EXCHANGE THEORY AND LEGISLATIVE BEHAVIOR: A COMPUTER SIMULATION OF ROLL-CALL VOTING IN THE U. S. SENATE

Thesis for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY
JEANNE LOUISE MARTIN

1971

This is to certify that the

thesis entitled

EXCHANGE THEORY AND LEGISLATIVE BEHAVIOR:
A COMPUTER SIMULATION OF ROLL-CALL
VOTING IN THE U. S. SENATE

presented by

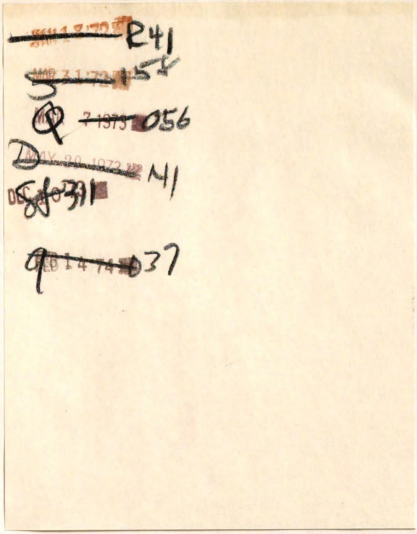
Jeanne Louise Martin

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Political Science

Major

Date April 2, 1971



ABSTRACT

EXCHANGE THEORY AND LEGISLATIVE BEHAVIOR:
A COMPUTER SIMULATION OF ROLL-CALL
VOTING IN THE U.S. SENATE

By

Jeanne Louise Martin

In a political system, a number of decisions are made on the allocation of values or utilities for the society. Inasmuch as these decisions have different consequences for the members of the society, individuals vary in the intensity with which they desire particular outcomes of political decisions. In a society where resources for affecting political decisions, or political power, are broadly distributed, rules provide for the aggregation of power in order to make collective decisions.

Aggregation of power is carried out in a representatives system by reallocating the political power of individuals to politicians who, in turn, make political decisions. This is done through elections in which voters choose representatives from among candidates for representative offices. Thus, a representative political system makes allocations of social utilities and, as a derivative of

its decision rules, political power. It does this through a set of interlocking institutions.

The political power of office-holders in political institutions varies in relation to the political power reallocated to them by election. Hence, the political power of a representative varies with the size of his electorate, those citizens for whom he may make collective decisions. As electorates increase in size, fewer politicians can occupy positions of aggregated power. Taken together, then, the offices in a representative political system form a hierarchy or opportunity structure of political power attendant upon holding office in the system's institutions. Political parties are organizations of individuals whose goal is to win political power allocated in the representative system: in the political system we describe, there are two political parties.

This political system models five conditions:

1. There are a number of issues to be decided in the political system.
2. Actors vary in the intensity by which they desire particular outcomes of different political decisions.
3. Resources for affecting the outcome of political decisions are broadly distributed.
4. There are rules by which political decisions are made; and these rules are accepted by the participants.
5. Two political parties attempt to gain political power.

In addition, we make two assumptions:

1. Actors are rational.
2. Actors make exchanges of resources affecting political decisions.

From this theory in conjunction with decision rules which tell what resources may be used and how they may be allocated, we derive hypotheses explaining behavior of voters and candidates in campaigns and behavior of legislators between elections.

Most of these hypotheses are corroborated by empirical findings of political research. Furthermore, these hypotheses parallel most of the hypotheses programmed into a simulation model by Cleo Cherryholmes and Michael Shapiro. This simulation model has been fairly successful in predicting roll-call voting in the U.S. House of Representatives.

In the light of the theory, criteria of explanatory power of simulation models, and considerations of applying a simulation model in comparative research, we revise the simulation and test both the Cherryholmes-Shapiro model and its revision on data describing characteristics of the U.S. Senate in the Eighty-Eighth Congress (1963-1964).

Although predictive accuracy of neither simulation model is as great for the Senate as the Cherryholmes-Shapiro model was for the House of Representatives, many of the discrepancies reflect patterns of correspondence and non-correspondence in the model construction itself. Many of

the discrepancies between the predictions of the simulation and actual behavior, then, contribute to our confidence in the validity of the theory. Furthermore, the revision of the Cherryholmes-Shapiro model, in addition to being more parsimonious, more closely related to a theory which explains it, and more easily applied in comparative research, is higher in explanatory power than the original model.

Finally, we offer suggestions for revision of the model to more adequately assess the correspondence between theory and reality, and for application of exchange theory to phenomena other than roll-call voting in American legislatures.

EXCHANGE THEORY AND LEGISLATIVE BEHAVIOR: A COMPUTER SIMULATION OF ROLL-CALL VOTING IN THE U.S. SENATE

By

Jeanne Louise Martin

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Political Science

1971

ACKNOWLEDGEMENTS

Many people took part in the completion of this project, and I thank them all. In particular, my dissertation committee, Joseph Schlesinger, Timothy Hennessey, and Cleo Cherryholmes, furnished many ideas at the inception of the research and useful criticisms for the revision of the thesis. The chairman of my dissertation committee, Cleo Cherryholmes, deserves special mention in this regard: he has been a friend as well as an academic advisor, demonstrating that academic communities fostering creativity and human development are possible.

A valuable friend, Elizabeth Powell, assisted me in the technical and methodological aspects of the research. Our dialogue is a source of great satisfaction in my continuing education.

Finally, I offer my deepest thanks to my parents who, by allowing me freedom and support, encouraged me to pursue my interests.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Research on Legislative Behavior

Some decisions on public policy are made in legislatures. This decision-making may be studied by focussing on various aspects of the legislative process, such as committee decision-making, leadership influence, communications and roll-call voting. Each focus may be interesting and may contribute to our understanding of the legislative process; however, roll-call votes express both the legislator's final decision on the policy in question and the legislature's collective decision. If one is interested in the outcome of decisions made in the legislature, then, the roll-call vote is one dependent variable which research on legislative decision-making should explain.

Not only is the roll-call fully justifiable as a phenomenon to be explained, but there is a wealth of fairly reliable data at hand to use in research. Furthermore, students of legislative behavior have developed elaborate techniques for manipulating this data.[1] One can identify

[1] An examination of many methods and their properties may be found in Lee Anderson, Meredith Watts, and Alan Wilcox, Legislative Roll-Call Analysis (Evanston: Northwestern University, 1966); and Duncan MacRae, Jr., Issues and Parties in Legislative Voting: Methods of Statistical Analysis (New York: Harper and Row, 1970).

agreement and disagreement of legislators by generating blocs, measuring cohesion and conflict, and scaling issue postures.[2] One can gauge continuity and discontinuity of public issues by generating factors, dimensions, and scales.[3]

[2]Classic methods of handling roll-calls originated with Stuart Rice, "The Behavior of Legislative Groups," Political Science Quarterly, 40 (1925), pp. 60-72; Rice, "The Identification of Blocs in Small Political Bodies," American Political Science Review, XXI (September, 1927), pp. 619-627; Herman C. Beyle, Identification and Analysis of Attribute-Cluster-Blocs (Chicago: University of Chicago, 1931). For a comparison of measures of cohesion, see Aage R. Clausen, "The Measurement of Legislative Group Behavior," Midwest Journal of Political Science, XI (May, 1967), pp. 212-224.

[3]Scale analysis is appropriate for differentiating among both individuals and legislative issues: G. M. Belknap, "A Method for Analyzing Legislative Behavior," Midwest Journal of Political Science, 2 (1958), pp. 377-402. Scaling may be used in conjunction with cluster-bloc analysis: Duncan MacRae, Jr., "A Method for Identifying Issues and Factions from Legislative Votes," American Political Science Review, LIX (December, 1965), pp. 909-926. Studies using scales include: Duncan MacRae, Jr., Dimensions of Congressional Voting, Publications in Society and Social Institutions, No. 3 (Berkeley: University of California, 1958), pp. 203-390; Charles Andrain, "Senators' Attitudes Toward Civil Rights," Western Political Quarterly, 17 (1964), pp. 488-503; Paul Dempsey, "Liberalism-Conservatism and Party Loyalty in the U.S. Senate," Journal of Social Psychology, 56 (1962), pp. 159-170; Charles H. Gray, "A Scale Analysis of the Voting Records of Senators Kennedy, Johnson and Goldwater, 1957-1960," American Political Science Review, LIX (September, 1965), pp. 615-621; Factor analyses include Stephen Cimbala, "Foreign Policy as an Issue Area: A Roll-Call Analysis," American Political Science Review, LXIII (March, 1969), pp. 148-156; John G. Grumm, "A Factor Analysis of Legislative Behavior," Midwest Journal of Political Science, VII (November, 1963), pp. 336-356; Gerald Marwell, "Party, Region and the Dimensions of Conflict in the House of Representatives, 1949-1954," American Political Science Review, LXI (June, 1967), pp. 380-399. Dimensional analysis is utilized in a comparative manner by Aage Clausen and Richard Cheney, "A Comparative Analysis of Senate-House Voting on Economic and Welfare Policy 1953-1964," American Political Science Review, LXIV (March, 1970), pp. 138-152. For exploring continuity over time see, Aage R. Clausen, "Measurement Identity in the Longitudinal Analysis of Legislative Voting," American Political Science Review, LXI (December, 1967), pp. 1020-1035.

Seldom, however, has the roll-call vote been used as a dependent variable.[4] Patterns of cohesion have been described by the common characteristics of cohesive individuals,[5] and roll-calls have been identified by their underlying commonality of content and by the characteristics of legislators who support and oppose them.[6] As a result, we have many hypotheses about the determinants of roll-call votes and about differences across issues, but rarely have these hypotheses been tested on new data.

Furthermore, each roll-call presents the legislator with a number of conditions which vary from motion to motion. These differences have often been obscured by lumping together large numbers of roll-calls. Roll-call votes have been aggregated into sessions, parties and issue areas, and disaggregated into blocs and policy dimensions.

---

[4]Notable exceptions to this generalization are the more formal treatments, mathematical, statistical, and simulation models of roll call voting which have been tested against data; Cleo Cherryholmes and Michael Shapiro, Representatives and Roll Calls (New York: Bobbs-Merrill, 1969); Donald Matthews and James Stimson, "Decision-Making by U.S. Representatives: A Preliminary Model," 1968 (Mimeo.); David B. Meltz, "Competition and Cohesion: A Model of Majority Party Legislative Bargaining" (unpublished Ph.D. dissertation, University of Rochester, 1970); Warren E. Miller and Donald E. Stokes, "Constituency Influence in Congress," American Political Science Review, LVII (1963), pp. 45-56.

[5]David Truman, The Congressional Party (New York: John Wiley, 1959).

[6]Andrain, "Senators' Attitudes Towards Civil Rights;" Cimbala, "Foreign Policy as an Issue Area;" Clausen and Cheney, "A Comparative Analysis of Senate-House Voting;" Grumm, "A Factor Analysis of Legislative Behavior;" Marwell, "Party, Region, and the Dimensions of Conflict in the House of Representatives."

In the glut of hypotheses about correlates of individual and group behavior, such as party, constituency and region, we find few insights into how or why the individual legislator reconciles these influences. Moreover, observers infer interpersonal influence and group processes from patterns of cohesion and conflict,[7] and legislatures have been described as social systems.[8] Few hypotheses, however, attempt to explain how we may link interaction to roll-call votes independently of, or in conjunction with other influences on legislative behavior.

Unless we account for both the individual's decision-making process and the effect of group decision-making, we cannot explain roll-call votes.

We propose to approach explanation of roll-call votes as decisions made by individuals in the context of an ongoing collective decision-making process. We will develop a theory and a method appropriate for validating it which are useful in comparative research.

---

[7] Truman, The Congressional Party.

[8] Raymond A. Bauer, Ithiel deSola Pool, and Lewis A. Dexter, American Business and Public Policy (New York: Atherton, 1964); Wayne L. Francis, "Influence and Interaction in a State Legislative Body," American Political Science Review, LVI (December, 1962), pp. 953-960; Samuel C. Patterson, "Patterns of Interpersonal Relations in a State Legislative Group: The Wisconsin Assembly," Public Opinion Quarterly, XXIII (Spring, 1959), pp. 101-109.

In the next section we shall examine two attempts to explain individual roll-call votes for their adequacy and for the insights they bring to the nature of scientific explanation.

Explanations of Roll-Call Voting

There are two types of explanation: the pattern type or factor theory fits what is to be explained into a set of known relationships. That is, a series of factors or influences all partially explaining one behavioral phenomenon are postulated. This set of propositions embodies a pattern of relationships which converge on the observation to be explained. The deductive type or hierarchical theory shows that the observation can be deduced from more general considerations. That is, from a set of assumptions, or lawlike generalizations, we derive hypotheses which predict the observed outcome.[9]

In general, the deductive model of explanation is to be preferred over the pattern model. First, it is generalizable to any system for which its assumptions are plausible; frequently the pattern model is bound to a specific situation by it component propositions. Furthermore, the deductive explanation circumscribes the realm of

---

[9]Abraham Kaplan, The Conduct of Inquiry (San Francisco: Chandler, 1964), pp. 327-346; Quentin Gibson, The Logic of Social Enquiry (London: Routledge and Kegan Paul, 1960).

admissible evidence; the pattern model may admit any grounds for explanation. Finally, if predictions are logical consequences of a set of assumptions, errors in prediction must stem from those assumptions; the inability of a factor theory to explain may stem from a mistaken conponent hypothesis or from a blank or hole in the pattern.

We have examples of both types of explanation for legislative voting. One, developed and tested by Donald Matthews and James Stimson, purports to be a deductive explanation; the other, a model developed and tested by Cleo Cherryholmes and Michael Shapiro, is a pattern explanation. Both have been tested by computer simulation on data from the United States House of Representatives.[10]

The Matthews-Stimson Model

Matthews and Stimson assume that representatives are rational or goal-directed in their actions. They maintain that rational behavior is "general (like cases are handled alike), regular (reasonably stable over time), and consistent (decisions on different issues are logically compatible)."[11] They also assume that the legislator is faced by a multiplicity of complex issues, the impact of

---

[10]Matthews and Stimson, "Decision-Making by U.S. Representatives;" Cherryholmes and Shapiro, Representatives and Roll-Calls.

[11]Matthews and Stimson, "Decision-Making by U.S. Representatives," p. 4.

which (relative to his goals) he is uncertain. Matthews and Stimson argue:

> . . . when a member is confronted with the necessity of casting a roll-call vote on a complex issue about which he knows very little, he searches for cues provided by trusted colleagues who--because of their formal position in the legislature or policy specialization--have more information than he does and with whom he would probably agree if he had the time and information to make an independent decision.[12]

To operationalize their theory, Matthews and Stimson designate nine possible cue-givers: the state party delegation, party leadership, the President, the chairman of the committee reporting the bill, the ranking minority member of the committee reporting the bill, the "conservative coalition" (two-thirds of the Southern Democrats voting the same way), the leadership of the Democratic Study Group, the party majority, and the House majority (two-thirds of the House voting the same way).[13]

From roll-calls in the first half of a congressional session, they calculate for each member and each cue-giver the ratio of the number of times the member voted with the cue-giver to the number of times the cue was available and the member was voting.[14] Since a ratio of one-half indicates chance agreement, deviations from chance are interpreted as propensities to vote with or against the cue-giver. The

---

[12] Ibid., p. 11.

[13] Ibid., pp. 14-16.

[14] Ibid., p. 16.

cue-givers for each legislator are arranged in the order of the deviation from chance and the propensity to agree is adjusted in direct relationship to its deviation from .5 to new values between +.5 and -.5.

On each roll-call simulated in the model, the observed outcome is analyzed to determine which cues are available and whether the cue-giver voted yea or nay. Then, for each legislator, the model multiplies the legislator's propensity to agree with his highest available cue-giver by the direction of the cue (+1 for yea, -1 for nay). If the product is +.5 or -.5, the legislator votes yea or nay, respectively. If the product is not +.5 or -.5, the process is repeated for the legislator's second highest available cue-giver. The criterion for voting is whether the sum of the first and second products is as great as +.5 or -.5. If it is not, the third highest available cue-giver is processed and algebraic sign of the sum of the three products determines the legislator's vote.

In spite of the restrictions of the assumptions and the simplified, somewhat arbitrary, selection of cue-givers, Matthews and Stimson report a high mean level of predictive accuracy (85.7% to 89.3%).[15]

The Matthews and Stimson model does not, however, provide us with an explanation of the decision-making

[15] Ibid., p. 25.

process because it uses roll-call votes exclusively as independent variables, including the roll-call vote to be explained! The simulation operates within a virtually tautological system of relationships. While it generates outcomes which substantially match observed behavior, it does so by gathering information from that very data and not from independent observations.

Joseph Hanna distinguishes between the descriptive and explanatory power of models:

> In brief, predictive or explanatory power is identified with information transmitted by empirical factors which can be determined prior to the data, while descriptive power is identified with total transmitted information, including information transmitted by the data.[16]

We sometimes take information which enables us to predict behavior from observation of that behavior itself, either through parameter estimation or by direct use of measures of that behavior as independent variables. Whenever we do this, our ability to predict stems from the descriptive power or our model. On the other hand, information which enables us to predict behavior determined prior to measurement of the dependent variable, such as the selection of variables and the direction of influences, is explanatory power.

---

[16]Joseph F. Hanna, "Explanation, Prediction, Description, and Information Theory," Synthese, 20 (October, 1969), pp. 308-309.

The Matthews-Stimson model takes all its information except the designation of possible cue-givers from the data to be explained. Its ability to predict, then, stems almost entirely from its descriptive power.

The Cherryholmes-Shapiro Model

The Cherryholmes-Shapiro simulation is based on a pattern model of explanation. Their model results from an extensive review of empirical research on legislative behavior and attitude consistency and change. This model relates a number of explanatory variables to legislative behavior, particularly roll-call voting. It also describes the norms and communication patterns of the legislature as a social system.

Sixty-eight propositions are generated. Many of the propositions are explicitly programmed into the computer model as relationships between the attributes of representatives and the attributes of the roll-call to be explained, exclusive of the outcome of the vote.

There are two phases in the Cherryholmes-Shapiro model. First, all representatives are processed serially through the predisposition phase in which the effects of party sponsorship, regional, state, and constituency interests, and public position (individual sponsorship and agreement with committee majority and minority reports) are computed for each congressmen. The first phase is deterministic, that is, with a given set of conditions,

only one outcome is possible. If these factors generate a strong predisposition for the member of the legislature, his vote is determined at this point.

If his predisposition is weak, the legislator enters the stochastic communication phase of the model where, with varying probabilities, he may encounter every other member's predispositions and the position of the President. The probabilities are computed by adding probabilities associated with the other actor's characteristics relative to the characteristics of the legislator whose vote is being predicted. The computer generates a random number between zero and one: if it is greater than the computed probability of interaction, they do not interact; if it is less than the probability of interaction, they do interact. The larger the probability, then, the greater the likelihood a random number will be less than the specified probability of interaction. The outcome of this phase, then, depends partially on chance.

The congressman's final disposition to vote is one half the sum of his own predisposition and the average of all the predispositions of those he encountered in the communications phase. His vote is the sign of the resulting disposition, yea if positive, nay if negative.

This model predicts at a rate nearly equal to the Matthews-Stimson model (84%). Moreover, it is superior as an explanatory instrument to the Matthews-Stimson model:

most important, it does not use votes on the same motion to predict a roll-call. As we have noted, the explanatory power of a model is that which stems from its theoretical base, the information it draws from the environment prior to observation of the behavior to be predicted. The Cherryholmes-Shapiro model, then, while not deductive, is higher in explanatory power than the Matthews-Stimson model. The variables and direction of influence are determined largely by propositions included in their inventory.

Furthermore, the Cherryholmes-Shapiro model fits more comfortably with notions of the influences of party, constituency, and communication within the legislature which have structured other analyses of legislative behavior.

There are several problems associated with the Cherryholmes-Shapiro model. One is that the probabilities added in the communication phase may not be independent: neither autocorrelation nor interaction of effects is explored. Secondly, the model uses past voting on similar legislation, the "memory score," as an input of the model; Cherryholmes and Shapiro interpret this as personal ideology and ideological consistency relative to the President's program. Although the "memory score" does not contribute much to the prediction level of the model, it would be preferable to exclude from the model direct measures of roll-call voting. Finally, although the Cherryholmes-Shapiro

model is a reasonably good pattern explanation, we would prefer to have a deductive model.

An Introduction to Retroduction

Abraham Kaplan suggests that the difference between the two types of explanation is primarily one of maturity: "The pattern model may more easily fit explanations in early stages of inquiry, and the deductive model explanations in later stages."[17] In other words, sometimes a pattern model of explanation can be mapped onto a deductive model. Progress in scientific explanation is gained by arrival at a hierarchical theory, one which is articulated as a deductive model of explanation.

> . . . we can subsume pattern explanations under the deductive model. Fitting something into a pattern has explanatory force insofar as thereby we are enabled to show how what is being explained can be deduced from more general considerations.[18]

Furthermore, Norwood Hanson maintains that this progression from data to theory has a logic of its own, retroduction. He contrasts this form of inference with induction and deduction (hypothetico-deductive, or H-D accounts):

> The form of the inference is this:
>
> 1. Some surprising phenomenon P is observed.
> 2. P would be explicable as a matter of course if H were true.
> 3. Hence there is reason to think that H is true.

---

[17] Kaplan, The Conduct of Inquiry, p. 332.

[18] Ibid., p. 338.

> H cannot be retroductively inferred until its content is present in 2. Inductive accounts expect H to emerge from repetitions of P. H-D accounts make P emerge from some unaccounted-for creation of H as a 'higher-level hypothesis.'[19]

We do not, then, arrive at hierarchical theories from a priori knowledge of general laws but from what seems plausible in the light of our knowledge about what is to be explained.

The Cherryholmes-Shapiro model suggests that a theory of legislative behavior should explain two things: the generation of predispositions and the patterns of interaction in a legislature. Other students of legislative behavior have also distinguished between the "outside model" and the "inside model" of explanation,[20] the "concerned" and the "defectors,"[21] the committed and the uncommitted.[22]

Political research in the recent past has also pursued the notion that bargaining is central to politics, especially legislative behavior. Gordon Black says,

---

[19]Norwood Hanson, Patterns of Discovery (Cambridge: University Press, 1958), p. 86.

[20]Heinz Eulau and Katherine Hinckley, "Legislative Institutions and Processes," in James Robinson, ed., Political Science Annual, 1966 (Indianapolis: Bobbs-Merrill, 1966).

[21]Meltz, "Competition and Cohesion."

[22]Donald Matthews, U.S. Senators and Their World (New York: Random House, 1960).

> Explicit bargaining pervades the entirety of the political process, from the development of electoral alliances to the formation of legislative coalitions, and at the center of these processes stands the politician.[23]

Riker notes that rules of the political "game" have a crucial effect as they structure the bargaining process:

> This fact should inspire political scientists to the continuation of the most important of their traditional functions, which is the explication of the effect of particular rules in occasioning deviation from abstractly expected strategies and solutions.[24]

There is a theory which accounts for the generation of both the "inside" and the "outside" influences on legislative behavior as well as bargaining and the rules of the game. Furthermore, this theory is in the growing tradition of the application of economic analogues to politics.

Economic Analogies

Analogues based in economic theory have been applied to interest groups,[25] political parties and elections,[26]

---

[23]Gordon Black, "A Theory of Professionalization in Politics," American Political Science Review, LXIV (September, 1970), p. 865.

[24]William Riker, "Bargaining in a Three-Person Game," American Political Science Review, LXI (September, 1967), p. 656.

[25]Mancur Olson, The Logic of Collective Action (New York: Schocken Books, 1968); Robert H. Salisbury," An Exchange Theory of Interest Groups," Midwest Journal of Political Science, XIII (February, 1969), pp. 1-32.

[26]Anthony Downs, An Economic Theory of Democracy (New York: Harper and Row, 1957); Duncan Black, The Theory of Committees and Elections (Cambridge: University Press, 1958).

constitution-making,[27] and the making of public policy.[28] Sociologists have also drawn parallels between social interaction and economic transactions.[29]

James S. Coleman has been the chief proponent of exchange theory in sociology: he has explored the model he suggests through formal analysis and experimental games.[30] Coleman's experiments are particularly suggestive of a use for exchange theory to explain legislative behavior, since he simulates a legislature as an example of collective social decisions.

The Legislative Game

In Coleman's legislative game, the objective of the players is to be reelected in designated districts by as large a majority as possible. Districts are represented by a number of precincts which are identified by their preferences on legislation. The player is reelected if the legislation preferred by his constituents is passed.

[27] James M. Buchanan and Gordon Tullock, The Calculus of Consent (Ann Arbor: University of Michigan, 1962).

[28] R. L. Curry and L. L. Wade, A Theory of Political Exchange (Englewood Cliffs, N.J.: Prentice-Hall, 1968).

[29] George C. Homans, "Social Behavior as Exchange," American Journal of Sociology, 63 (1959), pp. 597-606.

[30] James S. Coleman, "Collective Decisions," Sociological Inquiry, XXXIII (Winter, 1963), pp. 166-181; "Foundations for a Theory of Collective Decisions," American Journal of Sociology, LXXI (May, 1966), pp. 615-627; "Games as Vehicles for Social Theory," American Behavioral Scientist, XII (July-August, 1969), pp. 2-6; "The Possibility of a Social Welfare Function," American Economic Review, 56 (December, 1966), pp. 1105-1122.

Each player has one vote on each measure which is presented. Not all issues, however, have consequences for the legislator's chances of being reelected. Coleman assumes that each player is rational, that is, "wholly concerned with pursuit of his own interest."[31]

Coleman predicts,

> Faced with a situation of lack of power over actions which interest him, together with a surplus of power over actions which interest him little or not at all, the rational man will make an exchange of power.[32]

This prediction is born out in the playing of the legislative game. Coleman finds,

> Typically, in the playing of this game, the principal behavior of the players is exchange of votes: each player giving up votes on issues which are of little interest to him for votes on those which are of much interest. Other types of exchange exist also, involving the subsidiary types of powers held by each of the actors over the collective decisions: the order in which issues come to the floor, and the vote on tabling an issue.[33]

Other observations on the playing of the game indicate that this process is similar to legislative behavior. For example "pork barrel" legislation which affects only one constituency elicits more vote trading than other types because the constituency is intensely interested in the outcome while opposing interests are widespread.

---

[31] Coleman, "Collective Decisions," p. 168.

[32] Ibid., p. 172.

[33] Ibid., p. 173.

Furthermore, norms developed over time, particularly the norm of reciprocity. In early sessions of the game defection from bargains occurred frequently. As the sessions went on, however, defectors responded to sanctions and demonstrated themselves trustworthy.

> Certain actors gained reputations of being unreliable, with the consequence that others made agreements with them less frequently. As the sessions continued, however, all actors became quite trustworthy . . .[34]

Coleman also reports variations in the game's structure of decision rules. Of particular interest relative to the correspondence between the game and American legislatures is the addition of committees to the decision-making process.

> . . . this enriched greatly the amount and kinds of the resources of the collectivity members . . . . Much of the bargaining, negotiation, and exchange was now directed to obtaining a positive action in the committee . . . ; the smaller size of the committees . . . made the committee action much more dependent upon specific individuals and thus concentrated the control of particular actions much more in the hands of a few people.[35]

Exchange Theory

We will use Coleman's work as the basis of a theory of legislative decision-making. The game structure models several general conditions or givens of this theory. These are:

---

[34] Ibid., p. 176.

[35] Coleman, "Games as Vehicles for Social Theory," p. 6.

1. There are a number of issues to be decided collectively.
2. Actors vary in the intensity by which they desire particular outcomes of different collective decisions.
3. Resources for affecting the outcome of collective decisions are widely distributed.
4. There are rules by which collective decisions are made; and these rules are accepted by the participants.

Coleman assumes one axiom underlies the behavior of actors in this situation:

1. The actors are rational; that is, they pursue their own interests as defined by the game.

Coleman's experiments confirm his prediction which becomes our second axiom explaining the dynamics of collective decision-making:

2. Actors engage in exchange of resources.

Specifically, Coleman finds the rational actor increases "control over a decision for which control makes a great deal of difference in his expected utility, . . . in return giving up to another person control over a decision for which control makes little difference in his expected utility."[36] (Assumptions 1 and 2)

---

[36]Coleman, "The Possibility of a Social Welfare Function," p. 1113.

Application of Exchange Theory to Legislative Behavior

As Coleman has suggested, we can apply exchange theory to collective decision-making in elective legislatures. These are situations in which a number of collective decisions are made by specific decision rules and resources are broadly distributed. Moreover, legislatures and elections which select legislative actors are interlocking institutions, themselves part of the decision rules for making certain collective decisions for the society. We will apply exchange theory to the decisions made in elective legislatures by considering the implications elections have for the legislator's utility relative to outcomes of collective decisions.

In order to claim that this theory explains roll-call voting, we will do three things. First, we will specify the theory, i.e. define the assumptions and conditions in such a way that derivation of hypotheses is possible. Secondly, we must operationalize a model of derived hypotheses which can generate predictions. Finally, we must test the model against empirical data.

We, like others who have attempted explanations of roll-call votes as individual and group decisions, will utilize computer simulation to test this theory. This is, in part, a practical matter: we can in this way more easily compare the adequacy of our explanation with others' along

various criteria. The choice of method, moreover, is appropriate for several reasons.

Simulation

A simulation is an operating model of the process to be investigated which generates consequences or outcomes. When we construct a computer simulation, we make statements about relationships among variables in computer language. Since a computer uses a set of logical rules to interpret the set of statements, or program, the program must be internally consistent to generate outcomes. The relationships stated in the program thus embody a logically consistent theory. The output of a computer simulation is the set of dependent variables we wish to explain; the input, the values associated with variables which the program manipulates to generate consequences, are our independent variables.

Simulations are controlled experiments. In this respect, they are superior to most other types of data manipulation. The experimenter, the simulation designer, is assured that his predictions result from his independent variables and the process by which the simulation manipulates them. Furthermore, he can change aspects of the simulated environment to compare the results of different model instances, the same process operating with different initial conditions.

Simulations, as Raymond Boudon explains, are no different from other formal models in their content, but the medium allows us to observe the consequences of the model at a variety of points.

> Among a system of verbal propositions and a simulation model the relationships are of the same type. In any case, we manipulate these propositions in such a manner that it is possible to derive from them new consequences. One can obtain a simulation model from a verbal theory by a sequence of specifications, simplifications, and, eventually, reductions. The difference is that the consequences of a simulation model are obtained, not by deduction, but by the observation of an artificial system which corresponds to a physical realization of the model.[37]

Simulation is appropriate when we are studying a system and the behavior of parts of the system, such as collective and individual behavior, simultaneously. Through simulation we can investigate the behavior of collectivities under varying conditions. Furthermore, we can study the behavior of members of the collectivity, each of whom may exhibit a unique but explicable behavior under varying conditions. In such cases, Coleman says, our aim is

> . . . to program into the computer certain theoretical processes, and then to see what kind of behavior system they generate. The aim is to put together certain processes at the individual and interpersonal level--and then to see what consequences they have at the level of the larger system.[38]

---

[37] Raymond Boudon, "Reflexions sur la logique des modeles simules," Archives Europeenes de Sociologie, VI, I (1965), p. 4. (Author's translation)

[38] James S. Coleman, "Analysis of Social Structures and Simulation of Social Processes with Electronic Computers," Educational and Psychological Measurement, 21 (1961), p. 216.

Just as there are two different types of explanations, we may construct simulations from two different types of theories. We may test a hierarchical theory by a simulation as a substitute for a mathematical model. However, Boudon observes,

> . . . one also encounters examples where the simulator abandons parsimony of hypotheses characteristic of mathematical models so as to produce an artificial system which incorporates all known propositions about the real system which he wishes to study.[39]

The Cherryholmes-Shapiro model is of this type. As we move from a pattern model of explanation to a deductive model, we shall introduce changes in the simulation to make it reflect more accurately the predictions of the theory it is intended to represent. In making these changes, we may sacrifice some predictive accuracy since the theory will circumscribe our range of admissible evidence. However, we hope to gain the advantages of a deductive explanation, that is parsimony, generalizability, and the ability to isolate sources of errors.

We validate simulations and, derivatively, the theories they represent by comparing the output of the simulation with empirical observations. The simulation model, however, is not identical to the verbal theory it represents. Nico Fridja admonishes,

---

[39]Boudon, "Reflexions sur la logique des modeles simules," p. 4.

> According to some formulations in the literature, a program is a theory. This seems an incorrect way of putting things. Rather, a program represents a theory. It does this with the help of a number of mechanisms which are irrelevant to the theory or which the theory might explicitly disclaim.[40]

Abraham Kaplan, too, warns us of the "danger in the use of models . . . map reading: the failure to realize that the model is a particular mode of representation, so that not all its features correspond to some characteristic of its subject matter."[41] Theories may have loci of ignorance, aspects of the referent process which are neglected from necessity or convenience in formulating the model.[42]

For example, frequently stochastic processes will be included in a simulation program, as Cherryholmes and Shapiro have done, to circumvent a locus of ignorance. We should investigate the consequences of this and other approximations for the performance of models and their implications in terms of theory.

Perhaps more important from the standpoint of validating the theory, however, are aspects of the theory which are not included in the model. With the addition

---

[40]Nico H. Fridja, "Problems of Computer Simulation," Behavioral Science, 12, 1 (1967), p. 60.

[41]Kaplan, The Conduct of Inquiry, p. 284.

[42]Joseph Hanna, "Information-Theoretic Techniques for Evaluating Simulation Models," Michigan State University, Department of Philosophy, n.d. (Ditto.).

of the simulation model, our problems of validating the theory relative to the behavior we wish to explain are complicated.

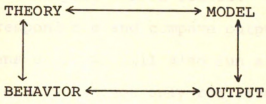


Figure 1.--Validation Scheme.

Since we validate the theory by the relationship of the output of the model to the behavior, the relationship of the theory to the model is crucial. If the model is not an exact reproduction of the theory, we can expect that the output will be distorted relative to observed behavior.

We can predict the patterns of correspondence and non-correspondence in the output relative to the observations from our knowledge of the aspects of the theory which are absent or roughly approximated in the model. If these predictions are born out, this renders our model, hence our theory, more valid.[43]

The difficulty of evaluating the output of a simulation model is compounded by the inapplicability of statistics in most cases. Fridja suggests, "The construction

[43]Paul Smoker, "Social Research for Social Anticipation," American Behavioral Scientist, XII (July-August, 1969), pp. 7-13.

of alternative models seems the only control, and a necessary one at that."[44]

In the validation of the simulation presented in this project we shall pursue both routes: we shall predict patterns of correspondence and compare output and behavior along these dimensions. We will also run alternative models: in our case we cannot only run several instances of one model, testing subhypotheses, but we can also compare the output of the Cherryholmes-Shapiro formulation with SIMEX, the revised model we shall develop in the light of our application of exchange theory.

The Setting

Cherryholmes and Shapiro tested their model on foreign affairs and federal role issues voted on in the U.S. House of Representatives in the Eighty-Eighth Congress (1963-64). We shall employ data describing the attributes and behavior of U.S. Senators as they voted on twenty-three roll-calls on motions having to do with the issue of the nature and extent of the federal role in domestic affairs in the Eighty-Eighth Congress. In this way we will hold constant situational factors such as the level of government, the President, and the issues brought before the legislature, while adding perspective on the differences between the two chambers.

---

[44]Fridja, "Problems of Computer Simulation."

CHAPTER II

EXCHANGE THEORY: AN APPLICATION TO POLITICS

The Political System

Let us define a situation which meets the structural conditions of exchange theory. In a political system a number of decisions are made on the allocation of values or utilities for the society. Inasmuch as these decisions have different consequences for the members of the society, individuals vary in the intensity with which they desire particular outcomes of political decisions. In a society where resources for affecting political decisions, or political power, are broadly distributed, rules provide for the aggregation of power in order to make collective decisions.[1]

In a representative system, aggregation of power is carried out by reallocating the political power of individuals to politicians who, in turn, make political decisions. This is done through elections in which voters choose representatives from among candidates for representative offices.

Thus, a representative political system makes allocations of social utilities and, as a derivative of

[1]For a theoretical exposition of rational strategy of the citizen in formulating decision rules, or constitutions, see Buchanan and Tullock, The Calculus of Consent.

its decision rules, political power. It does this through a set of interlocking institutions. Occasionally, we shall refer to these institutions as games, since they have rules, participants, and outcomes, rewards for winning the game and penalties for losing it.

The political power of office-holders in these institutions varies in relation to the political power reallocated to them by election. Hence, the political power of representative varies with the size of his electorate, those citizens for whom he may make collective decisions. When a representative shares control over decisions with other representatives, a situation we find in legislative chambers, the power inherent in his office is proportional to the average size of the electorates represented.[2] As electorates increase in size, fewer politicians can occupy positions of aggregated power. Taken together, then, the offices in a representative political system form a hierarchy or opportunity structure of political power attendant upon holding office in the system's institutions.[3]

---

[2]Political power at one level of aggregated power may vary with other attributes of office, such as the scope of decisions made (the number and impact of utilities allocated), their finality (whether they can be revoked by other decisions), and the length of tenure of the office (how long aggregated power may be held by the politician between elections).

[3]For further elaboration and research on the existence of an opportunity structure in the United States, see Joseph A. Schlesinger, Ambition and Politics (Chicago: Rand McNally, 1966).

Political parties are organizations of individuals whose goal is to win political power allocated in the representative system. Let us further specify that in the political system to which we will apply exchange theory:

Two political parties attempt to gain political power.

Axioms

Rationality

To avoid a tautological definition of rationality which would declare all action rational on the part of the actors, we define rationality in terms of the situation or game in which collective decisions are made. We assume that: (1) Actors intend to win whatever game or games within the collective decision-making process they are playing, i.e. they are "intendedly rational." (2) Actors will utilize their resources in a manner that they believe will enable them to win the game, i.e. they are "strategically rational."[4]

---

[4]This breakdown of rationality was suggested by Paul H. Conn, David B. Meltz, and Charles Press, "Rationality, Effectiveness, and Political Calculations," Michigan State University, August, 1970 (Mimeographed). Strategic rationality is utilized in Arthur S. Goldberg, "Social Determinism and Rationality as Bases of Party Identification, American Political Science Review, LXIII (March, 1969), pp. 5-25.

Since the political system allocates both social utility and political power there are two kinds of rational intentions. The citizen's rational goal is to gain the highest benefit from collective decisions on the allocation of social utilities. The rational goal of the politician is to gain political power. The politician, then, is motivated by political ambition.

This does not mean that the politician does not have personal preferences about the outcome of collective decisions, but that these utilities are lower in priority relative to his political ambition.[5]

Because of its dependence upon strategic choices, the rationality assumption renders theories of which it is a part difficult to utilize in predictions. Rationality does not necessarily imply effectiveness. Goldberg says,

> . . . being rational in a decision situation consists in examining the alternatives with which one is confronted, estimating and evaluating the likely consequences of each, and selecting that alternative which yields the most attractive set of expectations.
>
> However, there is room for error in these calculations. Individuals may, therefore, vary in their effective rationality.[6]

---

[5]The thesis of Schlesinger, in Ambition and Politics, is that ambition is central to the explanation of the behavior of politicians. For research using ambition as a central concept, see Gordon S. Black, "A Theory of Professionalization in Politics," American Political Science Review, LXIV (September, 1970), pp. 865-878; Michael L. Mezey, "Ambition Theory and the Office of Congressmen," Journal of Politics, 32 (August, 1970), pp. 563-579; John W. Soule, "Future Political Ambitions and the Behavior of Incumbent State Legislators," Midwest Journal of Political Science, XIII (August, 1969), pp. 439-454.

[6]Goldberg, "Social Determinism and Rationality," p. 5 (emphasis added).

As Quentin Gibson points out, rational (effective) action is composed of both a subjective element, the actor's belief in his efficacy, and an objective element, the foundation of this conviction.[7]

Gibson maintains the inclusion of the rationality assumption precludes derivation of a closed system of laws; rationality requires correction and modification of predictions at each step of the deductive system in the light of the influences we know to work counter to effectiveness. On the other hand, this quality of rationality invites the use of logic and evidential argument by the theorist. The theorist's ability to argue the efficacy of an action toward specified ends is one of the most attractive aspects of the rationality assumption.[8]

Exchange

Although political exchanges invite an analogy to the economic marketplace, this resemblance should not be taken literally. In several crucial ways, they are dissimilar. In the political marketplace, the exchange process takes place over time. This introduces a contingency problem. Each actor operates under some uncertainty that his bargains will be fulfilled. Thus, exchanges promising

---

[7]Gibson, The Logic of Social Enquiry, p. 156.

[8]Ibid., pp. 164-166.

certain gains may take precedence over more profitable, but risky, alternatives.

Furthermore, rules sometimes anchor decisions in time so that the most rational bargains may not be completed. The realization of bargains structured by time may require that one party or the other consent to an exchange that falls short of the return he might expect under unlimited bargaining.

Social marketplaces also deviate from the economic marketplace in the flexibility of transactions. In the economic marketplace, presumably the seller of a good does not care what the buyer of that good does with the exchanged value. In political exchanges, frequently the seller of control over a decision continues to have a stake in the use of the political resources. Consequently, preferences among alternative low-priority decisions influence the choice of partners to an exchange.[9]

Furthermore, the exchange currency of political transactions is frequently not divisible.[10] Curry and Wade make a persuasive argument supporting the thesis that all policy is divisible.[11] Policy may be among the more

---

[9]For further discussion of this point, see Coleman, "The Possibility of a Social Welfare Function."

[10]For further discussion of this and other limitations of social exchange, see Black, The Theory of Committees and Elections.

[11]Curry and Wade, A Theory of Political Exchange: Economic Reasoning in Political Analysis.

divisible of political resources, but this generalization has its limitations. One of the most common resources for political actors, the vote, is not divisible among options.

The rational actor will exchange resources, including control over decisions slightly affecting his expected utility, for control over decisions which greatly affect his expected utility. When there is a choice of alternative possible exchanges, he will make the one which brings him the greatest expected utility and which costs him the least in terms of resources. His costs include the opportunity foregone to use his resources in other ways. That is, the rational actor maximizes profits, or benefits-minus-costs, including opportunity costs.

Furthermore, since all actors attempt to maximize gain in transactions, parties to an exchange may not immediately agree on the terms of the bargain. The resources of time and investment of effort expended in negotiating decisions are bargaining costs; these expenditures will also be minimized by the rational actor.

Since knowledge of the outcome of different options conditions the ability of the actor to choose the correct strategy, he must take into account information costs, the resources expended in gathering information on alternative courses of action. Information-gathering may be inhibited in two ways. One encumbrance to information-gathering is the availability of resources to invest. These include

money, energy, and time. The second inhibition is the diminishing marginal return from further investment in information. Each actor deems a finite amount of information sufficient to make a strategically rational choice. An actor will engage in a limited, non-random search procedure designed to give him sufficient information at the least cost. His search procedure will be based on the likelihood that, given the structure of the situation, the information gained will narrow his choices to the optimal strategy and rule out non-optimal strategies.

The Election Game

In this representative political system, some collective decisions are made in the legislature. Participants in the legislature, legislators, are selected from among candidates for political office by voters, who constitute the electorate of his district. Legislative districts are geographically-defined subdivisions, or enclaves, of the total electorate. The decisions of the legislature must be approved by the executive, an elected representatives whose constituency is the entire electorate for whom collective decisions are made.[12]

---

[12]Behavior of representatives of enclaved districts and their relationship with representatives of the larger electorate is a topic discussed in Schlesinger, Ambition and Politics.

Electoral Decision Rules

1. Elections for each office are held at set intervals of time, limiting the length of time the winners of elections can hold power.

2. Each adult in the constituency has one vote for each office, a vote he casts in secret.

3. Each district is single-member, that is only one candidate can be elected.

4. All candidates are nominated by political parties. Political parties operate by decision rules which include that nomination for election in legislative districts are independent of one another and of the nomination of the executive.

5. The candidate receiving a majority of the votes case is elected to office.

6. Candidates may spend money only for staff and communications media. (They cannot buy votes.)

7. The executive is elected in the same election as the legislator but the voter may make his choices separately on the ballot.[13]

Electoral Exchanges

The citizen cannot win the electoral game per se. He can, however, utilize his vote in a way that will give him the highest reward among possible outcomes of the larger collective decision-making game.[14] The politician seeks political power through representative office; his

---

[13]Election rules 4 and 7 are among the three conditions Schlesinger names as requisites of his "ambition theory," Ibid., p. 126.

[14]Peter Blau makes the point that some exchanges are carried out via chains of intermediate transactions in Exchange and Power in Social Life (New York: John Wiley, 1964), pp. 250-260.

primary resources are his actions in that office. The citizen has resources, votes, which the politician needs in order to be elected. Furthermore, the candidate is in competition for these votes with another candidate who also desires political power. Since the immediate outcome of elections is more valued by the candidates than the voters, the candidates bear the bargaining costs of the campaign.

The candidate and the voter exchange resources, legislative activity for votes. This exchange is not explicit and binding, but implicit and contingent. The temporal structure of the political system imposes uncertainty upon both participants in the exchange.

The ongoing political system we describe is temporally divisible into election intervals and legislative intervals. This has implications for the exchanges made in each interval and the information available to the actors in the political system. Since the election decides who will make collective decisions in the succeeding time period, the voter exchanges votes for future action. However, as we shall see, the voter's best information for making his choice consists largely of knowledge of politicians' past behavior. While past behavior does not bind a politician to like future behavior, the voter can make a new decision in the next election on the basis of action in the interval between this and the next election.

Candidate uncertainty in campaigns stems from the necessity to make implicit bargains through public media and other efforts of his campaign organization. Voting is secret and discrete from the campaign, not a direct exchange, for example, the collection of proxies by the candidate or his organization. The candidate campaigns for power to be held in the future. Usually his best resources, however, are his past actions--his own if he is an incumbent or those of members of his party if he is non-incumbent.

After election, the politician is not bound by campaign promises, neither explicit pledges of action, nor implicit ones in his heralding of achievements of himself or his party in the past. In the interval between elections the focus of exchanges he makes is the next time period, the next election. The politician may use information of past behavior to gauge the effectiveness of alternative strategies. Nevertheless, activity between elections is an extension of campaign strategy for the next election not the last election.

The Voter

The citizen has only three alternatives: to vote for one or the other of the two candidates or to abstain. To cast any vote requires some expenditure of resources. If he abstains, however, the citizen foregoes the opportunity to use his limited political power to affect collective

decisions. Hence, the citizen who votes must see at least marginal differences in the probable outcome of collective decisions if one candidate is elected rather than the other.

V-1: The less difference in outcomes between his alternatives perceived by the citizen, the less likely he will vote.

Since the perception of the choice depends upon information possessed by voters, a corollary to the preceding hypothesis is

V-1.1: The less information possessed by the citizen, the less likely he will vote.

In non-competitive constituencies, i.e. where the candidate of same party wins nearly every election, the citizen may not perceive that he has an effective choice, that his vote makes any difference in the outcome. Consequently,

V-1.2: The less competitive his district, the less likely a citizen will vote.

Corroborative evidence.--Campbell, et al., find that intensity of partisan preference is positively related to voting turnout among the respondents in their sample.[15] They also discover a direct relationship between concern over election outcome and voting turnout.[16] Furthermore, turnout increases monotonically with political involvement,

---

[15]Angus Campbell, et al., The American Voter, abridged edition (New York: John Wiley, 1964), p. 53.

[16]Ibid., p. 57.

a measure combining interest in campaigns, concern about election outcome, political efficacy, and sense of citizen duty.[17]

Converse shows that information levels are related to non-voting; out of 201 non-voters in the Survey Research Center's sample, 72% possessed a medium level of information, 11% a high level of information.[18] Froman shows that non-competitive congressional districts tend to exhibit lower voting turnout than more competitive ones.[19]

The citizen can best utilize his vote by voting for the candidate who he believes will use aggregated power to make collective decisions he prefers.

Every voter may have different preference orderings of collective decisions. Consequently, neither candidate is likely to promise policies which match every preference of every voter. The vote, moreover, is not divisible. In order to maximize his utilities, the voter must choose between the candidates on the basis of his highest preferences among policies offered by the candidates.

In voting for one candidate, the citizen foregoes the opportunity to vote for the other. Since the candidate

---

[17] Ibid., p. 62.

[18] Philip E. Converse, "Information Flow and the Stability of Partisan Attitudes," in Elections and the Political Order, by Angus Campbell, et al. (New York: John Wiley, 1966), p. 139.

[19] Lewis A. Froman, Jr., Congressmen and Their Constituencies (Chicago: Rand McNally, 1963), p. 30.

makes exchanges for future benefits, the citizen must assess the likelihood that each candidate will in fact pursue his interests with the political power allocated to him by the election.

The most readily available information on the politician's behavior is the candidates past behavior. If the candidate is an incumbent in political office, the voter can assess his performance directly. If he has a record of supporting the voter's interests, the candidates's credibility in current exchanges is enhanced.

On the other hand, if the candidate is not an incumbent, the voter must rely on related past experiences. In the past, partisan representatives in power enacted collective decisions affecting the voter. The voter can assess the likelihood that the current candidates will enact his preferences by examining the behavior of politicians of the two parties in office. If a party's candidates have pursued his interests in collective decisions in the past, then the candidate's value and credibility are increased. Consequently, the voter decides not only on the basis of candidates' campaign promises, but perhaps primarily, on the basis of his experience with the candidate and members of his party in office as well.

V-2: For each office, the voter chooses to vote for the candidate who
(a) promises collective decisions which bring him the highest anticipated utility,

(b) is most credible because of his past behavior or because of the policies enacted by the party which nominated him or his past behavior.

Corroborative evidence.--Campbell, et al., demonstrate that voters hold evaluations of parties that are somewhat independent of their evaluation of candidates.[20] Key finds that although four-fifths to seven-eighths of the voters consistently vote for the same party, they are rational in this behavior; that is they do so in conformity with their agreement with the (presidential) party's policies. Key also shows that voters switched their support of party's nominees from election to election in accordance with their approval or disapproval of public policies enacted by politicians of the two parties.[21]

Although the level of ideological conceptualization among the sample analyzed in The American Voter is not high, the bulk (47%) of the voters had some idea of group benefits associated with political parties. Fifteen and one-half per cent of the voters had a more coherent ideological conception of party policies.[22] Furthermore, Campbell, et al., hypothesize on the basis of the survey responses:

---

[20]Campbell, et al., The American Voter, pp. 21-25.

[21]V. O. Key, The Responsible Electorate (Cambridge: Belknap, 1966).

[22]Campbell, et al., The American Voter, p. 144.

> Other things equal, then:
> (1) Persons for whom a value is more important will be more likely to express intense opinions than will persons for whom the same value is less important.
> (2) Persons who perceive issues to be more relevant for their values will be more likely to express intense opinions.[23]

Finally, voters react to past events. Key asserts,

> The patterns of flow of the major streams of shifting voters graphically reflect the electorate in its great, perhaps principal, role as an appraiser of past events, past performance, and past actions . . . Voters . . . are not likely to be attracted in great numbers by promises of the novel or unknown.[24]

Over time, if candidates of one party consistently use their office to effect the voter's preferences in collective decisions, the voter may reduce his information costs in campaigns by voting with little information beyond the party affiliation of the candidates. The proportion of such partisan voters in a district constitutes the "normal party vote" for each party in that district.[25]

V-3: Some voters consistently vote for the candidates for office of the same party.

Corroborative evidence.--The data presented in The American Voter reveal that, over time, a fairly consistent proportion of the electorate identify themselves as partisans

---

[23] Ibid., p. 104.

[24] Key, The Responsible Electorate, p. 61.

[25] Elaboration of the "normal vote" can be found in Elections and the Political Order, by Campbell, et al., pp. 9-39.

of various intensities.[26] Furthermore, the more strongly a respondent identifies himself with a party, the more likely it was that he reports voting "always or mostly for the same party."[27] As we have noted, however, Key shows that the "standpatters," those who do not switch parties, generally remain loyal in conformity with their approval of the policies enacted under their party's administrations.[28]

The Candidate

As we have noted, the candidate's electoral resources are his actions in office. In order to be a candidate, the politician exchanges a pledge to support his party's quest for political power in return for nomination for office. While this promise applies to the competition for political power in the legislature and the support of the party's quest for power in the larger electorate, the requirements of party loyalty cannot supercede the immediate objective of winning the election.

C-1: The candidate promises party loyalty in order to gain nomination.

C-1.1: Party loyalty is limited by the strategy the candidate must pursue to be elected.

---

[26] Campbell, et al., The American Voter, p. 69.

[27] Ibid., p. 69.

[28] Key, The Responsible Electorate.

Corroborative evidence.--Kingdon's interviews with candidates show that some politicians attribute more value to party nomination than others. Furthermore, winners who encountered little opposition attributed their victories to party considerations far more than politicians who were elected with stiff competition. The politicians, then, who had fewer strategic decisions to make in order to gain election had more respect for the role of the political party in their victories.[29]

The executive candidate runs under the same party designation or label as the legislative candidates. Furthermore, the candidates for these offices make policy promises in return for votes on the same set of collective decisions. If the candidate judges that the policy promises made by the executive are inimical to his chances of winning the election, he will dissociate his exchanges from those of the executive candidate; if the policy promises of the executive are congruent with his own electoral exchanges, he will attempt to associate himself with those exchanges.

C-1.2: The candidate will dissociate himself from other party nominees if the other nominees are making exchanges with the electorate that conflict with the exchanges he is making, that inhibit his chances of being elected.

---

[29]John Kingdon, "Politicians' Beliefs About Voters," American Political Science Review, LXI (March, 1967), pp. 137-145.

Corroborative evidence.--The findings of Robert A. Schoenberger support his hypothesis, "Those legislative candidates most closely identified with their party's Presidential candidate will achieve (or suffer) the latter's electoral fate in a direct relationship to that identification."[30] Schoenberger found that Republican congressional candidates who dissociated themselves from Goldwater's policy stance were more successful at resisting the Democratic landslide in 1964 than those who did not.

Once nominated, the candidate exchanges promises on collective decisions in return for votes. These promises may be explicit, or implicit in the politician's record. The politician knows that individuals' preference orderings vary with respect to collective decisions. Consequently, he knows that he is unlikely to satisfy a winning proportion of voters on every policy. Among a finite number of collective decisions, however, some groups of individuals will value the same decisions highly. Hence, these groups will react similarly to election campaigns. Thus, in order to reduce his bargaining costs,

C-2: The politician appeals to groups rather than to individuals for their votes.

The groups with whom a candidate makes exchanges are his electoral coalition.

---

[30]Robert A. Schoenberger, "Campaign Strategy and Party Loyalty," American Political Science Review, LXIII (June, 1969), p. 516.

Corroborative evidence.--Blau asserts, "Political parties compete for social segments rather than individual votes."[31] Buchanan and Tullock also maintain that in large groups where interaction and mutual adjustment do not take place directly and explicitly, vote trading is implicit rather than explicit.

> The political 'entrepreneurs' who offer candidates or programs to the voters make up a complex mixture of policies designed to attract support. In so doing, they keep firmly in mind the fact that the single voter may be so interested in the outcome of a particular issue that he will vote for the one party that supports this issue, although he may be opposed to the party stand on all other issues.[32]

Kingdon provides us more direct evidence: although only fifty-six per cent of the candidates interviewed admitted making "group appeals," well over seventy-five per cent of those candidates designated groups which comprised their electoral coalition.[33]

The fewer promises the candidate must make, the easier it is to communicate them to constituents, and the less the probability that they will be inconsistent within voters' preference orderings. Hence,

> C-3: The politician will make as few promises on collective decisions as he can in order to be elected.

---

[31]Blau, Exchange and Power in Social Life, p. 248.

[32]Buchanan and Tullock, Calculus of Consent, pp. 134-135.

[33]John Kingdon, Candidates for Office, Beliefs and Strategies (New York: Random House, 1968).

Corroborative evidence.--This hypothesis is related to the size principle, the prediction that, within n-person, zero-sum games in which actors are rational and have perfect information, minimum winning coalitions will be formed.[34] Its veracity in an electoral situation is demonstrated by Rosenthal's research on French electoral coalitions.[35]

Campaigns are costly in the money, time, and energy required to gain nomination and communicate policy promises to voters. In order to maximize his opportunity to win the election, the candidate will collect information that will enable him to choose a winning strategy in terms of campaign behavior and to make his promises of future behavior credible.

The least costly information for the candidate is the past behavior of his constituency and his opponent's current behavior. If the candidate is an incumbent in political office, he has made exchanges with constituents in the past. In the present election, he can reduce bargaining costs by remaking exchanges with the same constituency groups, using his past behavior as evidence of his value and credibility. If he has not acted in his constituents'

---

[34]William H. Riker, The Theory of Political Coalitions (New Haven: Yale, 1962).

[35]Howard Rosenthal, "Voting and Coalition Models in Election Simulations," in Simulation in the Study of Politics, ed. by William Coplin (Chicago: Markham, 1969), pp. 237-285.

interests, the rational strategy for his opponent is to exploit the incumbent's record in office in order to discredit him.

C-4: The incumbent running for reelection uses his record in office as a campaign resource.

C-4.1: The challenger to an incumbent attempts to discredit an incumbent by exposing his voting record to constituents if that record demonstrates that the incumbent did not act in the interests of his constituents.

Corroborative evidence.--The advantages of incumbency are demonstrated by the high rate of reelection of incumbents who run for consecutive terms. Kenneth Prewitt, studying city councilmen, found that over a ten-year period, eighty per cent of the incumbents who sought reelection won.[36] The success of congressional incumbents is even more dramatic, 90% of the incumbent representatives who ran between 1924 and 1956 won reelection.[37] Barbara Hinckley observes that in Senate elections, " . . . one finds a statistically significant relationship between incumbency and strong versus moderate deviations from the base party vote, with this relationship holding for both presidential-year and off-year elections."[38]

---

[36]Kenneth Prewitt, "Political Ambitions, Volunteerism, and Electoral Accountability," American Political Science Review, LXIV (March, 1970), pp. 5-17.

[37]David A. Leuthold, Electioneering in a Democracy (New York: John Wiley, 1968), p. 127 (cited in Prewitt, Ibid., p. 9).

[38]Barbara Hinckley, "Incumbency and the Presidential Vote in Senate Elections: Defining Parameters in Subpresidential Voting," American Political Science Review, LXIV (September, 1970), p. 840.

The consequence of a record in office displeasing to constituents is illustrated by an example described by Miller and Stokes. In 1958, Brooks Hays, who had gained a reputation as a civil rights moderate was defeated by a write-in candidate, Dale Alford, in Arkansas' Fifth District. Furthermore, interviews of constituents show that they were aware of this record, and that is why he was defeated.[39]

If the candidate is not an incumbent, he must make new exchanges. Candidates of his party have made exchanges with constituency groups in the past. The candidate will attempt to remake those exchanges, appealing to the behavior of party affiliates in office as evidence of his credibility. If the candidate's party has received large majorities in past elections, the current candidate will simply renew the exchanges made by those candidates in the past.

C-5: Candidates of the majority party in non-competitive constituencies will make exchanges with little policy content beyond that necessary to gain the normal party vote.

Corroborative evidence.--Kingdon's study shows that candidates who won by wide margins named party the most important consideration in their victory in contrast to marginal winners.[40]

---

[39]Miller and Stokes, "Constituency Influence in Congress."

[40]Kingdon, "Politicians' Beliefs About Voters."

The less successful party candidates in the past have been, the more the current candidate attempts to make exchanges in addition to past exchanges to assure election. If candidate of his party have been in the minority, the candidate attempts to make exchanges with voters who have previously supported the majority party by offering a policy product similar to the majority party's candidate. The candidate of a minority party may also attempt to make radically different exchanges with the electorate, that is introduce new preferences into the voters' priorities. This is risky, however, because it may alienate the support otherwise easily obtainable for the candidate. He may also have difficulty making such promises credible. Thus,

C-6: In a two party system, the minority party candidate's policy promises converge on the majority party candidate's promises.

Corroborative evidence.--While Downs maintains that parties will converge ideologically in a two-party system,[41] Schlesinger modifies this proposition:

> The condition of dominance, then, within the two-party system introduces different kinds of tensions for the two parties. The tension to converge exists primarily for the minority party. The majority party seeks instead to differentiate itself from its competitor.[42]

---

[41]Anthony Downs, An Economic Theory of Democracy, pp. 117-132.

[42]Schlesinger, Ambition and Politics, p. 125.

In a competitive district, where parties are evenly balanced, candidate uncertainty is elevated. Each candidate will try to raise the value of voting for himself relative to that of his rival by promising more in terms of policy to voters. Therefore:

C-7: In competitive constituencies, the campaigns of both candidates are more issue-oriented than in non-competitive constituencies.

Corroborative evidence.--Kingdon finds that candidates who won in competitive constituencies are more likely than those in non-competitive constituencies to name issues and candidate characteristics rather than party as the most important factor in their victories.[43]

As a consequence of the electoral process, the politician makes two kinds of exchanges, one with the party, to support its quest for political power, and one with his constituents, to support their interests in the allocation of social resources.

The Legislative Game

The legislature is a body of individual politicians, legislators, who meet face-to-face in a legislative chamber or "house." Legislative decisions are made by voting on motions in the legislative chamber, or "on the floor." Motions are made for passage of bills, legislation or

---

[43]Kingdon, "Politicians' Beliefs About Voters."

collective decisions. Other motions affect the outcome of bills: motions for specific amendments, for recommitting the bill to committee for further consideration, for "tabling" a motion--delaying a decision for a definite or indefinite interval of time. Committees are ongoing organizations composed of a small number of legislators who are allowed to revise the content of bills and report a recommendation of passage or defeat of bills to the entire legislature.

Legislative Decision Rules

1. All legislators are elected to their office.
2. Any member of the legislature may introduce a bill, an amendment to a bill, or a procedural motion affecting the outcome of a bill.
3. Each legislator has one vote on each motion brought to the floor of the legislative chamber.
4. The motion wins if a given proportion, usually a majority of legislators, votes 'yea.' It loses if that proportion votes 'nay.'
5. The executive must agree to a bill's passage before it becomes law.
6. The legislature is organized into the majority party and the minority party.
    a. Party leaders are selected by majority vote by party members and serve at the will of the party members, i.e. they can be replaced at any time.
    b. Party leaders make assignments of rank and file party members to committees.
7. All bills originated in the legislative house are sent to committees for consideration.

a. Committees have their own rules for making decisions which may include assigning legislation to subcommittees of the committee.

b. Committee chairmen allocate resources within the committee, such as the time available for hearings, assignment to subcommittees, and staff for gathering information on the impact of collective decisions.

c. Committee chairmen are members of the majority party.

d. Majority party members hold the same proportion of seats on committees as they hold in the legislative chamber as a whole.

Legislative Exchanges

Legislators are politicians, whose rational intention is the acquisition of political power. As we have noted, the legislative office is only one in the political opportunity structure. Since the legislator is interested in gaining political power, he will attempt to use his resources to gain political power in larger constituencies. Opportunities become attenuated at higher levels in the structure of political offices; the legislator, then, cannot be certain about his chances to gain higher office. Because the legislator is uncertain about advancement to positions of greater power in the political system, he will attempt to maintain his present position by using his resources to assure reelection. Uncertainty does not preclude a legislator's pursuing both reelection and higher office. Since the legislator has many opportunities to affect

collective decisions, he may use his resources to different ends at different points in time.

The most abundant resource the legislator has is his vote on collective decisions. He will use this resource as a currency with which to make exchanges with extra-legislative constituencies by seeking enactment of legislation in their interest and by blocking legislation inimical to their interest. The legislator will also exchange his votes and other resources with other members of the legislature for control over decisions which affect his power within the legislature and his opportunities for extra-legislative exchanges.

Constituency

In order to be elected, the politician must make exchanges with the electorate in his district. Whether he seeks election to a higher office or reelection to his present office, his record in office is a valuable resource. For reelection purposes, a legislator's future constituency is virtually identical to the constituency which elected him to his present office.

L-1: The legislator supports legislation which is in the interest of his constituents, and opposes legislation which is inimical to the interests of his constituents.

Some of the interests of the legislator's constituents may be relatively easy to infer, such as economic advantage. Thus,

L-1.1: The legislator supports legislation which is congruent with the economic interests of his constituents and opposes legislation which is inimical to their economic interests.

Some collective decisions may affect the political power of his constituents. Hence,

L-1.2: The legislator supports legislation which enhances the political power of his constituents and opposes legislation which curtails the political power of his constituents.

Furthermore, it follows from the campaign strategy of candidates in competitive districts that the legislator who is uncertain about his chances for reelection attempts to raise the value of voting for himself relative to future opponents by vigorous pursuit of the interests of the voters.

L-1.3: If the legislator was narrowly elected, his support of constituency interests is stronger than if he was elected by a wide margin.

Corroborative evidence.--Rustow says, "The desire for economic improvement has been an important motive in the rise of political movements. But the quest for political power and social status has been an even more potent force."[44]

Several studies show that, while the Democrats and the Republicans are generally supported by different types of constituencies, legislators who represent districts

---

[44]Dankwart Rustow, The Politics of Compromise (New York: Greenwood, 1969), pp. 229-230.

atypical of party strength are likely to deviate from their party toward the party typical for their districts.[45]

Miller and Stokes find that agreement with constituency opinion on roll-calls is issue-specific. Cnudde and McCrone, upon reanalysis of party of the Miller and Stokes data, attribute agreement with constituency opinion to the legislators' voting with their perception of constituency opinion rather than his sharing the attitudes of his constituents.[46]

Mayhew found that "interested" congressmen of both parties voted with their constituents' interest on farm, city, labor, and "Western" issues.[47]

Evidence on the hypothesis relating competitiveness of district to roll-call voting is mixed. MacRae asserts that this is the case.[48] Froman speculates that this may

---

[45]Lewis A. Froman, Congressmen and Their Constituencies, pp. 94-95; Duncan MacRae, Jr., "The Relation Between Roll-Call Votes and Constituencies in the Massachusetts House of Representatives," American Political Science Review, LXVI (1952), pp. 1046-1055; Frank J. Sorauf, Party and Representation: Legislative Politics in Pennsylvania (New York: Atherton, 1963), p. 52.

[46]Miller and Stokes, "Constituency Influence in Congress;" C. F. Cnudde and D. J. McCrone, "The Linkage Between Constituency Attitudes and Congressional Voting Behavior: Causal Model," American Political Science Review, 60 (1966), pp. 66-73.

[47]David Mayhew, Party Loyalty Among Congressmen (Cambridge: Harvard University, 1966).

[48]MacRae, "The Relation Between Roll-Call Votes and Constituencies in the Massachusetts House of Representatives."

not be true at the national level since competitive districts are more likely to be heterogeneous as well. Heterogeneity would make it less likely that the representative could accurately assess his constituents' interests on issues arising in the legislature.[49]

Some constituency interests may be relatively unknown to the legislator. The legislator cannot predict precisely which groups will support him in future elections since electoral exchange do not result from face-to-face bargaining. The legislator does know, however, how his constituents respond to other campaigns.

The executive, like the legislator, must act in office in such a way that he can use his record to make electoral exchanges. Thus, the executive will support bills which promote his ability to make exchanges with future constituents and oppose bills which will inhibit his opportunities to win the votes of a majority in the total electorate. The legislator, then, can infer enclaved constituency desires in part from its past response to the executive's campaign. We anticipate,

L-1.4: If the executive was successful in his district, the legislator supports legislation supported by the executive; if the executive fared poorly in his district, the legislator opposes legislation supported by the executive.

---

[49]Froman, Congressmen and Their Constituencies, p. 117.

Corroborative evidence.--Evidence on hypothesis L-1.4 is mixed. Sorauf finds that competiveness for governor is related to deviation from party majorities.[50] LeBlanc also finds that among state senators, the party vote for governor or president is a relatively good predictor of roll-call voting.[51] Among Southern Democrats, Flinn and Wolman find that the vote for Kennedy in 1960 (positively) and the vote for the States' Rights Party in 1948 (negatively) correlate with Kennedy Support and Party Unity measures in the First Session of the Eighty-Eighth Congress. Furthermore, these variables are more highly related to the dependent variables than demographic variables (per cent urban, per cent Black, per cent work force in mining and manufacturing, and for rural districts, per cent farm tenancy).[52] Waldman investigates this relationship within parties in the Eighty-Ninth (for Democrats and the Eighty-Seventh (for Republicans) Congresses. Among Democrats he finds that the size of the presidential vote and the relationship of the congressmen's vote relative to the President's (whether he led or lagged) is related to

---

[50]Sorauf, Party and Representation, p. 141.

[51]Hugh LeBlanc, "Voting in State Senates: Party and Constituency Influences," Midwest Journal of Political Science, XIII (February, 1969), pp. 33-57.

[52]Thomas A. Flinn and Harold L. Wolman, "Constituency and Roll-Call Voting: the Case of Southern Democratic Congressmen," Midwest Journal of Political Science, X (May, 1966), pp. 192-199.

liberalism of voting on selected roll-calls. Those who lagged behind the President's vote were higher in liberalism; within groups discriminated by this criteria, those in whose districts Kennedy received large majorities were more liberal. This relationship is much weaker and inconsistent for Republicans.[53] Other studies show, however, that the size of the executive vote in a district is related to roll-call behavior before the election, casting doubt on a causal chain from the executive's electoral margin to roll-call votes.[54]

Sponsorship

Whatever future office the legislator desires, he has the opportunity to introduce legislation designed to make credible exchanges with future constituents. Consequently, we can infer high interest in the success of legislation from the sponsorship of motions.

L-2: Legislators support motions they sponsor with their votes on those decisions.

Party

In order to be nominated for office, the politician must support his party in its drive for political power.

[53]Loren K. Waldman, "Liberalism of Congressmen and the Presidential Vote in Their Districts," Midwest Journal of Political Science, XI (February, 1967), pp. 73-86.

[54]Sarah McCally, "The Governor and His Legislative Party," American Political Science Review, LX (December, 1966), pp. 923-942; Marvin Weinbaum and Dennis R. Judd, "In Search of a Mandated Congress," Midwest Journal of Political Science, XIV (May, 1970), pp. 276-302.

Furthermore, since a majority of seats on committees and the chairmanships are allocated to majority party members, it is the advantage of the members of each party to have as large a proportion of the seats in the legislature as possible. Hence, party members will use their resources to support legislation proposed by members of their party. Further, a legislator will undermine the opportunities of the other party by opposing legislation proposed by members of the rival party. We anticipate, then,

L-3: Party members support members of their party on motions present to the legislature and oppose motions presented to the legislature by members of the opposite party.

Since the executive is also a partisan politician, we add the following hypothesis:

L-3.1: The executive's position contributes to the definition of motion as a party sponsored motion.

As a consequence of support elicited by party exchange, in the aggregate we expect

L-3.2: Party affiliation is highly related to legislative voting.

Since the impact of constituency exchanges may conflict with party loyalty, we hypothesize,

L-3.3: Party loyalty varies across different issues.

L-3.4: Party loyalty tends to be reinforced when it is congruent with constituency influence and tends to be weakened when it conflicts with constituency factors.

Corroborative evidence.--Gerald Marwell finds party influence highly evident in the factor structure of congressional voting. Marwell excludes roll-calls with a .9 (or higher) correlation with party affiliation and unanimous and nearly unanimous roll-calls which indicate high bipartisan support. Nevertheless, he finds, " . . . party still defines the first factor . . . ."[55]

Leadership

Although power is equally distributed in the legislature in the sense that every legislator can introduce motions and has one vote on each motion, the form of a bill can be greatly influenced in committees. A committee seat offers an added opportunity to the legislator to affect the outcome of decisions. The legislator, then, prefers to sit on committees which consider legislation affecting the utility of his future constituents. The party leaders also hold disproportionate power by virtue of their role in committee assignments.

The members of a party elect the party leaders by voting for their choice among contenders for that position. The resources of aspirants for party leadership posts are their power over committee assignments and their votes on

---

[55]Gerald Marwell, "Party, Region and the Dimensions of Conflict in the House of Representatives, 1949-1954," American Political Science Review, LXI (June, 1967), p. 381.

collective decisions. The candidate for party leader can exchange promises to support party member's ambitions in return for his position of added power. In office, the party leader makes committee assignments desired by the individual party members for their pursuit of extra-legislative exchanges. The party leader's resources in this respect are limited by the number of committee seats available for distribution. Furthermore, committee subject matter may vary in the interest it holds for extra-legislative constituencies, especially for larger constituencies than the ones from which legislators were elected. Furthermore, some committees may hold subsidiary power over subject matter of other committees. Given the variations in attractiveness of committees, the leader satisfies every ambition he can. However, in order to preserve his position of power, the leader will support the ambitions of individual members of his party by supporting the legislation they propose. In order to distinguish himself from the rest of the party members,

L-4: The party leaders exhibit greater party loyalty than the rank-and-file party members.

Corroborative evidence.--MacRae finds that party leaders are more highly loyal to party than the rank-and-file.[56] Ripley says,

---

[56]Duncan MacRae, Jr., "Roll-Call Votes and Leadership," Public Opinion Quarterly, 20 (1956), pp. 543-558.

> Party leaders make few requests of the members; the bargaining position of the individual senators is good, even when weighed against that of the leaders. Senators can use the leaders to help them attain their own individual ends.[57]

Committees

Committees have their own rules and decision-making processes. As a result of their bargain with the party leadership, most members have high interest in the outcome of decisions made by the committees of which they are members. The type of bargaining that goes on in committees is influenced by the subject matter which is considered. (1) If interests of committee members conflict, decisions will be difficult to reach, and unanimous decisions will be virtually impossible to achieve. (2) If the interests of committee members are diverse, but not conflicting, then it is likely that all members can have their interests satisfied in the committee's recommendation. (3) If the subject matter is continuously divisible, e.g. money matters such as appropriations or taxes, then committee bargaining is likely to occur which is similar to that of economic transactions. The resulting recommendation is likely to be a compremise figure, a mutually satisfactory decision for all members of the committee.

---

[57]Randall B. Ripley, Power in the Senate (New York: St. Martins, 1969), p. 228.

As a consequence of his high interest in the substantive matters considered by the committees of which he is a member,

L-5: The legislator has an interest in the bills considered by his committee.

L-5.1: If a bill revised in committee promotes his ambitions, the legislator supports it by voting for a favorable recommendation and for its passage in the legislature.

L-5.2: If the revised bill inhibits his ambitions, the legislator opposes a favorable recommendation, and votes against its passage in the legislature.

Corroborative evidence.--Goodwin shows that all the committees which are nationally-oriented in their substantive concerns are more prestigious than those which are oriented toward narrower clienteles.[58] Masters asserts that electoral considerations rank high in importance among the criteria utilized in committee assignments.[59]

Ralph K. Huitt concludes that committee members are advocates of policy positions rather than impartial judges: committee members take sides in debate and their perception of facts is affected by their predilections toward the subject matter.[60]

---

[58]George Goodwin, The Little Legislatures (Amherst: University of Massachusetts, 1970), p. 115.

[59]Nicholas A. Masters, "House Committee Assignments," American Political Science Review, LV (June, 1961), pp. 345-358.

[60]Ralph K. Huitt, "The Congressional Committee: A Case Study," American Political Science Review, XLVIII (June, 1954), pp. 340-365.

Rustow differentiates among coalition strategies according as they are employed for reaching decisions on different kinds of issues. He names these strategies exclusive, inclusive, and split-the-difference. Exclusive strategies are followed in cases where a variety of interests cannot be accomodated because all participants are highly interested in the outcome, and they disagree. The resultant coalitions reflect the gross strength of the conflicting groups. Inclusive strategies are those permitted by a variety of interests, all of which can be accommodated without conflict. A split-the-difference strategy is possible where the issue is monetary and a compromise position can be reached through bargaining.[61]

Case studies indicate that these strategies which parallel the three predictions about intra-committee bargaining from exchange theory accurately describe the behavior in committees of Congress.

1. The House Labor and Education Committee is characterized by an exclusive coalition pattern. The subject matter it handles is redistributive, social class-oriented, and approximates a zero-sum game. The cleavages in this committee stem from disputes over the kind and quality of government action rather than the extent of particular programs. Bargains are difficult to make since participants are unwilling to make exchanges. Hence,

---

[61]Rustow, The Politics of Compromise.

conflict within this committee is great, reports contested, and cohesion on roll-call voting poor.[62]

2. The House Agriculture Committee follows the inclusive strategy. Product differentiation among constituencies of committee members constitutes a variety of compatible interests. Virtually all members can be satisfied in their desires for legislation.[63]

3. Richard Fenno suggests that

> The subject matter . . . keeps [Appropriations] Committee members relatively free agents, which promotes intra-committee maneuvering and, hence, conflict avoidance. Members do not commit themselves to their constituents in terms of precise money amounts, and no dollar sum is sacred--it can always be adjusted without conceding that a principle has been breached.[64]

The mutual adjustment process allows widespread satisfaction and high cohesion among committee members both in their reports and in their behavior on the floor of the legislature.

Hypotheses L-1 through L-5 predict the generation of interests in a motion presented to the legislature.

---

[62]Richard Fenno, Jr., "The House of Representatives and Federal Aid to Education," in New Perspectives on the House of Representatives, Robert Peabody and Nelson Polsby, eds. (Chicago: Rand McNally, 1963), pp. 195-236.

[63]Charles O. Jones, "The Agriculture Committee and the Problem of Representation," in New Perspectives on the House of Representatives, Robert Peabody and Nelson Polsby, eds. (Chicago: Rand McNally, 1963), pp. 109-128.

[64]Richard Fenno, Jr., "The Appropriations Committee as a Political System," in New Perspectives on the House of Representatives, Robert Peabody and Nelson Polsby, eds. (Chicago: Rand McNally, 1963), p. 84.

Since some of these interests conflict with one another, it is likely that the legislator will pursue his interests serially over the decisions made in the legislature rather than simultaneously. The full impact of his interests are likely to be exhibited on passage of bills, since these have the greatest interest for extra-legislative constituencies.

Legislative Bargaining

Over the gamut of collective decisions made in the legislature, some legislators have little interest in some and great interest in others. On any particular decision, the legislators who have great interest in the outcome attempt to trade resources affecting decisions which mean little to them for votes on the current decision. Likewise, the legislators who have a surplus of power over a decision which is of little interest to them attempt to trade their vote for other resources which affect decisions which are of greater value to them. At a stage immediately prior to the roll-call, the legislators can be divided into buyers and sellers of resources. The buyers are those who, because the collective decision is of value to their ambition, have high interest in the outcome. The sellers are those for whom the vote has little value except as a resource to trade for greater control over other decisions. A decision may have little value for a legislator either because it does not affect his ambitions or because it may both promote

and inhibit his ambition depending upon the situation in which he will make exchanges in the future.

L-6: The value of a collective decision to a legislator is proportional to the value it has to him in making exchanges for political power.

L-6.1: Those who have great value for the outcome of a collective decision exchange control over decisions the outcome of which is less valuable in return for support of their position on the collective decision which is of greater interest.

L-6.2: Those who value collective decisions little exchange support on that decision in return for greater control over decisions they value highly.

Corroborative evidence.--Matthews characterizes activities exhibiting the norm of reciprocity in the Senate a "game."[65] He also says,

> Every senator, at one time or another, is in a position to help out a colleague. The folkways of the Senate hold that a senator should provide this assistance and that he be repaid in kind. The most important aspect of this pattern of reciprocity is, no doubt, the trading of votes.[66]

Although later in his work, Matthews describes the interaction in the Senate as advice or cue giving, reciprocity remains the dominant thrust of his account.[67]

Polsby also observes that consequences of fragmented power--mutual interdependence of legislators.

---

[65]Donald Matthews, U.S. Senators and Their World (New York: Random House, 1960), p. 101.

[66]Ibid., p. 99.

[67]Ibid., p. 252.

> . . . virtually no senator in the Eighty-Eighth Congress save a sprinkling of freshmen, was without some institutional base which guaranteed him a disproportionate say, either in some substantive area of public policy or in the behind-the-scenes management of Senate business . . . . The need for cooperative effort, and uncertainty about the precise composition of any particular winning coalition, makes senatorial bargaining necessary . . . [68]

Ripley, likewise, stresses the prevalence of bargaining in the Senate, the trading of votes as well as other resources affecting the outcome of legislation.

> The general stress on mutual aid that characterizes the Senate, particularly in committee, results in a great deal of bargaining and trading of credits. Trades of one specific item for another are not often made. But if a senator helps another senator, he anticipates that when he needs help at some future time he will be able to obtain it from the person he is presently helping.[69]

Coalitions

The sellers can only sell votes on the current collective decision, but the resources for which they can exchange votes may be votes or other resources held by legislators, such as action in committee. The buyers of votes will not, of course, expend more resources than necessary to assure the outcome they desire. That is

> L-7: Proponents of both passage and failure of a motion attempt to gain a minimum winning coalition.

---

[68] Nelson W. Polsby, Congress and the Presidency (Englewood Cliffs, N.J.: Prentice Hall, 1964), p. 89.

[69] Ripley, Power in the Senate, p. 175.

Corroborative evidence.--In the legislature, as in elections, we have a situation in which Riker's size principle is operable in the formation of coalitions. The size principle in legislative situations is demonstrated by Axelrod's work on coalition formation in the Italian Chamber of Deputies.[70]

Patterns of Interaction

Since the trading of resources takes place under the pressure of time, information on the alternative possibilities for exchange is very important for both buyer and seller. The legislator seeks information that will enable him to minimize bargaining and opportunity costs. His information must include who is willing to make exchanges, i.e. who is interested in the outcome of a decision. Furthermore, the legislator wants to reach bargains with a minimum of cost in terms of the time it will take to negotiate bargains. Finally, he will attempt to make bargains with individuals to whom he must relinquish the least in terms of opportunities foregone to use his resources in ways which would be of greater benefit to him.

The party leader, because of his position as supporter of party members' goals, has information about

---

[70]Robert Axelrod, "Derivation of a Coalition Theory Based on Conflict of Interest with an Application to Italy" (paper prepared for delivery at the Sixty-Fifth Annual Meeting of the American Political Science Association, 1969).

exchanges which can be made. Consequently, some exchanges will be made through the party leader as intermediary. His willingness to carry out this function may be tempered by his own extra-legislative political interests in the bill. We predict,

> L-8: Some legislators exchange votes for resources affecting political decisions through the party leader.

Corroborative evidence.--Polsby comments on Lyndon Johnson's performance as majority party leader in the U.S. Senate:

> Johnson was in a position to know more about the relative intensities of senators' positions on a variety of issues, and in this way could create coalitions of senators who would never have thought to get together on their own, but who, under Johnson's guidance, could be brought together to help one another on projects important to them. In return they would give Johnson support on items that for them mattered less.[71]

Secondly, the members of committees which have reported the bill have an interest in it; hence, they will trade resources for votes in support of their positions on the bill. We anticipate, then,

> L-9: Trading of legislative resources takes place place between those uninterested in the outcome of bill and the members of the committee(s) reporting the bill.

Corroborative evidence.--Francis finds that influence concerning substantive matters in a state legislature is

---

[71]Polsby, Congress and the Presidency, p. 45.

attributed to members of committees dealing with those subjects.[72] Ripley, too, finds that among U.S. senators, ". . . most automatically vote the position taken by their fellow party members on the standing committee handling the bill."[73]

Members of the legislative committees have experience bargaining with one another. Because they have had more interaction directed towards reaching collective decisions which promote their political ambitions, members of the same committees are likely to be familiar with the preference of other members of their committees. We predict,

> L-10: Trading of legislative resources takes place between legislators uninterested in the outcome of the motion and interested legislators who share their committee assignments.

Corroborative evidence.--Ripley points out the wealth of possibilities committee sharing provides for legislators:

> Because senators sit on several committees the chances and necessity for negotiation are increased. The senators' remembering that they will have to deal with other specific senators on a number of issues facilitates accommodation.[74]

Thibaut and Kelley also discuss the likelihood that individuals who are spatially close make exchanges.[75]

---

[72]Wayne L. Francis, "Influence and Interaction in a State Legislative Body."

[73]Ripley, Power in the Senate, p. 122.

[74]Ibid., p. 118.

[75]John Thibaut and Harold Kelley, The Social Psychology of Groups (New York: John Wiley, 1959), p. 39.

The participants in an exchange can minimize opportunity costs by making exchanges with legislators who require the least in terms of opportunities foregone to use resources to affect decisions which are of greater value to them. The buyer of a vote does not wish to promise action on a collective decision which is likely to be inimical to his political opportunities. If he has any preference about the outcome, the seller of a vote hopes to exchange his support with members of the coalition who are voting in accordance with his small interest. Among individuals in groups within which we expect transactions to take place, we expect trades will take place among individuals who are similar to one another along some dimension relating to the focus of their political ambitions. One dimension along which similar individuals would not conflict is demographic composition of the constituency which elected them. We chose this instead of party because in campaign strategies, constituency considerations come before party.

L-11: Trading of legislative resources takes place between legislators uninterested in the outcome and legislators similar to them in composition of the constituency which elected them.

Corroborative evidence.--In a system where electoral success is more rewarding to political ambition than party

loyalty, Sorauf finds, "Where the influence of party and constituency conflict, constituency tends to win out."[76]

As a consequence of this bargaining hypothesis, party groups simulated in our model should be cohesive insofar as constituent districts are similar. This variable characteristic of simulated party voting corresponds to observations of comparative studies of state legislatures in the United States. Comparing eight legislatures, Jewell finds,

> One factor leading to greater party voting in states with a higher urban concentration is that in most of these states party strength follows more consistently an urban-rural division. In the larger urban states the parties represent more clearly defined groups of interests, with the Democrats coming mainly from the largest cities and metropolitan areas, and the Republicans more representative of the smaller cities and rural areas.[77]

LeBlanc finds a similar pattern in a comparison of twenty-six state senates. He concludes,

> . . . socio-economic interests of constituencies are more likely perceived as differentiated by senators from the more industrialized states who are inclined to vote their constituencies. This often results in party votes . . . . Less homogeneity and more ambiguity characterized the relation of constituency factors and legislative voting in the less partisan states.[78]

---

[76]Sorauf, Party and Representation, p. 145.

[77]Malcolm Jewell, "Party Voting in American State Legislatures," American Political Science Review, XLIX (September, 1955), p. 786.

[78]LeBlanc, "Voting in State Senates: Party and Constituency Influences," pp. 51-53.

Axelrod points out that Riker's theory of political coalitions does not predict that minimum winning coalitions will be formed which are connected, i.e. members adjacent in an ordinal policy space. Connectedness is related to rationality in the Axelrod links it to ease in bargaining.

> The reason is that negotiations for coalitions that have low conflict of interest will simply be easier to conclude successfully, and hence these coalitions can be expected to be more likely to form--even if the political leaders are not able to identify them beforehand. Likewise a coalition with low conflict of interest can be expected to last longer once formed than an average coalition, just because disputes within such a coalition will be easier to resolve.[79]

The Vote Decision

The legislator, the vote seller, surveys the information that is likely to narrow his choices to those which will cost him the least and benefit him the most. The legislator must take into consideration the relative value of voting each way in terms of how much his vote is worth in exchange with interest legislators. That is, he will maximize his gain from the trade. He will also minimize his opportunity costs, the opportunity foregone to vote in accordance with his own interests on the bill, if any.

> L-12: The legislator exchanges his vote with an interested legislator who offers him the most in terms of resources in exchange for his vote.

---

[79]Axelrod, "Derivation of a Coalition Theory Based on Conflict of Interest with an Application to Italy," p. 9.

L-12.1: The legislator takes into account his own interest, if any in the outcome when he makes a decision to exchange his vote for resources affecting the outcome of other decisions.

Summary

Table 1 allows comparison of the propositions generated by Cherryholmes and Shapiro and the hypotheses related to legislative behavior deduced from exchange theory in a two party system. Clearly exchange theory explains much of the pattern exhibited in the Cherryholmes-Shapiro model. That is, we can subsume their pattern explanation under exchange theory.

The chief differences between the two sets of hypotheses are not apparent from the table because they concern hypotheses in the Cherryholmes-Shapiro inventory not comparable to predictions of exchange theory.

1. Cherryholmes and Shapiro include propositions relating ideology and ideological consistency to roll-call voting:

> The political predispositions or ideologies of congressmen are related to roll-call voting even when the effect of party, region, and constituency are controlled.
>
> Legislators tend to be very consistent in their roll-call votes from one Congressional session to the next.[80]

2. The Cherryholmes-Shapiro model does not include the influence of the executive's position in the manner

[80]Cherryholmes and Shapiro, Representatives and Roll-Calls, p. 35.

hypothesized in hypothesis 1.4. It does include propositions relating the presidential position to voting behavior through communication patterns.[81]

3. Cherryholmes and Shapiro hypothesize high interaction rates among legislators of the same party.[82] On the basis of exchange theory we hypothesize vote trading among party members will be high if they represent similar constituencies.

4. Cherryholmes and Shapiro list a series of propositions that generate conformity of position among leaders and the organization leaders use to disseminate information. The Cherryholmes-Shapiro model funnels leadership communication to party members predominantly through the regional whips in the House of Representatives.[83] Although the party leaders in a legislative chamber the size of the U.S. House of Representatives cannot communicate directly with the rank-and-file on every roll-call, the regional whips are only intermediaries, emissaries of party leaders. For greater generality, especially since most legislatures in the United States are not even half the size of the U.S. House of Representatives, we ignore such institutionalized communication networks as whip organizations and hypothesize direct dissemination of information through the elected party leaders.

---

[81] Ibid., pp. 69-71.

[82] Ibid., p. 77.

[83] Ibid., pp. 74-75.

TABLE 1.--Comparison of Propositions in the Cherryholmes-Shapiro Inventory and Deductions from Exchange Theory.

	Exchange Theory	Cherryholmes and Shapiro
1.	The legislator supports legislation which is in the interest of his constituents and opposes legislation which is inimical to the interests of his constituents.	The relationship between constituency and roll-call behavior tends to be issue specific: the areas of greatest influence are on affairs within the district and the weakest influence is on affairs outside the district (p. 30).[a]
1.1.	The legislator supports legislation which is congruent with the economic interests of his constituents and opposes legislation which is inimical to their economic interests.	Legislative districts atypical of party strength tend to produce less party loyalty at the roll-call stage (p. 30).
1.2.	The legislator supports legislation which enhances the political power of his constituents and opposes legislation which curtails the political power of his constituents.	Political and demographic characteristics of legislative districts are related to roll-call behavior (p. 30).
1.3.	If the legislator was narrowly elected, his support of constituency interests is stronger than if he was elected by a wide margin.	Inter-party competitiveness in state legislatures tends to be related to fewer party votes and inhibits legislators from taking extreme ideological positions (p. 30). Inter-party competitiveness in the House of Representatives does not seem to be related to party voting but does decrease the tendency for representatives to take extreme ideological positions (p. 30).

TABLE 1.--Continued.

	Exchange Theory	Cherryholmes and Shapiro
1.4.	If the executive was successful in his district, the legislator supports legislation supported by the executive; if the executive fared poorly in his district, the legislator opposes legislation supported by the executive.	
2.	Legislators support motions they sponsor with their votes on those decisions.	[program record nos. 85-86, p. 165]
3.	Party members support members of their party on motions they present to the legislature and oppose members of the opposite party on motions they present to the legislature.	Party affiliation is highly related to roll-call voting (p. 25).
3.1.	The executive's position contributes to the definition of a motion as a party-sponsored motion.	
3.2.	Party affiliation is highly related to legislative voting.	
3.3.	Party loyalty varies across different issues.	Party affiliation commands different degrees of loyalty across different issues (p. 25).

TABLE 1.--Continued.

	Exchange Theory	Cherryholmes and Shapiro
3.4.	Party loyalty tends to be reinforced when it is congruent with constituency interests and tends to be weakened when it conflicts with constituency interests.	Party loyalty tends to be increased when party is supported by salient factors, such as region and constituency and is decreased when opposed by salient audiences (p. 25).
4.	The party leaders exhibit greater party loyalty than the rank-and-file.	Party leaders tend to be more loyal to the party organization and ideology than rank and file members (p. 25).
5.	The legislator has high interest in the bills considered by his committee.	Well integrated committees give voting cues to members that tend to be followed at the roll-call stage (p. 43).
5.1.	If a bill revised in committee promotes his ambitions, the legislator supports it by voting for a favorable recommendation and for its passage in the legislature.	Voting cohesion among committee members tends to be inversely correlated with voting among members of the legislative party (p. 43).
5.2.	If the revised bill inhibits his ambitions, the legislator opposes a favorable recommendation, and votes against its passage in the legislature.	All legislative committees do not provide cues that produce high cohesion among their members on roll-call votes (p. 43).

TABLE 1.--Continued.

Exchange Theory		Cherryholmes and Shapiro
6.	The value of a collective decision to a legislator is proportional to the value it has to him in making exchanges for political power.	"Each representative's potential influence over his colleagues on a given bill is a function of the predisposition that he develops during his confrontation with the bill during the predisposition phase" (p. 66).
6.1.	Those who have great value for the outcome of a collective decision exchange control over decisions the outcome of which is less valuable in return for support of their position on the collective decision which is of greater interest.	Persons who hold extreme positions are less susceptible to counter-influences than are individuals who hold moderate positions (p. 52).
6.2.	Those who value a collective decision little exchange support on that decision in return for greater control over decisions they value highly.	When pressures salient to political decision-making are convergent, decisions tend to be made earlier than when salient pressures conflict (p. 56).
		Persons with intense preferences who make early voting decisions are more likely to be influencers and those who postpone voting decisions tend to be targets of influence (p. 56).
		Individuals with more extreme attitude positions are less susceptible to influence that individuals with less extreme attitude positions (p. 66).

TABLE 1.--Continued.

Exchange Theory	Cherryholmes and Shapiro
	A legislator with two or more pressures such as party and constituency influencing his vote in the same direction is unlikely to be susceptible to further influence concerning his vote (p. 66). There tends to be a high, positive relationship between high influencers and high interactors (p. 39).
7. Proponents of both passage and failure of a motion attempt to gain a minimum winning coalition.	
8. Some legislators exchange votes for resources affecting political decisions through the party leaders.	Legislators expect their leaders to focus issues and resolve conflict by the dissemination of information (p. 42). Legislators expect their leaders to administer the system so that it will be stable and predictable (p. 42). The higher the rank of the elected leader, the more the communications in which he engages (p. 80).
9. Trading of legislative resources takes place between those uninterested in the outcome of the bill and the members of the committee(s) reporting the bill.	The committee chairmen and high ranking members receive a disproportionate share of communications (p. 80).

TABLE 1.--Continued.

	Exchange Theory	Cherryholmes and Shapiro
10.	Trading of legislative resources takes place between those uninterested in the outcome of the motion and interested legislators who share their committee assignments.	Representatives communicate with colleagues who share their committee assignments (p. 78).
11.	Trading of legislative resources takes place between legislators uninterested in the outcome and legislators similar to them in composition of the constituency which elected them.	Similarity of constituency is a source of communication among representatives (p. 78).
12.	The legislator exchanges his vote with an interested legislator who offers him the most in terms of resources in exchange for his vote.	A representative who communicates on a bill changes his original predisposition toward the bill to a position half-way between his original predisposition and the average one that he confronts in his communications with the president and his colleagues (p. 82).
12.1.	The legislator takes into account his own interest, if any, in the outcome when he makes a decision to exchange his vote for resources affecting the outcome of other decisions.	

[a]Page numbers reference the location of these propositions in Cleo Cherryholmes and Michael Shapiro, Representatives and Roll-Calls (New York: Bobbs-Merrill, 1969).

CHAPTER III

THE SIMULATION MODEL

In this chapter we move from our theory to the simulation model. As we mentioned at the conclusion of the first chapter, the validation of a theory by the use of a simulation model engages a complex relationship among behavior, theory, model, and model output or predictions. Our main considerations in this chapter are the links between our theory and the model.

In this project, we simulate behavior in the U.S. Senate. For purposes of operationalizing the model, we will explore the links between the model and behavior. These include selection and measurement of variables and parameter estimation.

Theory-Model

Our model, SIMEX, is a revision of the Cherryholmes-Shapiro model. The revisions are based on the deductions from exchange theory in a two-party system, criteria of explanatory power, and pragmatic considerations of the use of the simulation as an instrument in comparative research. SIMEX models the decision-making calculus of the legislator as he decides to vote for or against motions affecting

collective decisions on the basis of exchanges he makes within the legislature and with extra-legislative electorates.

In the predisposition phase, the legislator assesses information about the bill and its consequences for his political ambition. In the interaction phase, the legislator who remains uncommitted after the predisposition phase surveys his trading options according to hypothetical bargaining patterns and decides which coalition he will join. These bargaining patterns take into account the strategies of both buyer and seller insofar as these concern bargaining and opportunity costs. That is, the vote-sellers' options are constrained by the preferences of vote-buyers.

Exchange theory is based on the notion that the legislator is motivated by a desire to be approved by extra-legislative constituencies. Communication to the voter of the outcome of all motions, however, is not uniform. In general, passage votes receive more media coverage than other motions. Since the final outcomes are, then, likely to be more salient for constituents than amendments and procedural motions, we expect the simulation based on exchange theory will predict passage motions more accurately than amendments and procedural motions.

Model hypothesis 1. Predictions of the simulation will be more accurate with respect to final votes on legislation than on amendments or procedural motions.

Simulations can be graphically represented by flow charts which diagram the progression of changes that take place in the operating model. We will demonstrate the operationalization of hypotheses in the model with flow charts in the following section.[1]

Predisposition Phase

Party exchange are represented in the flow chart in Figure 2: hypothesis L-3 for all legislators and L-4 for party leaders.

Figure 3 represents hypothesis L-1 and its subsidiary hypotheses, the generation of legislators' interests in bills according to the characteristics of their constituencies.

For the purpose of explaining roll-call voting in the Congress of the United States, we shall extend our definition of constituency to regional and state interests.

Occasionally, programs benefit particular states more than others. It is not, then, surprising that Truman

---

[1]The flow charts are not necessarily in the same order corresponding statements appear in the program; however, every step is illustrated in a figure appearing in this chapter. Hypotheses and corresponding record numbers with a listing of the program appear in Appendix A.

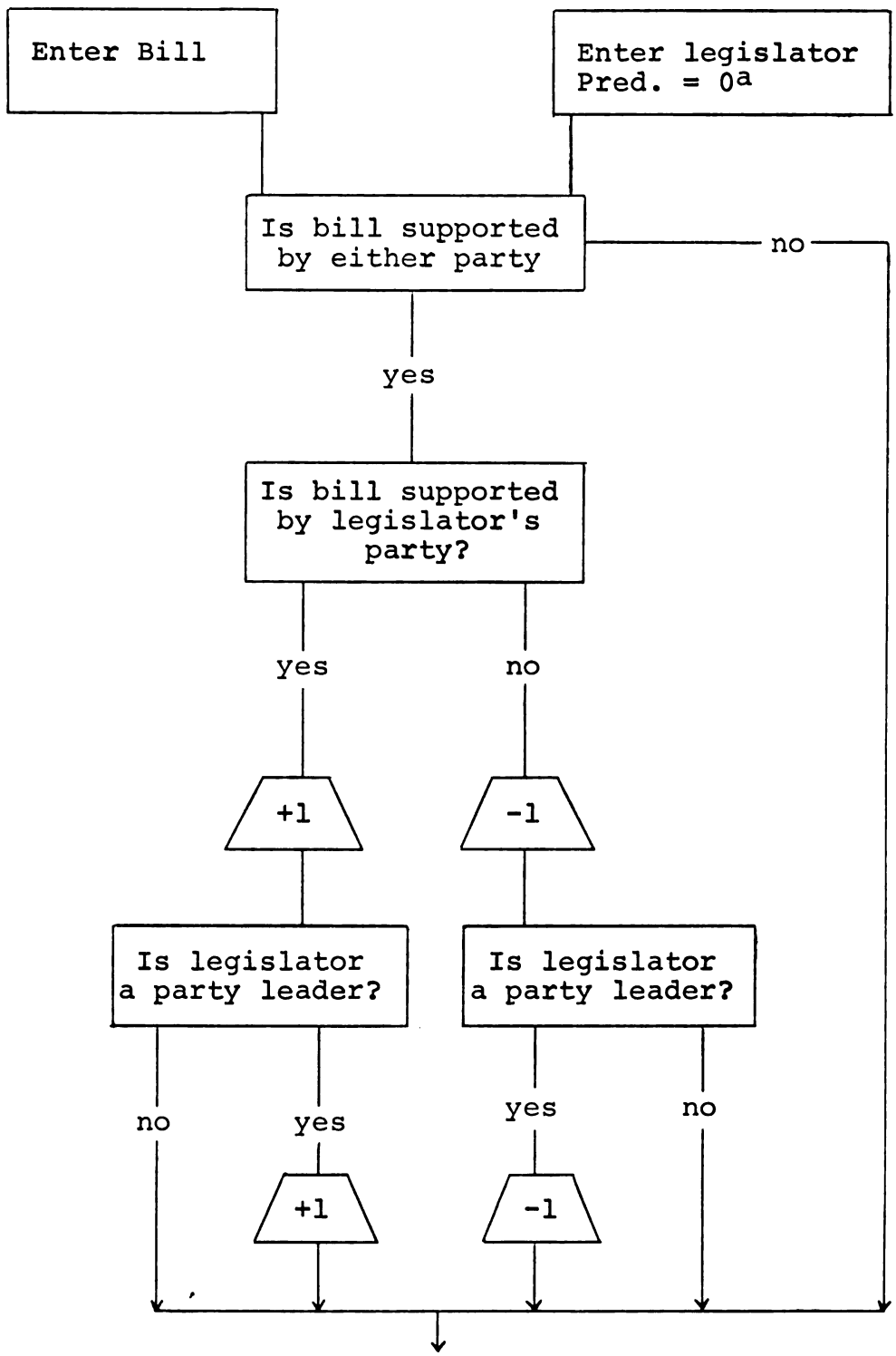


Figure 2.--Flowchart: Party.

[a]Signed integers change the value of the predisposition.

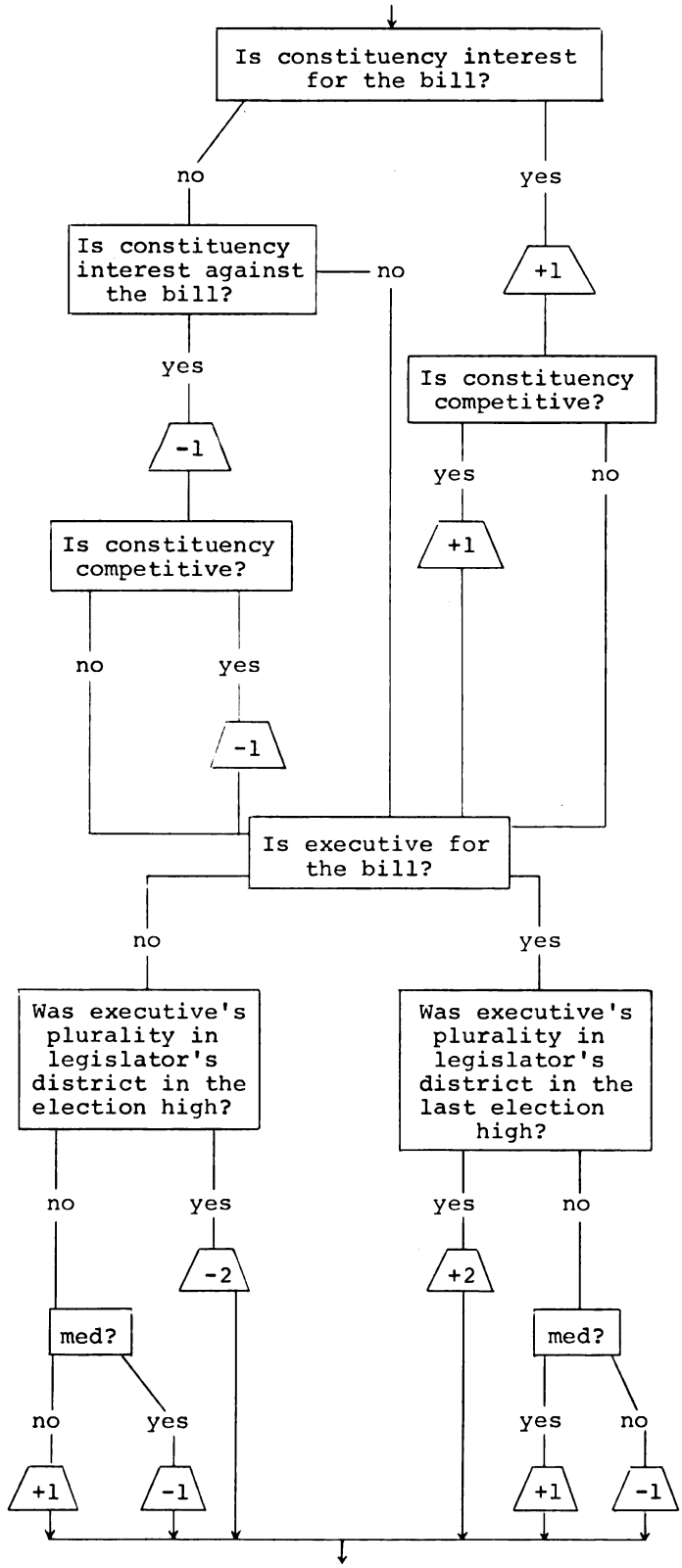


Figure 3.--Flowchart: Constituency.

finds that in the House of Representatives state delegations increased in cohesion as party cohesion declined on roll-call votes.[2]

From hypothesis L-1, we would argue that the racial composition and economic status of Southern districts should elicit a sympathetic response to social and economic problems of blacks from Southern representatives. However, the greatest opposition to the economic, social, and political advancement of blacks springs from the "black belts," areas in the South where forty per cent and more of the population is black.

Southern sectionalism, Key explains, lies deeply rooted in the history, the economy, the social structure and the political culture of the South.

> The South's heritage from crises of the past, its problem of adjustment of racial relations on a scale unparalleled in any western nation, its poverty associated with an agrarian economy which in places is almost feudal in character, the long habituation of many of its people to non-participation in political life--all these and other social characteristics both influence the nature of the South's political system and place upon it an enormous burden.[3]

The South, moreover, has two related attributes which make behavior of its representatives somewhat unpredictable. As a consequence of the Reconstruction, the

---

[2]Truman, The Congressional Party. Cherryholmes and Shapiro also hypothesize the effect of state delegations and state interests, Representatives and Roll-Calls, p. 39.

[3]V. O. Key, Southern Politics (New York: Knopf, 1949), p. 4.

white South votes overwhelmingly Democratic even though it has a predominantly rural population. Consequently, Southern Democratic districts, while not competitive, are atypical in some respects of Democratic districts nationwide. Furthermore, lack of competition is accompanied by factionalism within the Democratic party.[4] Consequently, Southern representatives are relatively independent of their legislative party and of many of the groups residing in their constituencies.

The West has also been characterized by its own sectional interests, although they are not as problematic as those of the South. The West's problems have been primarily those of the frontier, of economic and population growth; and these have been congruent with the growth of federal power and services. Mayhew finds that Western issues, mostly problems related to resource development such as water reclamation, were supported by Westerners and also by the Democratic party and its elected leadership.[5] Furthermore, regional cooperation in the Senate is fostered by an organization which monitors communication about legislation of interest to the West, the Conference of Western Democratic Senators.[6]

---

[4] Ibid., especially Chapter 14.

[5] Mayhew, Party Loyalty Among Congressmen.

[6] Neal Maxwell, Regionalism in the United States Senate: the West (Salt Lake City: Utah University, 1961).

Figure 4 diagrams the extension of constituency interests to the state and regional level for the purposes of explaining behavior in the Senate and the House of Representatives.

The consequences of the legislator's choice of specialization and sponsorship, hypotheses L-2 and L-5 are represented in Figure 5.

Figure 6 diagrams the separation of legislators into protocoalitions supporting passage and defeat of the motion and those less interested in the outcome of the collective decision.

Discussion.--The predisposition phase of SIMEX is identical to that of the Cherryholmes-Shapiro model with the exception of the relationship of legislators' positions to the executive program, hypothesis L-1.4 diagrammed in Figure 3. Our model does not include a prediction of the effects of personal ideology including in the Cherryholmes-Shapiro model. Cherryholmes and Shapiro include the following propositions in their inventory:

> The political predispositions or ideologies of congressmen are related to roll-call voting even when the effects of party, region, and constituency are controlled.
>
> Legislators tend to be very consistent in their roll-call votes from one Congressional session to the next.[7]

---

[7]Cherryholmes and Shapiro, Representatives and Roll-Calls, p. 35.

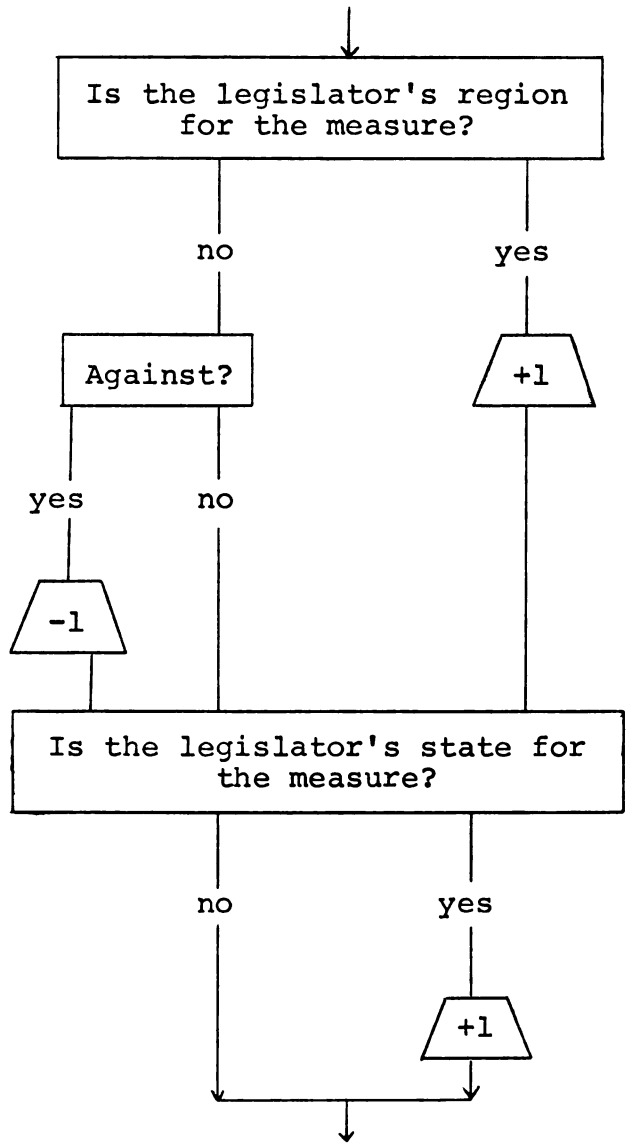


Figure 4.--Flowchart: State and Region.

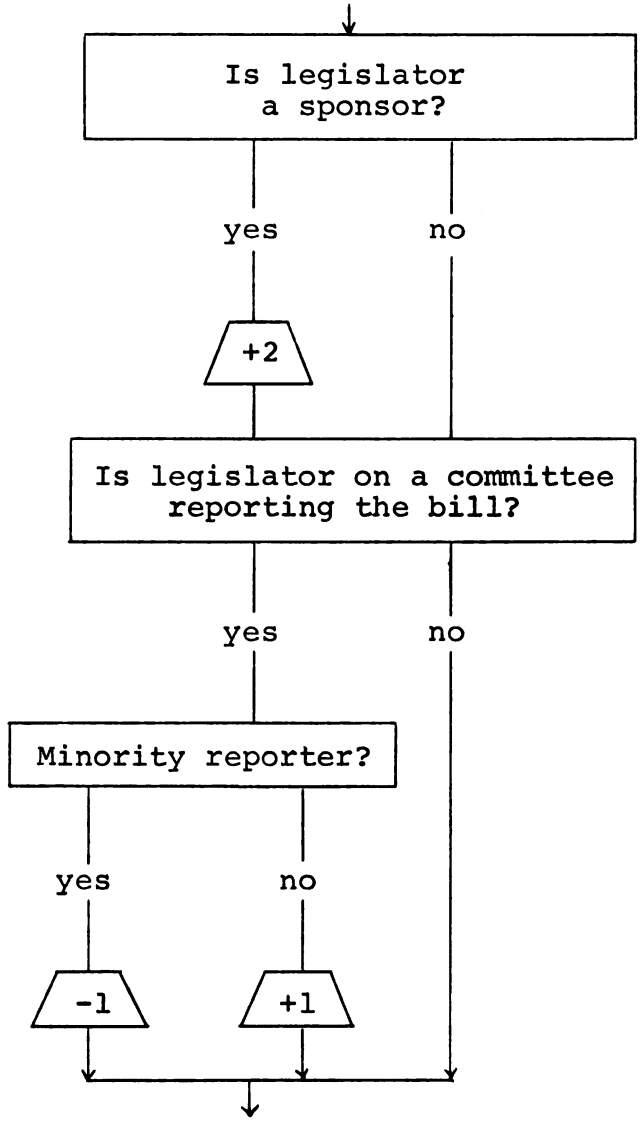


Figure 5.--Flowchart: Sponsorship and Committees.

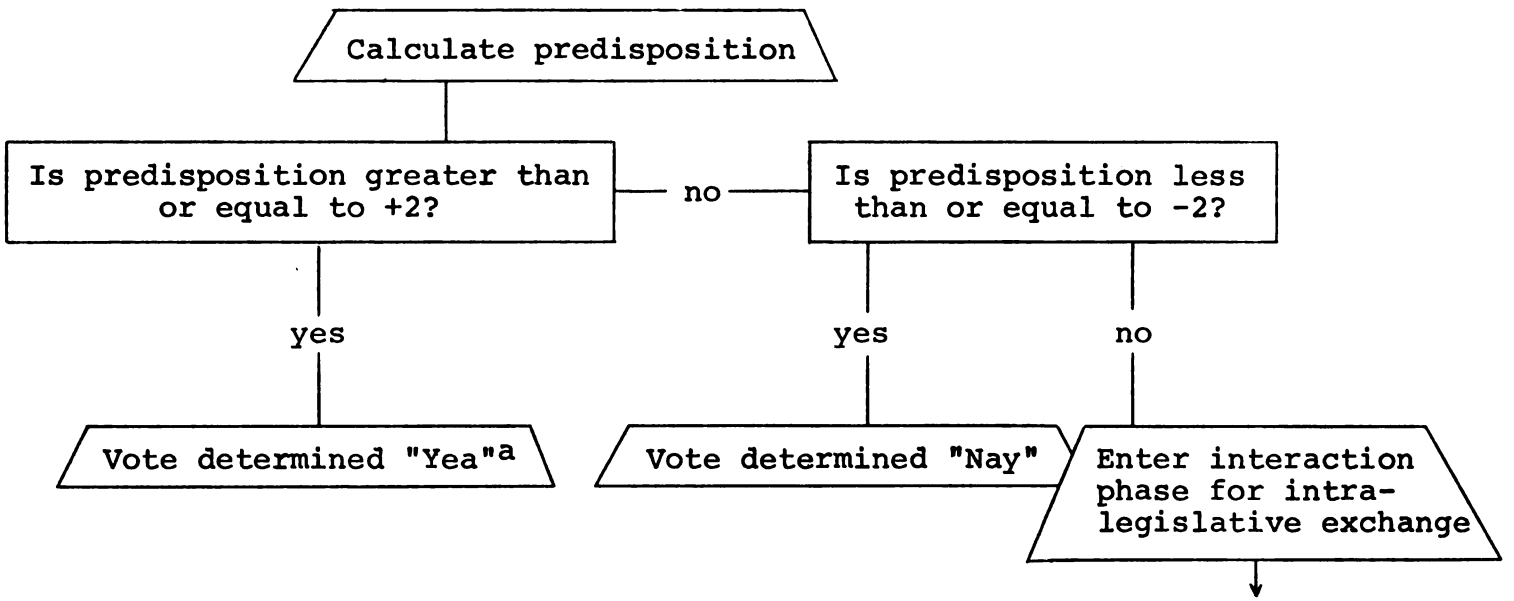


Figure 6.--Conclusion of Predisposition Phase.

[a]Only those who actually voted on the motion vote in the simulation.

These propositions are operationalized by relating the "memory score," the proportion of occasions on which the legislator voted in favor of an expanded federal role in the past session to a propensity to vote for or against the simulated motion which is described as for or against expansion of the federal role.

> . . . roll calls from the previous session of Congress--the Eighty-Seventh--were used to represent personal ideology or memory . . . . A representative's ideological predisposition was calculated in the model on the basis of the number of times he voted in support of foreign affairs or for an increase in the federal role as a proportion of all such bills on which his vote was recorded.[8]

We have noted that politicians may have personal preferences about the outcomes of collective decisions apart from their use of legislative action as a political resource. We assume, however, because of the game played by legislators, that these preferences are lower in priority relative to their desires for political power.

While we concede the likelihood that the legislator's personal ideology may be marginally reflected in voting behavior, its measurement for the Cherryholmes-Shapiro model is questionable. The measure of "memory" or ideology is highly related to the output, i.e. votes in a particular issue area. Thus, its interpretation is problematic; it may simply reflect the combined effect of

---

[8] Ibid., p. 52.

all the variables which influence the vote, including ideology in an unknown proportion.

According to Cherryholmes and Shapiro, the "memory score" reflects ideological consistency over time. Consistency of action, however, is not implied by exchange theory except insofar as past behavior has been rewarded and insofar as future ambitions are similar to past ambitions.

Interaction Phase

When a legislator interacts with another legislator in the interaction phase of the simulation, he in fact takes note of the second legislator's predisposition, defined as the value that passage or failure of the motion has for the second legislator (hypothesis L-6).

Figure 7 represents hypothesis L-8, the intermediary role played by party leaders in the exchange process.

Figure 8 illustrates the operationalization of the conjunction of hypotheses L-9 and L-11, the tendency of the legislator to interact with members of the committee reporting the bill who represent similar constituencies.

Figure 9 depicts the legislator's tendency to interact with legislators who share committee assignments and represent similar constituents, the conjunction of hypotheses L-10 and L-11.

Figure 10 illustrates the operationalization of hypotheses 12 and 12.1, the legislator's assessment of the value of his vote in exchange and the value of the motion for his own political interests.

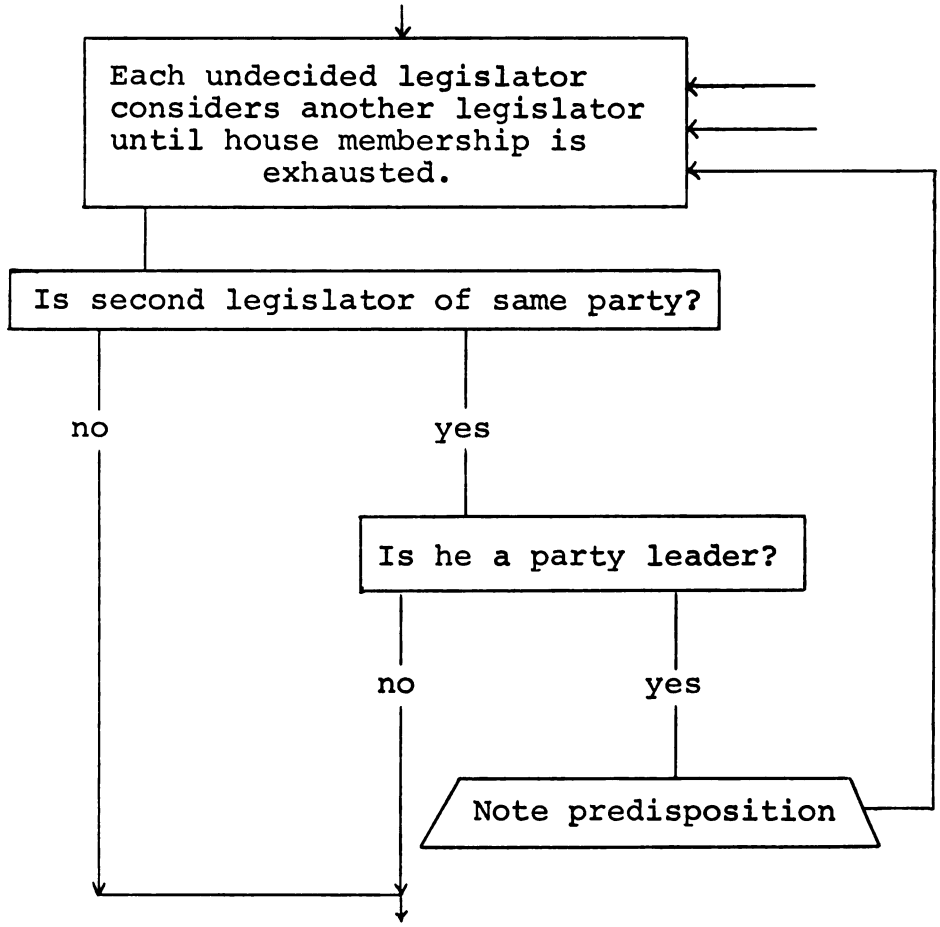


Figure 7.--Flowchart: Interaction with Leadership.

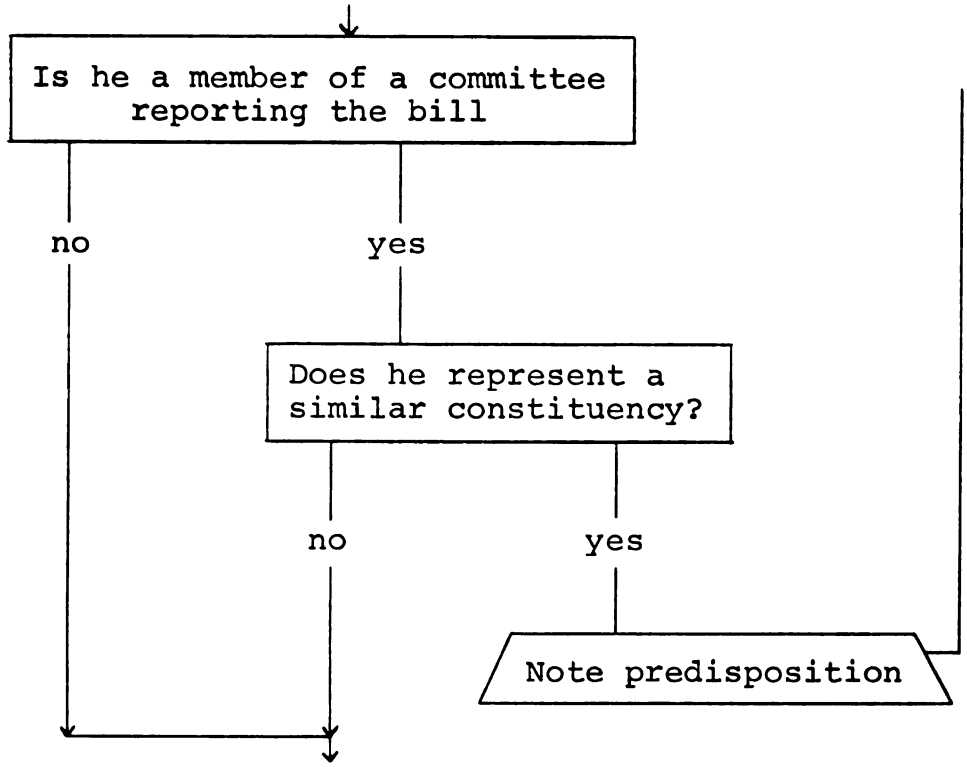


Figure 8.--Flowchart: Interaction with Members of Reporting Committee.

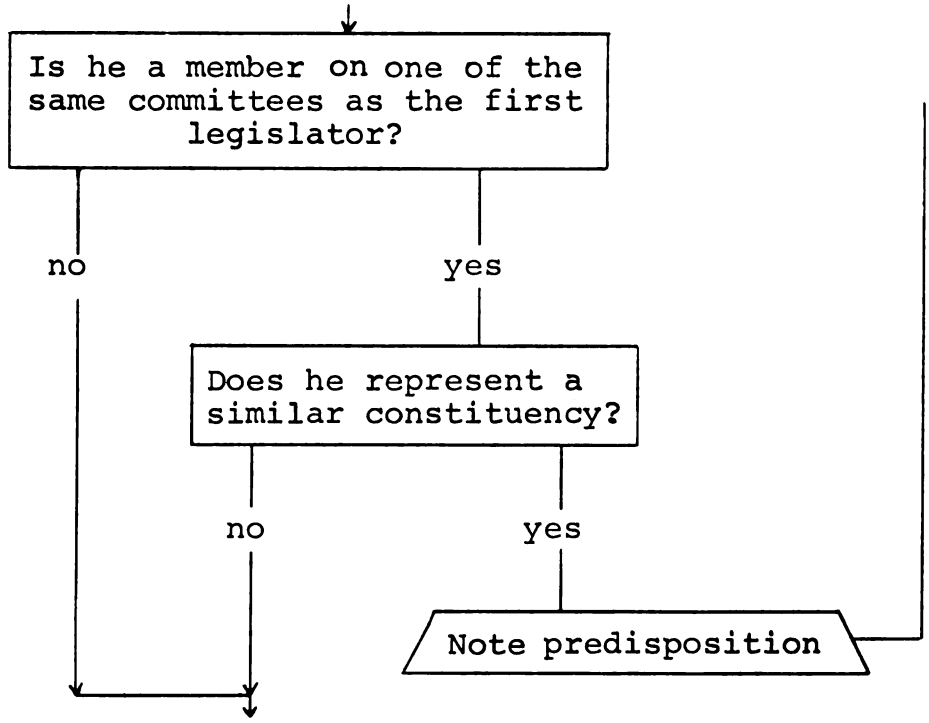


Figure 9.--Flowchart: Interaction with Members Sharing Committee Assignments.

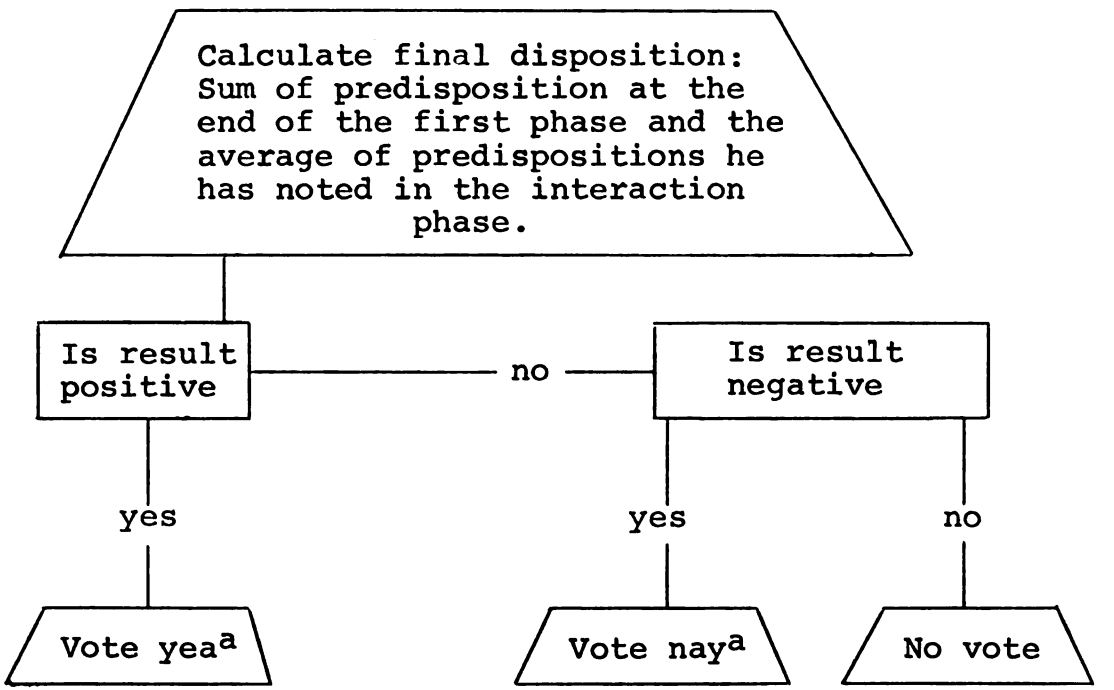


Figure 10.--Flowchart: Conclusion of Interaction Phase.

[a]Only those who actually voted on the motion vote in the simulation.

Discussion.--There is a limited relationship between the interaction phase of SIMEX and the communication phase of the Cherryholmes-Shapiro model. Every hypothesis incorporated in SIMEX is in the Cherryholmes-Shapiro model. However, the interaction phase of SIMEX is far simpler than the communication phase in the Cherryholmes-Shapiro model. The communications phase of the Cherryholmes-Shapiro model is very complex and highly structured by party considerations. In the U.S. House of Representatives, it was apparent that the model overdetermined party influence except for Democratic administration bills.[9] Many of the influences operating in the communications phase may overlap one another and often they repeat influences in the predisposition phase: party, region, constituency, state delegation, presidential position. Interpreting these as communications at some stage of the decision-making process is probably correct, although interpreting them as influences on voting independent from those in the predisposition phase and independent of each other may be in error.

The interaction phase of SIMEX is deterministic, while the interaction phase of the Cherryholmes-Shapiro model is stochastic. Because of the complexity of the communications phase of the Cherryholmes-Shapiro model, parameter estimation, the designation of probabilities of interaction, is difficult. Cherryholmes and Shapiro

---

[9] Ibid., pp. 109-110.

based their probabilities on an apportionment of the average number of communications expected for non-leaders, leaders, and the President.[10]

The success of the communications phase in predicting roll-call votes in the House of Representatives lends validity to these parameters. However, when the model is applied to another legislature, the question of optimum parameter values is reopened. Readjustment for the Senate is relatively simple: the values for intraparty and interparty communication are altered to allow the same average number of contacts as in the House of Representatives; leadership communications are changed in consideration of the absence of regional whips. These adjustments, however, are the minimum for comparability with performance on House of Representatives data. We may still question their interpretation and whether they are sufficiently precise.

Joseph Hanna suggests that stochastic models have advantages over deterministic models. Of these, the recognition that simulation models contain loci of ignorance--either neglected causal factors or errors in measurement--is among the most important.

> . . . the random elements occasioned by both loci of ignorance--neglected factors and measurement errors--are explicitly included in the [stochastic] model. In general, the less precise one's measurements, and the more significant the neglected causal factors, the greater variance the resulting

---

[10] Ibid., pp. 69, 74.

> probability distribution will have. In the limit, if nothing is known about the causal factors influencing behavior, the model should attribute equal likelihood to all possible responses.[11]

A stochastic model can generate a probability distribution of outcomes rather than a single determined prediction. In a model which has two possible outcomes, for example, a stochastic model can generate a probability for one outcome, p_1; the probability of the other, p_2, equals $(1-p_1)$. Alternatively, we may repeatedly run a stochastic simulation which generates a simple prediction and calculate the proportion of times each outcome occurs to obtain the probabilities of each outcome. With this information, we cannot only reject a model outperformed by a random prediction (one which generates a probability of .5 for each outcome), but we can also make better comparisons among model instances, versions of the same process with different initial conditions. We would, then, prefer the model or model instance which generates the highest probability for the observed outcome.

Unfortunately, the Cherryholmes-Shapiro model does not generate probabilities of the predicted outcome. Even though it is stochastic and the outcome may vary across runs of the same model instance, it generates only a simple prediction. Furthermore, the second method of obtaining

---

[11]Hanna, "Information-Theoretic Techniques for Evaluating Simulation Models."

probabilities involves a prohibitive number of replications of the model.

Although the SIMEX model is deterministic, we can regard the likelihood that an individual will vote in the way predicted as an increasing function of intensity of preference. Those legislators with high predispositions should, then, include proportionately fewer errors in prediction than those with low predispositions. The simulation model predicts the votes of those with high predisposition values at the end of the predisposition phase. Hence, we anticipate,

> Model hypothesis 2. Those legislators whose votes are determined at the end of the predisposition phase will be predicted more accurately than those predicted at the end of the interaction phase.

The referent process for exchange theory is bargaining and exchange. The interaction phase of SIMEX models the search for information on alternative exchange possibilities by those legislators who are undecided at the end of the predisposition phase. Their information consists of the predispositions of those with whom they interact, defined as the value of a vote for their positions. The resources exchanged for votes, sidepayments, are not present in the model; rather, they are a hypothetical construct assumed to be proportional to the value of the

motion generated in the predisposition phase for each legislator.[12]

In the final step, the values noted by the undecided legislator are averaged. This approximates the value offered by one member of the protocoalition offering him the most in terms of resources. Averaging makes it unlikely that a number of interactions with legislators having low predispositions will change the legislator's vote from the direction of his predisposition at the end of the first phase of the model.

Although the interaction patterns are based on the strategies of both buyers and sellers, only the sellers of votes seek information in the model. The simulation models no information feedback which would enable members of protocoalitions to gauge the size of their coalition and to limit sidepayments to those necessary to win with the least expenditure of resources (hypothesis L-7).

With complete absence of information feedback on the size of coalitions, we expect SIMEX will generate larger than observed coalitions. This neglected aspect of the

---

[12]The value of a motion for a legislator, a redefinition of a calculated numerical value, is an "intervening variable." The resources, not present in the model, but essential to its interpretation according to the theory, are a "hypothetical construct." For a discussion of this distinction, see Kenneth MacCorquodale and Paul E. Meehl, "On a Distinction Between Hypothetical Constructs and Intervening Variables," Psychological Review, 55 (March, 1948), pp. 95-107.

theory, or locus of ignorance, is present in both SIMEX and the Cherryholmes-Shapiro model. Since the stochastic Cherryholmes-Shapiro model produces conformity among groups within certain probabilistic limits, however, it builds in a brake on the overestimation of winning coalitions. Hence, we anticipate,

Model hypothesis 3. SIMEX will generate larger than observed winning coalitions.

Model hypothesis 3.1. The Cherryholmes-Shapiro model will generate smaller winning coalitions than SIMEX.

Model-Behavior

Senate Constituencies

In legislative chambers of small membership representing a large total electorate, districts of legislators are likely to be heterogeneous with respect to interests. Consequently, the tension to effect the wishes of any particular group of voters is lessened. It is likely, then, that constituency interests as defined by demographic characteristics will be less evident in the voting behavior of smaller legislative chambers than in the behavior of larger ones. We predict,

Model hypothesis 4. The constituency hypothesis will have less positive effect on predictive accuracy in the Senate than in the House of Representatives.

Corroborative evidence.--Clausen and Cheney discover that U.S. senators respond more to party relative to constituency, but they are also more independent of party

constraints on voting compared to U.S. representatives. They suggest that the greater heterogeneity of Senate constituencies and the ability of senators to build a reputation independent of their party through the media damp the influence of both party and constituency.[13]

The senator, according to Matthews, is more free to define his constituency than representatives from smaller, more homogeneous constituencies.

> . . . a constituency as large as a state can be represented in many different ways. Up to some point the senators are free to choose which groups and interests within their formal constituency they will champion. The senators' party, in two-party states, largely commits them to one approach in satisfying their constituents, yet this is not the case for the men from one-party or modified one-party areas . . . Senators from socially and economically heterogeneous states also enjoy greater maneuverability along with greater risks.[14]

Senate Interactions

The hypothesized constraints on bargaining rest on the assumption of limited availability of information on possible exchanges. The smaller the legislature, however, the more likely such shortcuts will be necessary. In smaller legislative chamber, then, we can expect more idiosyncratic patterns of vote trading.

---

[13]Clausen and Cheney, "A Comparative Analysis of Senate-House Voting on Economic and Welfare Policy 1953-1964."

[14]Matthews, U.S. Senators and Their World, pp. 237-238.

Model hypothesis 5. The Senate will exhibit less predictable patterns of interaction than the House of Representatives.

Corroborative evidence.--Truman corroborates this hypothesis by comparisons of bloc patterns in the U.S. Senate and House of Representatives. U.S. representatives, in contrast to senators, appear dependent on internal structures: their patterns of bloc voting are more regular than those of senators. Truman asserts that because of its larger size, the communication system is more standardized in the House than in the Senate.[15]

Clausen and Cheney contrast the Senate and the House of Representatives in the dimensional structure of their voting: the Senate exhibits greater complexity than the House.[16]

Variables

Each legislator in SIMEX is represented by eighteen variables: identification number, party, state, region, nine constituency characteristics, leadership position, and up to four committee assignments.[17] All variables

---

[15] Truman, The Congressional Party, pp. 194-195.

[16] Clausen and Cheney, "A Comparative Analysis of Senate-House Voting on Economic and Welfare Policy 1953-1964."

[17] In order to operationalize the more complex communications phase of the Cherryholmes-Shapiro model, more attributes are required: regional and assistant whips (if available), region as defined by the whip organization, chairman and the two ranking members of each party for each

except constituency characteristics are measured at the nominal level and can be identified by the assignment of a numerical value to each classification. (Appendix B lists the codes assigned to each value of each variable.)

Demographic constituency variables, per cent urban, rural non-farm, rural farm, non-white, owner-occupied dwellings, white collar employment, and median income,[18] are collapsed into ordinal scales according to observed clusters in their distribution across districts.[19] In the absence of parameter estimation routines, higher level measurement for these variables is not useful.

Political constituency variables were collapsed into ordinal scales according to breaking points which seem reasonable in the light of the information they were intended to convey to the legislator, electoral competition and the executive's plurality in his district.[20]

---

committee, and seniority groups. Cherryholmes and Shapiro also utilize the "memory score" as an attribute of the legislator utilized in the predisposition phase.

[18]Cherryholmes and Shapiro did not include median income, but they do include per cent foreign stock.

[19]Source: U.S. Bureau of the Census, U.S. Census of Population: 1960, Vol. 1: Characteristics of Population (Washington, D.C.: U.S. Government Printing Office, 1964).

[20]Source: Governmental Affairs Institute, America Votes: 1962, Vol. 5, ed. by Richard M. Scammon (Pittsburgh: University of Pittsburgh, 1964).

Bills simulated in SIMEX are identified by party sponsorship, committee reporting the bill, and individual sponsorship. Minority reporters were coded on the bill to operationalize hypothesis L-5. Descriptions of bills in the Congressional Quarterly Almanac are used to designate for each motion the constituency groups and states which would benefit, and regional interests. The executive's position, obtained from the C.Q. Almanac, is coded for or against the motion.[21] When the executive is against a motion sponsored by a member of his own party, party sponsorship is coded "without party" to operationalize hypothesis L-3.1.

The actual votes on roll-calls are arranged across columns of cards following bill attribute cards. The actual result is used only for assessing accuracy of the predictions of the model.

Figure 11 and Figure 12 illustrate the format on attribute cards for legislators and bills, respectively.

---

[21]The Cherryholmes-Shapiro model also uses information on the president's party, his regional and state base. Although not defined as such, the federal role orientation of the bill is utilized as the president's position on the motion. That is, on the roll-calls simulated in the Eighty-Eighth Congress, Kennedy and Johnson always favored expansion of the federal role, and opposed its diminution. The C.Q. Almanac confirms that this congruence is in most cases justified for the Eighty-Eighth Congress.

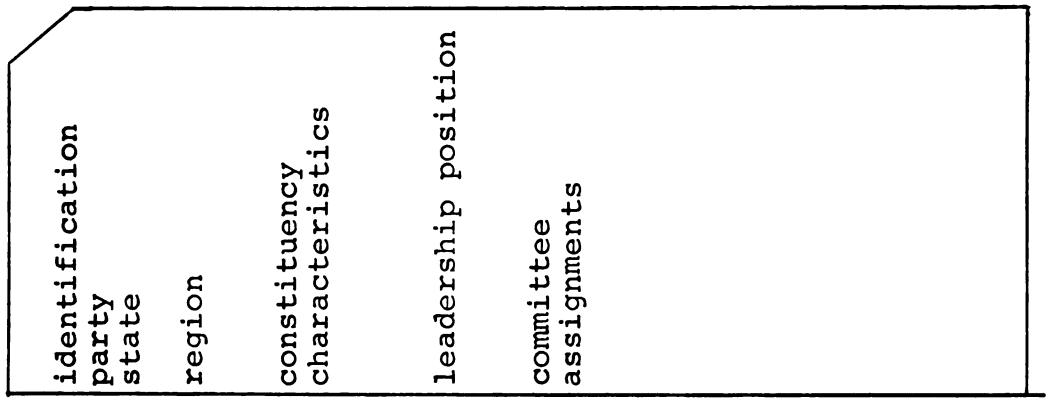


Figure 11.--Format: Attributes of Legislators.

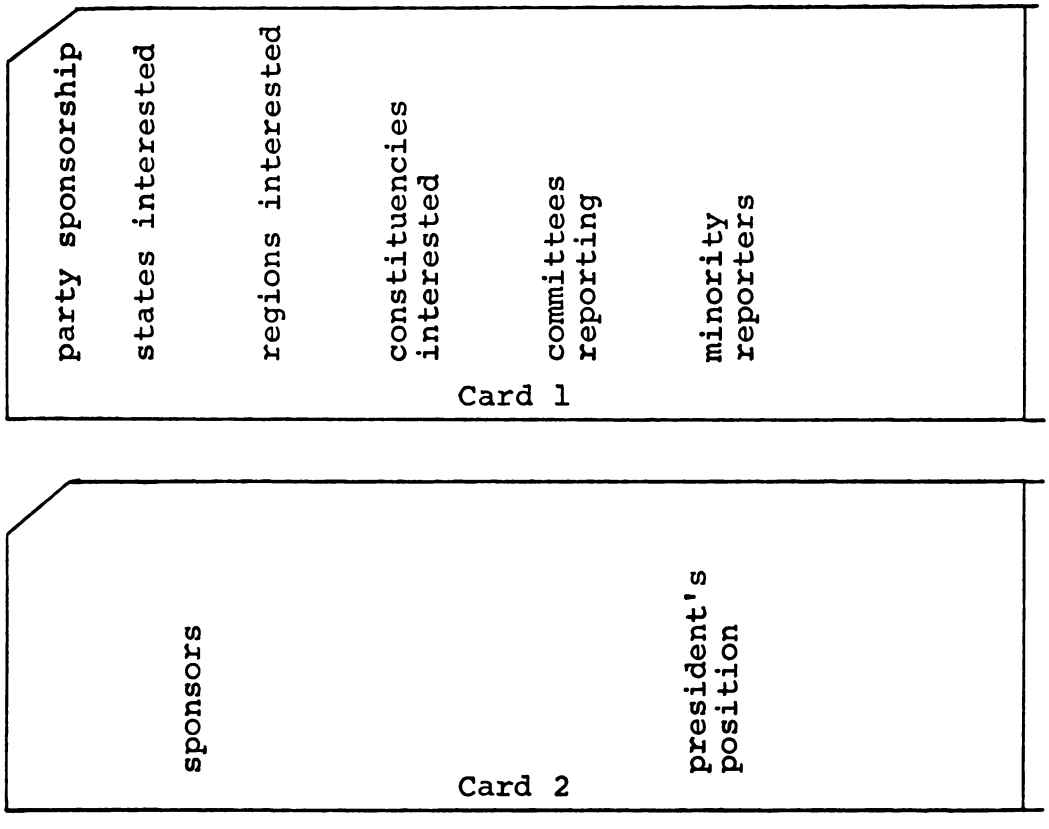


Figure 12.--Format: Attributes of Motions.

Parameters

We have adopted the parameters used by Cherryholmes and Shapiro in the predisposition phase of SIMEX. These are reasonable in the light of the value which separates the highly interested from the less interested at the end of the first phase of the model, a predisposition (positive or negative) that equals or exceeds 2.

In his simulated calculus, party alters the legislator's predisposition by a value of 1 for rank-and-file, 2 for leaders. Constituency interests change the predisposition by 1, by 2 if the constituency is competitive. State and regional interests alter the value of the predisposition by 1. Sponsors move to a strong propensity to agree; the majority of reporting committee(s) to moderate agreement, the minority of reporting committee(s) to moderate disagreement.

The executive's plurality in the legislator's district generates a tendency for the legislator to agree if it is moderate or high, to disagree with the executive if it is low. Our assignment of parameters gives the executive's position an advantage in the outcome of the bill. This aspect of the parameter values is somewhat questionable. However, we anticipate that because of the advantage the president has in media coverage to popularize his program, the legislator will tend to favor the president's position.

In view of the findings of Jewell and LeBlanc (see page 74, above), we chose urbanness as the relevant constituency dimension in the interaction phase. The simulation model, then, should generate cohesion within legislative parties which represent mostly urban or mostly rural constituencies. Since Senate constituencies are heterogeneous, any one constituency variable may not adequately delineate bargaining patterns. Because of its smallness, a correlate of heterogeneity, we have already predicted idiosyncratic bargaining patterns in the Senate (see p. 106, above).

Unquestionably, more precise parameters are desirable. However, since the theory and the model are still in the developmental stages, these approximations are appropriate.

Motions on the Federal Role

We chose twenty-three roll-calls from among votes on motions affecting the eighteen bills identified by the Congressional Quarterly Service as those which represented action on the nature and extent of the federal role in domestic government.[22] Nine passage votes, one vote on a conference bill, one vote on authorization of appropriations, and one vote on extension of a program (library services) to urban areas are considered final votes. Amendments and

---

[22]Congressional Quarterly Service, Congressional Quarterly Almanac, Vol. 19: 88th Congress, 1st Session; Vol. 20: 88th Congress, 2nd Session (Washington, D.C.: Congressional Quarterly, Inc., 1963, 1964).

procedural motions included eight amendment votes, one vote on a motion to consider a bill, one vote on cloture, and one vote on a recommittal motion.

We purposely chose roll-calls which give a sampling of types of legislative action and variation in sponsorship. We also chose motions on which conflict was evident, on which at least fifteen per cent of the participants on the roll-call were in opposition.[23] We chose those with the greatest number of participants where possible. Table 2 lists the motions in our sample and the observed outcome. Table 3 lists codes used in describing the motions.

Model-Outcome

In order to test our hypotheses, the model must produce outputs by which we can assess the validity of our theory and our predictions of patterns of correspondence between model and theory. Basically, the simulation generates individual predictions. We compare predictions with actual behavior to compute individual accuracy. We can also manipulate predictions of individual votes to assess system-level performance--passage or defeat of a motion, the generation of protocoalitions, and size of winning coalitions.

---

[23]This criterion was not met on two roll-calls because of the lack of roll-calls on these issues which did meet the standard.

TABLE 2.--Motions on Issue of the Federal Role.

Motion number	C.Q.Roll-Call No.	Name	Type of Action	Observed outcome
1	16(1963)	S6 Mass Transportation	amendment	41-57
2	18(1963)	S6 Mass Transportation	amendment	44-47
3	21(1963)	S6 Mass Transportation	passage	52-41
4	31(1963)	S1 Youth Employment	amendment	41-47
5	33(1963)	S1 Youth Employment	passage	50-34
6	102(1963)	S1321 National Service Corps	recommital	44-48
7	103(1963)	S1321 National Service Corps	passage	47-44
8	122(1963)	S1831 Manpower Training	passage	41-26
9	156(1963)	S649 Water Pollution Control	authorize appropriations	69-11
10	158(1963)	HR6143 College Aid	passage	60-19
11	202(1963)	S2265 Library Services	extension	89-7
12	211(1963)	HR6143 College Aid	conference	54-27
13	43(1964)	HR6196 Administration Farm Bill	amendment	12-80
14	45(1964)	HR6196 Administration Farm Bill	amendment	30-63
15	58(1964)	HR6196 Administration Farm Bill	passage	53-35

TABLE 2.--Continued.

Motion number	C.Q.Roll-Call No.	Name	Type of Action	Observed outcome
16	59(1964)	HR7152 Civil Rights	motion to consider	67-17
17	69(1964)	HR7152 Civil Rights	amendment	51-48
18	73(1964)	HR7152 Civil Rights	cloture	71-29
19	75(1964)	HR7152 Civil Rights	amendment	40-59
20	179(1964)	HR7152 Civil Rights	amendment	25-74
21	180(1964)	HR7152 Civil Rights	passage	73-27
22	282(1964)	HR11865 Medicare (1964)	passage	60-28
23	299(1964)	S2782(1964) Appalachia	passage	45-13

TABLE 3.--Coding for SIMEX Simulation of Motions on the Federal Role.

Motion number	Party	State	Region	Constituency	Committee[a]	Minority Reporting[b]	Sponsors[b]	President's Position
1 S6				high urban against, high rural (farm and non-farm) for			27	against
2 S6	Republican			high urban against, high rural (farm and non-farm) for			64	against
3 S6	Democratic			high urban for, high rural (farm and non-farm) against	5,6	8,12,27,30, 46,62,64,66, 78,88,90	1,16,19, 15,17,29, 35,37,36, 67,68,83, 91,92,95	for
4 S1	Republican			high urban, high non-white, low med. income, low white-collar against			12	against
5 S1	Democratic		South against	high urban, high non-white, low med. income, low white collar for	13	12,60,64,66	2,15,19, 21,25,28, 35,41,45, 37,74,82, 87,93,94	for
6 S1321	Republican			high urban, low med. income against			22	against
7 S1321	Democratic		South against	high urban, low med. income for	13	60,64	2,5,9,10, 15,19,25, 17,29,35, 74,93,97, 98,99	for
8 S1831	Democratic		South against	high urban, high rural farm, low med. income for	13	64,76	5, 10,12, 17,19,81,74	for

TABLE 3.--Continued.

Motion number	Party	State	Region	Constituency	Committee[a]	Minority Reporting[b]	Sponsors[b]	President's Position
9 S649	Democratic			high urban, high rural (farm and non-farm) for	15	65	3,35	for
10 HR6143	Democratic			high white collar for	13	64,76		for
11 S2265	Democratic			high urban for	13		93	for
12 HR6143	Democratic			high white collar for	13	76,64		for
13 HR6196	Republican		South against	high rural farm against, low med. income against			64	against
14 HR6196			South against	high rural farm, low med. income against			55	against
15 HR6196	Democratic		South for	high rural farm, low med. income for	2	31,55,86		for
16 HR7152	Democratic		South against	high non-white for			81	for
17 HR7152	Republican		South for	high non-white against			66	against
18 HR7152	Bipartisan		South against	high non-white for			22,81	for
19 HR7152			South for	high non-white against			53	against

TABLE 3.--Continued.

Motion number	Party	State	Region	Constituency	Committee[a]	Minority Reporting[b]	Sponsors[b]	President's Position
20 HR7152			South for	high non-white against			71	against
21 HR7152	Democratic		South against	high non-white for	6,13	8,12,47,62, 64,70,76		for
22 HR1865	Democratic			middle med. income for	8			for
23 S2782	Bipartisan	Md.,N.C., Ohio,Pa., Va.,W.Va., Tenn.	South for		15	13,32,34	19,20,21, 28,65,66, 67,68,72, 73,74,93, 98	for

[a]Refer to Appendix B for corresponding committees.

[b]Refer to Appendix B for corresponding senators.

By manipulating the coding of bills, we can test subhypotheses of the model. For example, we can perform a test of the sensitivity of the model to the effect of party by coding all bills without party. We will perform sensitivity tests on the major hypotheses of the theory--those concerning party, constituency, region, "memory" (for the Cherryholmes-Shapiro model), and executive position (for SIMEX). We can test the effect of interaction by predicting the votes of all legislators (not only those with high predispositions) at the end of the predisposition phase. We will also examine output in view of our model hypotheses predicting patterns of correspondence.

CHAPTER IV

VALIDATION AND FINDINGS

Validation of Simulations

Abraham Kaplan suggests three norms of validation for theories--correspondence, coherence, and pragmatism. In Chapter II we showed how exchange theory coheres with past empirical research and theoretical formulations by citing corroborative evidence of the theory's predictions from the literature on political behavior. In Chapter III, we demonstrated how the theory can be of practical use in empirical research. Kaplan points out, however, that correspondence of predictions and behavior is basic to the validation of theories.[1]

In discussing validation of simulations, Charles Hermann says, "The process of determining how well one system replicates properties of some other system is called validation."[2] The methodology of evaluating simulations, however, has evolved somewhat beyond the notion of

---

[1]Abraham Kaplan, The Conduct of Inquiry (San Francisco: Chandler, 1964), pp. 312-313.

[2]Charles Hermann, "Validation Problems in Games and Simulations," Behavioral Science, 12 (1967), p. 216.

strict replication and prediction to one in which some distortions in model output relative to behavior are not only permissible, but may contribute to our confidence in the worth of the simulation model. Of primary importance in considering validation criteria is a recognition that our standards are inseparable from the purposes of the simulation. Abelson points out, in "social simulation . . . one is not interested in literal prediction, but rather in validation of the model for theoretical purposes."[3]

Internal Validity

Hermann suggests that inter-run reliability is a measure of internal validity for stochastic models.[4] This is a measure of internal validity in that it allows us to make inferences from the results of a simulation. If a stochastic model varies greatly in its predictions across runs, it contains little information about the process simulated. To paraphrase Joseph Hanna, whom we quoted earlier, if the model provides us no information, it will predict that all outcomes are equally likely; this is equivalent to a random prediction (see above, p. 102). In other words, if a model contains no information, the

---

[3]Robert Abelson, "Simulation of Social Behavior," The Handbook of Social Psychology, ed. by Gardner Lindzey and Elliot Aronson, 2nd ed., II (Reading, Mass.: Addison-Wesley, 1968), p. 339.

[4]Hermann, "Validation Problems in Games and Simulations."

probability distribution of outcomes it generates is horizontal, or flat.

Cherryholmes and Shapiro used this standard of internal validity for their model. On data from the House of Representatives, the model varied little in its predictive accuracy across runs of the fully-coded model. The same model, however, exhibits more inter-run variance on Senate data. Apparently, since it is a smaller legislative chamber, it is less likely that errors in prediction of individual votes will be evenly distributed across runs. Although the average of predictive accuracy on all the motions simulated with Senate data did not vary across runs, accuracy of individual motions did.[5] Consequently, when we compare smaller subsets of the motions across runs, it is difficult to make inferences about the performance of the model.

We do not encounter this difficulty with SIMEX. Hermann's test of internal validity is not applicable for a deterministic model. Since deterministic models generate only one outcome, the distribution of possible outcomes is single-peaked. It is impossible, then, for a deterministic model which generates outcomes to be internally invalid.

---

[5]On three runs of the fully coded Cherryholmes-Shapiro model, the average prediction level was 68.7 per cent, 69.0 per cent, and 69.1 per cent. Variation for single bills was frequently higher. For example, motion 1 was predicted with 65.3 per cent, 56.1 per cent, and 62.2 per cent correct on the three runs.

External Validity

While external validity of a theory by definition is a question of matching prediction and behavior, Paul Smoker suggests that we refine our criteria for external validity of models by recognizing the ways in which the model may correspond well or poorly to behavior depending upon the behavioral consequences on which we focus our attention. Smoker labels this accounting recognition of "patterns of correspondence."

> Criteria of validity might well shift from demanding correspondence between simulation and reality to defining patterns of correspondence and noncorrespondence in terms of the model construction process itself.[6]

Patterns of correspondence and non-correspondence imply that there are loci of both information and ignorance in the model, even though loci of ignorance may not be incorporated in stochastic processes.

First of all, we expect the theory itself, hence the model, to be more accurate in predicting certain types of behavior. Since the outcome of amendments and procedural motions is less visible to extra-legislative constituencies than passage of legislation, we expect our model to predict votes on these motions less accurately than on final votes on legislation.

---

[6]Paul Smoker, "Social Research for Social Anticipation," American Behavioral Scientist, XII (July-August, 1969), p. 8.

> Model hypothesis 1. Predictions of the simulation will be more accurate with respect to final votes on legislation that on amendments and procedural motions (p. 86).

Secondly, although SIMEX generates only one prediction, we do not regard all the predicted outcomes equally likely. That is, the lower the interest in the bill, the less likely we will be correct in our prediction of the individual's vote. Accordingly, we have predicted that the model will be more accurate for those legislators for whom the model generates high predispositions than for those with low predispositions.

> Model hypothesis 2. Those legislators whose votes are determined at the end of the predisposition phase will be predicted more accurately than those predicted at the end of the interaction phase (p. 103).

Furthermore, by explicit recognition of the relationship between theory and model, we can anticipate inaccuracies built into the model. Specifically, in the interest of theory relevant validation, if our inaccuracies result largely from discrepancies in the model relative to the theory, then we may claim correspondence of theory and behavior, even when the model does not predict behavior in all cases. Smoker maintains,

> Validity and correspondence are no longer conceptually linked in a simple additive way such that the greater the number of correspondences the greater the validity. Nor does high correspondence necessarily imply high validity. Validity is the degree to which the predicted and actual correspondence patterns coincide.[7]

---

[7] Ibid., p. 8.

Because the model does not simulate all aspects of the intra-legislative bargaining process, we anticipate that winning coalitions will be generated which are larger than observed.

> Model hypothesis 3. SIMEX will generate larger than observed winning coalitions (p. 105).

Finally, since the model is related through the theory to behavior, we can extend this criterion to aspects of the model which may vary in their effect when the model is used in different settings. We expect some hypotheses included in the model to vary in validity when the simulation is used to predict behavior in legislative chambers of different sizes.

> Model hypothesis 4. The constituency hypothesis will have less positive effect on predictive accuracy in the Senate than in the House of Representatives (p. 105).

> Model hypothesis 5. The Senate will exhibit less predictable patterns of interaction than the House of Representatives (p. 107).

These anticipated non-correspondences, of course, are verifiable only in comparative research.

We shall compare the Cherryholmes-Shapiro model output to observed behavior overall and with respect to predicted patterns of correspondence and non-correspondence. We shall also compare the performance of the two models to assess the value of the two models relative to one another.

System Performance

We will examine two aspects of system-level performance. First, we shall assess the accuracy of the outcome of the motion, the predicted collective decision of the legislature. Secondly, we shall examine the structure of the behavior system generated by the simulation models, the generation of interests, interactions, and coalitions.

Collective Decisions

Exchange theory is a theory of collective as well as individual decision-making. We should, then, be able to predict the outcome of collective decisions with our simulation model.

Tables 4 and 5 show the actual and simulated yea-nay splits for each model with variations in the coding of the bills. Tables 6 and 7 show the result in terms of passage and defeat of actual and simulated motions. SIMEX with full coding predicts the outcomes of 21 of 23 motions in our sample correctly (91.3 per cent). Table 7 shows that the Cherryholmes-Shapiro model predicts the outcomes of 20 of 23 motions correctly with full coding (86.7 per cent).

Relative to the fully coded model instance, the without-constituency SIMEX model predicts collective decision outcomes more accurately, 22 of 23 (95.6 per cent) compared to 21 of 23 (91.3 per cent). We anticipated this with model hypothesis 4: because constituent districts

TABLE 4.--Actual and Simulated Yea-Nay Split on Twenty-Three Federal Role Motions: SIMEX.

No.	Actual	Fully coded	Without constituency	Without region or constituency
1. S6	41-57	57-41	38-60	38-60
2. S6	44-47	34-57	21-69	21-69
3. S6[a]	52-41	62-31	75-18	75-18
4. S1	41-47	8-78	19-69	18-69
5. S1[a]	50-34	79- 5	65-19	70-14
6. S1321	44-48	16-76	21-71	21-71
7. S1321[a]	47-44	73-18	68-22	73-18
8. S1831[a]	41-26	63- 3	52-14	55-11
9. S649[a]	69-11	78- 1	65-14	65-14
10. HR6143[a]	60-19	63-15	61-17	61-17
11. S2265[a]	89- 7	80-15	78-17	78-17
12. HR6143[a]	54-27	67-13	65-15	65-15
13. HR6196	12-80	8-78	19-67	20-65
14. HR6196	30-63	7-86	28-64	35-58
15. HR6196[a]	53-35	82- 4	73-13	70-16
16. HR7152	67-17	71-13	63-19	68-16
17. HR7152	51-48	17-72	27-63	19-70
18. HR7152	71-29	99- 0	99- 0	99- 0
19. HR7152	40-59	27-71	44-52	38-60
20. HR7152	25-74	27-71	43-53	38-60
21. HR7152[a]	73-27	80-19	74-25	78-21
22. HR11865	60-28	78- 8	68-18	68-18
23. S2782[a]	43-13	57- 0	57- 0	57- 0

[a]Final vote on legislation.

TABLE 5.--Actual and Simulated Yea-Nay Split on Twenty-Three Federal Role Motions: Cherryholmes-Shapiro Model.

No.	Actual	Fully coded	Without constituency	Without region or constituency
1. S6	41-57	53-44	47-51	47-51
2. S6	44-47	31-60	32-57	32-57
3. S6[a]	52-41	64-28	62-31	62-31
4. S1	41-47	13-75	28-59	28-59
5. S1[a]	50-34	69-15	50-33	57-26
6. S1321	44-48	17-74	33-59	34-57
7. S1321[a]	47-44	66-25	51-40	60-31
8. S1831	41-26	61- 5	38-27	47-19
9. S649	69-11	55-23	58-21	55-24
10. HR6143[a]	60-19	57-20	53-25	54-24
11. S2265[a]	89- 7	75-20	65-30	68-25
12. HR6143[a]	54-27	63-17	58-22	59-20
13. HR6196	12-80	17-68	27-68	31-56
14. HR6196	30-63	8-84	22-71	37-54
15. HR6196[a]	53-35	65-21	68-18	58-28
16. HR7152	67-17	64-20	54-29	58-25
17. HR7152	51-48	22-68	33-56	27-61
18. HR7152	71-29	99- 0	94- 5	97- 2
19. HR7152	40-59	25-73	42-54	41-55
20. HR7152	25-74	74-24	40-58	36-62
21. HR7152[a]	73-27	96- 3	67-30	67-31
22. HR11865[a]	60-28	57-26	61-25	61-24
23. S2782[a]	43-13	57- 0	57- 0	57- 0

[a]Final vote on legislation.

TABLE 6.--Actual and Simulated Outcome on Twenty-Three Federal Role Motions: SIMEX.

No.	Actual	Fully coded	Without constituency	Without region or constituency
1. S6	fail	pass	fail	fail
2. S6	fail	fail	fail	fail
3. S6[a]	pass	pass	pass	pass
4. S1	fail	fail	fail	fail
5. S1[a]	pass	pass	pass	pass
6. S1321	fail	fail	fail	fail
7. S1321[a]	pass	pass	pass	pass
8. S1831[a]	pass	pass	pass	pass
9. S649[a]	pass	pass	pass	pass
10. HR6143[a]	pass	pass	pass	pass
11. S2265[a]	pass	pass	pass	pass
12. HR6143[a]	pass	pass	pass	pass
13. HR6196	fail	fail	fail	fail
14. HR6196	fail	fail	fail	fail
15. HR6196[a]	pass	pass	pass	pass
16. HR7152	pass	pass	pass	pass
17. HR7152	pass	fail	fail	fail
18. HR7152	pass	pass	pass	pass
19. HR7152	fail	fail	fail	fail
20. HR7152	fail	fail	fail	fail
21. HR7152[a]	pass	pass	pass	pass
22. HR11865[a]	pass	pass	pass	pass
23. S2782[a]	pass	pass	pass	pass
Per cent correct		91.3%	95.6%	95.6%

[a]Final vote on legislation.

TABLE 7.--Actual and Simulated Outcome on Twenty-Three Federal Role Motions: Cherryholmes-Shapiro Model.

No.	Actual	Fully coded	Without constituency	Without region or constituency
1. S6	fail	pass	fail	fail
2. S6	fail	fail	fail	fail
3. S6[a]	pass	pass	pass	pass
4. S1	fail	fail	fail	fail
5. S1[a]	pass	pass	pass	pass
6. S1321	fail	fail	fail	fail
7. S1321[a]	pass	pass	pass	pass
8. S1831[a]	pass	pass	pass	pass
9. S649[a]	pass	pass	pass	pass
10. HR6143[a]	pass	pass	pass	pass
11. S2265[a]	pass	pass	pass	pass
12. HR6143[a]	pass	pass	pass	pass
13. HR6196	fail	fail	fail	fail
14. HR6196	fail	fail	fail	fail
15. HR6196[a]	pass	pass	pass	pass
16. HR7152	pass	pass	pass	pass
17. HR7152	pass	fail	fail	fail
18. HR7152	pass	pass	pass	pass
19. HR7152	fail	fail	fail	fail
20. HR7152	fail	pass	fail	fail
21. HR7152[a]	pass	pass	pass	pass
22. HR11865[a]	pass	pass	pass	pass
23. S2782[a]	pass	pass	pass	pass
Per cent correct		86.9%	95.6%	95.6%

[a]Final vote on legislation.

are heterogeneous, the Senate responds little to constituency pressures operationalized by demographic group concentration. Without constituency interests coded, the Cherryholmes-Shapiro model also predicts 22 of 23 motions correctly (95.6 per cent). The without region or constituency model, which we shall call the basic model, also predicts 22 of 23 (95.6 per cent) outcomes correctly for both SIMEX and the Cherryholmes-Shapiro model, neither validating nor invalidating the hypothesis of regional interests at this point of correspondence.

All errors in prediction of passage and defeat occur on amendments, corroborating our prediction that the models will be more accurate with respect to passage votes than amendments and procedural motions (model hypothesis 1).

Structure: Protocoalitions

In the referent process of our legislative decision-making model, protocoalitions form, consisting of those highly interested in the outcome of a roll-call at a point in time preceding the vote. In our simulation, these protocoalitions consist of those whose votes are determined at the end of the predisposition phase.

Both SIMEX and the Cherryholmes-Shapiro model generate protocoalitions of "determined" senators which are fewer in number than the final number voting. Fully

coded, SIMEX averages 55 determined, ranging from 31 to 74 at the end of the predisposition phase. The Cherryholmes-Shapiro model determines an average of 52, ranging from 34 to 82 at the end of the first phase. Other model instances for both simulations generate slightly smaller protocoalitions: SIMEX 46 and 49 on without-constituency and basic models, respectively; the Cherryholmes-Shapiro model 49 and 45 on without-constituency and basic models, respectively.

Structure: Interactions

Cherryholmes and Shapiro estimated that representatives would talk to twenty-five to thirty of their colleagues before each roll-call.[8] The Senate is a smaller chamber than the House of Representatives and more roll-calls are taken. These conditions restrict the opportunity for inter-personal communication among senators. A reasonable approximation of the number of senators who interact, then, would be somewhat less than the estimate for representatives.

On the average, SIMEX generates seventeen interactions between an undecided senator and other senators. The Cherryholmes-Shapiro model generates an average of fourteen interactions between undecided senators and

---

[8]Cherryholmes and Shapiro, Representatives and Roll-Calls, p. 75.

other legislative actors. Both models, then, predict a reasonable number of interactions for a legislative body the size of the Senate.

Structure: Coalition Size

Tables 8 and 9 show the actual and predicted difference in size of coalitions supporting passage and defeat of each motion for SIMEX and the Cherryholmes-Shapiro model. Minimum coalitions, of course, would average a difference of one member. Because of uncertainty, Riker concludes that coalitions will be greater than minimum.[9] There are reasons other than payoffs for joining coalitions: in the absence of profitable sidepayments, any difference in the values of passage and defeat would lead a legislator to join a coalition.

The average of actual differences between winning and losing coalitions in our sample of roll-calls is 29. We have predicted that SIMEX will generate larger than observed coalitions (model hypothesis 3). On the fully coded model, the average difference is 61, more than twice the actual average difference. The without-constituency SIMEX model generates winning coalitions closer to observed coalitions in average size, differing by 47. The basic

[9]Riker, The Theory of Political Coalitions.

TABLE 8.--Coalition Size. Difference Between Number Voting with Winning Coalition and Number Voting with Losing Coalition: SIMEX.

No.	Actual	Fully coded	Without constituency	Without region or constituency
1. S6	16	16	22	22
2. S6	3	23	48	48
3. S6[a]	11	31	57	57
4. S1	6	70	51	51
5. S1[a]	16	74	46	56
6. S1321	4	60	50	50
7. S1321[a]	3	55	46	55
8. S1831[a]	15	60	38	44
9. S649[a]	58	77	51	41
10. HR6143[a]	41	48	44	44
11. S2265[a]	82	65	61	61
12. HR6143[a]	27	54	50	50
13. HR6196	68	70	48	45
14. HR6196	33	79	36	23
15. HR6196[a]	18	78	60	54
16. HR7152	50	58	44	52
17. HR7152	3	55	36	51
18. HR7152	42	99	99	99
19. HR7152	19	44	8	22
20. HR7152	49	44	10	22
21. HR7152[a]	46	61	49	57
22. HR11865[a]	32	70	50	50
23. S2782[a]	30	57	57	57

[a]Final vote on legislation.

TABLE 9.--Coalition Size. Difference Between Number Voting with Winning Coalition and Number Voting with Losing Coalition: Cherryholmes-Shapiro Model.

No.	Actual	Fully coded	Without constituency	Without region or constituency
1. S6	16	9	4	4
2. S6	3	29	25	25
3. S6[a]	11	36	31	31
4. S1	6	62	31	31
5. S1[a]	16	54	17	31
6. S1321	4	57	26	23
7. S1321[a]	3	41	11	29
8. S1831[a]	15	56	11	28
9. S649[a]	58	32	37	31
10. HR6143[a]	41	37	28	30
11. S2265[a]	82	55	35	43
12. HR6143[a]	27	46	36	39
13. HR6196	68	51	35	25
14. HR6196	33	76	49	17
15. HR6196[a]	18	44	50	30
16. HR7152	50	44	25	33
17. HR7152	3	46	23	34
18. HR7152	42	99	89	95
19. HR7152	19	48	12	14
20. HR7152	49	50	18	26
21. HR7152[a]	46	93	37	36
22. HR11865[a]	32	31	36	37
23. S2782[a]	30	57	57	57

[a]Final vote on legislation.

SIMEX model generates slightly larger winning coalitions, differing from losing coalitions by 48 members.[10]

We also anticipated that the Cherryholmes-Shapiro model, because its interactions phase is stochastic, will generate smaller coalitions than SIMEX (model hypothesis 3.1). Table 9 shows that the fully coded Cherryholmes-Shapiro model predicts coalitions which differ in average size by 52. While this is larger than observed differences, it is smaller than SIMEX predictions. Like SIMEX, the Cherryholmes-Shapiro model generates coalitions closer in average size to observed coalitions in the without-constituency model; the simulated average difference is 32 compared to the actual average difference of 29. The basic model instance, like SIMEX, on the average generates slightly larger coalitions than the without-constituency model. Overdetermination of the winning coalition in the Cherryholmes-Shapiro model is less consistent than in SIMEX. While on the average this model generates smaller winning coalitions, it would be difficult to alter the interaction phase to conform more closely to exchange theory, since the model as it is now formulated underestimates winning coalitions more frequently than SIMEX.

---

[10]Only accurately predicted outcomes are considered in the comparison of coalition size.

Individual Performance

Individual Predictions

The prediction of individual votes is a much more rigorous test of the validity of the model than the prediction of collective outcomes. The fully coded SIMEX model predicts an average of 66.2 per cent of participants' votes on roll-calls in our sample correctly (Table 10). Subdividing the motions, we find that mean predictive accuracy is 68.8 per cent for passage of legislation, 64.0 per cent for amendments and procedural motions. This corroborates model hypothesis 1, the anticipation that the simulation model will predict passage roll-calls more accurately than roll-calls on other types of motions.

Comparing the results of twenty-two motions coded with constituency interests, we find that prediction improves in the without-constituency model from 66.2 per cent to 67.4 per cent. This pattern accords with model hypothesis 4, which predicts that the coding of constituency interest will have less positive effect on model performance with Senate data than with House of Representatives data.

Although the average difference is small, differences are not uniformly distributed across motions coded with constituency interests. The prediction of votes on two bills which are solely urban in nature, S6, Mass Transportation, and S2265, Library Services, were aided by the coding of constituency. Water Pollution Control,

TABLE 10.--Proportion Correct for Individuals: SIMEX.

No.	Fully coded	Without constituency	Without region or constituency
1. S6	.571	.684	
2. S6	.582	.689	
3. S6[a]	.720	.688	
4. S1	.640	.655	
5. S1[a]	.631	.702	.667
6. S1321	.630	.685	
7. S1321[a]	.648	.700	.670
8. S1831[a]	.591	.636	.652
9. S649[a]	.873	.861	
10. HR6143[a]	.667	.692	
11. S2265[a]	.832	.811	
12. HR6143[a]	.600	.625	
13. HR6196	.826	.791	.800
14. HR6196	.688	.620	.667
15. HR6196[a]	.616	.651	.663
16. HR7152	.643	.598	.607
17. HR7152	.584	.622	.584
18. HR7152	.717	.717	.717
19. HR7152	.551	.573	.520
20. HR7152	.541	.490	.449
21. HR7152[a]	.606	.626	.586
22. HR11865[a]	.698	.698	
23. S2782[a]	.772		.772
Average correct	.662	.674	.643

[a]Final vote on legislation.

a Democratic bill, received high bipartisan support: coding of broad constituency support enhanced predictive accuracy of the vote on authorization of appropriations. Amendments to the Farm Bill, HR6196, are also aided by constituency coding. Since this bill had been carefully balanced to include several interests, rejection of amendments which would have changed its provisions was important. Passage of the Farm Bill, however, was very nearly a party vote.

Several bills--Youth Employment, Manpower Training, and the National Service Corps--were predicted better without constituency coded. These bills were intended to help disadvantaged, unemployed and delinquent individuals. It may be that the constituency groups benefitted by these bills are poorly mobilized, have little effect on the outcome of elections, and, therefore, elicit little response from their representatives.

Fully coded, the Cherryholmes-Shapiro model predicts an average of 69.0 per cent correct on the individual level (Table 11). Passage votes are predicted with greater accuracy than amendments and procedural motions, 71.2 per cent compared with 66.2 per cent. This corroborates model hypothesis 1.

Although coding of constituency interests aids predictive accuracy of the Cherryholmes-Shapiro model on Senate passage votes slightly, the improvement falls short of that obtained with this model on data from the House of

TABLE 11.--Proportion Correct for Individuals: Cherryholmes-Shapiro Model.

No.	Fully coded	Without constituency	Without region or constituency
1. S6	.653	.735	
2. S6	.769	.670	
3. S6[a]	.753	.720	
4. S1	.636	.670	
5. S1[a]	.702	.690	.667
6. S1321	.707	.707	
7. S1321[a]	.747	.780	.725
8. S1831[a]	.652	.727	.591
9. S649[a]	.759	.797	
10. HR6143[a]	.654	.615	
11. S2265[a]	.800	.695	
12. HR6143[a]	.650	.563	
13. HR6196	.802	.742	.667
14. HR6196	.667	.667	.570
15. HR6196[a]	.698	.686	.756
16. HR7152	.583	.571	.524
17. HR7152	.589	.644	.556
18. HR7152	.717	.747	.697
19. HR7152	.714	.786	.673
20. HR7152	.449	.735	.694
21. HR7152[a]	.707	.606	.515
22. HR11865[a]	.686	.733	
23. S2782[a]	.772		.772
Average correct	.690	.696	.646

[a]Final vote on legislation.

Representatives. On eleven passage votes coded with constituency interest, predictive accuracy declines without constituency coding to 69.2 per cent from 71.0 per cent with constituency coding. This decrease is smaller than the decrease of 7 per cent, from 85 per cent to 78 per cent, reported by Cherryholmes and Shapiro.[11] On all twenty-two motions coded with constituency, performance of the Cherryholmes-Shapiro model improved without constituency to 69.6 per cent from 68.6 per cent.

On the individual level the hypothesis of regional interests has marginal validity for SIMEX. Comparing thirteen motions with regional interest with the basic SIMEX model we find that predictive accuracy declines from 65.3 per cent to 64.3 per cent. This pattern of regional effect varies across motions. In particular, Southern coding does not aid predictive ability on any votes concerning the Administration Farm Bill. Southerners generally did oppose amendments and support passage; however, constituency and party interests coincide for Southerners on these motions. Apparently, the addition of region masks variation which is already explained by constituency and party.

Regional coding for the Cherryholmes-Shapiro model improves performance over the basic model. Thirteen motions coded with region are predicted with an accuracy

---

[11]Cherryholmes and Shapiro, Representatives and Roll-Calls, p. 112.

of 70.4 per cent; without region, predictive accuracy on these motions declines to 64.6 per cent.

SIMEX and the Cherryholmes-Shapiro model are similar in their performance. In every case, the Cherryholmes-Shapiro model predicts individual performance slightly better than SIMEX. Since the Cherryholmes-Shapiro model does not use median income as a constituency characteristic, we compared the difference between with- and without- constituency model instances for both models to find out if this variable accounts for the difference in constituency effect between the two models. On nine motions coded with median income for SIMEX but not for the Cherryholmes-Shapiro model, we find that without-constituency improves performance 1.9 per cent for SIMEX, and 1.1 per cent for the Cherryholmes-Shapiro model. While this difference is slight and cannot account for the difference between the two models, the value of median income as an indicator of constituency interest should remain suspect before further testing. Since Southern states are characterized as low on median income, this variable may not predict well on the national level, yet still be a salient characteristic for use in prediction of roll-calls in subnational legislatures.

Prediction of Protocoalitions

Model hypothesis 2 states that legislators highly predisposed to vote a given way on a roll-call will be

predicted more accurately than those who enter the interaction phase. Table 12 shows the assessment of SIMEX accuracy for highly interested senators alone. The fully coded model predicts an average of 70.9 per cent of these participants' votes correctly; among the total number predicted, only 66.2 per cent were correct. On the twenty-two roll-calls coded with constituency interest, predictive accuracy for highly predisposed participants rises from 70.5 per cent to 71.8 per cent correct when constituency coding is eliminated. This corroborates model hypothesis 4. Furthermore, removal of regional coding decreases predictive accuracy for highly interested legislators. On thirteen motions coded with regional interest, SIMEX predicts only 63.6 per cent correctly when region is eliminated, whereas it predicts 73.6 per cent correctly with region coded. Only the basic SIMEX model, without region or constituency coding, predicts better for the total number voting than for the highly predisposed.

Although output from the Cherryholmes-Shapiro model does not allow us to test this model hypothesis, the predisposition phases of the two models are nearly identical. The Cherryholmes-Shapiro model is, in general, more accurate on the individual level than SIMEX; it is likely, then, that highly predisposed legislators are predicted with even higher accuracy in the Cherryholmes-Shapiro model.

TABLE 12.--Proportion Correct for Highly Interested Senators: SIMEX.

No.	Fully coded	Without constituency	Without region or constituency
1. S6	.672	.571	
2. S6	.667	.694	
3. S6[a]	.778	.781	
4. S1	.685	.690	
5. S1[a]	.672	.804	.724
6. S1321	.706	.746	
7. S1321[a]	.776	.849	.767
8. S1831[a]	.609	.750	.644
9. S649[a]	.946	.868	
10. HR6143[a]	.650	.643	
11. S2265[a]	.797	.770	
12. HR6143[a]	.607	.588	
13. HR6196	.891	.786	.780
14. HR6196	.824	.917	.833
15. HR6196[a]	.741	.737	.741
16. HR7152	.565	.532	.491
17. HR7152	.576	.667	.583
18. HR7152	.683	.783	.667
19. HR7152	.613	.727	.333
20. HR7152	.727	.636	.357
21. HR7152[a]	.581	.561	.500
22. HR11865[a]	.736	.714	
23. S2782[a]	.814		.850
Average correct	.709	.718	.636

[a]Final vote on legislation.

Interaction

We have predicted that in smaller legislative chambers, patterns of interaction will be more idiosyncratic since there is a greater likelihood that legislators will know more about one another's interests (model hypothesis 5). Furthermore, familiarity reduces bargaining costs between all members of the smaller legislative house. We can eliminate the interaction phase by predicting the votes of all legislators at the end of the predisposition phase; in this case, the total number voting in the simulation usually does not reach the number actually voting.

On the fully coded SIMEX model, bypassing the interaction phase actually increases predictive accuracy of those voting from 66.2 per cent to 67.3 per cent. Examination of alternative formulations of SIMEX shows that interaction does aid prediction for the without-constituency and basic model instances (Table 13). Since these versions of SIMEX generate smaller protocoalitions, leaving more votes to be determined after interaction, we may claim some validity for the hypothesized interaction patterns. Predictive accuracy increases from 65.9 per cent to 67.8 per cent for the without-constituency model when interactions are permitted, from 65.8 per cent to 67.1 per cent for the basic model. The slightly greater difference between predictions with and without interaction with region coded probably reflects the greater accuracy of

TABLE 13.--Proportion Correct with Interaction and Without Interaction: SIMEX.

No.	Fully coded		Without constituency		Without region or constituency	
	Interaction					
	with	without	with	without	with	without
1. S6	.571	.640	.684	.670		
2. S6	.582	.612	.689	.662		
3. S6[a]	.710	.726	.688	.728		
4. S1	.640	.620	.655	.667		
5. S1[a]	.631	.685	.702	.681	.667	.697
6. S1321	.630	.680	.685	.706		
7. S1321[a]	.648	.714	.700	.733	.670	.746
8. S1831	.591	.672	.636	.604	.652	.633
9. S649	.873	.878	.861	.841		
10. HR6143[a]	.667	.652	.692	.625		
11. S2265[a]	.832	.782	.811	.712		
12. HR6143[a]	.600	.619	.625	.576		
13. HR6196	.826	.812	.791	.776	.800	.758
14. HR6196	.688	.663	.620	.644	.667	.663
15. HR6196[a]	.616	.700	.651	.710	.663	.708
16. HR7152	.643	.592	.598	.484	.607	.492
17. HR7152	.584	.597	.622	.571	.584	.563
18. HR7152	.717	.681	.717	.642	.717	.661
19. HR7152	.551	.571	.573	.590	.520	.531
20. HR7152	.541	.489	.490	.482	.449	.454
21. HR7152[a]	.606	.583	.626	.542	.586	.530
22. HR11865[a]	.698	.696	.698	.712		
23. S2782[a]	.772	.804			.772	.804
Average correct	.662	.673	.678	.659	.671	.658

[a]Final vote on legislation.

this model in predicting the votes of the highly interested senators.

Table 14 presents the results of with- and without-interaction versions of the Cherryholmes-Shapiro model. The fully coded model with interaction predicts 69.0 per cent correctly, whereas when it bypasses the interaction phase it predicts only 65.1 per cent correctly. Approximately the same difference obtains for the without-constituency and basic model instances. Even though the interaction phase does exhibit some positive effect on predictive accuracy, the improvement falls short of that observed in experiments with data from the House of Representatives. Cherryholmes and Shapiro found that communications improved predictive accuracy from 78 per cent to 84 per cent, a difference of 6 per cent compared to only 3.9 per cent for the same model on Senate data.[12]

Party

The effect of political party affiliation on legislative voting has repeatedly been a focus for students of legislative behavior. There is no doubt that party exerts pressure on its members to conform. However, the proper simulation of this influence is of interest to us because it may help us answer the question of how and under what

---

[12] Ibid., p. 117.

TABLE 14.--Proportion Correct with Interaction and Without Interaction: Cherryholmes-Shapiro Model.

No.	Fully coded		Without constituency		Without region or constituency	
	Interaction					
	with	without	with	without	with	without
1. S6	.653	.541	.735	.592		
2. S6	.769	.659	.670	.670		
3. S6[a]	.753	.699	.720	.710		
4. S1	.636	.648	.670	.705		
5. S1[a]	.702	.726	.690	.738	.667	.702
6. S1321	.707	.728	.707	.707		
7. S1321[a]	.747	.769	.780	.769	.725	.736
8. S1831[a]	.652	.697	.727	.742	.591	.682
9. S649[a]	.750	.671	.797	.671		
10. HR6143[a]	.654	.654	.615	.615		
11. S2265[a]	.800	.642	.695	.579		
12. HR6143[a]	.650	.575	.563	.537		
13. HR6196	.802	.709	.742	.652	.667	.533
14. HR6196	.667	.602	.677	.516	.570	.495
15. HR6196[a]	.698	.616	.686	.651	.756	.605
16. HR7152	.583	.560	.571	.619	.524	.488
17. HR7152	.589	.600	.644	.678	.556	.578
18. HR7152	.717	.677	.747	.657	.697	.626
19. HR7152	.714	.694	.786	.684	.673	.663
20. HR7152	.449	.500	.735	.633	.694	.622
21. HR7152[a]	.707	.606	.606	.657	.515	.556
22. HR11865[a]	.686	.674	.733	.674		
23. S2782[a]	.772	.737			.772	.737
Average correct	.690	.651	.699	.661	.666	.630

[a]Final vote on legislation.

conditions party exerts its influence. Party alone predicts 63.5 per cent of the votes of senators on motions in our sample. This is lower than the "just party" prediction in the House of Representatives, 78 per cent.[13] Clausen and Cheney also observed that on all roll-calls, senators respond less to party than do representatives.[14] Table 15 shows SIMEX results with party (fully coded), without party, and the party-only prediction. Comparing party-only and with party-model instances, we find that party-only predicts an average of 63.5 per cent correct whereas the fully-coded model instance predicts 67.8 per cent correct.[15] Subdividing the sample, we find that the difference in the party-only prediction and the fully coded model prediction is greater for passage votes than for amendments and procedural motions. Cherryholmes and Shapiro found that recommittal motions exhibited relatively more inter-party conflict than passage votes in the House of Representatives.[16] Insofar as recommittal motions are one type of bill included in our selection of amendments and procedural

---

[13] Ibid., pp. 106-110.

[14] Clausen and Cheney, "A Comparative Analysis of Senate-House Voting on Economic and Welfare Policy 1953-1964."

[15] Only motions coded with party are used in the comparison of alternative party formulations.

[16] Cherryholmes and Shapiro, Representatives and Roll-Calls, p. 110.

TABLE 15.--Effect of Party on Predictive Accuracy: SIMEX.

No.	Fully coded (with party)	Fully coded (without party)	Party only
1. S6		.571	
2. S6	.582	.516	.648
3. S6[a]	.720	.667	.645
4. S1	.640	.517	.670
5. S1[a]	.631	.590	.631
6. S1321	.630	.598	.674
7. S1321[a]	.648	.626	.670
8. S1831[a]	.591	.636	.552
9. S649[a]	.873	.861	.738
10. HR6143[a]	.667	.654	.575
11. S2265[a]	.832	.726	.667
12. HR6143[a]	.600	.612	.506
13. HR6196	.826	.837	.674
14. HR6196		.688	
15. HR6196[a]	.616	.612	.727
16. HR7152	.643	.590	.500
17. HR7152	.584	.544	.551
18. HR7152	.717	.546	.707
19. HR7152		.551	
20. HR7152		.541	
21. HR7152[a]	.606	.626	.484
22. HR11865[a]	.698	.694	.667
23. S2782[a]	.772	.737	.772
Average correct	.678	.632	.625

[a]Final vote on legislation.

motions, we find that their result obtains in the Senate as well. As a corollary to model hypothesis 1, then, we might add that party contributes proportionately more to procedural motions and amendments than other variables.

When we compare the fully coded SIMEX model with the without-party model, this conclusion is reinforced. The without-party SIMEX model predicts 64.2 per cent of the votes correctly, whereas the fully coded model predicts 67.8 per cent of the votes correctly. Most of this difference, however, occurs on results for amendments and procedural motions. Prediction level for passage votes declines 1.7 per cent, from 68.8 per cent to 67.1 per cent; for amendments and procedural motions, however, prediction level declines 6.7 per cent, from 66.0 per cent to 59.3 per cent.

We have established that party contributes to the predictability of roll-call votes, especially procedural motions and amendments. A comparison of the Cherryholmes-Shapiro model with party and the party-only prediction affirms this (Table 16). The party only prediction is 63.5 per cent whereas the with-party prediction of the model is 70.4 per cent. More of this difference is attributable to passage votes which decline from 71.5 per cent correct in the fully coded Cherryholmes-Shapiro model to 63.7 per cent correct in the party-only prediction.

TABLE 16.--Effect of Party on Predictive Accuracy: Cherryholmes-Shapiro Model.

No.	Fully coded (with party)	Fully coded (without party)	Party only
1. S6		.779	
2. S6	.769	.712	.648
3. S6[a]	.753	.872	.645
4. S1	.636	.677	.670
5. S1[a]	.702	.640	.631
6. S1321	.707	.774	.674
7. S1321[a]	.747	.678	.670
8. S1831[a]	.652	.707	.552
9. S649[a]	.759	.737	.738
10. HR6143[a]	.654	.721	.575
11. S2265[a]	.800	.842	.677
12. HR6143[a]	.650	.673	.506
13. HR6196	.802	.736	.674
14. HR6196		.720	
15. HR6196[a]	.698	.580	.727
16. HR7152	.583	.655	.500
17. HR7152	.589	.674	.551
18. HR7152	.717	.714	.707
19. HR7152		.682	
20. HR7152		.595	
21. HR7152[a]	.707	.775	.484
22. HR11865[a]	.686	.848	.667
23. S2782[a]	.772	.744	.772
Average correct	.704	.719	.635

[a]Final vote on legislation.

Amendments decline from 68.6 per cent correct in the fully coded model to 63.2 per cent in the party-only prediction.

When we compare the fully coded prediction of the Cherryholmes-Shapiro model with the without-party prediction, however, we find a surprising difference. Without party the Cherryholmes-Shapiro model predicts at a higher level than it does with party. Prediction level rises from 70.4 per cent to 72.4 per cent when party is eliminated. Furthermore, this difference is equally apportioned between passage votes and votes on other types of motions. This suggests that the Cherryholmes-Shapiro model is over-determined with respect to party, as Cherryholmes and Shapiro suggested.[17] This becomes most evident in the Senate, in which members appear to be less bound by party considerations. Not only is party over-determined, but some variable in the Cherryholmes-Shapiro model contributes more to predictive accuracy in the absence of party influence than in its presence. The interaction phase of the Cherryholmes-Shapiro model is highly structured by party likeness. Furthermore, the memory score prediction matches 73 per cent of party only predictions on individuals. The memory score, moreover, is a likely candidate for an influence superior to party, since it is directly related to the measure of model output, votes cast on federal role measures in the past session.

---

[17] Ibid., pp. 109, 116.

Effect of "Memory"

Table 17 shows that "memory" alone predicts 69.5 per cent of the votes in our sample. Overall, this is higher than the prediction of the full model. Furthermore, when we compare the without-memory model to the fully coded model, we find that predictive accuracy falls off to 64.5 per cent without "memory" from 69.0 per cent with "memory." Compared to results of the House of Representatives, "memory" contributes more to predictive accuracy of the Cherryholmes-Shapiro simulation run on Senate data. Cherryholmes and Shapiro found that without memory, predictive accuracy fell only 2 per cent short of predictive accuracy with memory. In the Senate, the difference is 3.5 per cent. Since the fully coded model on Senate data predicts less well, generally, memory contributes even more to variation explained than the difference in percentage values indicates.

Examining subsets of the sample, we find that "memory" alone predicts amendments and procedural motions better than passage motions, 70.5 per cent compared to 68.6 per cent correct. Furthermore, without memory, predictive accuracy is reduced less for passage motions than for amendments and procedural motions.

These findings are not unanticipated. We have found that senators are more independent of constituency and party than representatives. Furthermore, their patterns

TABLE 17.--Effect of Party on Predictive Accuracy: Cherryholmes-Shapiro Model.

No.	Fully coded (with "memory")	Fully coded (without "memory")	"Memory" only
1. S6	.653	.520	.733
2. S6	.769	.571	.753
3. S6[a]	.753	.656	.732
4. S1	.636	.602	.785
5. S1[a]	.702	.679	.853
6. S1321	.707	.679	.802
7. S1321[a]	.747	.626	.775
8. S1831	.652	.561	.783
9. S649	.759	.759	.643
10. HR6143[a]	.654	.654	.681
11. S2265[a]	.800	.832	.553
12. HR6143[a]	.650	.587	.592
13. HR6196	.802	.767	.548
14. HR6196	.667	.677	.542
15. HR6196[a]	.698	.698	.558
16. HR7152	.583	.619	.733
17. HR7152	.589	.578	.756
18. HR7152	.717	.717	.701
19. HR7152	.714	.602	.744
20. HR7152	.449	.337	.655
21. HR7152[a]	.707	.737	.690
22. HR11865[a]	.686	.651	.722
23. S2782[a]	.772	.772	.654
Average correct	.690	.645	.695

[a]Final vote on legislation.

of interaction are more idiosyncratic than the corresponding processes in the House of Representatives. As we suspected, it is likely that the memory score reflects a number of influences that are not replicated by other processes in the Cherryholmes-Shapiro model. This summary of influences may include ideological preferences; however, since amendments and procedural motions are relatively more influenced by "memory," it seems unlikely that "memory" exclusively measures ideology. It is likely that Senate voting is more idiosyncratic than voting in the House of Representatives for several reasons. Hence, memory is essential to the Senate performance of the Cherryholmes-Shapiro model because it inculcates variables and effects of patterns of interaction not included in the model.

Without memory, the fully coded Cherryholmes-Shapiro model predicts individual votes less accurately than the fully coded SIMEX model. Since SIMEX includes the effect of the president's position in the predisposition phase which is not present in the Cherryholmes-Shapiro model, we shall examine the consequences of this addition for predictive accuracy of SIMEX.

Effect of President's Position

The results presented in Table 18 show that the executive's position does not contribute to predictive accuracy of the SIMEX model over all motions. Predictive

TABLE 18.--Effect of Executive Position on Predictive Accuracy: SIMEX.

No.	Fully coded (with exec. pos.)	Fully coded (without exec. pos.)
1. S6	.571	.531
2. S6	.582	.622
3. S6[a]	.720	.667
4. S1	.640	.636
5. S1[a]	.631	.595
6. S1321	.630	.652
7. S1321[a]	.648	.670
8. S1831[a]	.591	.606
9. S649[a]	.873	.861
10. HR6143[a]	.667	.654
11. S2265[a]	.832	.830
12. HR6143[a]	.600	.612
13. HR6196	.826	.779
14. HR6196	.688	.685
15. HR6196[a]	.616	.651
16. HR7152	.643	.639
17. HR7152	.584	.578
18. HR7152	.717	.717
19. HR7152	.551	.592
20. HR7152	.541	.745
21. HR7152[a]	.606	.667
22. HR11865[a]	.698	.640
23. S2782[a]	.772	.772
Average correct	.662	.670

[a]Final vote on legislation.

accuracy rises from 66.2 per cent to 67.0 per cent when the effect of the president's position is eliminated. When we examine subsets of the motions, however, we find that this variable contains negative information only for amendments and procedural motions. The results of the fully coded model are 63.4 per cent correct on amendments and procedural motions, but 65.2 per cent correct when the executive's position is eliminated. For passage votes, the level of prediction declined only marginally when presidential position is eliminated from the fully coded SIMEX model, from 68.8 per cent to 68.5 per cent.

Theoretically, this variable is utilized as an item of constituency information, operationalized by the president's plurality in the senator's state in conjunction with the president's position. Its marginal positive effect on passage motions but not on amendments and procedural motions may reflect the greater consideration given to future exchanges with constituents by legislators on those legislative outcomes most likely to be salient to future voters.

This variable aided predictive accuracy on twelve of the twenty-three bills. It did not help for passage votes on the National Service Corps, Manpower Training, College Aid, the Administration Farm Bill, or the Civil Rights Bill. It is likely that the president does not equally stress passage of all legislation he favors. We

might, then, attempt to find a better measure of the president's position than the one provided for us by the Congressional Quarterly Service.

Our decision rules state that the legislator and the executive run for office in the same elections; however, six year terms prohibit a senator's running in a presidential election year twice in succession. Thus, the electoral cycle of the senator relative to that of the president may attenuate the relationship between the senator's voting record and the president's plurality in his state (hypothesis L-1.4). Furthermore, the U.S. senator enjoys a position of great importance and prestige in the American political system. Consequently, news media publicize his activities more than any other American legislator. Because of this opportunity to popularize issues, a senator may preceive more electoral independence than other legislators. Barbara Hinckley shows that the incumbent senator does experience independence of other electoral forces in his reelection campaigns.[18]

Although the executive's position as we have engaged it is not satisfactory, we should test it on other legislative bodies before discarding the hypothesis altogether.

---

[18]Barbara Hinckley, "Incumbency and the Presidential Vote in Senate Elections," American Political Science Review, LXIV (September, 1970), pp. 836-842. Clausen and Cheney also hypothesize that senators are relatively more free of party than representatives because of their opportunity to build a reputation independent of their parties. Clausen and Cheney, "A Comparative Analysis of Senate-House Voting on Economic and Welfare Policy 1953-1964."

Conclusion

Both the Cherryholmes-Shapiro model and the revised simulation model, SIMEX, predict the outcomes of collective decisions quite well. However, their performance on Senate data reveals that they do not predict individual behavior as well as simulations tested on data from the House of Representatives. Nevertheless, since patterns of correspondence and non-correspondence in predictions of the models relative to behavior conform to our prognosis of these distortions, we may conclude that exchange theory provides a better explanation of legislative behavior than the models provide predictions.

In comparing predictions of the Cherryholmes-Shapiro model with SIMEX, we find great similarities. Without memory, the fully coded Cherryholmes-Shapiro model fails to predict as well as the fully coded SIMEX model, 64.5 per cent for the former compared with 66.2 per cent for the latter. Since the memory score predicts well, but provides little information we can determine apart from results of roll-calls themselves, we must conclude that SIMEX has greater explanatory power than the Cherryholmes-Shapiro model.

CHAPTER V

CONCLUSION

Summary

In this project we moved in two directions from the point Cherryholmes and Shapiro concluded their work on the U.S. House of Representatives. First, we expanded vertically, subsuming their model and the research findings upon which it is based under a hierarchical theory, one postulated as a deductive explanatory model. Based on this theory, the simulation designed by Cherryholmes and Shapiro was modified to accord more closely with this theory. Secondly, the simulation experiments were conducted on another legislative chamber, the U.S. Senate. Furthermore, in extending the analysis of legislative behavior in these two directions, we acknowledged both the limitations of the theory and the sources of variations in the simulation's predictive accuracy in various settings.

In this concluding section, the contributions of this exercise are summarized and directions in which research might continue are suggested. Much of the discrepancy between predictions of the simulation and observed behavior is anticipated. The reasons for these results lie in the nature of a theory based on individual rationality

and in the distortions built into the simulation model. We must, then, operate between the theory and the simulation model to enable us to claim better correspondence; if theoretically-based adjustments in the simulation model do not enable us to predict with greater accuracy, we should hold in abeyance our confidence in the theory and search for one which more closely accords with observed behavior.

Kaplan, as we have noted, says that correspondence is basic to the validation of theories, but we must also consider the norms of coherence and pragmatism in evaluating theories. In Chapter II, we demonstrated the coherence between predictions of the theory and relationships observed in a number of research settings. We also suggested at several points the aspects of exchange theory that correspond to ambition theory and theories of political coalitions. The making of sidepayments, central to coalition theories, is integral to the assumption that individuals make exchanges of resources as part of their strategies. Schlesinger's central axiom, that ambition is the primary motivation for politicians, is explicit in our definition of rationality.

Although the rationality assumption and the complexity of the situation as specified by the decision rules inject an element of uncertainty into the precision of our predictions, we demonstrated that exchange theory can be defined in such a way that testable hypotheses can be

derived from it. In Chapter II, we derived such hypotheses and in Chapter III we illustrated one method for testing these hypotheses, a simulation model. This demonstrates the pragmatic validity of the theory, our ability to use it in empirical research.

The model we designed based on exchange theory, SIMEX, has several advantages over the simulation model used by Cherryholmes and Shapiro. SIMEX requires fewer input variables than the Cherryholmes-Shapiro model. Internal processing in the interaction phase of SIMEX is simpler than that in the "communications" or interaction phase of the Cherryholmes-Shapiro model; more specifically, SIMEX requires estimation of fewer parameters than the Cherryholmes-Shapiro model. Furthermore, the SIMEX model uses no direct measures of the outcome, roll-call votes, to predict behavior; the Cherryholmes-Shapiro model includes "memory," a direct input of the individual's past behavior. Since "memory" is an issue-specific measure, we might add that operationalization of SIMEX is not dependent on the isolation of broad issue dimensions. Because it is easier to use for research, SIMEX scores more highly on the criterion of pragmatic validity than the Cherryholmes-Shapiro model.

We have noted that explanatory power is that associated with information determined prior to the measurement of the dependent variables, while descriptive power is that associated with information drawn from the data to

be explained. "Memory" is a measure of the dependent variable: while the Cherryholmes-Shapiro model with "memory" predicts votes better than the fully-coded SIMEX model, the "memory score" contributes to descriptive, but not explanatory power of the model. In fact, "memory" alone predicts individual behavior better than any instance of either simulation model. This finding clearly demonstrates the descriptive nature of this variable. Without "memory," predictive accuracy of the Cherryholmes-Shapiro model lags behind that of SIMEX; hence, we conclude that SIMEX is higher in explanatory power than the Cherryholmes-Shapiro model.

SIMEX predicts collective outcomes very well, and performs less well for individual votes. We find, however, that distortions in predicted outcome relative to actual behavior result from known distortions in the construction of the model. Many of our inaccuracies in prediction, then, contribute to our confidence in the explanation provided by the theory.

Recommendations

Strictly speaking, the model is not a sufficient test of the theory. We suggest two major types of modification: (1) Since our primary concern is theory-building, we should first work between the model and the theory to render comparison of simulation output and behavior a more adequate test of correspondence, (2) The operation of the

model depends upon our choice and measurement of variables and the estimation of parameters. We should, then, attempt to test the value of variables which are justifiable theoretically and to estimate parameters with more accuracy.

Interaction Phase

The most blatant discrepancy in the SIMEX model relative to exchange theory lies in the interaction phase: the rough approximation of bargaining and exchange generates larger than observed coalitions. Concomittantly, the interaction phase results in less accurate prediction of votes of individuals who are processed through it than the prediction of votes at the end of the predisposition phase. The subsidiary prediction that an undecided legislator will interact with seventeen other senators may be somewhat high. Fewer interactions would still be reasonable and might heighten the accuracy of this phase of the simulation. There are several ways in which the interaction phase of the model might be modified to fit the theory while maintaining the basic patterns we have hypothesized.

1. We could alter the interaction phase to allow legislators to encounter only those legislators who are highly interested in the outcome of the collective action. The simulation model could store this information at the end of the predisposition phase as a screening device for the interaction phase. This alteration is unlikely to affect the outcome greatly, since averaging predispositions

encountered prevents a series of marginally interested legislators from influencing the undecided legislator's vote decision.

2. A more profitable approach might be to distinguish between those undecided because of cross-pressures and those indifferent to the outcome in the model's prediction. This accounting could also be stored as an additional variable generated by the simulation. Since the indifferent operate under little risk, buying their votes would be easier for the interested protocoalition than bargaining with a legislator who is more uncertain about the consequences of his action. After bargaining with this group of legislators is completed, the model could check if either coalition is winning, has more than fifty per cent of the total number of possible votes. If one coalition is winning, then the model could predict the rest of the votes on the basis of the algebric sign of whatever small interest the rest of the legislators (the cross-pressured) have. If neither coalition is winning, the model could continue the interaction phase for the rest of the undecided legislators.

3. A third way of limiting coalition size is to revert to a stochastic process in the anticipation that fewer interactions would reduce the consensus-formation aspect of the deterministic process. One way of estimating probabilities of interaction is to adjust them inversely to

the size of protocoalitions determined in the first phase of the model. In this manner, the fewer the number determined in favor of a position in the first phase, or the greater the need for additions to their coalitions, the greater the probability of interaction between legislators for the purposes of exchanging resources.

4. Finally, we could adjust the "offer," or the value of an additional vote for a coalition inversely in relation to the size of the coalition already committed to a particular outcome. In this alternative formulation, the larger the protocoalition, the less likely that a legislator's vote will be "purchased" by a member of that coalition.

Predisposition Phase

The success of the interaction phase, no matter how much it conforms to the theory and the theory to reality, depends upon the precision with which we estimate parameters in the first phase of the model. Without taking information directly from the data, we can refine the estimation of some parameters.

First of all, we reason in Chapter II that the legislator probably pursues various goals serially over the multiplicity of motions decided in the collective context. In the simulation outcomes we find that party considerations are more salient on the less visible

amendments and procedural motions. Constituency considerations appear more salient when the legislator votes on passage of legislation. We might gain more accuracy by reducing the value of the party parameter on passage motions and raising it on amendments and procedural motions. Correspondingly, we might raise the value of the constituency parameters on passage motions and reduce them on amendments and procedural motions.

Further precision might be introduced by judicious choice of constituency variables. The legislator acts on his prospects of making exchange with future constituents. Past governmental action, particularly financial aid, is the current status quo for an electorate. Legislators who plan to seek votes in a district upon which governmental programs have already made an impact might, then, be more likely to vote for increases or expansion of programs than those legislators whose future constituents are less well-acquainted with such action. There is some evidence to this effect: Ripley finds that of the congressmen who were elected from districts in which the food stamp program had been, thirty-one of thirty-three supported it in 1964 (two did not vote).[1]

Ultimately, we must invest in parameter estimation procedures such as regression or factor analysis to more

---

[1]Randall B. Ripley, "Legislative Bargaining and the Food Stamp Act, 1964," in Congress and Urban Problems, by Frederic Cleaveland, et al. (Washington, D.C.: Brookings, 1969), pp. 279-310.

accurately assign values to parameters in the predisposition phase of the model. Parameter estimation takes information from the data to enhance predictive accuracy of model output. At this point additional predictive power is descriptive and not explanatory. Nevertheless, parameter estimation provides us much more meaningful information than a variable such as the "memory score" because it allows us to infer relative importance of independent variables. Only after parameter estimation and theoretical adjustments of the model can we begin to make educated guesses about what proportion of the remaining variance must be explained by unique and idiosyncratic variables such as personal ideology.

Comparative Use of the Model

We have arrived at a point similar to the conclusion of Cherryholmes and Shapiro's research on the House of Representatives. Further comparative research is necessary. Testing the simulation on roll-call votes spanning a number of congressional sessions should prove theoretically interesting and informative. The postwar period provides us with variations in presidential party, majority party in Congress, and combinations of presidential party and congressional majority. If these variations affect the performance of the model, it would inform us of ways in which we might further refine or elaborate our theory.

Since the theory of exchange in a two-party system is a comparative theory and data is readily available on state legislatures, broad testing of the model should be relatively easy.

Beyond Simulation

In our deductions from exchange theory, we have focused on the behavior of legislators as they decide to allocate their votes on each motion. Simulation is appropriate for carrying out such research on behavior of individuals in an organization: depending on his constituency, party and position in the legislature, the determinants of each of the legislator's votes may vary; the organization itself exhibits varying characteristics under changing conditions.

The application of exchange theory is not, however, confined to its use in simulation of roll-call votes in American legislatures. Two related areas of research to which we might apply it are legislative behavior other than roll-call voting and legislatures and collective decision-making in non-American settings. We might focus on selected aspects of legislative behavior other than the individual legislator's roll-call vote. We have suggested in passing that hypotheses are derivable from exchange theory explaining behavior of committees and party leaders. Preliminary evidence of the resources and their distribution

in these areas could be sought in recent work on party leadership change and legislative committees.[2]

Secondly, by altering the conditions, particularly electoral decision rules and the number of political parties, we can apply exchange theory to behavior in non-American elective legislatures. Cabinet stability and instability may reflect convergent and divergent tensions generated by episodic elections and the desire to participate in a coalition government.

---

[2]Robert L. Peabody, "Party Leadership Change in the House of Representatives," American Political Science Review, LXI (September, 1967), pp. 675-693; and "Senate Leadership Change: 1953-1970" (paper prepared for delivery at the 66th Annual Meeting of the American Political Science Association, 1970). Randall B. Ripley, Majority Party Leadership in Congress (Boston: Little Brown, 1969); and Party Leaders in the House of Representatives (Washington, D.C.: Brookings, 1967).

BIBLIOGRAPHY

BIBLIOGRAPHY

Abelson, Robert P. "Simulation of Social Behavior." The Handbook of Social Psychology. Edited by Gardner Lindzey and Elliot Aronson. 2nd ed. Vol. II. Reading, Mass.: Addison-Wesley, 1968.

Anderson, Lee F.; Watts, Meredith W., Jr.; and Wilcox, Allen R. Legislative Roll-Call Analysis. Evanston: Northwestern University, 1966.

Andrain, Charles F. "Senators' Attitudes Toward Civil Rights." Western Political Quarterly, 17 (1964).

Axelrod, Robert. "Derivation of a Coalition Theory Based on Conflict of Interest with an Application to Italy." Paper prepared for delivery at the 65th Annual Meeting of the American Political Science Association, 1969. (Mimeographed.)

Bauer, Raymond A.; Pool, Ithiel deSola; and Dexter, Lewis A. American Business and Public Policy. New York: Atherton, 1964.

Belknap, George M. "A Method for Analyzing Legislative Behavior." Midwest Journal of Political Science, 2 (1958).

Beyle, Herman C. Identification and Analysis of Attribute-Cluster-Blocs. Chicago: University of Chicago, 1931.

Black, Duncan. The Theory of Committees and Elections. Cambridge: University Press, 1958.

Black, Gordon S. "A Theory of Professionalization in Politics." American Political Science Review, LXIV (September, 1970).

Blau, Peter. Exchange and Power in Social Life. New York: John Wiley, 1964.

Boudon, Raymond. "Reflexions sur la logique des modeles simules." European Journal of Sociology, VI, 1 (1965).

Browning, Rufus. "Computer Programs as Theories of Political Processes." Journal of Politics, 24 (1962).

Buchanan, James M., and Tullock, Gordon. The Calculus of Consent. Ann Arbor: University of Michigan, 1962.

Campbell, Angus; Converse, Philip; Miller, Warren; and Stokes, Donald. The American Voter. Abridged edition. New York: John Wiley, 1964.

Cherryholmes, Cleo, and Shapiro, Michael. Representatives and Roll-Calls. New York: Bobbs-Merrill, 1969.

Cimbala, Stephen. "Foreign Policy as an Issue Area: a Roll-Call Analysis." American Political Science Review, LXIII (March, 1969).

Clausen, Aage R. "Measurement Identity in the Longitudinal Analysis of Legislative Voting." American Political Science Review, LXI (December, 1967).

Clausen, Aage R. "The Measurement of Legislative Group Behavior." Midwest Journal of Political Science, XI (May, 1967).

Clausen, Aage R., and Cheney, Richard B. "A Comparative Analysis of Senate-House Voting on Economic and Welfare Policy 1953-1964." American Political Science Review, LXIV (March, 1970).

Cleaveland, Frederic, et al. Congress and Urban Problems. Washington, D.C.: Brookings, 1969.

Cnudde, C. F., McCrone, D. J. "The Linkage Between Constituency Attitudes and Congressional Voting Behavior: A Causal Model." American Political Science Review, 60 (March, 1966).

Coleman, James S. "Analysis of Social Structures and Simulation of Social Process with Electronic Computers." Educational and Psychological Measurement, 21 (1961).

Coleman, James S. "Collective Decisions." Sociological Review, XXXIII (Winter, 1963).

Coleman, James S. "Foundations for a Theory of Collective Decisions." American Journal of Sociology, LXXI (May, 1966).

Coleman, James S. "Games as Vehicles for Social Theory." American Behavior Scientist, XII (July-August, 1969).

Coleman, James S. "The Possibility of a Social Welfare Function." American Economic Review, 56 (December, 1966).

Conn, Paul H.; Meltz, David B.; and Press, Charles. "Rationality, Effectiveness, and Political Calculations." Michigan State University, August, 1970. (Mimeographed.)

Converse, Philip E. "Information Flow and the Stability of Partisan Attitudes." Elections and the Political Order. Edited by Angus Campbell, Philip Converse, Warren Miller, and Donald Stokes. New York: John Wiley, 1966.

Cummings, Milton C. Congressmen and the Electorate. Washington, D.C.: Brookings, 1966.

Curry, R. L., and Wade, L. L. A Theory of Political Exchange: Economic Reasoning in Political Analysis. Englewood Cliffs, N. J.: Prentice-Hall, 1968.

Cyert, Richard M., and March, James G. A Behavioral Theory of the Firm. Englewood Cliffs, N. J.: Prentice-Hall, 1963.

Dempsey, Paul. "Liberalism-Conservatism and Party Loyalty in the U.S. Senate." Journal of Social Psychology, 56 (April, 1962).

Downs, Anthony. An Economic Theory of Democracy. New York: Harper and Row, 1957.

Dye, Thomas. "A Comparison of Constituency Influences in the Upper and Lower Chambers of a State Legislature." Western Political Quarterly, XIV (June, 1961).

Eulau, Heinz, and Hinckley, Katherine. "Legislative Institutions and Processes." Political Science Annual, 1966. Edited by James A. Robinson. Indianapolis: Bobbs-Merrill, 1966.

Fenno, Richard. "Congressional Committees: A Comparative View." Paper prepared for delivery at the 66th Annual Meeting of the American Political Science Association, 1970. (Mimeographed.)

Fenno, Richard F., Jr. The Power of the Purse: Appropriations Politics in Congress. Boston: Little, 1966.

Flinn, Thomas A. "Party Responsibility in the States: Some Causal Factors." American Political Science Review, LVIII (March 1964).

Flinn, Thomas A., and Wolman, Harold L. "Constituency and Roll-Call Voting: the Case of Southern Democratic Congressmen." Midwest Journal of Political Science, 10 (May, 1966).

Francis, Wayne L. "Influence and Interaction in a State Legislative Body." American Political Science Review, LVI (December, 1962).

Fridja, Nico H. "Problems of Computer Simulation." Behavioral Science, 12 (1967).

Froman, Lewis A., Jr. Congressmen and Their Constituencies. Chicago: Rand McNally, 1963.

Froman, Lewis A., Jr. "The Importance of Individuality in Voting in Congress." Journal of Politics, II (May, 1963).

Froman, Lewis A., Jr. "Inter-Party Constituency Differences and Congressional Voting Behavior." American Political Science Review. (March, 1963).

Froman, Lewis A. "Organization Theory and Explanation of Important Characteristics of Congress." American Political Science Review, LXII (June, 1968).

Froman, Lewis A., Jr., and Ripley, Randall B. "Conditions for Party Leadership: the Case of the House Democrats." American Political Science Review, LIX (March, 1965).

Gibson, Quentin. The Logic of Social Enquiry. London: Routledge and Kegan Paul, 1960.

Goldberg, Arthur S. "Social Determinism and Rationality as Bases of Party Identification." American Political Science Review, LXIII (March, 1969).

Goodwin, George. The Little Legislatures. Amherst: University of Massachusetts, 1970.

Gray, Charles H. "A Scale Analysis of the Voting Records of Senators Kennedy, Johnson and Goldwater, 1957-1960." American Political Science Review, LIX (September, 1965).

Grumm, John G. "A Factor Analysis of Legislative Behavior." Midwest Journal of Political Science, VII (November, 1963).

Hanna, Joseph F. "Explanation, Prediction, Description, and Information Theory." Synthese, 20 (October, 1969).

Hanna, Joseph F. "Information-Theoretic Techniques for Evaluating Simulation Models." East Lansing, Michigan: Michigan State University, Department of Philosophy, n.d.

Hanson, Norwood R. Patterns of Discovery. Cambridge: University Press, 1958.

Hermann, Charles F. "Validation Problems in Games and Simulations with Special Reference to Models of International Politics." Behavioral Science, 12 (1967).

Hinckley, Barbara. "Incombency and the Presidential Vote in Senate Elections: Defining Parameters in Subpresidential Voting." American Political Science Review, LXIV (September, 1970).

Homans, George C. "Social Behavior as Exchange." American Journal of Sociology, 63 (1959).

Homans, George C. "Bringing Men Back In." American Sociological Review, 29 (December, 1964).

Huitt, Ralph K. "The Congressional Committee: A Case Study." American Political Science Review, XLVIII (June, 1954).

Huitt, Ralph K. "Democratic Party Leadership in the Senate." American Political Science Review, LV (June, 1961).

Huitt, Ralph K., and Peabody, Robert L. Congress: Two Decades of Analysis. New York: Harper and Row, 1969.

Jewell, Malcolm E. "Party Voting in American State Legislatures." American Political Science Review, XLIX (September, 1955).

Kaplan, Abraham. The Conduct of Inquiry. San Francisco: Chandler, 1964.

Kesselman, Mark. "Presidential Leadership in Congress on Foreign Policy: A Replication of a Hypothesis." Midwest Journal of Political Science, IX (November, 1965.

Key, V. O. American State Politics: an Introduction. New York: Knopf, 1966.

Key, V. O. The Responsible Electorate. Cambridge: Belknap, 1966.

Key, V. O. Southern Politics. New York: Knopf, 1949.

Kingdon, John W. Candidates for Office, Beliefs and Strategies. New York: Random House, 1968.

LeBlanc, Hugh L. "Voting in State Senates: Party and Constituency Influences." Midwest Journal of Political Science, XIII (February, 1969).

Lehnen, Robert G. "Behavior on the Senate Floor: An Analysis of Debate in the U.S. Senate." Midwest Journal of Political Science, XI (November, 1967).

Lowi, Theodore J. "American Business, Public Policy, Case Studies, and Political Theory." World Politics, XVI (July, 1964).

MacCorquodale, Kenneth, and Meehl, Paul E. "On a Distinction Between Hypothetical Constructs and Intervening Variables." Psychological Review, 55 (March, 1948).

MacRae, Duncan, Jr. "A Method for Identifying Issues and Factions from Legislative Votes." American Political Science Review, LIX (December, 1965).

MacRae, Duncan, Jr. Dimensions of Congressional Voting. Berkeley: University of California, Publications in Society and Social Institutions, Vol. 3, 1968

MacRae, Duncan, Jr. Issues and Parties in Legislative Voting: Methods of Statistical Analysis. New York: Harper and Row, 1970.

MacRae, Duncan, Jr. "The Relation Between Roll-Call Votes and Constituencies in the Massachusetts House of Representatives." American Political Science Review, XLVI (December, 1952).

MacRae, Duncan, Jr. "Roll-Call Votes and Leadership." Public Opinion Quarterly, 20 (1956).

MacRae, Duncan, Jr., and Schwartz, Susan Barker. "Identifying Congressional Issues by Multidimensional Models." Midwest Journal of Political Science, XII (May, 1968).

Martin, Roscoe. The Cities and the Federal System. New York: Atherton, 1965.

Marwell, Gerald. "Party, Region and the Dimensions of Conflict in the House of Representatives, 1949-1954." American Political Science Review, LXI (June, 1967).

Masters, Nicholas A. "House Committee Assignments." American Political Science Review, LV (June, 1961).

Matthews, Donald R. U.S. Senators and Their World. New York: Random House, 1960.

Matthews, Donald, and Stimson, James. "Decision-Making by U.S. Representatives: A Preliminary Model." University of South Carolina, 1968. (Mimeographed.)

Mayhew, David R. Party Loyalty Among Congressmen. Cambridge: Harvard University, 1966.

Maxwell, Neal A. Regionalism in the United States Senate: the West. University of Utah, Institute of Government Research Monograph No. 5. Salt Lake City: University of Utah, 1961.

McCally, Sarah. "The Governor and his Legislative Party." American Political Science Review, LX (December, 1966).

Meller, Norman. "Legislative Behavior Research." Western Political Quarterly, 13 (1960).

Meller, Norman. "Legislative Behavior Research Revisited: a Review of Five Years' Publications." Western Political Quarterly, 18 (1965).

Meltz, David B. "Competition and Cohesion: a Model of Majority Party Legislative Bargaining." Unpublished Ph.D. dissertation, University of Rochester, 1970.

Mezey, Michael L. "Ambition Theory and the Office of Congressmen." Journal of Politics, 32 (August, 1970).

Miller, Warren E., and Stokes, Donald E. "Constituency Influence in Congress." American Political Science Review, 57 (1963).

Munger, Frank J., and Fenno, Richard F., Jr. National Politics and Federal Aid to Education. Syracuse: Syracuse University, 1962.

Olson, Mancur, Jr. The Logic of Collective Action: Public Goods and the Theory of Groups. New York: Schocken Books, 1968.

Patterson, Samuel C. "Comparative Legislative Behavior: a Review Essay." Midwest Journal of Political Science, XII (November, 1968).

Patterson, Samuel C. "Patterns of Interpersonal Relations in a State Legislative Group: the Wisconsin Assembly." Public Opinion Quarterly, XXIII (Spring, 1959).

Peabody, Robert L. "Party Leadership Change in the House of Representatives." American Political Science Review, LXI (September, 1967).

Peabody, Robert L. "Senate Leadership Change: 1953-1970." Paper prepared for delivery at the 66th Annual Meeting of the American Political Science Association, 1970.

Peabody, Robert L., and Polsby, Nelson W., eds. New Prespectives on the House of Representatives. Chicago: Rand McNally, 1963.

Polsby, Nelson W. Congress and the Presidency. Englewood Cliffs, N. J.: Prentice Hall, 1964.

Polsby, Nelson W. "The Institutionalization of the U.S. House of Representatives." American Political Science Review, LXII (March, 1968).

Polsby, Nelson W.; Gallaher, Mirian; and Rundquist, Barry Spencer. "The Growth of the Seniority System in the U.S. House of Representatives." American Political Science Review, LXIII (September, 1969).

Prewitt, Kenneth. "Political Ambitions, Volunteerism, and Electoral Accountability." American Political Science Review, LXIV (March, 1970).

Rice, Stuart. "The Behavior of Legislative Groups." Political Science Quarterly, 40 (1925).

Rice, Stuart. "The Identification of Blocs in Small Political Bodies." American Political Science Review, 21 (1927).

Riker, William H. "Bargaining in a Three-Person Game." American Political Science Review, LXI (September, 1967).

Riker, William H. The Theory of Political Coalitions. New Haven: Yale University Press, 1962.

Riker, William H., and Ordeshook, Peter C. "A Theory of the Calculus of Voting." American Political Science Review, LXII (March, 1968).

Ripley, Randall B. Majority Party Leadership in Congress. Boston: Little Brown, 1969.

Ripley, Randall B. Party Leaders in the House of Representatives. Washington D.C.: Brookings, 1967.

Ripley, Randall B. "Power in the Post-World War II Senate." Journal of Politics, 31 (May, 1969).

Ripley, Randall B. Power in the Senate. New York: St. Martins, 1969.

Rosenthal, Howard. "Voting and Coalition Models in Election Simulations." Simulation in the Study of Politics. Edited by William D. Coplin. Chicago: Markham, 1969.

Rustow, Dankwart A. The Politics of Compromise. New York: Greenwood, 1969.

Salisbury, Robert H. "An Exchange Theory of Interest Groups." Midwest Journal of Political Science, XIII (February, 1969).

Schlesinger, Joseph A. Ambition and Politics. Chicago: Rand McNally, 1966.

Schoenberger, Robert A. "Campaign Strategy and Party Loyalty: the Electoral Relevance of Candidate Decision-Making in the 1964 Congressional Elections." American Political Science Review, LXIII (June, 1969).

Shapiro, Michael. "The House and the Federal Role: a Computer Simulation of Roll-Call Voting." American Political Science Review, LXII (June, 1968).

Smoker, Paul. "Social Research for Social Anticipation." American Behavioral Scientist, XII (July-August, 1969).

Sorauf, Frank J. Party and Representation: Legislative Politics in Pennsylvania. New York: Atherton, 1963.

Soule, John W. "Future Political Ambitions and the Behavior of Incumbent State Legislators." Midwest Journal of Political Science, XIII (August, 1969).

Thibaut, John W., and Kelley, Harold H. The Social Psychology of Groups. New York: John Wiley, 1959.

Truman, David B. The Congressional Party. New York: John Wiley, 1959.

Turner, Julius. Party and Constituency. Baltimore: Johns Hopkins, 1951.

Wahlke, John C.; Eulau, Heinz; Buchanan, William; and Ferguson, LeRoy C. The Legislative System. New York: John Wiley, 1962.

Waldman, Loren K. "Liberalism of Congressmen and the Presidential Vote in Their Districts." Midwest Journal of Political Science, XI (February, 1967).

Weinbaum, Marvin G., and Judd, Dennis R. "In Search of a Mandated Congress." Midwest Journal of Political Science, XIV (May, 1970).

White, William S. Citadel: The Story of the United States Senate. New York: Harper, 1956.

APPENDICES

APPENDIX A

COMPUTER PROGRAM

COMPUTER PROGRAM

Following a summary list of propositions appearing in Chapter II predicting the behavior of legislators, we present a list of the program statements exactly as they appear in the operating simulation program. Beside each hypotheses we give the location of corresponding statements in the program.

1.	The legislator supports legislation which is in the interest of his constituents, and he opposes legislation which is inimical to the interests of his constituents.	87-121
1.1.	The legislator supports legislation which is congruent with the economic interests of his constituents and opposes legislation which is inimical to their economic interests.	coding guide
1.2.	The legislator supports legislation which enhances the political power of his constituents and opposes legislation which curtails the political power of his constituents.	coding guide
1.3.	If the legislator was narrowly elected, his support of constituency interests is stronger than if he was elected by a wide margin.	113-120
1.4.	If the executive was successful in his district, the legislator supports legislation supported by the executive; if the executive fared poorly in his district, the legislator opposes legislation supported by the executive.	71-86
2.	Legislators support motions they sponsor with their votes on those decisions.	55-58
3.	Party members support members of their party on motions they present to the legislature and oppose members of the opposite party on motions they present to the legislature.	coding guide 38-54
3.1.	The executive's position contributes to the definition of a motion as a party-sponsored motion.	coding guide

3.2.	Party affiliation is highly related to legislative voting.	38-54
3.3.	Party loyalty varies across different issues.	38-121
3.4.	Party loyalty tends to be reinforced when it is congruent with constituency influence and tends to be weakened when it conflicts with constituency factors.	38-121
4.	Party leaders exhibit greater party loyalty than the rank-and-file.	41-43 52-54
5.	The legislator has high interest in the bills considered by his committee.	60-70
5.1.	If a bill revised in committee promotes his ambitions, the legislator supports it by voting for a favorable recommendation and for its passage in the legislature.	62-64
5.2.	If the revised bill inhibits his ambitions, the legislator opposes a favorable recommendation, and votes against its passage in the legislature.	67-69
6.	The value of a collective decision to a legislator is proportional to the value it has to him in making exchanges for political power.	122-219
6.1.	Those who have great value for the outcome of a collective decision will exchange control over decisions the outcome of which is less valuable in return for support of their position on the collective decision which is of greater interest.	
6.2.	Those who value a collective decision little exchange support on that decision in return for greater control over decisions they value highly.	121-174
7.	Proponents of both passage and failure of a motion attempt to gain a minimum winning coalition.	

Bargaining

8.	Some legislators will exchange votes for resources affecting political decisions through the party leader.	179-184
9.	Vote trading takes place between those uninterested in the bill and the members of the committee reporting the bill.	185-200
10.	Vote trading takes place between legislators uninterested in the bill and interested legislators who share their committee assignments.	202-216
11.	Trading of legislative resources takes place between legislators uninterested in the outcome and legislators similar to them in composition of the constituency which elected them.	195-200 212-217
12.	The legislator exchanges his vote with an interested legislator who offers him the most in terms of resources in exchange for his vote.	221-222
12.1.	The legislator takes into account his own interest, if any, in the outcome, when he makes a decision to exchange his vote for resources affecting the outcome of other decisions.	221-222

```
      PROGRAM SIMEX (INPUT,OUTPUT,TAPE 60=INPUT,TAPE 61=OUTPUT)
      DIMENSION ID(100),ISTAT(100),IREG(100),ICON(100,9),ICOM(100,4),
     1ILEAD(100),IRANK(100,4),JSPON(15),IPAR(100),KCOM(13),IVOTED(100),
     2JSTAT(7),JREG(5),JCON(9),JCOM(3),PARRT(2),REGRT(5),STATRT(50),CON
     3RT(4,9),PARSUM(2),STATSUM(50),REGSUM(5),CONSUM(4,9),PRED(100)
      INTEGER SUMACOM,SUMNVOT
      REAL NORT
C     READ IN ATTRIBUTES OF LEGISLATORS
      READ(60,201) (ID(I),IPAR(I),ISTAT(I),IREG(I),(ICON(I,J),J=1,9),
     1ILEAD(I),(ICOM(I,J),J=1,4),(IRANK(I,J),J=1,4),I=1,100)
C     READ IN BILLS
  100 READ(60,202) JPAR,(JSTAT(I),I=1,7),(JREG(I),I=1,5),(JCON(I),
     1I=1,9),(JCOM(I),I=1,3),(KCOM(I),I=1,13),(JSPON(I),I=1,15),JPARP,
     2JSTATP,JREGP,JPOS,(IVOTED(I),I=1,100),NUMBER,SPLIT
C     INITIALIZE VALUES COMPUTED IN PROGRAM
      SUMYES=0.
      YESRT=0.
      SUMNO=0.
      NORT=0.
      SUMDET=0.
      DETRT=0.
      SUMRT=0.
      SUMVOTE=0.
      SUMNVOT=0
      DO 1 I=1,2
      PARRT(I)=0.
      PARSUM(I)=0.
    1 CONTINUE
      DO 2 I=1,9
      DO 2 J=1,4
      CONRT(J,I)=0.
      CONSUM(J,I)=0.
    2 CONTINUE
      DO 3 I=1,50
      STATRT(I)=0.
      STATSUM(I)=0.
    3 CONTINUE
      DO 4 I=1,5
      REGRT(I)=0.
      REGSUM(I)=0.
```

```
    4 CONTINUE
C     IF THERE ARE NO MORE BILLS GO TO END                              032
      IF (JPAR.LT.1.OR.JPAR.GT.4) GO TO 5                               033
      GO TO 6
    5 GO TO 200                                                         034
C     ASSESS RELATIVE VALUE TO LEGISLATORS                              035
    6 DO 42 IVOTE=1,100                                                 036
      PRED(IVOTE)=0.                                                    037
C     CALCULATE EXCHANGE WITH PARTY
      IF (IPAR(IVOTE).EQ.JPAR) GO TO 7                                  038
      GO TO 8                                                           039
    7 PRED(IVOTE)=PRED(IVOTE)+1.                                        040
      IF (ILEAD(IVOTE).GT.0) GO TO 107                                  041
      GO TO 11                                                          042
  107 PRED(IVOTE)=PRED(IVOTE)+1.                                        043
      GO TO 11                                                          044
    8 GO TO (9,9,10,11) JPAR                                            045
    9 PRED(IVOTE)=PRED(IVOTE)-1.                                        046
      IF (ILEAD(IVOTE).GT.0) GO TO 108                                  047
      GO TO 11                                                          048
  108 PRED(IVOTE)=PRED(IVOTE)-1.                                        049
      GO TO 11                                                          050
   10 PRED(IVOTE)=PRED(IVOTE)+1.                                        051
      IF (ILEAD(IVOTE).GT.0) GO TO 109                                  052
      GO TO 11                                                          053
  109 PRED(IVOTE)=PRED(IVOTE)+1.                                        054
C     CALCULATE SPONSORS INTEREST
   11 DO 13 I=1,15                                                      055
      IF (ID(IVOTE).EQ.JSPON(I)) GO TO 12                               056
      GO TO 13                                                          057
   12 PRED(IVOTE)=PRED(IVOTE)+2.                                        058
   13 CONTINUE                                                          059
C     CALCULATE COMMITTEE INTEREST AND MINORITY REPORTERS
      DO 15 I=1,4                                                       060
      DO 15 J=1,3                                                       061
      IF (ICOM(IVOTE,I).EQ.JCOM(J)) GO TO 14                            062
      GO TO 15                                                          063
   14 PRED(IVOTE)=PRED(IVOTE)+1.                                        064
   15 CONTINUE                                                          065
      DO 17 I=1,13                                                      066
```

```
      IF (ID(IVOTE).EQ.KCOM(I)) GO TO 16                                067
      GO TO 17                                                          068
   16 PRED(IVOTE)=PRED(IVOTE)-2.                                        069
   17 CONTINUE                                                          070
C     CALCULATE INTEREST IN PRESIDENTS POSITION
      GO TO (18,21,24) ICON(IVOTE,9)                                    071
   18 GO TO (19,20) JPOS                                                072
   19 PRED(IVOTE)=PRED(IVOTE)+2,                                        073
      GO TO 27                                                          074
   20 PRED(IVOTE)=PRED(IVOTE)-2,                                        075
      GO TO 27                                                          076
   21 GO TO (22,23) JPOS                                                077
   22 PRED(IVOTE)=PRED(IVOTE)+1,                                        078
      GO TO 27                                                          079
   23 PRED(IVOTE)=PRED(IVOTE)-1,                                        080
      GO TO 27                                                          081
   24 GO TO (25,26) JPOS                                                082
   25 PRED(IVOTE)=PRED(IVOTE)-1,                                        083
      GO TO 27                                                          084
   26 PRED(IVOTE)=PRED(IVOTE)+1,                                        085
   27 CONTINUE                                                          086
C     CALCULATE REGIONAL INTEREST
      DO 31 I=1,5                                                       087
      IF (IREG(IVOTE).EQ.JREG(I)) GO TO 28                              088
      GO TO 29                                                          089
   28 PRED(IVOTE)=PRED(IVOTE)+1,                                        090
      GO TO 31                                                          091
   29 IF (JREG(I)-IREG(IVOTE).EQ.10) GO TO 30                           092
      GO TO 31                                                          093
   30 PRED(IVOTE)=PRED(IVOTE)-1,                                        094
   31 CONTINUE                                                          095
C     CALCULATE STATES INTERESTS
      DO 33 I=1,7                                                       096
      IF (ISTAT(IVOTE).EQ.JSTAT(I)) GO TO 32                            097
      GO TO 33                                                          098
   32 PRED(IVOTE)=PRED(IVOTE)+1,                                        099
   33 CONTINUE                                                          100
C     CALCULATE CONSTITUENTS INTERESTS
      ISAL=0                                                            101
      DO 37 I=1,9                                                       102
```

```
      IF (ICON(IVOTE,I),EQ,JCON(I)) GO TO 34                          103
      GO TO 35                                                        104
   34 ISAL=ISAL+1                                                     105
      GO TO 37                                                        106
   35 IF (ICON(IVOTE,I)+5,EQ,JCON(I)) GO TO 36                        107
      GO TO 37                                                        108
   36 ISAL=ISAL-1                                                     109
   37 CONTINUE                                                        110
      IF (ISAL) 38,42,40                                              111
   38 PRED(IVOTE)=PRED(IVOTE)-1,                                      112
      IF (ICON(IVOTE,8),EQ,3) GO TO 39                                113
      GO TO 42                                                        114
   39 PRED(IVOTE)=PRED(IVOTE)-1,                                      115
      GO TO 42                                                        116
   40 PRED(IVOTE)=PRED(IVOTE)+1,                                      117
      IF (ICON(IVOTE,8),EQ,3) GO TO 41                                118
      GO TO 42                                                        119
   41 PRED(IVOTE)=PRED(IVOTE)+1,                                      120
   42 CONTINUE                                                        121
C     COMPUTE SUMMARY VALUE
      DO 77 IVOTE=1,100                                               122
      IF (IVOTED(IVOTE),EQ,1,OR,IVOTED(IVOTE),EQ,2) GO TO 43          123
      GO TO 76                                                        124
   43 MA=IPAR(IVOTE)                                                  125
      MB=ISTAT(IVOTE)                                                 126
      MC=IREG(IVOTE)                                                  127
      DO 44 I=1,9                                                     128
      MD=ICON(IVOTE,I)                                                129
      CONSUM(MD,I)=CONSUM(MD,I)+1,                                    130
   44 CONTINUE                                                        131
      PARSUM(MA)=PARSUM(MA)+1,                                        132
      STATSUM(MB)=STATSUM(MB)+1,                                      133
      REGSUM(MC)=REGSUM(MC)+1,                                        134
      IF (PRED(IVOTE),GE,2,) GO TO 45                                 135
      GO TO 49                                                        136
   45 JVOTE=1                                                         137
      SUMYES=SUMYES+1,                                                138
      SUMDET=SUMDET+1,                                                139
      SUMVOTE=SUMVOTE+1,                                              140
      IF (JVOTE,EQ,IVOTED(IVOTE)) GO TO 46                            141
```

```
      GO TO 48
   46 SUMRT=SUMRT+1,
      PARRT(MA)=PARRT(MA)+1,
      STATRT(MB)=STATRT(MB)+1,
      REGRT(MC)=REGRT(MC)+1,
      YESRT=YESRT+1,
      DETRT=DETRT+1,
      DO 47 I=1,9
      MD=ICON(IVOTE,I)
      CONRT(MD,I)=CONRT(MD,I)+1,
   47 CONTINUE
   48 WRITE(61,203) ID(IVOTE),PRED(IVOTE),JVOTE,IVOTED(IVOTE)
      GO TO 77
   49 IF (PRED(IVOTE).LE.-2.) GO TO 50
      GO TO 54
   50 JVOTE=2
      SUMNO=SUMNO+1,
      SUMDET=SUMDET+1,
      SUMVOTE=SUMVOTE+1,
      IF (JVOTE.EQ.IVOTED(IVOTE)) GO TO 51
      GO TO 53
   51 SUMRT=SUMRT+1,
      PARRT(MA)=PARRT(MA)+1,
      STATRT(MB)=STATRT(MB)+1,
      REGRT(MC)=REGRT(MC)+1,
      NORT=NORT+1,
      DETRT=DETRT+1,
      DO 52 I=1,9
      MD=ICON(IVOTE,I)
      CONRT(MD,I)=CONRT(MD,I)+1,
   52 CONTINUE
   53 WRITE(61,203) ID(IVOTE),PRED(IVOTE),JVOTE,IVOTED(IVOTE)
      GO TO 77
C     BEGIN COMMUNICATION PROCESS
   54 SUMCOM=0,
      SUMACOM=0
      SUMINF=0,
      DO 66 ITALK=1,100
C      COMMUNICATION WITH PARTY LEADERSHIP
      IF (IPAR(IVOTE).EQ.IPAR(ITALK).AND.ILEAD(ITALK).GT.0) GO TO 55
```

```
      GO TO 56
   55 SUMINF=SUMINF+PRED(ITALK)                                          180
      SUMCOM=SUMCOM+1,                                                   181
      SUMACOM=SUMACOM+1                                                  182
      GO TO 66                                                           183
C     COMMUNICATION WITH COMMITTEE REPORTING BILL                        184
   56 DO 61 I=1,3                                                        185
      DO 61 K=1,4                                                        186
      IF (ICOM(ITALK,K).EQ.JCOM(I)) GO TO 57                             187
      GO TO 61                                                           188
   57 IF (ILEAD(ITALK).GT.0) GO TO 58                                    189
      GO TO 59                                                           190
   58 SUMINF=SUMINF+PRED(ITALK)                                          191
      SUMCOM=SUMCOM+1,                                                   192
      SUMACOM=SUMACOM+1                                                  193
      GO TO 66                                                           194
   59 IF (ICON(IVOTE,1).EQ.ICON(ITALK,1)) GO TO 60                       195
      GO TO 61                                                           196
   60 SUMINF=SUMINF+PRED(ITALK)                                          197
      SUMCOM=SUMCOM+1,                                                   198
      SUMACOM=SUMACOM+1                                                  199
      GO TO 66                                                           200
   61 CONTINUE                                                           201
C      IVOTE COMMITTEES
      DO 166 I=1,4                                                       202
      DO 166 K=1,4                                                       203
      IF (ICOM(IVOTE,I).GT.0.AND.ICOM(IVOTE,I).EQ.ICOM(ITALK,K))GO TO 62 204
      GO TO 166                                                          205
   62 IF (ILEAD(ITALK).GT.0) GO TO 63                                    206
      GO TO 64                                                           207
   63 SUMINF=SUMINF+PRED(ITALK)                                          208
      SUMCOM=SUMCOM+1,                                                   209
      SUMACOM=SUMACOM+1                                                  210
      GO TO 66                                                           211
   64 IF (ICON(IVOTE,1).EQ.ICON(ITALK,1)) GO TO 65                       212
      GO TO 166                                                          213
   65 SUMINF=SUMINF+PRED(ITALK)                                          214
      SUMCOM=SUMCOM+1,                                                   215
      SUMACOM=SUMACOM+1                                                  216
      GO TO 66                                                           217
```

```
166 CONTINUE
 66 CONTINUE
C    CALCULATE FINAL PREDISPOSITION                                    218
     PREDLST=PRED(IVOTE)+(SUMINF/SUMCOM)                               219
     IF (PREDLST) 72,76,67                                             220
 67  JVOTE=1                                                           221
     SUMYES=SUMYES+1,                                                  222
     SUMVOTE=SUMVOTE+1,                                                223
     PARSUM(MA)=PARSUM(MA)+1,                                          224
     STATSUM(MB)=STATSUM(MB)+1,                                        225
     REGSUM(MC)=REGSUM(MC)+1,                                          226
     DO 267 I=1,9                                                      227
     MD=ICON(IVOTE,I)                                                  228
     CONSUM(MD,I)=CONSUM(MD,I)+1,                                      229
267  CONTINUE                                                          230
     IF (JVOTE,EQ,IVOTED(IVOTE)) GO TO 68                              231
     GO TO 70                                                          232
 68  SUMRT=SUMRT+1,                                                    233
     PARRT(MA)=PARRT(MA)+1,                                            234
     STATRT(MB)=STATRT(MB)+1,                                          235
     REGRT(MC)=REGRT(MC)+1,                                            236
     YESRT=YESRT+1,                                                    237
     DO 69 I=1,9                                                       238
     MD=ICON(IVOTE,I)                                                  239
     CONRT(MD,I)=CONRT(MD,I)+1,                                        240
 69  CONTINUE                                                          241
 70  WRITE(61,204) ID(IVOTE),PRED(IVOTE),JVOTE,IVOTED(IVOTE),PREDLST   242
    1,SUMACOM                                                          243
     GO TO 77                                                          244
 72  JVOTE=2                                                           245
     SUMNO=SUMNO+1,                                                    246
     SUMVOTE=SUMVOTE+1,                                                247
     PARSUM(MA)=PARSUM(MA)+1,                                          248
     STATSUM(MB)=STATSUM(MB)+1,                                        249
     REGSUM(MC)=REGSUM(MC)+1,                                          250
     DO 172 I=1,9                                                      251
     MD=ICON(IVOTE,I)                                                  252
     CONSUM(MD,I)=CONSUM(MD,I)+1,                                      253
172  CONTINUE                                                          254
     IF (JVOTE,EQ,IVOTED(IVOTE)) GO TO 73                              255
                                                                       256
```

```
      GO TO 75                                                          257
   73 SUMRT=SUMRT+1.                                                    258
      PARRT(MA)=PARRT(MA)+1.                                            259
      STATRT(MB)=STATRT(MB)+1.                                          260
      REGRT(MC)=REGRT(MC)+1.                                            261
      NORT=NORT+1.                                                      262
      DO 74 I=1,9                                                       263
      MD=ICON(IVOTE,I)                                                  264
      CONRT(MD,I)=CONRT(MD,I)+1.                                        265
   74 CONTINUE                                                          266
   75 WRITE(61,204) ID(IVOTE),PRED(IVOTE),JVOTE,IVOTED(IVOTE),PREDLST
     1,SUMACOM                                                          267
      GO TO 77                                                          268
   76 JVOTE=9                                                           269
      SUMNVOT=SUMNVOT+1                                                 270
      WRITE(61,203) ID(IVOTE),PRED(IVOTE),JVOTE,IVOTED(IVOTE)           271
   77 CONTINUE                                                          272
      DO 78 I=1,2                                                       273
      PPAR=PARRT(I)/PARSUM(I)                                           274
      WRITE (61,205) I,PPAR                                             275
   78 CONTINUE                                                          276
      DO 80 I=1,5                                                       277
      PREG=REGRT(I)/REGSUM(I)                                           278
      WRITE(61,207) I,PREG                                              279
   80 CONTINUE                                                          280
      DO 81 I=1,9                                                       281
      DO 81 J=1,4                                                       282
      PCON=CONRT(J,I)/CONSUM(J,I)                                       283
      WRITE(61,208)  I,J,PCON                                           284
   81 CONTINUE                                                          285
      WRITE(61,209) YESRT,NORT,DETRT,SUMRT                              286
      WRITE (61,210) SUMYES, SUMNO,SUMDET,SUMVOTE,SUMNVOT               287
      PYES=YESRT/SUMYES                                                 288
      PNO=NORT/SUMNO                                                    289
      PDET=DETRT/SUMDET                                                 290
      PROPRT=SUMRT/SUMVOTE                                              291
      WRITE (61,211) PYES,PNO,PDET,PROPRT                               292
      WRITE (61,212) NUMBER,SPLIT                                       293
      GO TO 100                                                         294
  200 CONTINUE                                                          295
```

```
      STOP
  201 FORMAT(I3,I1,I2,I1,9I1,I1,4I2,4I1)                                296
  202 FORMAT(I1,7I2,5I2,9I1,3I2,13I3/15I3,I1,I2,2I1/72I1,1X,7I1/12I1,1X,
     19I1,43X,A5,A10)                                                   297
  203 FORMAT(10X,3HID ,I3,8H  PRED  ,F8,3,9H  JVOTE  ,I1,10H  IVOTED  ,I
     11)                                                                298
  204 FORMAT(10X,3HID ,I3,8H  PRED  ,F8,3,9H  JVOTE  ,I1,10H  IVOTED  ,I
     11,12H  PREDLAST  ,F8,3,2X,I3)                                     299
  205 FORMAT(10X,8HPARTY   ,I1,21H   PROPORTION RIGHT  ,F8,3)           300
  207 FORMAT(10X,8HREGION  ,I1,21H   PROPORTION RIGHT  ,F8,3)           301
  208 FORMAT(10X,4HCON ,I1,5H VAL ,I1,21H  PROPORTION RIGHT   ,F8,3)    302
  209 FORMAT(10X,6HYES RT,2X,F3,0,4X,5HNO RT,2X,F3.0,5X,6HDET RT,2X,
     1F3,0,5X,10HSUMRIGHT  ,F3,0)                                       303
  210 FORMAT(10X,8HSUMYES  ,F3.0,4X,7HSUMNO  ,F3,0,5X,8HSUMDET  ,F3,0,
     15X,10HSUMVOTE   ,F3,0,8H  NVOTE ,I3)                              304
  211 FORMAT(10X,13HPROP YES RT  ,F5,3,14H  PROP NO RT  ,F5.3,
     115H  PROP DET RT  ,F5,3,16H   PROP TOTAL   ,F5,3)                 305
  212 FORMAT(A5,A10)                                                    306
      END
```

APPENDIX B

CODEBOOK

Col.	Variable	Value	
1-3	identification number	1.Dodd	31.Hickenlooper
		2.Ribicoff	32.Miller
		3.Muskie	33.Carlson
		4.Smith	34.Pearson
		5.Kennedy	35.Humphrey
		6.Saltonstall	36.McCarthy
		7.McIntyre	37.Long(Mo.)
		8.Cotton	38.Symington
		9.Pastore	39.Curtis
		10.Pell	40.Hruska
		11.Aiken	41.Burdick
		12.Prouty	42.Young(N.D.)
		13.Boggs	43.McGovern
		14.Williams(Del.)	44.Mundt
		15.Willians(N.J.)	45.Byrd(Va.)
		16.Case	46.Robertson
		17.Javits	47.Hill
		18.Keating	48.Sparkman
		19.Clark	49.Fulbright
		20.Scott	50.McClellan
		21.Douglas	51.Holland
		22.Dirkson	52.Smathers
		23.Bayh	53.Russell
		24.Hartke	54.Talmadge
		25.Hart	55.Ellender
		26.McNamara	56.Long(La.)
		27.Lausche	57.Eastland
		28.Young(Ohio)	58.Stennis
		29.Nelson	59.Ervin
		30.Proxmire	60.Jordan(N.C.)

Col.	Variable	Value	
		61.Johnston	81.Mansfield
		62.Thurmond	82.Metcalf
		63.Yarborough	83.Bible
		64.Tower	84.Cannon
		65.Cooper	85.Anderson
		66.Morton	86.Mechem
		67.Brewster	87.Moss
		68.Beall	88.Bennett
		69.Edmondson	89.McGee
		70.Monroney	90.Simpson
		71.Gore	91.Engle
		72.Kefauver	92.Kuchel
		73.Byrd(W.Va.)	93.Morse
		74.Randolph	94.Neuberger
		75.Hayden	95.Jackson
		76.Goldwater	96.Magnuson
		77.Allott	97.Bartlett
		78.Dominick	98.Gruening
		79.Church	99.Inouye
		80.Jordan(Idaho)	100.Fong

Col.	Variable	Value
4	Party	1=Democrat 2=Republican
5-6	State	1-50, in alphabetical order
7	Region	1=East (Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont) 2=South(Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Oklahoma, Tennessee, Texas, Virginia, West Virginia) 3=Midwest(Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Wisconsin, South Dakota, Ohio) 4=Mountain(Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming) 5=Pacific(California, Oregon, Washington, Hawaii, Alaska)
8	Urban	1=high (70-100%) 2=medium (51-69%) 3=low (0-50%)
9	Rural non-farm	1=high (26-100%) 2=low (0-25%)
10	Rural farm	1=high (7-100%) 2=low (0-6%)
11	Non-white	1=high (5-100%) 2=low (0-6%)
12	Owner-occupied dwellings	1=high (71-100%) 2=medium (63-70%) 3=low (0-63%)

Col.	Variable	Value
13	White-collar occupied	1=high (43-100%) 2=medium (39-42%) 3=low (0-38%)
14	Median income	1=high ($6000.+) 2=medium ($5000.-$5999.) 3=low (0-$4999.)
15	Competition	1=high plurality (61-100%) 2=medium plurality (55-60%) 3=low plurality (0-54%)
16	President's plurality	1=high (55-100%) 2=medium (46-54%) 3=low (0-45%)
17	Leadership position	1=speaker or president pro tem 2=majority leader 3=minority leader 4=majority whip 5=minority whip
18-25	Committee assignment (four two-column fields)	1=Aeronautical and Space Sciences 2=Agriculture and Forestry 3=Appropriations 4=Armed Services 5=Banking and Currency 6=Commerce 7=District of Columbia 8=Finance 9=Foreign Relations 10=Government Operations 11=Interior and Insular Affairs 12=Judiciary 13=Labor and Public Welfare 14=Post Office and Civil Service 15=Public Works 16=Rules and Administration

Coding Motions

card no.	col. no.	Variable	Value
1	1	Party	1=Democratic 2=Republican 3=Bipartisan 4=no party
1	2-25	State (seven two column fields)	state code=for empty=no effect
1	16-25	Region (five two-column fields corresponding to regional codes 1-5)	regional code=for regional code+10=against empty=no effect
1	26-34	Constituency (nine one column fields)	code=for code+5=against empty=no effect
1	35-40	Committee (three two column fields)	committee code=reporting bill
1	41-79	Minority Reporting (thirty-nine three column fields)	identification number= corresponding legislator a minority reporter
2	1-45	Sponsors	identification number= corresponding legislator a sponsor of motion
2	50	President's position	1=for 2=against

$\tilde{b}_{\mu\delta}{}^{2}$

m^{4}

ps.