RESPONSE MEMORANDUM FOR

CONFERENCE ON ISSUE

VOTING

JESSE F. MARQUETTE

DEPARTMENT OF POLITICAL SCIENCE

THE UNIVERSITY OF AKRON

Research on the topic of issue voting has demonstrated the complexity of the forces effecting the decision process. This apparent complexity of the underlying phenomenon argues for the utilization of multiple predictor variables, both in theoretical arguments and in any attempt at empirical vertification of theory. Lack of availability of powerful and easily interpretable multivariate procedures for the analysis of categorical data has been, therefore, a continuing constraint on the development and verification of a theory of issue voting, and indeed voting behavior in general.

One procedure which is well known but not utilized due to technical difficulties is prediction to the mode. This procedure is powerful, straightforward, easily interpretable and yields a wide variety of information necessary to the analysis of the categorical data usually found in voting research. The conceptual simplicity and relative ease of interpretation of the prediction to the mode strategy suggests that a feasible and efficient implementation of the procedure would have many attractive aspects for practitioners engaged in discrete multivariate analysis.

DISCUSSION

Given a categorical criterion variable Y and a set of categorical predictors, $(X_1, X_2 \ldots X_p)$, it is well known that for any given combination of X_i categories the modal category of Y is the "best" predicted value in the sense of maximum probability of occurrence. It is also well known that a priori, the number of possible marginals is

$$M = C_y \times \prod_{i=1}^{p} C_i$$

which rapidly becomes large for even modest combinations of p and c. Computation of the relevant marginals heretofore required operations on arrays of prohibitive dimension with consequent excessive cost in C.P.U. time.

It is obvious however, that irrespective of the size of M_a, given a sample of size N, the number of observed marginals M_o, cannot exceed N. In fact, if the researchers theoretical basis for the selection of the X_i is sound, then M_o should be far less than either M_a or N. Perhaps somewhat less obvious is the possibility of creating, without restrictive assumptions, an integer valued combined characteristic vector CCV of order $O \leq \min (M_o, N)$, which retains all the information of the original X_i, Y combinations. Operations on CCV for the prediction to the mode strategy are thereafter powerful, general and very, very fast.

An algorithm for the prediction to the mode strategy has resulted as a by-product of the systems development of the University of Akron's Advanced Data Enquiry Package Time-Shared, (Marquette and Dufala, 1977).

The attached example illustrates the variety of information which can currently be obtained from the procedure.

Inasmuch as the procedure does not require restrictive assumptions of additivity, is appropriate for both categorical predictor and criterion variables, and is fast enough to make feasible the employment of a stepwise search procedure for the best combination of predictor variables it is ideal for use in voting behavior research. There are in addition a number of interesting possibilities for application in the area of attitude scaling.

Since this methodology has not been utilized previously I would like to place before the conference the questions of the variety of applications of this procedure to issue voting research, and what kinds of additional information would be useful as output from the procedure.

```
:OPTIONS? DE
:DISCRETE DATA ANALYSIS REQUESTED

:OPTIONS? DM
:DISCRETE MULTIVARIATE ANALYSIS REQUESTED
':SELECT VARIABLES
': 1 3 5 7 11

':OPTIONS?
)      CANCEL
   M :MULTIPLE-ANALYSIS
!  S :STEPWISE-ANALYSIS
':OPTIONS? S
!:STEPWISE ANALYSIS REQUESTED
':SELECT DEPENDENT VARIABLE(S)
': 7
!:SELECT INDEPENDENT VARIABLE(S)
': ALL
!:OUTPUT SELECTION FOR CLASSIFICATION MATRIX

':OPTIONS?
0      CANCEL
1   EF:EXPECTED-FREQUENCY
2   CP:COLUMN-PERCENT'S
3   RP:ROW-PERCENT'S
4   TP:TOTAL-PERCENT
5   A :ALL
6   N :NONE
':OPTIONS? ALL
':DO YOU WISH TO SELECT PREDICTOR SET BASED ON STEPWISE RESULTS? (Y/N) Y
':DO YOU WISE TO PRINT CELLS OF 1? (Y/N) Y
':TO CHANGE PERCENTAGE SELECTOR FOR PRINTING PREDICTOR CATEGORIES FROM 50, ENTER NEW PERCENTAGE:
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DISCRETE MULTIVARIATE ANALYSIS FOR: PRES72;VOTE FOR MCGOV OR NIXON
WITH: GOVAID DEGREE PARTYID RACE

FREQUENCY TABLE FOR: PRES72;VOTE FOR MCGOV OR NIXON

VALUE LABELS	SCALE VALUE	OBSERVED FREQUENCY	PERCENT OF TOTAL
MCGOVERN:	1	328	35.27
NIXON:	2	561	60.32
OTHER:	3	28	3.01
NOPRES:	5	13	1.40

TOTAL VALID CASES: 930

STATISTICS

MINIMUM	MODE	MAXIMUM	RANGE
1	2	5	4

STEPWISE DISCRETE MULTIVARIATE ANALYSIS WITH 4 INDEPENDENT VARIABLES: 15 STEPS

LEGEND

1-GOVAID
3-DEGREE
5-PARTYID
11-RACE

STEP	VARIABLES	MULTIVARIATE LAMBDA	CORRECTED LAMBDA	CORRECTLY ASSIGNED-PCT	CELLS	NON-UNIT CELLS
1	1	.00000	.00000	60.32	2	2
2	3	.00000	.00000	60.32	5	5
3	5	.30081	.29984	72.26	7	7
4	11	.15447	.15464	66.45	3	3
5	1 3	.00271	.00259	60.43	10	10
6	1 5	.30894	.30562	72.58	14	14
7	1 11	.15447	.15431	66.45	5	5
8	3 5	.33052	.31996	73.44	34	33
9	3 11	.15447	.15331	66.45	11	9
10	5 11	.36314	.35846	74.73	16	12
11	1 3 5	.33875	.31726	73.76	63	60
12	1 3 11	.15718	.15465	66.56	19	15
13	1 5 11	.36314	.35455	74.73	26	22
14	3 5 11	.39295	.37267	75.91	52	43
15	1 3 5 11	.39566	.36120	76.02	85	74

LARGEST CORRECTED LAMBDA: .37267 STEP: 14

DM:SELECT STEP NUMBER FOR ANALYSIS, ENTER 0 WHEN DONE 14

MULTIVARIATE ANALYSIS TABLE FOR: PRES72;VOTE FOR MCGOV OR NIXON
WITH: DEGREE PARTYID RACE

PREDICTED ACTUAL

VALUE LABEL / ACTUAL VALUE		MCGOVERN: 1	NIXON: 2	OTHER: 3	NOPRES: 5	ROW MARG.	ROW PCT.
1:MCGOVERN	OF	228	83	15	6	332	35.70
	EF	117.09	200.27	10.00	4.64		
	CP↓	69.51	14.80	53.57	46.15		
	RP→	68.67	25.00	4.52	1.81		
	TP	24.52	8.92	1.61	.65		
2: NIXON	OF	100	478	13	7	598	64.30
	EF	210.91	360.73	18.00	8.36		
	CP↓	30.49	85.20	46.43	53.85		
	RP→	16.72	79.93	2.37	1.17		
	TP	10.75	51.40	1.40	.75		
COLUMN MARG.		328	561	28	13		
COLUMN PCNT		35.27	60.32	3.01	1.40	N = 930	

THERE ARE 1 CELLS WITH EXP. FREQ. LESS THAN 5

MULTIVARIATE STATISTICS

CHI SQUARE	DF	SIGNIF	LAMBDA	CORRECTED LAMB
274.6798	3	.00000	.39295	.37267

CELLS	CORRECTLY ASS'D(PCT)	NON-UNIT CELLS	CORRECTLY ASS'D(PCT)
52	75.91	43	74.95

DM:SELECT STEP NUMBER FOR ANALYSIS, ENTER 0 WHEN DONE 0
DM:SELECT STEP FOR PREDICTOR CELL ANALYSIS: 14

DEGREE;HIGHEST DEGREE EARNED
0-LT HIGH 1-HIGHSCHL 2-JUNCOL 3-BACHELOR 4-GRAD
PARTYID;R PARTY IDENT
0-STRDEM 1-NVSDEM 2-ICLSDEM 3-IND 4-ICLSREP 5-NVSREP 6-ST
RACE;R'S RACE
1-WHITE 2-BLACK 3-OTHER
PREDICTING:PRES72;VOTE FOR MCGOV OR NIXON
1-MCGOVERN 2-NIXON 3-OTHER 5-NOPPES

DEGREE	PARTYID	RACE	NO OF CASES	PCT OF TOTAL	PRED. Y	(CELL)PCT CORRECT	(TOTAL)PCT CORRECT
0	0	1	56	6.022	1	67.857	4.086
0	0	2	28	3.011	1	85.714	2.581
0	1	1	51	5.484	2	62.745	3.441
0	1	2	11	1.183	1	81.818	.968
0	2	1	15	1.613	2	66.667	1.075
0	3	1	21	2.258	2	90.476	2.043
0	4	1	9	.968	2	88.889	.860
0	5	1	51	5.484	2	94.118	5.161
0	5	2	2	.215	1	100.000	.215
0	6	1	21	2.258	2	100.000	2.258
1	0	1	55	5.914	1	58.182	3.441
1	0	2	12	1.290	1	83.333	1.075
1	1	1	102	10.968	2	53.922	5.]14
1	1	2	9	.968	1	100.000	.968
1	2	1	69	7.419	1	55.072	4.086
1	2	2	3	.323	1	66.667	.215
1	3	1	51	5.484	2	70.588	3.871
1	3	2	3	.323	1	100.000	.323
1	4	1	45	4.839	2	84.444	4.086
1	5	1	90	9.677	2	93.333	9.032
1	5	2	3	.323	1	66.667	.215
1	6	1	38	4.086	2	97.368	3.978
2	0	1	5	.538	1	80.000	.430
2	1	1	3	.323	2	66.667	.215
2	2	1	3	.323	1	66.667	.215
2	3	1	5	.538	2	60.000	.323
2	4	1	2	.215	2	100.000	.215
2	5	1	4	.430	2	100.000	.430
3	0	1	11	1.183	1	81.818	.968
3	0	2	2	.215	1	50.000	.108
3	1	1	24	2.581	1	58.333	1.505
3	2	1	16	1.720	1	68.750	1.183
3	2	2	2	.215	1	100.000	.215
3	3	1	11	1.383	2	72.727	.860
3	4	1	15	1.613	2	100.000	1.613
3	5	1	15	1.613	2	86.667	1.398
3	6	1	16	1.720	2	100.000	1.720
4	0	1	6	.645	1	100.000	.645
4	1	1	7	.753	2	57.143	.430

DEGREE	TYPE	RACE	NO OF CASES	PCT OF TOTAL	PRED. Y	(CELL)PCT CORRECT	(TOTAL)PCT CORRECT
4	2	1	8	.860	1	75.000	.645
4	4	1	8	.860	2	100.000	.860
4	5	1	11	1.183	2	72.727	.860
4	6	1	2	.215	2	100.000	.215

TOTALS FOR 43 SELECTED CATEGORIES

921	99.032		74.946

9 *UNIT CELLS*

UNIT CELLS

DEGREE	PAY	RACE	-	PRED. SEX	DEGREE	PAY	RACE	-	PRED. SEX
0	2	2		1	2	2	2		1
0	4	2		2	3	1	2		1
0	5	3		2	3	6	2		2
1	6	3		2	4	3	1		2
2	0	2		1					

:*OPTIONS?*