, or even more, important? Did these four issues form a left-center-right latent structure? Did these social issues also have a materialist aspect? What were the direct effects on vote of the issues, party identification, political philosophy, and social attributes? How did the issues interact?

1.1 Related Work

This case study provides answers to these questions by applying Cox and Wermuth's paradigm for the analysis of multivariate dependencies in graphical models (1996 2001 2004). To advance cumulative research on voting, it conceptualizes the voting choice as the joint consequence and interaction of political stimuluses (the issues) and partisan predispositions (party identification and political philosophy), as affected by social attributes (Berelson, Lazarsfeld, and McPhee 1954, 278; Smith 2001). It advances this investigator's studies that primarily focus on how social attributes influence vote (Smith 1992a 1992b 1993a 1996). By assessing here the effects of the issues and their latent structure (Smith [2003] 2004; 2008a), this recursive dependencies analysis advances an earlier path analysis that did not assess the

issues (Smith 1999, 32-33). By studying environmental, healthcare, and character issues as well as the economic, it builds on other studies of this election (Stokes and DiIulio 1993; Alvarez and Nagler 1995; Miller and Shanks 1996, 492; Shanks 2001, 186-194, Smith 2008b), which taken together provide cumulative results that can focus further theorizing and research.

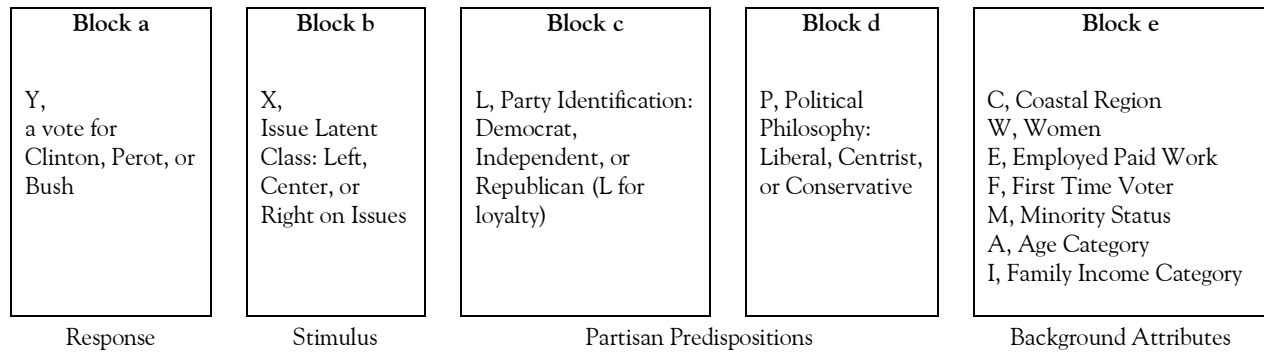
1.2 The Data

This study models data from a focused election night telephone survey of 1,200 voters taken between 4:30 and 10:00 P.M. Eastern Standard Time; this survey asked numerous questions about health care reform (Frederick/Schneiders 1992; Smith 1999, note 2, 41). It covers this salient issue more thoroughly than the 1992 National Election Studies (NES); the need of the NES for continuity across elections may have hampered the asking of novel questions about health care for this election (Shanks 2001, 212). Public opinion surveys for commercial clients, such as this one, can provide plentiful data for secondary analysis; this survey has broader coverage of the issues than the exit polls, which must be very brief. By applying graphical modeling to these data, this case study shows how investigators can combine their knowledge of the subject matter with statistical procedures to uncover novel insights.

1.3 Graphical Models

For studying multivariate dependencies in graphical models, Cox and Wermuth develop this recursive model-building strategy (1996, 135-170; 2001, 70-74; 2004). The first step organizes the measured variables into blocks, which are depicted by boxes that are ordered: the response variable is on the left, intervening variables are in the middle, and intrinsic background variables are on the right. Typically, when there are four blocks of variables, block a contains the primary response; b, a potential explanatory variable; c, intermediate variables; and d, background variables. The variables are defined and given an mnemonic identifying letter, e.g., Y for the ultimate response in block a, X for the direct proximate explanatory variable in b, intervening variables Z, U, and V in c, and background variables W, A, B in d.

The second step explores the data, reporting in a table the matrix of partial and marginal correlations, the range of the variables, and their means and standard deviations. Inspection of the partial correlations provides clues about which relationships may be conditionally independent or dependent. (Because this case study advances many relationships that previous publications have explored, this step will be skipped here.)



Note: The data are from the Fredericks/Schneiders survey of the 1992 election in which the Democrat candidate Bill Clinton was victorious over the Republican candidate George Bush and the Independent candidate Ross Perot. Political Philosophy (P) and Party Identification (L) are both aspects of Partisan Predispositions with the former influencing the latter.

Figure 1. The Ordering of Blocks of Variables Bearing on Electoral Voting

The third step estimates the effects recursively (Simon [1953] 1957, 10-49); the regression methods vary depending on the levels of measurement of the response and explanatory variables. Cox and Wermuth regress the primary response on all variables that are prior, most often deleting from the final regression equation inconsequential effects. They portray their results in a regression graph in which all of the prior variables appear in a doubly-edged box in which continuous variables are depicted as circles and discrete variables are depicted as solid circles (dots). Arrows are drawn from the consequential variables to the response variable. A table reports the estimates of the regression coefficients, the standard errors, and the *t* statistics.

Then they regress the block b variable on all of the variables in the prior blocks, c and d. They portray the results in a regression graph, and report the estimated coefficients, standard errors, and *t* statistics in a table. Then they regress the block c variables on the block d variables, graph their findings, and present the results in a table. Finally, they interpret their findings, depicting the salient relationships in a simplified dependence graph. This analysis of voting illustrates their strategy.

2. The Variables

The voting choice is influenced by the campaign issues in conjunction with the person's partisan predispositions (i.e., party identification and political philosophy) and social attributes. This study conceptualizes these partisan predispositions as rather stable characteristics that the person learned through processes of political socialization. Given that a voter's social attributes are prior to the partisan predispositions, that political philosophy is prior to party identification, and that both philosophy and

party identification shape how voters evaluate the issues, where in the substantive model should the issues and their latent structure appear? The issues are conceptualized as intervening variables that mediate the effects on vote of the two aspects of political partisanship.¹ Disregarding the interpersonal and media influence that occurred prior to the final vote, the voting choice thus depends most directly on the political stimuli (the issues), and on the partisan predispositions (party identification and philosophy), and indirectly on the social attributes.

2.1 Precedence Ordering

Figure 1 depicts the precedence ordering as five blocks of variables, a through e. The response variable in block a is labeled Y, for voting for Clinton, Perot, or Bush. The explanatory variable in block b is labeled X for a three-class latent structure that combines the issues of the campaign, forming a left, center, and right ordinal continuum. As in the 2008 election, the economy, health care reform, the environment, and the candidate's character were salient issues. Of the two partisan predispositions, a two-stage least squares analysis found that party identification is a consequence of political philosophy (Smith 1999). Block c contains party identification—Democrat, Independent, or Republican—labeled L (for loyalty to a party); and block d contains

¹ This placement of issues as intervening between party identification and vote is similar to that of Shanks (2001, 208, Table 7.1). Placing the issues as intervening between party identification and philosophy produces a model that is not parsimonious and that does not fit well. Miller and Shanks report a larger direct effect on vote of party identification, .48 (1996, Table 11.1, 286) compared with that for political philosophy, .27 (Table 11.2, p. 291), as do Beck et al. (2002, Table 1, 65), the odds ratio is 1.87 to 1.18 or 1.58.

political philosophy—liberal, centrist or conservative—labeled P (for philosophy). Block e contains five dichotomized and two trichotomized background attributes: residence in a coastal region (C), women (W), paid workers (E for employed), first-time voters (F), ethnic minorities (M), ordinal trichotomous age categories (A), and ordinal trichotomous family income categories (I).

2.2 Block a, the Voting Choice

In response to this question, “For whom did you vote for President—Bill Clinton, George Bush, or Ross Perot?” about 46.6% said Clinton, 19.9% said Perot, and 33.5% said Bush. These percentages approximated the actual national distribution of votes: Clinton, 43.3%; Perot, 19%; and Bush, 37.7%; for an overall difference of 5.6 percentage points.

2.3 Block b, the Issues

Unitary two-item ordinal indices gauge the economic and health care issues. The items composing these indices have face validity and each index has stronger effects on response variables than their individual items, which have common determinants and stronger effects than other potential indicators. Single items gauge the environmental and character issues.

Table 1 presents bivariate Kendall's τ correlations relating

the four issues and their latent structure to a number of validating measures. The latter include the following three political interests that are correlated with support for the political left: *economic equity* refers to the scope of governmental responsibility for fair distribution of economic resources; *social equality* refers to civil, social, and constitutional rights for groups that some people disesteem, and *the public's health* refers to universal access to health care, a healthy environment, and women's reproductive choice. Smith (1999, 28-32; ([2003] 2004, 109-111) provides further theoretical development and the measures

The Economy

In 1992 about 82% of all voters stressed that the economy was a very important factor in determining their vote; this percentage was higher than for any other issue. About 90% of the voters for Clinton or Perot stressed the importance of the economy, as did 66% of voters for Bush. The meaning of this question varied: Clinton voters emphasized the importance of jobs and economic expansion. Perot voters emphasized the importance of controlling the deficit: 86% said this was very important, compared with 78% of Clinton voters and with 69% of Bush voters; this issue worked best for Perot (Alvarez and Nagler 1995, 739). Bush voters emphasized the importance of a tax cut: 68% said this was very important, compared with 63% of Perot voters and with 56% of Clinton voters.

Table 1. Four Issues and Their Composite Three-Class Left, Center, Right Latent Structure

Correlates of the Issues:	The Economy	Health Care Reform	Concern for Environment	Character Not Very Important	Modal Latent Structure	Higher Probability of Being in the Left Class	Higher Probability of Being in the Right Class	Higher Probability of Being in the Center Class
Political Interests:								
Economic Equity	0.20*	0.16*	0.19*	0.09**	0.23*	0.21*	-0.23*	0.08**
Social Equality	0.07***	0.05 (n.s.)	0.10**	-0.02 (n.s.)	0.10**	0.07***	-0.09**	+0.01 (n.s.)
The Public's Health	0.22*	0.37*	0.21*	0.13*	0.29*	0.29*	-0.38*	0.01 (n.s.)
Left on Political Interests Continuum	.25*	0.28*	0.21*	0.08**	0.30*	0.28*	-0.33*	0.04 (n.s.)
Partisan Predispositions:								
Liberal Philosophy	0.22*	0.26*	0.15*	0.19*	0.28*	0.26*	-0.28*	0.01 (n.s.)
Democratic Party Identification	0.24*	0.25*	0.18*	0.17*	0.28*	0.27*	-0.30*	-0.01 (n.s.)
Candidate Characteristics:								
Voted For Clinton	0.28*	0.30*	0.21*	0.27*	0.32*	0.33*	-0.35*	-0.01 (n.s.)
Universal Healthcare Access	0.17*	0.20*	0.08**	0.11*	0.19*	0.21*	-0.21*	-0.02 (n.s.)
Character Not Important	0.13*	0.14*	-0.01 (n.s.)	--	0.19*	0.32*	-0.23*	-0.11*
Delegitimation of Authority: Crime & Drugs and Gridlock VIP	-.01 (n.s.)	.03 (n.s.)	0.22*	-0.18*	0.03 (n.s.)	0.02 (n.s.)	-0.08**	0.13*

Notes: * $p \leq .0001$, ** $.01 > p > .0001$, *** $.05 > p > .01$. Kendall's tau quantifies the associations. Coefficients that are not statistically significant are denoted (n.s.). The cell with -- indicates that the same item is being used to assess both variables. Jay Magidson and his Latent GOLD computer program provided the estimates of the three class latent structure. The delegitimacy index is composed of items about Gridlock and Crime and Drugs.

Because this direct, single question has ambiguous meanings, and because its marginal proportions are very skewed, to assess the economic issue this study draws on two items that assess presidential economic interventions. One question asks: "On the economy, should he concentrate on economic expansion and jobs even if that means a higher deficit (41%) or should he concentrate on first getting the deficit under control (59%)?" The other question asks: "On regulation, should he concentrate on regulating industry to protect consumers (41%) or reducing regulation to make American businesses more competitive (59%). In 1992, the first alternative answer to each question was the liberal response; the second, the more conservative response. The additive index composed of these items thus assesses support for economic expansion and regulations and classifies about 19% of the respondents as wanting both presidential economic interventions, 44% as wanting one of the interventions, and 37% as opposing both interventions—those in opposition favored bringing the deficit under control and reducing regulation of businesses.

This index of the economic issue has positive associations with indicators of support for governmental interventions concerning economic equity, social equality, and the public's health, and for the left (see Table 1). It also has positive associations with core political variables—liberalism, Democratic identification, and vote for Clinton. Those disposed toward the political center—centrists and Independents—varied less across the three categories of this economic index than those on the left or right. As did those on the right, those in the center tended to prefer a reduced deficit and less regulation of industry. Approvers of presidential economic activism said that a candidate's character was not an important determinant of their vote and they did not indicate a loss of legitimacy (i.e., delegitimation) of authority.

Health Care Reform

During the 1992 election campaign politicians discussed numerous health care plans (Smith 1993b, 56-65). On the left were proposals for a national health care system similar to Canada's; this reform would require a maximum of governmental participation and radical change. In the center at the beginning of the campaign Clinton supported the Pepper Commission's mandated employer-provided insurance with "play or pay," which required some new public insurance. Toward the end of the campaign Clinton endorsed "managed competition," but stipulated that the plan must provide universal access and limits to spending. Both plans built on the existing mixed private and public sector systems but required extensive change. On the right President George H. W. Bush offered his voucher-based, private-sector plan,

which aimed to ameliorate problems of lack of insurance in the small business market.

A typology can classify these plans (and present-day plans as well): one dimension ascertains whether the plan requires extensive involvement of the federal government or whether the plan melds private and public systems; the other dimension ascertains the scope of the reform, whether the plan requires radical change or only amelioration of the present system. Two dichotomized questions directly gauge these aspects of health care reform and form an appropriate index. One question ascertains whether the respondent trusted federal involvement in health care: "If the federal government operated the health care system in this country, do you think we would have a system that is much better, somewhat better (52%), somewhat worse, or much worse (48%) than the system we currently have." The other question ascertains whether the respondent believed that radical change was necessary: "The existing health care system in the United States is so flawed that we should get rid of it and start over with a completely new approach" (45%), versus amelioration: "The existing health care system in the United States has many good qualities and we should keep it and try to make it better" (55%). The resulting index has three categories: those who trusted federal participation and desired radical change; or, in other words, favored comprehensive reform (+ + = 29%); those who supported some reform (+ - or - + = 39%); and those who opposed comprehensive reform (- - = 32%). Respondents in the latter category preferred minimal governmental intervention in the health care system and some amelioration of the problems of the present system but not radical change.

This index strongly predicts (at the $p < .0001$ level of significance) the responses to other items about health care reform: voters who desired comprehensive reform believed that the president should completely overhaul the system (Kendall's $\tau = .49$); they preferred government-provided health care to a mixed private and public system ($\tau = .32$); they said that health care reform was a very important factor in their choice of a candidate ($\tau = .24$), and they wanted all Americans to have universal access to healthcare ($\tau = .20$). When questioned about whether they had enough information concerning changes in the system, about 28% of those who desired comprehensive reform responded positively compared with 18% of those in opposition ($\tau = .09$). The latter were concerned about choice of physicians—the difference was about 15 percentage points. As expected, support for comprehensive reform was associated with the left ($\tau = .28$): pro-reformers were more likely than anti-reformers to support governmental interventions aimed toward economic equity, social equality, and the public's

health, see Table 1. Compared with the right, liberals, Democrats, and voters for Clinton all supported reform ($p < .001$); Independents and Perot voters held intermediate positions. Compared to the anti-reformers, the pro-reformers were more likely to say that a candidate's character was not very important in determining their vote.

The Environment

To assess environmental issues, environmental protection should be untangled from the loss of jobs. When the latter class-related materialist interest is stressed, the effect of environmental concern on vote is reduced. Consequently, the environmental issue is best gauged by this single item: the environment was a very important factor in determining which candidate to vote for (47%) versus it was not very important (53%); rather than by an index of the available items, which serve to clarify its meaning. This indicator of environmental concern has positive associations with agreement that the president should protect the environment even if there is loss of some jobs ($\tau = .20$), with agreement that a company's environmental record is important in forming an opinion about it ($\tau = .21$), and with the index of these two items ($\tau = .24$).

Unlike the economic and health care issues, environmental concern is associated with indicators of weakened legitimacy of authority: gridlock, crime and drugs, and their index. (The effect on delegitimation holds when minority group membership is controlled; the odds ratios, θ s, are environmental concern = 2.3, minority = 2.1, and $R^2 = .07$). Environmental concern is associated with left positions on the left-to-right political continuum ($\tau = .21$); with interests concerning economic equity, social equality, and public health; liberalism; Democratic identification; and vote; but not with the character issue, see Table 1. Voters in the center were equally likely to be environmentally concerned as not.

The Character of the Candidates

About 52% said the character of the candidates was a very important factor in determining their choice of candidate; 48% said the opposite. Most likely, this question assessed the voters' perceptions of differences between Bush and Clinton. Because of the negative campaign waged by some Republicans against Clinton (they accused him of 'slickness' and 'waffling' on issues, adultery, draft evasion, and marijuana use) and the pro-family and pro-life campaign of the Republicans, those most concerned about the character of the candidates voted for Bush and those less concerned voted for Clinton—Perot voters were in the middle. Voters who

favor universal access to health care (which includes women's health services) are more likely to say that character is not an important determinant of their vote ($\tau = .11$, $p < .0001$); public health interests and the healthcare reform issue when jointly controlled do not explain this relationship (partial $\tau = .09$, $p = .006$). Apparently, the character issue in part reflects a candidate's position on women's choice: pro-life Republicans attribute character flaws to pro-choice Democrats.

Regarding philosophy and party identification, liberals and Democrats were less concerned about presidential character than conservatives and Republicans. Those less concerned about character leaned toward the left: they tended to support governmental interventions for economic equity, the environment, and healthcare reform (see Table 1). Like the single-item indicator of environmental concern, concern about character has a positive association with delegitimation of governmental authority: gridlock, crime and drugs, and their index; but, paradoxically, these two measures of concern are unrelated. Employed women are less concerned about character than homemakers and housewives ($\tau = .13$; $p = .04$); they also are more likely to favor universal access to health care ($\tau = .08$; $p = .04$).

Latent Structure of the Issues

As Smith ([2003] 2004, 116-120; 2008a, 178-184) reports in some detail, to the four issues Jay Magidson's Latent GOLD computer program fitted two latent structures that appropriately conceptualize the economic and health care issues as ordinal variables and the environment and character issues as attributes (Vermunt and Magidson 2000; Hagenaaars 1993; Goodman [1974] 1978; Lazarsfeld 1954). The three-class model (bootstrap $p = .053$) fits better than the two-class model (bootstrap $p = .000$) and the subsequent analyses use that typology.² For the two-class model the proportions in each class are left & center = .78 and right = .22, and for the three-class model the proportions are left = .20, center = .68, and right = .12. Earlier, Table 1 presented the correlations of the political interests, predispositions, and

² The three-class model has the more favorable Akaike AIC and a better probability of fit. However, the two-class model has the more favorable Schwarz BIC. The reduction in the likelihood squared from the two-class to the three-class model is 22.61 and this costs 5 degrees of freedom, or 4.52 per degree of freedom. For the AIC this represents a real improvement of the three-class model over the two-class model since $4.52 > 2$, the critical value for the AIC. The BIC for the three class model does not indicate a real improvement since $4.5 < \ln(N) = \ln(954) = 6.86$. Because the three-class model has the better probability of fit, AIC value, and empirical support, it is the preferred model.

candidate characteristics with the modal three-class latent structure (not corrected for measurement error) and with the posterior probabilities of being in each class. As expected, the left class and its probability correlated positively with those validating items; the right class and its probability correlated negatively. Those in the center tended to rate the candidates' character as very important and expressed some delegitimation of governmental authority.

Table 2 relates the true three-class model with the partisan predispositions and vote. The high concentration of conservatives in the right class (69.5%) compared with the diffusion in the left class of liberals (43.7%) and centrists (32.6%) underscore the ideological consistency of the right. However, about the same percentage of the left (55.8%) are Democrats as of the right are Republican (56.3%). Consequently, the center's vote made Clinton's victory decisive. Clinton's vote share from the center was 28.1% ($= .68*41.3%$) whereas Bush's vote share was 21.1% ($= .68*31.1%$). Clinton's share from the left's vote, 12.9% ($= .20*64.5%$) was greater than Bush's share from the right's vote, 7.9% ($.12*65.7%$). However, Clinton's share from the right's vote, 1.5% ($= .12*12.6%$) was less than Bush's share from the left's vote, 3.4% ($= .20*17.2%$). Disregarding the vote of the center, the vote shares were much closer: Clinton's left plus right share was 14.4% ($= 12.9% + 1.5%$); Bush's left plus right share was 11.3% ($= 3.4% + 7.9%$) for a difference of 3.1 percentage points. When the contributions of the center are added in the totals are Clinton = 42.5% and Bush = 32.4%, for a large difference of 10.1 percentage points in these data.

2.4 Blocks c and d, Partisan Predispositions

Party identification (block c) is a consequence of political philosophy (block d) when these variables are assessed by the following questions. Philosophy: "When it comes to politics in general, do you consider yourself very liberal, somewhat liberal, middle-of-the-road, somewhat conservative, or very conservative?" When the responses are grouped, the categories of philosophy are liberal (29%), centrist (34%), and conservative (37%). Party identification: "Do you consider yourself to be a Democrat (40%), a Republican (30%), or an Independent (30%)?" For these data this precedence ordering was determined by a series of two-stage least-squares analyses that used the social attributes as instrumental variables (Smith 1999, 35-39). The effect of philosophy on party identification was large ($\beta = .51$) and statistically significant ($t = 2.9$), whereas the effect of party identification on philosophy was much smaller ($\beta = .17$) and not statistically significant ($t = 1.7$). The stability of these effects was tested by the successive

Table 2. True Three-Class Latent Structure

	Left	Center	Right
Cluster Size	0.20	0.68	0.12
Covariates:			
Political Philosophy			
Liberal	43.7%	27.3%	11.0%
Center	32.6%	35.1%	17.2%
Conservative	22.9%	35.5%	69.5%
Missing	0.9%	2.1%	2.3%
Party Identification			
Democrat	55.8%	37.5%	12.9%
Independent	24.1%	29.7%	28.3%
Republican	17.5%	30.5%	56.3%
Missing	2.7%	2.3%	2.4%
The Vote Choice			
Clinton	64.5%	41.3%	12.6%
Perot	14.8%	23.0%	16.9%
Bush	17.2%	31.1%	65.7%
Missing	3.5%	4.6%	4.9%

Notes: The Center's vote made Clinton's victory decisive. His share was 28.1% ($= .68*41.3%$); Bush's Center share was 21.2% ($= .68*31.1%$). Clinton's Left + Right share was 14.4% compared with 11.3% for Bush. Clinton's margin of victory was about 6.9% + 3.1% = 10% in these data. His actual margin of victory was less, a difference of 5.6 percentage points.

elimination one at a time of each instrumental variable and then averaging the re-estimated effects using meta-analytic procedures; the average effects were very similar to the original estimates. Consequently, this case study assumes that philosophy has an asymmetric direct influence on party identification. Separate tabulations indicate that liberals, Democrats, and Clinton voters are more likely than conservatives, Republicans, and Bush voters to want governmental interventions that aim to increase economic equity, social equality, and health. The centrist's policy choices usually are located between those of the left and right (also see Miller and Shanks 1996, 454-456).

2.5 Block d, Social Attributes

All of the social attributes are thought to be on equal footing. Four dichotomous attributes are associated with liberal political philosophy but not with Democratic party identification. Their categories and percentages are: *region*, those who reside on either coast (42%) versus those who reside in the Midwest or in the South; *gender*, women (50%) versus men; *employment*, paid work (65%) versus not paid; and *political age*, first-time voter (11%) versus not. Three attributes are associated with Democratic party identification but not with liberal political philosophy. Their categories and percentages are: *minority ethnicity*, African-American, Hispanic, and so forth (13%) versus white; *family income*, less than \$30,000 (38%), \$30,000 through \$49,999 (37%), and

\$50,000 or more (25%); and age, 50 years or older (37%), 30 through 49 (46%), and 18 through 29 (17%).

3. Statistical Methods

This case study estimates recursively the asymmetric effects of the basic variables and the election-specific issues and their latent structure. When the response variable is dichotomous it applies the logistic regression model (Goodman [1972a] 1978, 7-25). When the response variable is an ordinal trichotomy it applies the proportional-odds model (Stokes, Davis, and Koch 2000, 243-257; Agresti 1996, 212-215) and, if that model does not fit well, continuation-ratio logits (Agresti 1996, 218-220), all implemented by SAS's PROC LOGISTIC. To facilitate interpretation of the results, it uses the incremental-effects, reference-cell parameterization (i.e., dummy variable coding), rather than the deviation-from-the-mean, effect parameterization.

The subsequent tables report the logistic regression coefficient B_i , its standard error (s.e.) in parentheses, and θ its odds ratio (Hosmer and Lemeshow 1989); from these the interested reader can calculate the predicted proportions. A B_i represents the change in the log odds ratio associated with a one-unit change in a stimulus variable. For example, ethnicity X_i is composed of minority and majority groupings. The odds of an event, say, a minority person choosing to vote for Clinton, is that group's probability that it will vote for Clinton divided by that group's probability that it will not vote for Clinton—these odds are high. Similarly, the odds of a majority person voting for Clinton is that group's probability of voting for Clinton divided by that group's probability that it will not vote for Clinton—these odds are much lower. The ratio of these odds—the odds ratio θ —expresses the effect of minority versus majority group membership on a vote for Clinton. The θ is the exponentiated value e^{B_i} of the logistic B_i coefficient; it is the factor by which the odds change when that variable changes by one unit, from majority to minority. The reciprocal of θ represents the factor when the change is in the opposite direction, from minority to majority.

Because all of the response variables are ordinal trichotomies, this study first applies the proportional-odds model to obtain one summary odds ratio (Agresti 1996, 212-215; Stokes, Davis, and Koch 2000, 243-252). For example, in a cross-tabulation of gender with philosophy—liberal, centrist, conservative—the θ that summarizes the four-fold table composed of gender differences cross-tabulated with philosophy cut liberal versus [centrist + conservative] is assumed to equal the θ in the four-fold table composed of the gender differences cross-tabulated with philosophy cut [liberal + centrist]

versus conservative. The model's goodness of fit is tested against the null hypothesis $H_0: \beta_k = \beta$ for all k ; that is, the log odds ratios are the same in each four-fold table; probabilities less than .05 reject this hypothesis (Stokes et al. 2000, 249-250). If that model does not fit well, then continuation-ratio logits are used to decompose the ordinal trichotomies: the first category relative to the other two categories, and then the second category relative to the third category (Agresti 1996, 218-220).

The following diagnostic statistics facilitate assessments of how well these models fit the data: tests of the proportional-odds hypothesis; Hosmer and Lemeshow goodness-of-fit tests based on an approximation to the Pearson χ^2 (Agresti, 1996, 113-114); changes in the value of Schwarz's (1978) Bayesian information criterion (BIC) statistic (here smaller values imply better models); and changes in the value of the -2 log likelihood.³ To assess the impacts of the issues, the values of the Nagelkerke R^2 (1991) are compared before and after the issues have been entered into the model (larger values of R^2 are preferred).⁴

When the three-class latent structure is either a response or explanatory variable, the following procedure minimizes the measurement error: The analysis is run on a data set that has three complete records for each respondent. The first record has an additional indicator for the left and the respondent's probability of being in that class; the second record has an additional indicator for the center and the respondent's probability of being in that class; the third record has an additional indicator for the right and the respondent's probability of being in that class. The cross-tabulations and regressions are carried out weighting the data by the probabilities, which sum to unity. Thus, the effective sample size is the original 1,200 respondents minus any missing data.

To uncover the nested interactions among the issues as they affect vote, and to corroborate aspects of the analyses, this study also applies hierarchical log-linear models using the backward selection algorithm of SPSS's HILOGLINEAR procedure to find the model that best fits the data (Goodman [1972b] 1978, 57-109).

³ Schwarz's BIC adjusts the -2 log likelihood statistic by the number of terms in the model and the number of observations used. Lower values indicate more parsimonious models. For the computational formulas see SAS Institute (1997, 453).

⁴ The Nagelkerke R^2 (1991) adjusts the Cox and Snell R^2 so that its maximum value can equal one. For the computational formulas see SAS Institute (1997, 454).

4. Results

The subsequent recursive logistic regressions initially included all prior variables in their set of potential explanatory variables. For reasons of parsimony, variables exhibiting non-significant effects on a response variable were deleted from that set of covariates and the resulting model was re-estimated.

4.1 Models Including the Issues Latent Classes

Using the left-center-right latent class structure to summarize the four issues, Table 3 presents the results for the separate recursive logistic regressions; Figure 2, the separate regression graphs that depict these results; and Figure 3, a dependence graph that synthesizes these findings.

The Voting Choice

The regression of the voting choice on all relevant prior variables indicates that the hypothesis of proportional odds is rejected ($p = .01$).⁵ Consequently panel (1) of Table 3 also reports the vote as Clinton versus all others, and, given a vote for other than Clinton, Perot versus Bush. The odds ratios, θ s, for the Clinton model indicate those in the left class (4.8) and those in center class (2.1) voted for Clinton, along with Democrats (34.2), Independents (4.3), liberals (3.4), centrists (2.3), and minorities (2.3). Adding the issues latent structure to the basic model improves the R^2 from .43 to .45 or 4.7 percentage change points.

The θ s for the Perot versus Bush model indicate that those in the Left class (2.9) and those in the Center class (2.4) were more likely to vote for Perot, as were Democrats (7.1), Independents (6.2), liberals (2.1), and centrists (3.2). The addition of the issues latent structure improves the R^2 from .239 to .254 or 6.3 percentage change points.

The first panel of Figure 2 presents regression graphs that depicts these findings qualitatively. In (1.1) the response variable Clinton (1) versus all others (0) is contained in a single-edged box and depicted as a solid circle labeled Y10; this binary variable is coded (1,0). The four explanatory variables are contained in a double edged box and are positioned in the box according to their precedence ordering, variables most proximate to the response are closest to it (left most); the most prior

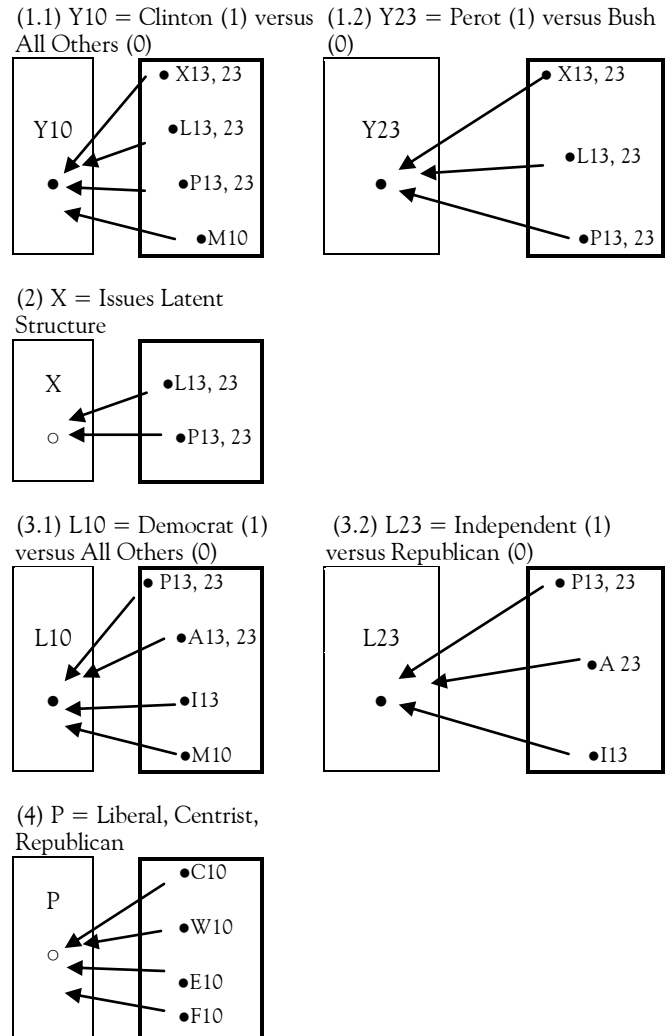


Figure 2. Results of Logistic Regression Analyses Depicted by Regression Graphs

variables are farthest from it (right most). The issue latent structure is labeled X13, 23; the numbers indicate the dummy variable coding, respectively, left versus right (13) and center versus right (23). Because of the dummy variable coding of the three-category variables, solid circles depict these binary coded variables. Comparison of the results for Perot (1) versus Bush (0) with the Clinton results shows that qualitatively the issues (X13, 23), party identification (L13, 23), and political philosophy (P13, 23) have similar effects in the two regressions, but minority ethnicity (M10) only directly affects the Clinton vote.

The Issues Latent Classes

For the regression of the latent classes on its prior variables, which panel (2) of Table 3 presents, the proportional-odds model is not rejected; the $p = .05$ is the threshold value and for reasons of parsimony this

⁵ For the full proportional-odds model the R^2 is .40; for the issueless model, .38. Their difference represents an increase of 5.3 percentage change points due to the issues.

Table 3. Logistic Regression Equations Forming a Recursive Model of Electoral Voting

(1) Determinants of Vote:	Proportional Odds (PO)		Clinton vs. All Others		Perot vs. Bush	
	B	Exp(B)	B	Exp(B)	B	Exp(B)
Clinton, Perot, or Bush						
Intercept1	-4.1(.30)		-3.8(.41)			
Intercept2	-2.4(.28)				-2.74(.34)	
M10, Minority Ethnicity vs. White	.68(.27)	2	.85(.30)	2.3	--	--
P13, Liberals vs. Conservatives	1.12(.20)	3.1	1.22(.24)	3.4	.75 (.29)	2.1
P23, Centrists vs. Conservatives	.97(.19)	2.6	.84(.23)	2.3	1.17(.25)	3.2
L13, Democrats vs. Republicans	3.68(.22)	39.8	3.53(.27)	34.2	1.96(.33)	7.1
L23, Independents vs. Republicans	1.77(.19)	5.9	1.46(.27)	4.3	1.82(.24)	6.2
X13, Left vs. Right Class	1.58(.31)	4.9	1.57(.41)	4.8	1.05(.43)	2.9
X23, Center vs. Right Class	.88(.26)	2.4	.74(.37)	2.1	.90(.33)	2.4
Tests of Fit:	PO chi2 = 18.4, df = 7, p = .01 Deviance/DF = .72, p = .98		H&L Not Applicable Deviance/DF = .64, p = .97		H&L Not Applicable Deviance/DF = .58, p = .93	

(2) Determinants of Issues Latent Structure:	Proportional Odds (PO)	
Left, Center, Right	B	Exp(B)
Intercept 1	-0.27(.18)	
Intercept 2	1.05(.14)	
P13, Liberals vs. Conservatives	1.14(.19)	3.1
P23, Centrists vs. Conservatives	0.79(.18)	2.2
L13, Democrats vs. Republicans	1.11(.19)	3
L23, Independents vs. Republicans	0.39(.19)	1.5
Tests of Fit:	PO chi2 = 9.49, df = 4, p = .05 Deviance/DF = 1.07, p = .38	

(3) Determinants of Party Identification:	Proportional Odds (PO)		Democrats vs. All Others		Independent vs. Republican	
	B	Exp(B)	B	Exp(B)	B	Exp(B)
Democrat, Independent, Republican						
Intercept1	-2.42(.22)		-1.93(.22)			
Intercept2	-.94(.21)				-1.13(.17)	
M10, Minority Ethnicity vs. White	1.92(.22)	6.8	1.93(.23)	6.9	--	--
A13, Older Age (50+) vs. Younger (18-29)	.56(.17)	1.8	.53(.20)	1.7	--	--
A23, Middle Age (30-49) vs. Younger (18-29)	.56(.17)	1.8	.41(.20)	1.5	.41(.17)*	1.5
I13, Low Income (<\$30,000) vs High (\$50,000+)	.66(.16)	1.9	.47(.14)	1.6	.40(.18)**	1.5
I23, Middle Income (\$30,000 -\$49,999) vs. High	.29(.15)	1.3	--	--	--	--
P13, Liberals vs. Conservatives	1.68(.15)	5.3	1.37(.17)	3.9	1.73(.23)	5.6
P23, Centrists vs. Conservatives	1.12(.14)	3.1	.81(.17)	2.2	1.23(.19)	3.4
Tests of Fit:	PO chi2 = 22.5, df = 7, p = .002 Deviance/DF = 1.23, p = .07		H&L chi2 = 2.8, df = 7, p = .91 Deviance/DF = 1.20, p = .21		H&L chi2 = 4.1, df = 7, p = .77 Deviance/DF = .85, p = .54	

(4) Determinants of Political Philosophy:	Proportional Odds (PO)		Liberal vs. All Others		Centrist vs. Conservative	
	B	Exp(B)	B	Exp(B)	B	Exp(B)
Liberal, Centrist, Conservative						
Intercept1	-1.60(.14)		-1.75(.16)			
Intercept2	-.14(.13)				-.17(.07)	
C10, Coastal Region vs. Midwest or South	.28(.11)	1.3	.41(.13)	1.5	--	--
W10, Women vs. Men	.45(.11)	1.6	.53(.13)	1.7	--	--
E10, Paid Work vs. Not Paid	.43(.12)	1.5	.58(.14)	1.8	--	--
F10, First-Time Voter vs. Not First Time	.43(.17)	1.5	--	--	.69(.24)	2
Tests of Fit:	PO chi2 = 9.8, df = 4, p = .044 Deviance/DF = 1.11, p = .32		H&L chi2 = 6.9, df = 6, p = .33 Deviance/DF = 1.74, p = .14		H&L Not Applicable Deviance/DF Not Applicable	

Notes: Standard errors are enclosed in parentheses. A dash (-) indicates that the effect lacks statistical significance and was deleted from the model, which was then re-estimated. * The base category is (Younger + Older). ** The base category is (Middle + High Income). Tests of Fit: PO = Proportional Odds; H&L = Hosmer & Lemeshow.

model is thought to be appropriate. As the regression graph (2) in Figure 2 makes crystal clear, the variables of political partisanship—party identification (L13, 23) and political philosophy (P13, 23)—directly influence a voter's position on the left-center-right ordinal issues classification (X): that is, Democrats (3), Independents (1.5), liberals (3.1), and centrists (2.2) are more likely to align with the left than with the right; the $R^2 = .09$.

Party Identification

When trichotomous party identification is the response variable, the hypothesis of proportional odds ratios is rejected ($p = .002$); see panel (3) of Table 3. Even so, the θ s for this model are very similar to those for the model in which the response is dichotomized as Democrat (1) versus all others (0). Both models suggest that liberals, centrists, older people, poorer people, and ethnic minorities are likely to have a Democratic identification; the R^2 is about .23. The best-fitting log-linear model ($\chi^2 = 114.3$, $df = 120$, $p = .63$) for the full trichotomy underscores the relevance of these variables: it includes interactions of two variables between Democratic party identification and, respectively, liberal philosophy, older people, people with lower family income, and ethnic minorities; interactions of two variables between lower family income and minority ethnicity and older age; and this interaction of three variables: liberal philosophy*older age*minority ethnicity, which implies that for whites, older people are more conservative ($\tau = -.07$); for minorities, they are not ($\tau = .03$, not significant). Ethnicity and philosophy are not related ($\tau = .03$, not significant).

Because the odds ratios are not proportional, panel (3) of Table 3 presents the results when party identification is treated as two successive dichotomies: Democrats versus [Independents plus Republicans] and, given that the voter is not a Democrat, then Independents versus Republicans. The logit analysis of the first dichotomy finds that liberals (3.9), centrists (2.2), older voters (1.7), middle-aged voters (1.5), voters with low family income (1.6), and ethnic minorities (6.9) have higher odds ratios favoring Democratic party identification than do voters with the opposite characteristics; the R^2 is .21. The best-fitting log-linear model ($\chi^2 = 71.4$, $df = 74$, $p = .56$) includes the same components as the one above for trichotomous political philosophy.

For the Independent versus Republican dichotomy, panel (3) of Table 3 reports that liberals (5.6), centrists (3.4), middle-aged people relative to all others (1.5), and people with low family income relative to those with more family income (1.5) are more likely to say they are Independent rather than Republican; the R^2 is .17.

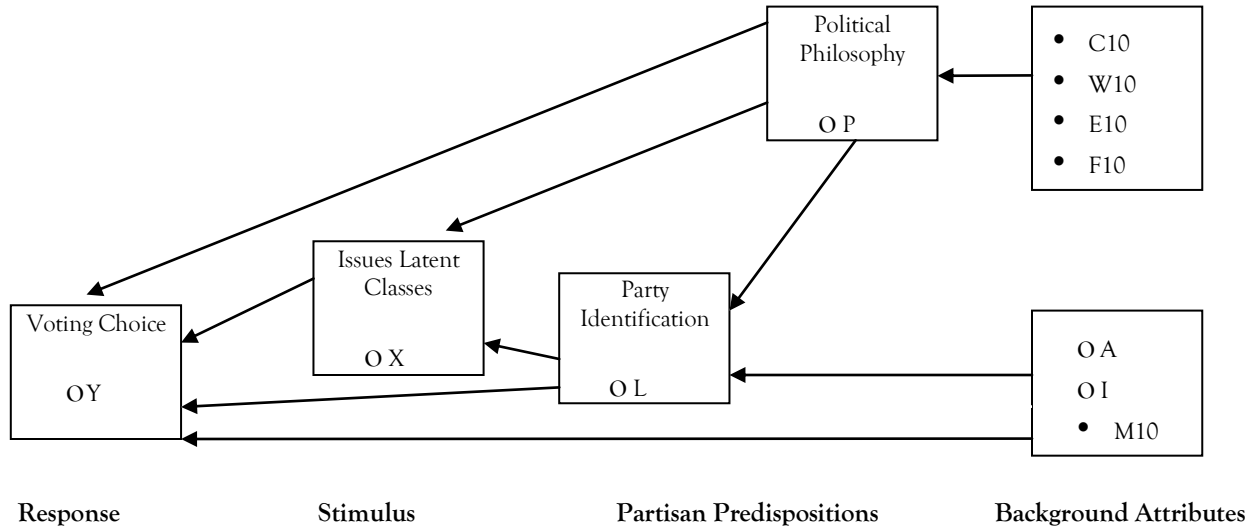
The regression graphs 3.1 and 3.2 of Figure 2 clearly show that political philosophy (P13, 23) always influences party identification. Additionally, older age categories (A13, 23), low family income (I13) and minority ethnicity (M10) influence Democratic identification (L10). The middle-aged (A23) and low-family income (I13) respondents are more likely to be Independent than Republican (L23).

Philosophy

The θ s in panel (4) of Table 3 produced by the proportional-odds model indicate that residents of a coastal region (1.3), women (1.6), paid workers (1.5), and first-time voters (1.5) lean toward a liberal philosophy; the R^2 is .037. Although the deviance per degree of freedom, the change in the BIC, and the change in the -2 log-likelihood favor this model, the test of the hypothesis that the odds ratios are proportional indicates that the two odds ratios differ slightly ($p = .044$). However, when first-time voters are deleted from this model, the hypothesis of proportional odds is not rejected ($p = .09$), and the θ s for region, gender, and paid workers are about the same as in the first model. A best-fitting log-linear model ($\chi^2 = 22.4$, $df = 32$, $p = .90$) for the five-variable table includes interactions of two variables for each of those four attributes with philosophy. It also includes the gender*employment interaction—women are less likely than men to be paid for their work ($\tau = -.17$).

When philosophy is analyzed as two successive dichotomies—liberal versus [centrist plus conservative], and then, given not liberal, centrist versus conservative—two different substantive models hold, see panel (4) of Table 3. Like the proportional-odds models, the logit analysis for the first dichotomy indicates that residents of either coast (1.5), women (1.7), and paid workers (1.8) are more likely to be liberal than are people with the opposite attributes; the R^2 is .045. The best-fitting log-linear model ($\chi^2 = 18.7$, $df = 22$, $p = .67$) includes the marginal effect of first vote, two-variable interactions of philosophy with coastal region, female gender, and employment, and gender*employment—again women are less likely than men to be paid for their work.

The logit analysis of the second dichotomy indicates that for first-time voters the odds of being a centrist are twice that for other voters. The best-fitting log-linear model ($\chi^2 = 13$, $df = 24$, $p = .97$) includes coastal region's marginal effect, gender*employment, and the interaction of first vote with being a centrist. Separate analyses indicate that first time voters tend to be younger ($p < .001$), have lower family income ($p < .005$), want some health care reform ($p < .02$), and vote for Perot ($p < .004$).



Note: Ordinal trichotomies are depicted as circles \circ and dichotomies as solid circles \bullet . The acronyms for the background attributes are: C = coastal region; W = women; E = employed paid work; F = first-time voter; A = age category, I = family income category; and M = minority status

Figure 3. Dependence Graph for Network of Ordinal and Dichotomous Variables

The regression graph (4) of Figure 2 emphasizes that coastal region (C10), women (W10), paid workers (E10), and first-time voters (F10) are more likely to be liberal than conservative (P). Additionally, first-time voters tend to be centrist rather than conservative and women are less likely than men to be paid for their work.

Dependence Graph

At this point, the big picture is obscure: how do these various relationships fit together forming a system? The dependence graph of Figure 3 provides an answer. It simplifies the detailed findings by depicting the variables as either ordered trichotomies (circles) or as dichotomies (solid circles). It depicts the conditional dependencies by the arrows linking the blocks of variables; a missing edge between two variables in different blocks indicates that their relationship is conditionally independent. Reading the diagram from left to right it shows that the latent classes of the issues directly determine the voting choice, as do party identification and political philosophy; additionally, minority ethnicity has a direct effect on vote. The latent classes of the issues are directly determined by the partisan predispositions of party identification and political philosophy, with the latter shaping the former, along with age and family income. Political philosophy is in turn shaped by area of residence, gender, employment, and first-time voting. Apparently, political philosophy is a pivotal variable: it directly

influences party identification, positions on the issues, and the voting choice; change a person's political philosophy and this will change the person's party identification, positions on issues, and vote.

This dependence graph is very similar to a summarizing path diagram for a recursive path analysis of a system of ordinal and dichotomous variables; Smith (1972) provides an example of the path analysis of such variables using Kendall's τ . However, a number of other statistical methods are available. These include the assignment of equal-interval scales to the variables (e.g., Smith 1999); the use of rank correlation methods in the Kendall's τ or Spearman's rho families of statistics (e.g., Smith 1978 1985 1986); weighted least squares methods based on Goodman and Kruskal's gamma or Somers's d_{yx} both using Mann-Whitney statistics (Carr, Hafner, and Koch 1989; Stokes, Davis, and Koch 2000); LISREL modeling based on polychoric and tetrachoric correlation coefficients (Jöreskog and Sörbom 1993, 44-50); and log linear models (Goodman 1972a 1972b). The interested reader can use the online data set to explore these methods and to delve more deeply into the causal analysis of such systems (Pearl 2000; Wermuth 2003, 50-53; Morgan and Winship 2007); now this case study focuses on the separate issues.

4.2 Models Including the Separate Issues

The latent class model combines the separate issues forming a useful composite, but its contributions to the overall R^2 s are not very high. For the separate issues this section presents analyses that improve their contributions to the R^2 s; uncovers their unique determinants; summarizes their patterns of direct and indirect dependencies; and probes their interaction effects.

Separate Issues and the Vote

Table 4 presents the results from logistic regressions that quantify the direct effects on the voting trichotomy of the separate issues, the partisan predispositions, and the attributes—the hypothesis of proportional odds is rejected ($p = .002$). However, the other measures of fit are fine and the effects are instructive. When the issues, party identification, and philosophy are controlled, only two social attributes directly influence the vote: minorities are more likely to vote for Clinton; people with middle-family income are less likely. Of course, Democrats (33.5), Independents, liberals, and centrists are more likely to vote for Clinton. The θ s for the issues are significant and improve the explanation:⁶ When they are excluded the R^2 is .54, when included, .57—an increase of about 5.6 percentage change points, which is slightly larger than the 5.3 percentage change points found earlier due to the latent structure of the issues.⁷

The voting results for Clinton (versus Perot plus Bush)

⁶ An ordinary least-squares regression analysis based on the assignment of equal-interval scales to the categories of the variables provides the following overall estimates of the effects of the issues. The basic model explained 50 percent of the variance in vote; the issues, an additional 4.62 percent, an increase in R^2 of 9.24 percentage change points. Party identification mediated the effects on vote of many of the other variables and it had by far the strongest direct effect, $\beta = .54$. Minority status had a direct effect of $\beta = .06$, liberalism's effect was $\beta = .12$ (its zero-order effect on vote was .40), and, among the four issues, character had the largest direct effect, $\beta = -.16$; compared with $\beta = .09$ for health care reform, $\beta = .07$ for economic interventions, and $\beta = .08$ for the environment. Thus, distrust of character, a variable closely linked to delegitimation of authority and to conservative positions on issues, slightly offset the liberal positions on the issues. However, these results are based on the assignment of equal-interval scales to the categories of the variables; the results from the logistic regressions are more appropriate.

⁷ The proportional odds model lacking the issues reduced the BIC from 1,791.5 to 1291.5, by 27.9 percentage change points. The model including the separate issues reduced the BIC to 1,249.5, by 30.3 percentage change points; the issues improved the fit of the model.

are similar to those from the proportional odds model. Regarding social attributes, the θ for minorities becomes larger (2.7), the family income effect drops out, and the θ for older people (1.9) becomes significant. In this model the economy is the most pivotal issue: the θ s for the effects on vote of either level of support for economic interventions are significant (3.7 and 1.7, respectively), followed by lack of concern about character (2.8), the environment (1.6), and support for comprehensive health care reforms (1.5). When the issues are excluded the R^2 is .55, when they are included it is .605. The difference of .055 represents an increase of 10 percentage change points due to the separate issues, which is considerably larger than the 4.7 percentage change points found earlier due to the issues latent structure.⁸

When votes for Perot versus Bush are probed the θ s for ethnicity and family income lack significance, but older people are more likely to vote for Bush (1.6). However, Democrats (7.2), Independents (6.3), liberals (1.8), and centrists (2.9), are more likely to vote for Perot than for Bush. The issue of the economy does not distinguish between Perot and Bush voters, but supporters of comprehensive health care reform (2.1), the environment (1.5), and Clinton's character (1.8) are more likely to vote for Perot than for Bush. When the issues are excluded the R^2 is .32, when included, .36; the difference of .04 represents an increase of about 12.5 percentage change points which is much larger than the 6.3 percentage change points found earlier due to the inclusion of the latent structure of the issues.⁹

The separate issues explained more of the variance in vote than their latent structure explained; they noticeably improved the explanations of the Clinton vote and the Perot vote. The economic issue had the strongest direct effect on votes for Clinton but no measured effect on the Perot vote. Character, environmental concern, and health care reform had significant independent effects.

Determinants of the Separate Issues

By regressing each separate issue on the prior variables of

⁸ For Clinton versus all others, the model including the issues reduced the BIC from 1,219.8 to 763.7, by 37.4 percentage change points. The model lacking the issues reduced the BIC to 794.8, by 34.8 percentage change points; the issues improved the fit.

⁹ For Perot versus Bush, the model lacking the issues reduced the BIC from 731 to 615, by 15.9 percentage change points. The model with the issues further reduced the BIC to 613, or 16.1 percentage change points.

Table 4. Effects on Vote of the Separate Issues and Prior Variables

Block a: Determinants of Vote: Clinton, Perot, or Bush	Proportional Odds (PO)		Clinton vs. All Others		Perot vs. Bush	
	B	Exp(B)	B	Exp(B)	B	Exp(B)
Intercept1	-4.1(.27)		-4.5(.37)			
Intercept2	-2.3(.23)				-2.34(.24)	
M10, Minority Ethnicity vs. White	.72(.28)	2.1	1.00(.31)	2.7	--	--
I20, Middle Income (\$30,000 -\$49,999) vs. Others	-.39(.16)	.67 or 1.5	--	--	--	--
A10, Older Age (50+) vs. All Others	--	--	.63(.21)	1.9	-.47(.23)	.63 or 1.6
P13, Liberals vs. Conservatives	.89(.21)	2.4	1.06(.25)	2.9	.60(.28)	1.8
P23, Centrists vs. Conservatives	.84(.19)	2.3	.82(.24)	2.3	1.08(.24)	2.9
L13, Democrats vs. Republicans	3.51(.23)	33.5	3.46(.28)	31.9	1.98(.32)	7.2
L23, Independents vs. Republicans	1.69(.20)	5.4	1.38(.28)	4.0	1.84(.23)	6.3
EI13, Two Economic Interventions vs. None	.73(.23)*	2.1	1.32(.29)	3.7	--	--
EI23, One Economic Intervention vs. None	--		.53(.22)	1.7	--	--
HR13, Two Healthcare Reforms vs. None	.71(.21)	2	.42(.21)*	1.5	.73(.25)	2.1
HR23, One Healthcare Reform vs. None	.41(.20)	1.5	--	--	--	--
EV10, Environment is Very Important	.53(.16)	1.7	.49(.20)	1.6	.41(.21)	1.5
CN10, Character is Not Very Important	.97(.16)	2.6	1.02(.20)	2.8	.58(.21)	1.8
	PO chi2 = 30, df = 11, p = .002		Deviance/DF = .97, p = .64		Deviance/DF = 1.22, p = .06	
	Deviance/DF = .87, p = .995		H&L X2 = 7.6, df = 8, p = .48		H&L chi2 = 12.9, df = 8, p = .11	
	BIC 1791.5 reduced to 1249.5		BIC 1219.8 reduced to 763.7		BIC 731 reduced to 613.1	
	-2LL 1778.1 reduced to 1161.9		-2LL 1213 reduced to 682.3		-2LL 724.7 reduced to 556.4	

Notes: Standard errors are enclosed in parentheses. A dash (--) indicates that the effect lacks statistical significance and was deleted from the model, which was then re-estimated. * The base category is (All Other Categories). Tests of Fit: PO = Proportional Odds; H&L = Hosmer & Lemeshow; BIC = Schwarz's Bayesian Criterion; -2LL = -2 Log Likelihood.

partisanship and social background, the analyses of Table 5 uncover their unique pattern of determinants.

Block b1, the Economy (EI): When the logistic procedure treats this clearly materialist issue as a trichotomous ordinal response, the hypothesis of proportional odds is not rejected ($p = .11$). Democrats (2.7), Independents (1.4), liberals (2.3), centrists (1.4), and women (1.5) support governmental economic interventions aiming to provide more jobs and consumer protection; the R^2 is .13.

Block b2, Health Care Reform (HR): Although the hypothesis of proportional odds is rejected ($p = .006$), this model does underscore the materialist aspect of reform: Democrats, liberals, and poorer people wanted more comprehensive reform; Republicans, conservatives, and affluent people did not; the R^2 is .17. Reform is best modeled using continuation-ratio logits: pro-reform on both items (1) versus all other responses (0) and then plus on one item (1) versus not plus on any items (0). Substantiating the materialist aspect of reform, the factors favoring comprehensive change are Democrats (1.6), liberals (2.9), centrists (1.5), low family income (2.1), and middle family income (1.6); the R^2 is .11. When the second dichotomy is modeled the effect of family income drops out: Democrats (3.4), Independents

(1.8), liberals (2.5), and centrists (2.2) favor one aspect of reform; the R^2 is .16.

Block b3, the Environment (EV): Environmental concern has both materialist and post-materialist aspects. Apparently, poor people and minorities primarily want protection from the polluted environments to which they are exposed (which is a materialist concern), more so than protection of natural habitats from the violations of people and industry (which is a post-materialist concern). Model 1 indicates that women (1.3), minorities (1.4), and people with low family income (1.4) said the environment is an important determinant of their vote (the middle-family income indicator has no effect, $p = .58$). However, only the effect of low family income—a materialist attribute—persists when both political philosophy and party identification are controlled. When in Model 2 political philosophy is controlled, then the effect of gender (1.2) becomes not statistically significant ($p = .09$). This lack of an effect is consistent with the idea that liberalism interprets women's environmental concern (Smith 1993a, 286). In Model 2 the odds ratio for minority status (1.4) remains unchanged, but its significance ($p = .07$) is questionable.

Table 5. Determinants of the Positions on the Separate Issues

Block b1: Presidential Economic Interventions (EI)		Proportional Odds (PO)			
	B	Exp(B)			
Intercept1	-2.62(0.16)				
Intercept2	-.42(.14)				
W10, Women vs. Men	.40(.12)	1.5			
P13, Liberals vs. Conservatives	.84(.16)	2.3			
P23, Centrists vs. Conservatives	.36(.15)	1.4			
L13, Democrats vs. Republicans	.99(.16)	2.7			
L23, Independents vs. Republicans	.31(.16)	1.4			
Tests of Fit:		PO X2 = 8.87, df = 5, p = .11			
		Deviance/DF = .95, p = .54			

Block b2: Healthcare Reform (HR)		Proportional Odds (PO)		Both Reforms vs. Not Both		One Reform vs. None	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	
Intercept1	-2.40(.18)		-2.03(.20)				
Intercept2	-.57(.16)				-.85(.15)		
I13, Low Income (<\$30,000) vs. High	.66(.16)	1.9	.75(.20)	2.1	--	--	
I23, Middle Income (\$30,000 -\$49,999) vs. High	.34(.16)	1.4	.47(.20)	1.6	--	--	
P13, Liberals vs. Conservatives	1.16(.16)	3.2	1.07(.18)	2.9	.90(.22)	2.5	
P23, Centrists vs. Conservatives	.63(.15)	1.9	.41(.18)	1.5	.80(.19)	2.2	
L13, Democrats vs. Republicans	.93(.16)	2.5	.49(.15)*	1.6	1.24(.21)	3.4	
L23, Independents vs. Republicans	.43(.16)	1.5	--	--	.59(.20)	1.8	
Tests of Fit:		PO chi2 = 18.1, df = 6, p = .006		H&L chi2 = 10.2, df = 9, p = .33		H&L chi2 = 3.1, df = 6, p = .79	
		Deviance/DF = 1.37, p = .047		Deviance/DF = 1.21, p = .26		Deviance/DF = 1.91, p = .11	

Block b3: The Environment is a Very Important (VIP)		Model 1 Yes, VIP		Model 2 Yes, VIP		Model 3 Yes, VIP	
Determinant of My Vote (EV)	B	Exp(B)	B	Exp(B)	B	Exp(B)	
Intercept	-0.46(.10)		-0.83(.13)		-.91(.14)		
W10, Women vs. Men	.28(.12)	1.3	.21(.12) n.s.	1.2	--	--	
M10, Minority vs. White	.37(.18)	1.4	.33(.18) n.s.	1.4	--	--	
I10, Low Income (<\$30,000) vs. Other	.36(.12)	1.4	.36(.13)	1.4	.32(.13)	1.4	
P13, Liberals vs. Conservatives	Not Entered	Not Entered	.75(.15)	2.1	.56(.16)	1.7	
P23, Centrists vs. Conservatives	In Model	In Model	.50(.15)	1.6	.33(.15)	1.4	
L13, Democrats vs. Republicans	Not Entered	Not Entered	Not Entered	Not Entered	.72(.16)	2.1	
L23, Independents vs. Republicans	In Model	In Model	In Model	In Model	.27(.17) n.s.	1.3	
Tests of Fit:		H&L chi2 = 3.5, df = 4, p = .48		H&L chi2 = 18.1, df = 9, p = .035		H&L chi2 = 13.2, df = 8, p = .11	
		Deviance/DF = 1.24, p = .29		Deviance/DF = 1.6, p = .051		Deviance/DF = 2.03, p = .02	

Block b4: The Character of a Candidate is Not a Very Important Determinant of My Vote (CN)		Model 1, Not VIP		Model 2, Not VIP		Model 3, Not VIP	
	B	Exp(B)	B	Exp(B)	B	Exp(B)	
Intercept	.01(.17) n.s.		-.47(.20)		-.83(.21)		
E10, Paid Work vs. Not Paid	.35(.14)	1.4 or .71	.28(.14)	1.3 or .77	.28(.14)	1.3 or .77	
A13, Older Age (50+) vs. Younger (18-29)	-.38(.18)	.68 or 1.5	-.36(.18)	0.70 or 1.4	-.43(.19)	0.65 or 1.5	
A23, Middle Age (30-49) vs. Younger (18-29)	-.35(.17)	.70 or 1.4	-.33(.17)	0.72 or 1.4	-.40(.18)	0.67 or 1.5	
P13, Liberals vs. Conservatives	Not Entered	Not Entered	.96(.15)	2.6	.68(.16)	2	
P23, Centrists vs. Conservatives	In Model	In Model	.67(.14)	2	.48(.15)	1.6	
L13, Democrats vs. Republicans	Not Entered	Not Entered	Not Entered	Not Entered	.79(.16)	2.2	
L23, Independents vs. Republicans	In Model	In Model	In Model	In Model	.76(.17)	2.1	
Tests of Fit:		Deviance/DF = 1.04, p = .96		Deviance/DF = .6, p = .86		Deviance/DF = 1.2, p = .19	
		H&L chi2 = .07, df = 4, p = .99		H&L chi2 = 1.7, df = 7, p = .98		H&L chi2 = 4, df = 8, p = .86	

Notes: Standard errors are enclosed in parentheses. A dash (--) indicates that the effect lacks statistical significance and was deleted from the model, which was then re-estimated. *The base category is (All Other Categories). **The base category is (Middle + High Income).

In Model 3 the control for party identification decisively eliminates the effects on environmental concern of gender ($p = .17$) and minority status ($p = .62$). The latter's absence of a significant effect is consistent with the view that Democratic party identification and not liberal philosophy interprets this choice of minorities. In the re-estimated model only low family income, political philosophy, and party identification directly determine environmental concern; the R^2 is .07. The environmental issue thus has materialist and post-materialist aspects.

Block b4, Character (CN): The character issue (i.e., Clinton's character) had moral and political aspects: The unchanging θ s for the social attributes when the partisan predispositions are controlled suggest the moral aspects; the θ s for political philosophy and party identification suggest the political aspects. In Model 3 people not paid for their work ($1.3 = 1/.77$) such as housewives, homemakers, and retirees; older people ($1.5 = 1/.65$); and middle-aged people ($1.5 = 1/.67$) are more likely to take a moral position saying that the character of the candidates was a very important factor in determining their vote. Contrariwise, liberals (2), centrists (1.6), Democrats (2.2), and Independents (2.1) are more likely to take a political position saying that the candidates' character was not very important; the R^2 is .10. Additional controls for universal access to healthcare and for public health interests change the significance of the paid work attribute ($p = .14$); this suggests that the abortion issue may explain why housewives and homemakers are concerned about the character of the candidates.

The economic and health care reform issues tapped materialist interests, the environmental issue tapped both materialist (protection from unsafe environments) and post-materialist (protection of the environment) interests, and the character issue had both moral and political aspects.

Edge Matrices

Because of the large number of variables and their interrelationship, graphing the dependencies is not easy. Instead, this case study uses parental and ancestor edge matrices to portray the dependencies (Wermuth 2003, 50-52). The parental edge matrix of Table 6 lists the ordinal and dichotomous response variables on the rows (graph modelers refer to these as children) and lists the prior ordinal and dichotomous explanatory variables on the columns (graph modelers refer to these as parents). A conditional dependency between a prior explanatory variable and a response is indicated by 1; two variables that are independent of each other in the model are

indicated by a zero, as is the absence of a directed relationship between variables in the same block. For vote (Y) the pattern of 1s indicates that all four of the issues (EI, HR, EV, and CN) have direct influence, along with party identification, political philosophy, age, income, and minority ethnicity. The pattern of 0s indicates that coastal residence, women, paid employment, and first time voters do not directly influence vote. Among the other interesting relationships are those between the social attributes and the variables of political partisanship. The patterns of 1s and 0s indicate that age, income, and minority ethnicity directly influence party identification but not political philosophy; contrarily, coastal region, women, paid employment, and first-time voting directly influence political philosophy but not party identification. These two patterns enabled these social attributes to be used as instrumental variables in the earlier two-stage least squares analysis that found that political philosophy is prior to party identification in these data (Smith 1999).

The overall ancestor edge graph of Table 7 has a similar structure to that of the parental graph, but the ancestors who indirectly influence a child through their direct

Table 6. Edge Matrix Summarizing Direct Dependencies on Prior Variables

Priors:	Y	EI	HR	EV	CN	L	P	C	W	E	F	A	I	M
Responses:	○	○	○	●	●	○	○	●	●	●	●	○	○	●
Y	○	1	1	1	1	1	1	0	0	0	0	1	1	1
EI	○		1	0	0	1	1	0	1	0	0	0	0	0
HR	○			1	0	1	1	0	0	0	0	0	1	0
EV	●				1	0	1	0	0	0	0	0	1	0
CN	●					1	1	0	0	1	0	1	0	0
L	○						1	1	0	0	0	1	1	1
P	○							1	1	1	1	0	0	0
C	●								1	0	0	0	0	0
W	●									1	0	0	0	0
E	●										1	0	0	0
F	●											1	0	0
A	○												1	0
I	○													1
M	●													

Note: This matrix summarizes finding from Tables 4 and 5 treating the variables as ordinals symbolized by circles ○ or dichotomies symbolized by solid circles ●. The acronyms are: Y = vote; EI = economy issue; HR = Healthcare reform; EV = environment; CN = character not important; L = party identification; P = political philosophy; W = women; E = paid employment; F = first-time voter; A = age; I = income; M = minority status.

influence on parents are also designated by 1s; no indirect or direct influence is indicated by 0s. For vote (Y) all of the prior variables have either direct or indirect influence as indicated by the universal pattern of 1s. Moreover, background variables C through M directly influence or indirectly influence (through variables of political partisanship) positions on all four of the issues. The patterns of distinct relationships between the social attributes that influence political philosophy and those that influence party identification are the same as in the earlier matrix. How best to quantify such direct and indirect dependencies in matrices of ordinal and dichotomous variables is a problem for further research.

4.3 Interaction Effects

To further study how the four separate issues interacted to influence vote, they were cross-tabulated directly with voting choice—inclusion of other variables in the cross-tabulation would produce too many cells with zero cases. The backward selection procedure found this best-fitting log-linear model ($\chi^2 = 45.3, df = 56, p = .85$) comprising four components: character*environment*reform* economy; character*environment*vote; economy*vote; and reform*vote. These imply that the four issues directly affected vote but, in addition, there were some significant interactions among the variables. The interacting variables that had the same qualitative relationship with vote (either + + or - -) tended to have mutually intensifying effects. Thus, the character*environment*vote interaction implied that, among those voters who were not very concerned about the environment (-), the effect of being very concerned about character (-) on Republican vote (-) was stronger ($\tau = .37$) than that effect among those voters very concerned about the environment (+) ($\tau = .18$). Alternatively, among those voters very concerned about character (-), the effect of lack of environmental concern (-) on Republican vote (-) was stronger ($\tau = .30$) than that effect among those not very concerned about character (+) ($\tau = .12$). When the Democratic candidates emphasized the strengths of their own characters (+), this may have weakened the effect of lack of environmental concern (-) on Republican vote (-). Alternatively, when the Democratic candidates emphasized their concern about the environment (+), this may have weakened the impact of the character issue (-) on Republican vote (-).

A reason for this environmental interaction effect that weakened the negative effect of a candidate's character on Democratic vote may be as follows. Some evangelical Christians are both anti-women's choice concerning abortions and also believe that human beings are the custodians of God's earth, and that we should take good

Table 7. Edge Matrix Summarizing Direct and Indirect Dependencies on Priors

Priors:	Y	EI	HR	EV	CN	L	P	C	W	E	F	A	I	M
Responses:	○	○	○	●	●	○	○	●	●	●	●	○	○	●
Y	○	1	1	1	1	1	1	1	1	1	1	1	1	1
EI	○		1	0	0	1	1	1	1	1	1	1	1	1
HR	○			1	0	1	1	1	1	1	1	1	1	1
EV	●				1	0	1	1	1	1	1	1	1	1
CN	●					1	1	1	1	1	1	1	1	1
L	○						1	1	0	0	0	0	1	1
P	○							1	1	1	1	1	0	0
C	●								1	0	0	0	0	0
W	●									1	0	0	0	0
E	●										1	0	0	0
F	●											1	0	0
A	○												1	0
I	○													1
M	●													

Note: This matrix summarizes findings from Tables 4, 5, and 6 treating the variables as ordinals symbolized by circles ○ or dichotomies symbolized by solid circles ●. The acronyms are: Y= vote; EI = economy issue; HR = Healthcare reform; EV = environment; CN = character not important; L = party identification; P = political philosophy; W = women; E = paid employment; F = first-time voter; A = age; I = income; M = minority status.

care of it; they are pro-environment, at least implicitly. Clinton favored women's choice; evangelical Christians deemed this stance among others of his to be a character flaw. However, Gore and Clinton favored protection of the environment. This could have created a cross-pressure that moderated the anti-Clinton fervor of some evangelical Christians.

The four-issue interaction (character*environment*reform* economy) implied that the association between opposition to health care reform (-) and opposition to economic interventions (-) varied depending upon concern about character and environmental concern. When voters were very concerned about the environment (+) but not very concerned about character (+) (i.e., disposed toward the Democratic position on those issues), then the association between opposition to reform (-) and opposition to interventions in the economy (-) was weaker ($\tau = .15$) than that association ($\tau = .28$) when voters were not very concerned about the environment (-) but were very concerned about character (-) (i.e., disposed toward the Republican position on

those issues).¹⁰ Thus, the character and the environmental issues intensified the consistency of voters' attitudes about governmental interventions in the economy and health care. When Democratic candidates emphasized their concern about the environment and the strengths of their own characters this may have weakened the consistency of opposition to governmental interventions in the economy and in the health care system. These four issues were synergistic; they certainly did matter.

5. Conclusion

This case study has applied the multivariate dependencies paradigm to develop graphical models of a system of variables that produces voting choices. In these models the voters' choices are influenced by the issues of the campaign, which this study conceptualizes as stimuluses; party identification and political philosophy, which this study conceptualizes as stable partisan predispositions; and social attributes, which shape the predispositions. Most simply, the voting choice here depends on the conjunction of the stimuluses and the predispositions, with the social attributes affecting the latter. Other studies can develop this basic model by studying interpersonal and media influence and religion; important factors that this survey questionnaire did not tap; and by testing the precedence ordering. Although this model was developed using data for the 1992 election, it is consistent with many of the findings of numerous studies of electoral voting in the United States. It also provides sensitizing observations about the 2008 election campaign in the United States, which as noted earlier, shares some features with this earlier election.

The decisive issues in the 2008 election were very similar to those in 1992; the economy, health care reform, the environment (and energy), and character were all salient. With the melt down of the financial institutions in the United States and globally, the economy became most salient. Obama successfully linked the McCain-Palin ticket to the failed economic policies of George W. Bush

(i.e., deregulation; tax cuts for the wealthy, and deficits) and this helped him to win. Obama's health care reform proposal was thought by many to be better than McCain's, which probably would increase the already high numbers of people (about 47 million) that lack health insurance. The public thought that Obama was more concerned about the effects of energy policy on the environment and global warming; McCain and Palin's mantra "drill, baby, drill!" disclosed their lack of environmental concern and advocacy of simplistic solutions to complex problems

Much like the 1992 campaign, the Republicans attacked the character of the Democrats' candidate. Obama was characterized as friendly to terrorists and radical clergy; a Muslim and not a Christian; betraying the troops in Iraq and accepting defeat; being pro-Palestinian and anti-Israel; wanting sex to be taught to kindergarteners; supporting infanticide (i.e., abortions); and being a socialist. He countered these attacks forthrightly and also attacked McCain and Palin about their character.

The latent structure analysis shows that Clinton won in 1992 because he captured the vote of the center; Obama did this in 2008. Although Palin mobilized the Republican base of evangelicals, many centrists and some prudent conservatives thought that she was not prepared to be president should McCain become immobilized or die in office. Palin's limitations pushed them to support Obama and Biden, helping to create their margin of victory of 6.8 percentage points, which is larger than the 5.6 for Clinton over Bush.

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¹⁰ For the two other types of voters – those who experienced a cross-pressure between their attitudes about the environment and character – the associations were as follows. When the environment was not very important (-) and character was not very important (+) the association between opposition to governmental interventions in the economy and in health care – support for the Republican positions – was $\tau = .165$. When the environment was very important (+) and character was very important (-) the association between opposition to governmental interventions in the economy and in health care – support for the Republican positions – was $\tau = .12$. Environmental concern weakened the consistency of the Republican issue positions even when character was important.

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Correspondence: rsmithphd@comcast.net