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A METHODOLOGICAL ANALYSIS.

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ASOKE KUMAR BASU

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MODEL-BUILDING IN POLITICAL SCIENCE:

A METHODOLOGICAL ANALYSIS

APPROVED BY

DISSERTATION COMMITTEE

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The author wishes to thank Professor Oliver Earl Benson, who guided this dissertation with sensitivity and patience.

DEDICATED TO MY WIFE FIFI
without who...
without whom...

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CHAPTER I

MODEL-BUILDING IN POLITICAL SCIENCE: A LITERATURE REVIEW

1.0 The concept of a model is as old as human civilization. Basically, an abstraction, models define a frame of reference in which elements are ordered. Ever since philosophy began, mathematical models have been one of the great sources of philosophical problems. For the Greeks, mathematical abstractions were pre-eminently geometry--Euclidean geometry. In the philosophy of mathematics, Euclidean models are rational formulations of geometrical laws in universal form. The elements of model are worded so as to be rigorous and absolute.[1] In short, the basic foundation was based on postulates to be deduced out of "nature."

Enormous philosophical debate may be raised over the

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[1]Stephen F. Baker, Philosophy of Mathematics (New Jersey: Prentice-Hall, 1964), 16. Also see Karl Deutsch, "Mechanism, Organism and Society," Philosophy of Science, 18 (July, 1951), 230-252.

problem of inference in model building--in short, the basic formulation of knowledge. The major of these is a distinction to which philosophers have long given attention, that between what they have called "a priori" knowledge and what they have called empirical (or "a posteriori") knowledge. Traditionally, rationalists were philosophers who held a priori knowledge to be far more important than empirical knowledge, while empiricists were philosophers who took the opposite view. One question that has been regarded as fundamental in the philosophy of model building is the question whether mathematical knowledge, as evidenced in the beginning of model analysis, is a priori or empirical.

Kant in recognizing the basic human abstraction saw two major dichotomies--analytic and synthetic. In trying to explain his distinction of human abstraction, Kant made use of the notion of judgment. Kant felt that a distinction has to be drawn between two basically different sorts of human judgments. In the basic model of human order, the distinction is parallel to the distinction in chemistry between synthesis, the act of putting together things that were uncombined and different, and analysis, the act of separating out of something a component that was present in it. Kant thought it was obvious how the mind is able to obtain analytic knowledge, all of which is of course based on a priori knowledge. Kant felt that abstraction represented the very clearest instances of such synthetic a priori knowledge.

For more than several centuries, basic abstraction model such as Euclid's concept was highly accepted, but gradually more and more small criticisms began to accumulate. Euclidean abstraction was soon to be discovered as having logical gaps. In the nineteenth century, the growth of physical science enabled a new solution. The goal for model building was to construct a system so that every element in the abstraction order would follow from the postulates by strict deductive logic--that is on account of logical form alone. Nineteenth and twentieth century physical sciences are primarily based on this concept alone. At this point in the basic change-over, several features may be noted:

1. It defines a system of actions.
2. The elements of models were logico-deductive.
3. Knowledge to be defined as "empirical" and "observable."

Thus the basic models of physical sciences were soon to be based on observable "analytic" knowledge which could be proven. System came to be defined as a "field of action" where elements played a definite role to form abstractions or models.

The development of organizing system in social science was slow. Unlike physical science, it thrived on vague generalization about human life with very little observable data. However, abstractionism in social writing has been traced by Dr. Oliver Benson as far as back to

Artha Sastra, Hsun Tzu, and other classical thinkers.[2]

Furthermore, in nineteenth century social science, "ideal-types" were used as the model of human interaction. With Tonnies, we find the ideal-typical distinction of "Gemeinschaft" and "Gesselschaft."[3] Max Weber perhaps used "ideal-typical" analysis to its fullest perfection.[4]

In psychological literature, the attention has been concentrated on the prospects of using modern psychological principles of individual behavior as a model in predicting human social phenomena.

2.0 Mathematical Models:[5] The basic linear model first used in such an area was by C. L. Hull.[6] The Hullian theory considers behavior as the event to be described. Behavior is viewed as a response (R) of the organism evoked by the stimulus complex (S) impinging upon his sensory apparatus. Thus, the simple linear model of human behavior, according

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[2]Oliver Benson, "Classical International Systems: Four Models of Power Politics." Read at South Western Social Science Association, Dallas, 1964.

[3]Robert Bierstedt (ed.), The Making of Society (New York: The Modern Library, 1959), 294.

[4]Reinhard Bendix, Max Weber: An Intellectual Portrait (New York: A Doubleday Anchor Book, 1962).

[5]For a stimulating discussion see George M. Ewing, Mathematical Models, Their Generation and Use (Mimeographed, University of Oklahoma, Norman, Oklahoma, 1960-61). Also see J. C. Kemeny and J. L. Snell, Mathematical Models in the Social Sciences (New York: Ginn and Co.), Ch. 1.

[6]C. L. Hull, A Behavior System (New Haven: Yale University Press, 1952).

to Hull, would be:

$$S \rightarrow R$$

2.1 Information Theory Model: Observers are men able to learn about their environment and are impelled to reduce their uncertainty about the events which occur in it by dint of learning. In this network of information theory, psychologists define behavior as the unchanging form of events due to the activity within an assembly.

A I B
a → b

INPUT OUTPUT

Simple Information Model

Channel Capacity: In any communication system, the human model is so chosen as to match the source to the channel. If each of these N(T) information

N(T) ←
a → b
FEEDBACK
INPUT OUTPUT

bits pass through the channels there will be equally likely output $\log_2 N(T)$ bits per signal of duration T time units.

$$C(T) = \frac{\log_2 N(T)}{T} \text{ bits}$$

of information per signal per unit time.

Thus the capacity of the above linear model would be represented as:

$$C = \lim_{T \to a} C(T) = \lim_{T \to a} \frac{\log_2 N(T)}{T}$$

2.2 System Model: A system entails an a priori structure which specifies the logical possibilities an observer can talk about. We shall call it a "universe of discourse" and will denote it as $\mathcal{U}$. Sometimes abstraction $\mathcal{U}$ is a loosely related collection of names for elements or events. At the other extreme is an elaborate mathematical model wherein names are related by manipulable calculi, so that given one relation many others are deducible. In either case, its names and relations and its deductive content exist in the observer's mind independently of any assembly. $\mathcal{U}$ does not depend upon the observer's previous experience, his objective, and his hunch about a useful form of description.

The reference frame in a model itself is a system. It satisfies a definition proposed by Colin Cherry[7] that a system is an "ensemble of attributes," but it has no predictive value. In order to show how it becomes of predictive value, we shall introduce the concept of phase space.

A system entails an identification L between the names in $\mathcal{U}$ and those attributes of the elements in the system model which observer regards as relevant to his objective. Hence L specifies the set of possible observations. The following flow chart may develop.

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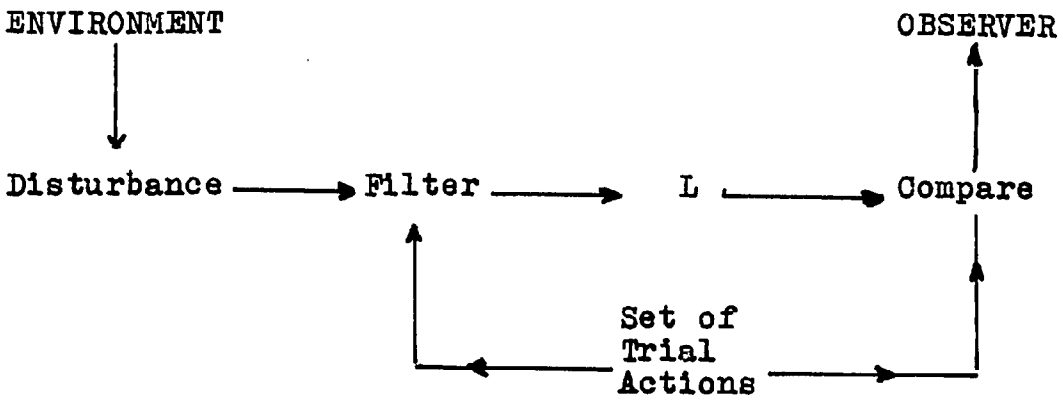
[7]Colin Cherry, On Human Communication (New York: Wiley and Sons, 1957).



Observation and experimentation viewed as systems.

2.3 Probability Model: Probability is a mathematical discipline with aims akin to those, for example, of geometry or analytic mechanics. In each field, we must carefully distinguish three aspects of theory: (a) the formal logical content, (b) the intuitive background, (c) the applications.

(a) Formal logical content: Axiomatically, mathematics is concerned solely with relations among undefined things. This property is well illustrated by the game of chess. It is meaningless to talk about the "definition" of a pawn. Similarly geometry does not care what a point and straight line "really are" (as discussed earlier in Euclidean basis of axioms). They remain undefined notions and the axioms of geometry specify the relations among them, e.g., two points determine a line, etc.

(b) Intuitive background: The collective intuition of mankind is inherent in the nature. Newton's notions of a field force and of action at a distance and Maxwell's concept of

electromagnetic theories in physical science were at first decried as "unthinkable" and "contrary to intuition." Vague as it is, in the probability model functioning of these intuitions serve as background and guide for the step. After all, man is not all mechanical.

(c) In applications, the abstract mathematical probability models to describe human events serve as tools and different models can describe the same empirical situation.[8]

2.4 Game Theory Model: In developing the theory of coalition formation in N--person games--Von Neumann and Morgenstern[9] transformed the normal form into a mathematically simpler structure, which it appears, will allow a broader application of the theory. What then is the significance of game theory to the social scientist? It is true there has been a plethora of applications in a dozen years especially in the field of political science.[10] Much of the theory is of very general importance, but some revision may be required for fruitful applications.

Game models have found their biggest use in the allocation of decision making. Suppose that we want to

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[8] B. O. Koopman, "The Axioms and Algebra of Intuitive Probability," Annals of Mathematics, 2 (1940), 269-292.

[9] John Von Neumann and Oskar Morgenstern, Theory of Games and Economic Behavior (New York: Wiley Science Foundation, 1964).

[10] Martin Shubik (ed.), Game Theory and Related Approaches to Social Behavior (New York: Wiley and Sons, 1964).

measure the means of "m" uncorrelated random variables x_1, x_2, x_3...ym on the basis of a stratified random sample of size N^2 from a population stratified into "K" different strata. The estimates are the sample means with variance for the j-th estimate as:

$$\sum_{h=1}^{K} \frac{1}{nh^2} \frac{N_h^2 S_{jN}^2}{N_o^2} - \sum_{h=1}^{K} \frac{Nu S_{jN}^2}{N_o^2}$$

Where,

Nu = Number of units in the j-th strata.

$N_o = \Sigma Nu$

S_{jn}^2 = Variance as defined by Cochran[11] for the j-th character within the h-th stratum.

The problem now is to choose the n's, satisfying $N_n = N$ in such a way that the variance attains optimum values in some sense. A larger paper on this context has been attempted by this researcher in the past.

3.0 In the following section the applications of mathematical models in political science will be discussed. As stated by Kaplan:

> The strictest sense of the term 'model' is associated with the formal style. Given a formal system a model is constituted by any interpretation of the system which makes its postulates true.[12]

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[11]John Cochran, Sampling Techniques (New York: Wiley and Sons, 1953).

[12]Abraham Kaplan, The Conduct of Inquiry (San Francisco: Chandler Publishing Co., 1962), Chapter 7.

In political science data are not as ordered as in physical science. The "formality" as Kaplan describes is not as rigid in political science. Political science has always been guided by political theory and the investigation of "good life." As Parsons noted:

> What has traditionally been called political theory has contained more of philosophical and ethical implication of the problems of government than of empirical analysis of its processes and determinants.[13]

However, there has been a distinctive move for model analysis in political science and they may be stated in the following sections.

3.1 System Model: Rosecrance in his book Action and Reaction in World Politics[14] combines the systematic features of general explanatory concepts with the empirical content of detailed analysis. In his work, the raw data are largely gathered through the essential works of diplomatic and political history. For the universe of discourse for his system, he chooses nine different system periods. These are:

(1)	1740-1789	(4)	1822-1848	(7)	1890-1918
(2)	1789-1814	(5)	1848-1871	(8)	1918-1945
(3)	1814-1822	(6)	1871-1890	(9)	1945-1960

Rosecrance suggests that

> System change may be said to occur when the internal constituents of disturbance and regulation are altered.

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[13]Talcott Parsons and Edward A. Shils (eds.), Toward a General Theory of Action (Illinois Free Press, 28-29.

[14]Richard N. Rosecrance, Action and Reaction in World Politics (Boston: Little, Brown and Co., 1963).

> All constituents of disturbance (goals or objectives, domestic security, etc.) on the one hand and all constituents of regulation (institutional) on the other need not undergo transformation in order for system change to occur.[15]

The four major detriments of the international system as Rosecrance suggests are direction, control, resources, and capacity. He suggests that these four characteristics may be used to ascertain the state of that system at any given time. Thus, the following system-model may be developed.

Direction Control Resources Capacity

$$X \longrightarrow Y \longrightarrow Z \longrightarrow K$$

A change in Direction	X
A change in Control	Y
A change in Resources	Z
A change in Capacity	K

$$C(t) = \int_{t \to a} \left(\frac{dx}{dt} + \frac{dy}{dt} + \frac{dz}{dt} + \frac{dk}{dt}\right)$$

when C(t) = Change as function of time

Boulding[16] defines international system as "a group of interacting behavior units called 'nations' or 'countries' to which may sometimes be added certain supranational organizations such as United Nations."[17] Thus defining "nations" or "countries" as an interacting system, Boulding formulates a matrix of interaction.

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[15] Ibid., 13.

[16] K. E. Boulding, "National Images and International Systems," Journal of Conflict and Resolution, 2 (June, 1959), 120-131.

[17] Ibid., 128.

	A	B	C	D	E	Total
A		ab	ac	ad	ae	
B	ab		bc	bd	be	
C	ac			cd	ce	
D	ad		cd		de	
E	ae		ce	ed		
Total						

In a time series f(t), Boulding notes that "dynamics" of the matrix may be noted. For example, Boulding cites the Richardson method of working out "hostility matrix."

> Let $(a_{ij})t$ be a cell of the matrix at time "t" and $(a_{ij})t + 1$ be the corresponding value at a time t + 1.
>
> Then for each corresponding value, the following matrix function may be noted:
>
> $$F(a_{ij})t = (a_{ij})t + 1$$

One way or another "system analysis" has been incorporated in the quantitative formulation of political science. Parsons and Shills undoubtedly have pioneered the application of system analysis in social science in their famous book Toward a General Theory of Action.[18] A social system Parsons and Shils have defined as:

> A system of action which has the following characteristics: (1) it involves a process of interaction between two or more actors; (2) the situation toward which the actors are oriented includes other actors. (3) There

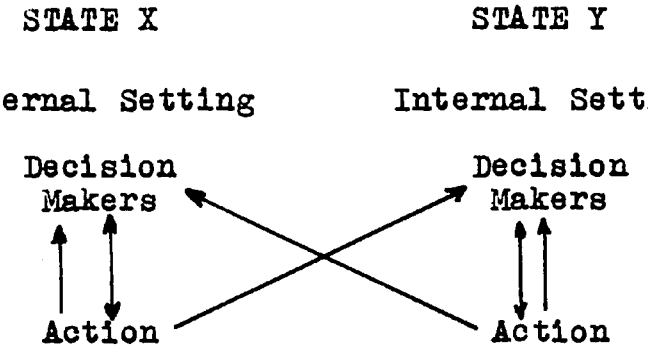
[18] T. Parsons and Edward Shils, op. cit.

> is (in a social system) interdependent and, in part, concerted action in which the concert is a function of collective goal orientation or common values, and of a consensus of normative and cognitive expectations.[19]

Snyder,[20] in his formulation of decision-making process uses such a formulation of system analysis. System in Snyder's context refers to:

> the modes, rules and nature of reciprocal influence which structure the interaction between states. Five kinds of system may be mentioned--coalitions (temporary and permanent); supranational organization; bilateral; multilateral (unorganized); and ordination-subordination.[21]

With this formulation, Snyder comes up with the following system model.



3.2 Snyder's[22] decision-making model: This approach basically believes in studying international politics' chief

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[19] Ibid., 54-55.

[20] Richard Snyder, H. W. Bruck and Burton Sapin, "The Decision-Making Approach to the Study of International Politics," in James Rosenau (ed.), International Politics and Foreign Policy (Illinois: Free Press, 1961), 186-192.

[21] Ibid., 192.

[22] Richard Snyder, H. W. Bruck and B. Sapin, Decision-Making as an Approach to the Study of International Politics, Princeton Foreign Policy Analysis Series, No. 3, 1954.

concern should be on actions, reactions and interactions among political entities called national states. Emphasis on action suggests "process" analysis. Thus multiplicity of actions, reactions and interactions analysis must be concerned with a number of processes. Snyder explains this by an interactional diagram:

STATE A ⟷ STATE B

The above diagram implies a reciprocal relationship. Snyder suggests that in the basic decision-making process such is not always the case.

It may be

STATE A ⟶ ⟵ STATE B

where State A's interaction is complete and State B's interaction with State A is not complete.

As a result decision-making would be incomplete. Thus, Snyder, using such an action-interaction approach in all the nations develops a "pattern" (basically symmetrical or asymmetrical). Thus the following flow chart as worked out by Robert Cecile[23] may emerge:

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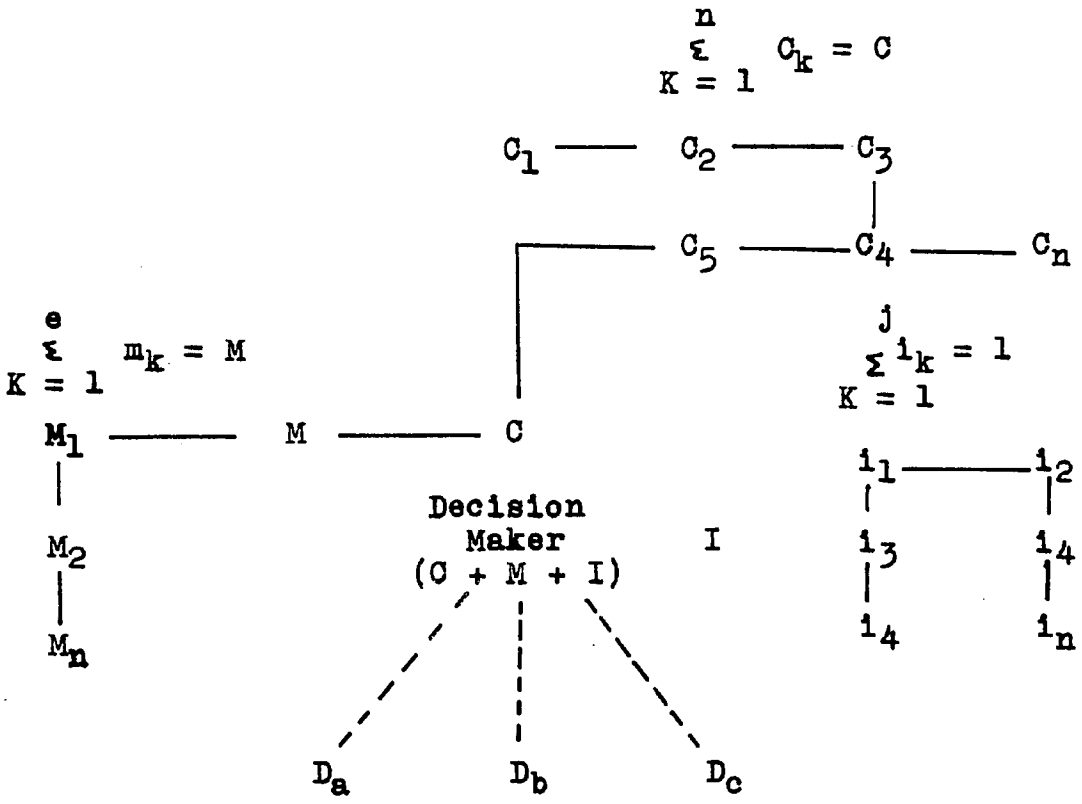
[23]Robert Cecile, The Hungarian and Suez Decisions--1956: An Analysis of Decision-Making in American Foreign Policy, unpublished M.A. Thesis, University of Oklahoma, Norman, 1963, 92.



where, C = Sphere of Competence
M = Motivation
I = Information-Communication

and C + M + I = The decision taken (D_a D_b or D_c)

In the formulation of a decision-making model, Snyder leans heavily on the theoretical formulations of systems theory as discussed above. At the risk of being repetitious, let us restate that the formulation of "pattern variable"[24] is a dichotomy one side of which must be chosen by a nation before the action-interaction process has been established. These according to Snyder are:

(a) discrimination and relating of objects

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[24]For an elaborate discussion on "pattern-variable" see Parsons and Shils, op. cit., 77.

(b) definition of "goals"

(c) attachment of significance to the goals

(d) standards of acceptability

Two aspects of a decision-making situation in political science, in which research is being performed for the decision makers by others, are not usually, if ever, incorporated in the model even approximately:

(1) the probability associated with each possible course of action; that is, the probability that the decision maker will follow that course if the model so indicates; and

(2) the likely amount of distortion the course of action will be subjected in the application if accepted. The science of decision-making will have to advance a great deal more before these factors can be handled quantitatively and consciously.

3.3 Coalition Model: As Leiserson suggests:

> Coalition formation and coalition maintenance make up a large part of all political activities. From creating a government in a multiparty parliamentary system to coordinating the Civil Rights Movement in the American South . . . political activity involves coalition.[25]

Leiserson has suggested an empirical verification of coalition behavior in parliamentary politics of Sweden, France, and Italy. In deducing a general principle, he finds three types of cases. These are:

(a) A strategy of coalition formation based on the prominence of joint rewards to coalitions.

(b) Strategy for forming coalitions according to the sure thing principle.

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[25]Michael Avery Leiserson, Coalition in Politics: A Theoretical and Empirical Study, Unpublished Doctoral Dissertation, Yale University, New Haven, 1966, 1.

(c) A general search for strategy, based on prominence, aspiration level and subjective probability of success.

Leiserson's hypotheses are mainly geared to four problem areas in coalition theory. These are:

(1) Rationality: "Theories requiring higher levels of rationality will be more successful in predicting payoffs than less demanding theories."[26]

(2) Communication and Coordination: "Payoffs, coalitions and other behavior will differ depending on whether communication is indirect or face-to-face."[27]

(3) Characteristic Functions: "Payoffs, coalitions and other behavior will differ depending on whether subjects are presented with 'life-like' situation or with characteristic function directly."[28]

(4) Real-World Applicability: "It will not be possible to 'scale' all the theories being tested (in Gutman's sense) on the basis of their success in successively more realistic experimental settings."[29]

The dynamic model of coalition theory as presented by Riker[30] is largely guided by game theory.

Let,

I = decision making body

n = members operating under the rules of an n-person zero-sum game with side payments allowed

m = weight

The rule of decision according to Riker is,

where $m > 1/2 \sum_{i=1}^{n} w_i$

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[26] Ibid., 207.

[27] Ibid.

[28] Ibid.

[29] Ibid.

[30] William H. Riker, The Theory of Political Coalitions (New Haven: Yale University Press, 1962), 103.

where w_i = weight of a member.

However, it is to be noted that w_i varies from leader to the lowliest follower.

Using Riker's models, several international organizations from a large to a small body may be studied. As Riker noted:

> In 1945 the United States stood at what has turned out to be the apex of its world leadership. . . . Its most immediate allies--England, France and China--were so crippled by the war that they had no choice but to look to the United States for leadership.

Extending Riker's thesis, the following relationship may be established. The data below represent NATO share each state is assessed for UN contributions.[31]

Number	State	I. Contribution	Weight
1	U.S.A.	32.02	1
2	U. Kingdom	7.58	2
3	France	5.94	3
4	W. Germany	4.35	4
5	Canada	3.12	5
6	Italy	2.24	6
7	Belgium	1.20	7
8	Netherlands	1.01	8
9	Denmark	.58	9
10	Norway	.45	10
11	Turkey	.40	11
12	Greece	.23	12
13	Portugal	.16	13
14	Luxembourg	.05	14
15	Iceland	.04	15

Thus such a coalition formation develops:

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[31]Data obtained from Oliver Benson, Quantitative Methods in International Relations, University of Minnesota, 1964, 6-2.

Formula $\sum_{i=1}^{n} w_i$

$\sum_{i=1}^{15} w_1 = 32.02$ U.S.A.

↓

$\sum_{i=2}^{15} w_2 = 7.58$ U. Kingdom

↓

$\sum_{i=3}^{15} w_3 = 5.94$ France

↓

$\sum_{i=4}^{15} w_4 = 4.35$ W. Germany

↓

$\sum_{i=5}^{15} w_5 = 3.12$ Canada

↓

$\sum_{i=6}^{15} w_6 = 2.24$ Italy

↓

$\sum_{i=7}^{15} w_7 = 1.20$ Belgium

↓

$\sum_{i=8}^{15} w_8 = 1.01$ Netherlands

↓

$\sum_{i=9}^{15} w_9 = .58$ Denmark

$$\sum_{i=10}^{15} w_{10} = .45 \quad \text{Norway}$$

$$\sum_{i=11}^{15} w_{11} = .40 \quad \text{Turkey}$$

$$\sum_{i=12}^{15} w_{12} = .23 \quad \text{Greece}$$

$$\sum_{i=13}^{15} w_{13} = .16 \quad \text{Portugal}$$

$$\sum_{i=14}^{15} w_{14} = .05 \quad \text{Luxembourg}$$

$$\sum_{i=15}^{15} w_{15} = .04 \quad \text{Iceland}$$

Dr. Oliver Benson[32] has extended Riker's concept to investigate size and potential conflicts within a coalition. The formula used for determining the number of relationships depends upon the symmetry or asymmetry of nations.

Hence, the number of potential conflicts within a coalition of a given size may be represented as:

$$n(n - 1)/2 = \text{paired relationship}$$

Two possible measures of balance have also been suggested by Dr. Benson.[33] The states, he suggests, may be scaled from

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[32] Ibid., 6-3.

[33] Ibid., 6-4.

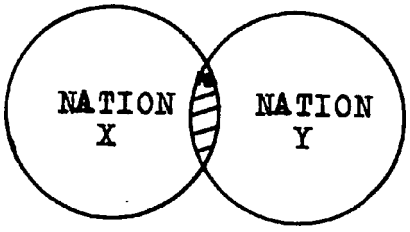
the strongest to the weakest. By using standard deviation of the strongest to the next state, this will enable, Dr. Benson suggests, somewhat of a measure of "balance."

3.4 Conflict Model: Boulding defines conflict as:

> A situation of competition in which the parties are aware of the incompatibility of potential future positions and in which each party wishes to occupy a position that is incompatible with wishes of the other.[34]

Boulding analyzes conflict phenomena in terms of two basic models which he postulates (a) a static and (b) dynamic model.

(a) Static Model. The system inflicted in the general area of conflict space Boulding terms as "behavior space." This concept is very similar to phase space as discussed by this writer in system analysis. A simple static model would then be:



Boulding defines the shaded area of the model as the conflict set.

(b) In the dynamic model, game theory plays a very important role. The basic concept of game theory is that of payoff matrix. A game is a situation in which there is a certain number of parties each of which is capable of

---

[34]Kenneth E. Boulding, Conflict and Defense (New York: Harper and Brothers, 1962), 5.

assuming one out of a given number of choices. There could be two persons or n-person (where n 2) game form.

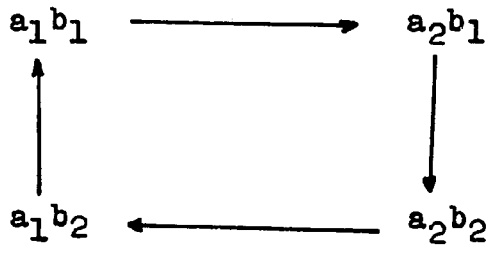
A typical two person game strategy is:

	A_2	B_2	C_2
A_1	3	1	-4
B_1	2	-2	0
C_1	5	2	3

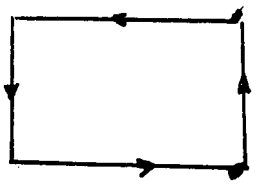
	A_2	B_2
A_1	3.3	- 5.5
B_1	5	- 5 - 3 - 3

In a matrix form it may be represented in the following form:

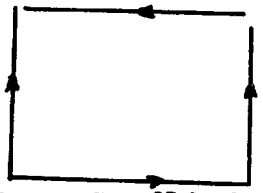
	a_1	b_2
b_1	(0 0)	(1 - 1)
b_2	(-1 1)	(0 0)



From the Richardson process models, Boulding deduces the following graphic models.



Mixed Conflict



Pure Conflict

In the international realm Boulding admits that "there are problems involved in the definition of the party to

international conflict."[35] The following typology is mentioned:

(1) The tribe

(2) Feudal society

(3) The universal agricultural society

(4) The industrial power

(5) The superpower

(6) The world state

Leaving out the sixth type as not "yet relevant," Boulding comes up with sixteen possible conflict situations.

Bernard[36] analyzes conflict phenomenon in terms of two basic models which postulate in essence, position scarcity (mutual exclusiveness) with respect to given objects and opposed values (mutual incompatibility). Both, he suggests, lead to issues and require choices. Information as to the state of affairs concerning these two types of conflict may be extended to include international state system. A conflict paradigm may be constructed on the basis of subjective information-dimensions reflecting the views of nations and their judgments on the existence of mutual exclusiveness and mutual incompatibility.

In this connection, Sherif's intragroup relations

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[35] Ibid., 227.

[36] Jessie Bernard, "Parties and Issues in Conflict," Journal of Conflict and Resolution, 2 (June, 1957), 111-122.

study[37] models may be extended to include nations-state system. In his Robbers Cave experiment, Sherif postulated three main hypotheses. There were:

Experimental Ingroup Formation

H_1 A definite group structure consisting of differentiated status positions and reciprocal roles will be produced when a number of individuals interact with one another under conditions.

Intergroup Conflict Phase

H_2 When individuals interact under conditions stated in H_1, concomitant with formation of group structure, group conflict and tension emerges.

Intergroup Integration Phase

H_3 When groups in a state of friction are brought into contact under conditions embodying superordinate goals, "the attainment of which is compelling but which cannot be achieved by the efforts of one group alone," they will strive for common goal.

By extrapolating Sherifian thesis, there is no reason why it cannot be applied to international conflict situations.

3.5 Game Theory Models: To a large extent, political models have largely been guided by game theory models. As Shubik states:

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[37] Muzafer Sherif et al., Intergroup Conflict and Cooperation: The Robbers Cave Experiment (Norman: The University of Oklahoma Press, 1961). Also see I. L. Janis and D. Katz, "Reduction of Intergroup Hostility," The Journal of Conflict and Resolution, 3 (1959), 80-100.

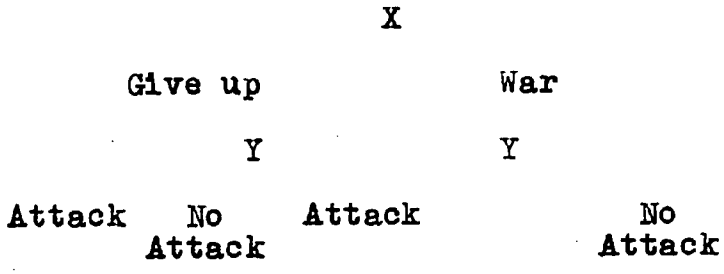
> The essence of a "game" in this context is that it involves decision-makers with different goals or objectives whose fates are interwind. The individuals are in a situation in which there may be many possible outcomes with different values to them.[38]

Game theory as applied in political science has developed certain terminology. A game is described in terms of players or individual decision-makers planning a strategy which may involve two (called two-person games) or more (called n-person games) players. The payoff and the rules specify the variables that each player controls. The payoff may be maximum or minimum. Translating these terminologies in political science language will mean:

(a) Players as nation-states system

(b) Strategy as diplomatic and other planning of events

In the diagram below, a simple type of threat situation is presented.[39]



When a decision-maker contemplates the actual situation between the nation X and Y, these following questions may be raised.

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[38]Martin Shubik (ed.), Game Theory and Related Approaches to Social Behavior (New York: Wiley and Sons, 1964), 8.

[39]Ibid., 22-23.

Choices

1. Is it possible for a country to precommit itself to a line of action?
2. Are there actually two major alternatives?
3. Do values stay fixed over the period of negotiations?
4. Is the other country thinking in terms of strategies?
5. Surely negotiations between two countries are part of a larger on-going process and must be investigated in a complete dynamic context?

As pointed out by Rapoport,[40] in negotiations there is an effort to make the opposition "see things your way." The values held by the participants at the start of the negotiations may not be the same as "those held at the end of the negotiations." The adaptive models of Simon,[41] the role of aspiration level,[42] the possibilities for the rationalization of one's actions through the mechanisms described by Festinger as cognitive dissonance[43] lead to the conclusion that negotiations are an intermixture of values rather than one concrete value.

Goldhamer and Speier[44] suggest in an actual gaming

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[40]Anatol Rapoport, Fights, Games and Debates (Michigan: University of Michigan Press, 1960).

[41]Herbert Simon, Models for Man (New York: John Wiley and Sons, 1957).

[42]S. Siegel, "Level of Aspiration and Decision-Making," Psychology Bulletin, 64 (1957), 253-262.

[43]Leo Festinger, A Theory of Cognitive Dissonance (New York: Row-Peterson, 1957).

[44]H. Goldhamer and H. Speier, "Some Observations on Political Gaming," World Politics, 12 (1959), 71-83.

performed at RAND, six main formulations were sought after. These were:

1. Minimal formalization
2. Simulation of incomplete and incorrect information
3. Simulation of contingent factors
4. Plausibility of game events
5. Clarification of issues
6. Explorations of novel strategies

What contribution then has game theory made in political science? As Snyder suggests,

> Game theory may provide the political scientist with the raw materials for concise, economical and powerful models that in some way may be markedly superior to the ones he now has. . . . certain Rey concepts--power, decision, conflict, and co-operation--are badly in need of more precise and operational definition and in need of explicit rules for governing their use as research tools.[45]

3.6 Simulation Model: Simulation models in political science have been used as an operating representation of central features of reality. Northwestern simulation has largely been of two types--war and other social psychological group experiments. Both have been directed under the able guidance of Professor Guetzkow. Guetzkow defines simulation process as "operating representation in reduced and/or simplified form of relations among social units by means of

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[45]Richard Snyder, in Roseneau (ed.), op. cit., 386. Also see Karl Deutsch, "Game Theory and Politics," The Canadian Journal of Economics and Political Science, 20 (February, 1954), 76-83.

symbolic and/or replicate component parts."[46] Guetzkow in his simulation operations[47] used small group analysis. Group has been defined by Sherif as a:

> social unit which consists of a number of individuals who stand in (more or less) definite status and role relationships to one another and which possesses a set of values or norms of its own regulating the behavior of . . . members at least in matters of consequence to the group.[48]

Small groups do not drop out of a clear blue sky with stabilized relationships among members and a set of norms. "Political groups" as Sherif suggests are similar to "political categories" in that their members are aware that they share something in common--a consciousness of kind. They differ from social or political categories in one important respect--relations between individuals. The members of a "political group" (as formed by Guetzkow in laboratory situations) are in <u>interaction</u> with one another ("face-to-face contact"); that is, there is a mutual and reciprocal influence to each other. As Guetzkow suggests, "Contrived face-to-face groups, even when they are created in the experimentor's laboratory, are more replications of

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[46]Harold Guetzkow, "A Use of Simulation in the Study of International Relations," <u>Behav. Science</u>, 4 (July, 1959), 183-191.

[47]Harold Guetzkow (ed.), <u>Simulation in International Relations</u> (New Jersey: Prentice-Hall, 1963).

[48]Muzafer and Carolyn Sherif, <u>An Outline of Social Psychology</u> (Harper and Row, 1956), 144.

reality than they are simulations."[49]

For some time now, the approach to group concepts has been an important facet of political analysis. In an earlier period, political research centered on the role of pressure groups in a democratic society. More recent times have witnessed a growing emphasis on the interdependence of social-political behavior patterns. One effect of this has been the increasing frequency with which small group-oriented studies[50] as evidenced in simulation field and others have originated. Using the work of Bentley[51] as a base, Truman and others[52] have developed the internal approach which views the nation-state from outside as a cell in the political organism and societies as essentially collectivities of groups.

A variety of simulation techniques has been developed and employed by social scientists and a number of terms are currently in use. Among the more frequent terms used in simulation are: small group analysis, man-machine simulation, analog computer simulation, gaming, Monte Carlo

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[49]Guetzkow, op. cit., 276.

[50]Sydney Verba, Small Groups and Political Behavior (Princeton: Princeton University Press, 1961).

[51]Arthur E. Bentley, The Process of Government (Chicago: University of Chicago Press, 1908).

[52]David Truman, The Governmental Process (New York: A. A. Knopf, 1951), and also Alfred de Grazia, "Nature and Prospects of Political Interest Groups," Annals, 319, 113-122.

techniques, digital computer simulation, analog computer simulation, machine simulation, and real-time simulation.

In political science in specific, the usages of simulation are several and the techniques are varied.[53]

Sola Pool and Abelson[54] have simulated the studies of data obtained at the Roper Public Opinion Research Center in Williamstown. The "issue clusters" containing in a 480x52 matrix included political issues such as foreign aid, attitudes toward the United Nations, and McCarthyism. Other so-called "issue-clusters" included familiar indicators of public opinion such as party belonging, vote intention, etc. An actual correlation with "trail heats contemporaneous with simulation data" was found to be .53.

Oliver Benson[55] has designed A Simple Diplomatic Game to be applied in the field of international relations. Basic arrangements for simulation for this particular is through the help of IBM 600 series. As Benson states: "Input to the program is of two kinds: (a) data descriptive of the nine large actors' states and nine small target states

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[53]For a stimulating study see Harold Guetzkow (ed.), Simulation in Social Science Readings (New Jersey: Prentice-Hall, 1962).

[54]Ithiel de Sola Pool and Robert Abelson, "The Simulmatic Project," The Public Opinion Quarterly, 25 (1961), 167-183.

[55]Oliver Benson, "A Simple Diplomatic Game," in Rosenau (ed.), op. cit., 504-511.

which make up the program's universe and (b) action data."[56] Nine major powers for the "action data" were: United States, Britain, the Soviet Union, West Germany, France, Italy, India, China, and Japan. As Benson states "nine target states are chosen from recent tension areas" (Korea, Guatemala, Egypt, Lebanon, Hungary, Vietnam, Taiwan, Cuba and the Congo).

The basic descriptive data in this international simulations consist of:

(a) nine indicators of war potential

(b) nine indicators of aggressiveness ("propensity to act")

(c) information on atomic capability

(d) coalition membership

(e) possession of bases abroad

(f) geographical location

(g) the data on mutual trade relationship.

Using this as a basic frame of reference, Benson develops a scale for measuring action areas. These are:

Intensity	Action
.100	Diplomatic Protest
.200	United Nations Action
.300	Severing Diplomatic Relations
.400	Propaganda Subversion Campaign
.500	Boycott or Reprisals
.600	Troop Movements
.700	Full Mobilization
.800	Limited War
.900	All Out War

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[56] Ibid., 505.

With these formulations, simulation model then proceeds to detect "tension-action areas."

Rome and Rome[57] have developed quite an extensive computer simulation called "the Leviathan Computer Program" for large organizations. As Rome and Rome state: "Leviathan's programs provide it (the simulation) with a facility for many kinds of investigations. Parameters have been provided wherever specific quantitative values are needed."[58]

3.7 Scale Model: Several attitude studies in political science[59] have incorporated scale models. The basic attitude scale has been the type devised by Guttman. Most of the writers in using Guttman's scale have assumed several propositions. It is fitting, thus, at this point to discuss the assumptions of Guttman's scale model.

Guttman's technique can basically be described as a "Scalogram technique." Two important assumptions of Guttman's scale model are:

(a) Linearity

(b) Unidimensionality

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[57]Sydney C. Rome and B. K. Rome, "Computer Simulation Toward a Theory of Large Organizations," in Harold Borko (ed.), Computer Applications in the Behavioral Sciences (New Jersey: Prentice-Hall, Inc., 1962), 523-555.

[58]Ibid., 551.

[59]Glendon Schubert, "Judicial Attitudes and Voting Behavior: The 1961 Term of the United States Supreme Court," Law and Contemporary Problems, 28 (1963), 100-142, also see H. McClosky, P. J. Hoffman and R. O'Hara, "Issue Conflict and Consensus Among Party Leaders and Followers," American Political Science Review, June (55), 406-427.

(a) A Test of Linearity: There is no relationship in the population. As we shall see, if we can assume a bivariate normal distribution, we can use analysis of variance to test the hypothesis = b = 0 (null hypothesis). In other words, if there is no linear association in the population, the slope of the regression equation will be zero. If the regression of Y and X is linear, we can write an equation as follows:

$$Y = a + bX$$

where a and b are constants.

(b) Unidimensionality: Let us examine another important aspect of Guttman's model. In a fourfold study of joint occurrences[60] two basic questions were asked:

Is war good?

Is war bad?

Let us assign each question a value of (1) and (2). A rough probability model in such an event would be

.9	.1
.8	.2

A fourfold study of joint occurrences in a paradigm would look like:[61]

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[60] T. W. Anderson, "Probability Models for Analyzing Time Changes in Attitudes," in Paul F. Lazarsfeld (ed.), Mathematical Thinking in the Social Sciences (Illinois: Free Press, 1954), 24.

[61] L. Guttman, "The Principal Components of Scalable Attitudes," in Ibid., 219.

	Is War Good	
	Yes	No
Is War Bad? Yes		
Is War Bad? No		

To carry it one step further, Guttman assumes that there is an underlying continuum for the "universe of attitude" towards war. Guttman expressed that the selection of a small number of statements from the large number of possible statements representing what he called "universe of contents,"[62] should be done upon intuition and experience. He also stated that the questions selected should be those that have a "homogeneous content."[63] Perhaps as Festinger put it, one should look for statements all of which are, to a large extent, rephrasings of the same thing.[64]

Loevinger[65] has stressed the essential similarity between what she calls "a cumulative homogeneous test" and Guttman's test. She develops a coefficient H_{ij} to measure

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[62]L. Guttman, "A Basis for Scaling Qualitative Data," American Socio. Review, 9 (1944), 139-150.

[63]L. Guttman, "On Festinger's Evaluation for Scale Analysis," Psych. Bulletin, 44 (1947), 451-465.

[64]L. Festinger, "The Treatment of Qualitative Data by 'Scale Analysis,'" Psych. Bulletin, 44 (1947), 159-163.

[65]J. Loevinger, "The Technique of Homogeneous Tests Compared with Some Aspects of Scale Analysis and Factor Analysis," Psych. Bulletin, 45 (1948), 507-529.

the degree of homogeneity of two statements and a coefficient H_t for a given set of statements.

We assume now, that a group of individuals possessing an attitude towards war in a percentile metric.

Unfavorable		Favorable	
Let us assign a value of,			
favorable a value of	1		(A)
favorable but not quite as	1	.75	(B)
has not made up mind		.50	(C)
NOT favorable a value of		.25	(D)
unfavorable a value of		.00	(E)

When objects can be ordered along a single continuum, interesting relations exist among the objects. For example, we know that (A) with rank 1 is higher than the other remaining attitude variables (n - 1).

Suppose, we have five rods[66] arranged in order of magnitude with respect to length. At this point, we pay no attention to the actual measured differences. Any set of n objects arranged in order of magnitude of some variable or attribute is said to be "ranked." Let us assign the object with the highest value of the variable a rank 1, the next highest rank 2...n.

Let us bring another set of sticks of varying but

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[66]A. L. Edwards (ed.), Techniques of Attitude Scale Construction (New York: Wiley and Sons, 1942).

unknown length. Let us take each stick in turn and compare it with each of the five rods. If the stick is longer than a given rod, we assign a value of 1 and if shorter, we assign a value of 0.

The following matrix will generate:

1	1	1	1	1
0	1	1	1	1
0	0	1	1	1
0	0	0	1	1
0	0	0	0	1
0	0	0	0	0

From the matrix, it may be noted that scores assigned to the sticks thus met Guttman's requirements for a scale and we may say that these scores fall along a unidimensional continuum.

The practical technique of scale analysis with empirical data, with such a correspondence, is approximately possible. Most political scale studies[67] have used a specific Guttman technique known as "Cornell technique."[68] If the hypothesis is sustained, then there ensues an empirical approximation to ranks along a political continuum.

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[67]Glendon A. Schubert, Quantitative Analysis of Judicial Behavior (Illinois: The Free Press, 1959).

[68]L. Guttman, "The Cornell Technique for Scale and Intensity Analysis," Ed. and Psych. Meas., 7 (1947), 247-249. For a machine technique using IBM see R. N. Ford, "A Rapid Scoring Procedure for Scaling Attitude Questions," Public Opinion Quarterly, 14 (1950), 507-532.

The empirical political variables might be transferred to empirical scale variables.

3.8 Information Theory Model: Mathematical assumptions of information theory have been discussed earlier. In the mathematical sense of the word, political science has not developed to a great extent.

Snyder,[69] in his decision-making model, also discussed earlier, has used some form of information theory. In the basic formulation of a decision-making model, Snyder suggests that the actor is influenced by "Information-Communication" along with other variables.

Deutsch[70] has used communication models to emphasize the implications for the evaluation of certain aspects of organizational behavior. Deutsch suggests information-flow models have been used in physiology, economics, and neuro-psychology.[71] In his special reference to organization, Deutsch states:

> Communication and control are the decisive processes in organizations. Communication is what makes organizations cohere; control is what regulates their behavior. If we can map the pathways by which information is communicated between different parts of an organization and by which it is applied to the behavior of the organization in relation to the

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[69] Robert Cecile, op. cit.

[70] Karl Deutsch, "On Communication Models in the Social Sciences," Public Opinion Quarterly, 16 (1952), 356-380.

[71] Ibid., 358-359.

outside world, we will have gone far toward understanding that organization.[72]

Deutsch[73] in his recent work applies this organizational information theory in the governmental process. He builds his operational model on the assumptions of serve-cybernatic and feedback systems. He applies such concepts to measure the "adaptativeness" or "nonadaptativeness" of political system.

3.9 Probability Model: Probability models in social science have been used quite widely.[74] In political science, Grum[75] has used the essential methods of probability models in the study of legislative behavior.

But as such, no such political model is in existence which has used a strict probability model to abstract political behavior. In various statistical studies, probability functions have been used to ascertain political attitude,[76] voting behavior, etc.[77]

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[72] Ibid., 367.

[73] Karl Deutsch, The Nerves of Government: Models of Political Communication and Control (New York: The Free Press, 1963).

[74] T. W. Anderson, op. cit., 28-66.

[75] John G. Grum, Quantitative Methods in Legislative Behavior: Probability Models, Cluster Analysis and Factor Analysis, Mimeographed, 1962.

[76] H. McClosky, op. cit.

[77] Angus Campbell et al., The American Voter (New York: John Wiley and Sons, 1964).

3.10 Statistical Model:

(a) Multivariate Model: Relationship between two variables has been investigated by several political scientists.[78] This method of descriptive statistical technique has been used in political science to illustrate city-state[79] and international system.[80] Simple relationship may be established by using multivariate technique. For example,[81]

	Aggressor	Nonaggressor
	A	$\bar{A}$
Attacked B	a	b
Not Attacked $\bar{B}$	c	d

A simple relation of proportion may be established as:

$$\gamma = \frac{ad - bc}{(a + c)(b + d)}$$

Where γ = Yule's[82] criterion of independence. Russett, Alker, Deutsch and Lasswell in their formidable study of World Handbook of Political and Social Indicators[83]

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[78]Hayward Alker, Jr., Mathematics and Politics (New York: The MacMillan Co., 1965), Chs. 4-5.

[79]Grum, op. cit.

[80]Benson, op. cit.

[81]Alker, op. cit., 57.

[82]Yule was the first to establish this result for dichotomous attributes. For an application of Yule's coefficient in social science see Paul Lazarsfeld, "Evidence and Inference in Social Research," Daedalus, 87 (Fall, 1958).

[83]Bruce Russett et al., World Handbook of Political and Social Indicators (New Haven: Yale University Press, 1964).

have used a series of multivariate relationships to establish a series of hypotheses.

Grum has also used this technique to study legislative roll call relationship.[84]

This simple (2x2) or (nxm) relationship of political attributes, as may be noted, has been used quite widely in political science studies.

(b) Factor Analytic Model: Another often used statistical compilation has been factor analytic model.

Alker,[85] by using factor analysis, has studied the dimensions of conflict in the United Nations General Assembly.

A formidable study of societies by using factor analysis has been undertaken in a brilliant manner by Gouldner and Peterson.[86]

Another ambitious attempt, using factor analysis, has been made by Gregg and Banks[87] in studying the dimensions of political systems. As the authors stated:

> it has become increasingly common for political scientists to speculate as to the basic factors which may

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[84]Grum, op. cit. See especially footnote No. 29.

[85]Hayward R. Alker, Jr., "Dimensions of Conflict in the General Assembly," Am. Pol. Sci. Rev., 58 (September, 1964), 642-657.

[86]Alvin W. Gouldner and R. A. Peterson, Notes on Technology and the Moral Order (New York: The Bobbs-Merrill Co., Inc., 1964).

[87]Philip M. Gregg and Arthur S. Banks, "Dimensions of Political Systems: Factor-Analysis of a Cross-Polity Survey," Am. Pol. Sci. Rev., 59 (September, 1965), 602-614.

> be common to all political systems and which in their varying manifestations determine the unique styles of political behavior within each.[88]

The authors factor analytic study confirmed the types which political scientists currently employ. For example, the factor analytic type noted as "one party Totalitarian System" pronounces the same characteristics used by Friedrich and Brzezinski label.[89]

The principal task in this review has been to identify the extensive use of model building in political science. It is this writer's hope that such synthesis will enhance the development of a formal rigor, so urgently needed in the study of political behavior.

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[88] Ibid., 602.

[89] Carl J. Friedrich and Z. K. Brzezinski, Totalitarian Dictatorship and Autocracy (Cambridge: Harvard University Press, 1956.

CHAPTER II

APPLICATION OF LOGICAL MODELS IN POLITICAL SCIENCE

1.1 In recent Political Science literature, the application of logical models[1] to explain behavioral phenomena is on the rise. There seem to be two basic approaches[2] in constructing logical models: abstraction and realization.

In abstraction, the real world situation is thought of and is put into a model. The system has been used in political science[3] as a representative mathematical model.

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[1]For a stimulating discussion on the usage of models in Social Science see: A. Chapins, "Men, Machines and Models," American Psychology, XVI (1961), at 113; Paul Meadows, "Models, Systems and Science," American Sociological Review, XXII, 3-9; Everett E. Hagen, "Analytical Models in the Study of Social Systems," American Journal of Sociology, LXVII (1961), 144-151; Kenneth J. Arrow, "Mathematical Models in the Social Sciences," in Daniel Lerner and Harold D. Lasswell (eds.), The Policy Sciences (Stanford: Stanford University Press, 1951), 129-154; Karl W. Deutsch, The Nerves of Government (Glencoe, Illinois: The Free Press, 1963), chs. 1-3.

[2]C. H. Coombs et al., "Some Views on Mathematical Models and Measurement Theory," in R. M. Thrall et al. (eds.), Decision Process (New York: John Wiley and Sons, Inc., 1954), ch. 2.

[3]Oliver E. Benson, "Simulation of International Relations and Diplomacy," in Harold Borko (ed.), Computer Application in the Behavioral Sciences (New Jersey: Prentice-Hall, Inc., 1962), 574-595.

In abstraction, the political behaviorists have perceived several variables to be affecting "the universe of content."

Model building by realization is somewhat the opposite. Here, the investigator starts with the "logically consistent" conceptual systems. In such a model, the reflection of the "real world," is supposed to be contained in the system. It is thus, in short, a process of going from the logical system to the real world.

Model by this method has also been widely used in the social science literature. One of such a mathematical tool, Markov process,[4] has been used to study several behavioral phenomena.

In this paper, two logical models: Implicational and Typological models especially applicable to political studies will be discussed. In the second half of this paper, this writer will present an analytical-implicational decision model.

1.2 Implicational Model

Seemingly, the necessity of categorizing the unstructured data in terms of the existence or non-existence of referent condition, in order to most comprehensively utilize such uniformities as do hold, might be considered a disadvantage. In terms of utilizing the powers of various

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[4]Paul F. Lazarsfeld (ed.), Mathematical Thinking in the Social Sciences (Glencoe, Illinois: The Free Press, 1954).

statistical tools which are available this is to a certain extent so, inasmuch as this method produces encoded data manupulable only at the lowest or most primitive of the levels of measurement, the nominal scale or mere counting level. However, there are many statistical measures which are useful at such levels and these have been fruitfully used throughout the behavioral sciences where many researches produce data not susceptible to the necessary assumptions of parametric statistical measures, as opposed to the former or nonparametric measures.

At this point it is relevant to mention a recent upsurge of interest in the application of logical models to statistical analysis problems. The methodologist, R. G. Francis,[5] proposed the need for utilizing logical analysis in studying relationships in research. Explanations relate to the assertion of relations, which invokes the image of logic, especially when antecedents and consequents are involved. He proposed that logical relationships could be assessed through use of 2 x 2 tables.[6]

Thus, we may, with our data, seek for those consistent appearances of a given condition which occur throughout whenever certain other conditions occur or do not occur.

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[5]Roy G. Francis, The Rhetoric of Science: A Methodological Discussion of the Two-by-Two Table (Minneapolis: The University of Minnesota Press, 1961).

[6]Ibid., 17-35.

This leads to the happy circumstance that we are able to glean from a mass of unstructured data which include mixed levels of interdependence a reliable statement of conditions which do happen to absolutely hold throughout the data, through rigorously defining our variables and level of analysis. The method of analysis will be presented in terms of the discussion presented by Magoroh Maruyama,[7] Stanford University, in his paper Conjunctive-Disjunctive-Implicational Model in Discrete Scales.

Suppose that we are confronted with the following tabulation of data:[8]

	ate oysters	had warm blankets	cabin was cold	has headache	had good appetite
Joe	yes	yes	yes	yes	no
Jane	yes	yes	no	no	no
Jim	yes	yes	yes	yes	no
.	.	.	.	.	.
.	.	.	.	.	.

We could try to discover some relationships between headache and the other factors. One possible hypothesis might be that cold cabin implies headache, or its equivalent that absence of headache implies that one has not slept in a cold cabin. If we tabulate the number of subjects for the

[7] Magoroh Maruyama, "Conjunctive-Implicational Model in Discrete Scales," Journal of Experimental Education, XXX (1962) 289-305.

[8] Ibid., 289.

four possible response patterns (++), (+-), (-+), (--) for the two test conditions CC and H, we might find that there are no subjects for the (+-) response pattern, in which case the hypothesis would be supported. The hypothesis is not used to propose a causal relationship, but rather proposes a logical inferribility--an implicational relationship. The hypothesis is supported by the fact that the numbers of the subjects for (+-) is zero. It is confirmed by the fact that the numbers of subjects for (++) and for (--) are non-zero; and the number for (+-) is zero. The number for (-+) is irrelevant for the hypothesis. If the number for (-+) were zero, then we would have two-way implications, or logical equivalence. To distinguish between the one and two way implicational relationships, we call the former the proper implication. A proper implicational relationship holds if and only if one and only one of the four cells in a two-by-two table is empty. The direction of the implication is summarized here:

		Q: yes	Q: no
if P then Q (if $\not Q$ then $\not P$)	P: yes	1	1
	P: no	0	1

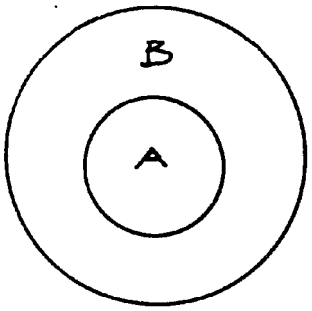
		Q: yes	Q: no
if Q then P (if $\not P$ then $\not Q$)	P: yes	1	0
	P: no	1	1

		Q: yes	Q: no
if P then $\not Q$ (if Q then P)	P: yes	0	1
	P: no	1	1

		Q: yes	Q: no
if $\not P$ then Q (if $\not Q$ then P)	P: yes	1	1
	P: no	1	0

We may play with the table to discover any relationships between the antecedent (row) and consequent (column)

variables which might hold. The ultimate relationships we desire to discover are equivalence relationships. This is the situation in many political studies, one gathers data and tries to find what conjunctive-disjunctive combinations of circumstances provide necessary and sufficient conditions for other circumstances. In fact, causal analysis has popularly become (when going beyond a mere search for association) a quest for necessary and sufficient conditions existing throughout a particular set of data. The proposition "if A then B" is an implicatory statement and can be read "A implies B." This relationship is demonstrated in the Venn diagram presented in Figure A, to the right. The converse, given in parenthesis for P and Q above, would here be "if not in B then not in A." Hence, we can see that A is a sufficient condition of B, and B is a necessary condition A. Furthermore, we can see the parallel relationship with experimental relationships with which we are acquainted; membership in A is dependent upon membership in B, while membership in B is independent of membership in A. The following list summarized these parallels:



antecedents	(implication relation)	consequents
sufficient conditions		necessary condition
dependent variables		independent variable

Instead of recording the response patterns of an independent variable on all tests, or conditions, or variables, we may record the response pattern of a test on all such variables, so that there is a symmetry in applying the method to data. Maruyama[9] extends in his paper the work conceptualized by Francis into the implicational relationships between multi-variate conjunctive-disjunctive (implicational) conditions through introducing statistical measures capable of computer programming and of application to continuous rather than discrete data, such as the 1-0 data we deal with in this study. There are cases where we are concerned as to the possibility of spurious relationships which can be introduced by where one chooses the cutting points in order to convert continuous scales into discrete scales. In order to maintain comparable degrees of freedom, in a two-by-two table, we must choose the cutting points of continuous-scale data at the median which will ensure that exactly half of the cases will fall into the category above the median and half into the category below the median.

One advantage of implicational analysis is that it can discover relationships which can hardly be uncovered by most of the measures of association, correlation, etc. These relationships uncovered are not statistical, they are not representative of distributions holding to a given level

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[9] Ibid., 291-292.

of probability. Instead, they are absolutely descriptive of complete implicative nature of political studies.

In this spirit, let us discuss Dahl's major premise in Modern Political Analysis.[10] He defines "a political system" as "any persistent pattern of human relationships that involves, to a significant extent, power, rule and authority."[11] The derivation of such a thesis came about through an implicational analysis on the basic definition of politics as expounded by Aristotle, Weber and Lasswell. It may be noted that checking the agreement and disagreement between the three above mentioned theorists, Dahl[12] came up with the general definition of "politics" as quoted above.

With a more mathematical rigor, Benson,[13] using Venn diagrams has investigated the leadership roles in alliance commitments. Using NATO, SEATO, and CENTO, he clearly points out the roles played by the countries involved in such alliances.

1.3 Typological Models

Ideographic devices are creatively useful in extension of the bound of our knowledge. As such a heuristic

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[10]Robert Dahl, Modern Political Analysis (New Jersey: Prentice-Hall, Inc., 1963).

[11]Ibid., 6.

[12]Ibid., 5-7.

[13]Oliver E. Benson, Quantitative Methods in International Relations (Monograph: University of Minnesota, Minneapolis, 1964), Sec. 6-4.

instrument, the 2 x 2 table has a long and varied history in facilitating the construction of types. Thus, besides the assessment of association and the analysis of implication, we can use the 2 x 2 table for comparison of typological relationships. Other convergent terminologies refer to systematic, clustering and configurational relationships. The case study method provided a steppingstone to the construction of documentation of types, which social theorists used to conceptualize society as a whole. Many feel the best single exposition on using the type is found in Max Weber's[14] Methodology of the Social Sciences. But, we would refer the reader to Howard Becker,[15] wherein he states "The logic of experiment . . . is the bedrock of constructive typology."

Generally, the history of philosophical and scientific efforts to understand behavior as well as society shows concern for the significance of patterns. The approach of taxonomic classification is consistent with typological theories, wherein a response can have different assessment depending on other combinations with which it occurs because interaction variance is utilized.

In psychology, mental measurement usually assumes a

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[14]Max Weber, Methodology of the Social Sciences, translated by Edward A. Shils and H. A. Finch (Glencoe, Illinois: The Free Press, 1949).

[15]Howard Becker, Through Values to Social Interpretation (North Carolina: Duke University Press, 1950), ch. 2.

response means the same thing irrespective of who gives it so that they appear to potentially as an individual experience differences. But, they cannot do so if interpreted to have the same meaning unless all people have homogenous experiences. Responses which have the same meaning across all persons are quantitative responses and qualitative responses reflect various meanings, depending on who gives them. With the appearance of "Meahl's Paradox"[16] has emerged the present ability to presume that all items have predictive values when treated in combinations which they do not reveal when analyzed separately in relation to a criterion. Meahl has shown that items have different configural values for various types of subjects.

Louis L. McQuitty has developed from psychological theory the statistical methods, which he calls Elementary Linkage Analysis[17] and Elementary Factor Analysis,[18] a later refinement. These measures are based on a theory of types which use the assumption that responses have differential meanings depending on them through reflecting interaction

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[16]For a good discussion see Louis L. McQuitty, "Isolating Prediction Patterns Associated with Major Criterion Patterns," Educational and Psychological Measurements, XVII (1957), 3-42, at 9.

[17]Louis L. McQuitty, "Elementary Linkage Analysis for Isolating Orthogonal and Oblique Types and Typal Relevancies," Educational and Psychological Measurements, XVII (1957), 207-227.

[18]Louis L. McQuitty, "Elementary Factor Analysis," Psychological Reports, IX (1961), 71-78.

variance. Standard methods of factor analysis can accomplish the same tasks but are both laborious and limited in the number of variables they can analyze. Typal analysis, the term we shall use from the general set of related methods he has developed from which the above-mentioned were drawn, can extend computer machine capacity many times, in terms of number of variables, and so is helpful in selecting from many variables those to be analyzed further by more sophisticated methods. The method for isolating clusters or typal structures can be performed on a relatively large matrix of intercorrelations with only pencil and paper and using no more complicated mathematics than addition. Also, the method is applicable to matrices derived from simple agreement scores, nonparametric statistical correlation coefficients, or parametric statistical correlation coefficients, thus is not limited to rigorously confining assumptions concerning distributions of the data.

The fundamental difference between factor analysis and typal analysis is in terms of the assumed structure being investigated. Factor analysis is designed to isolate simple structure while typal analysis is designed to isolate typal structure.[19] However, the typal results can be treated to produce similar structures as factor analysis, and the method is less laborious than required by factor analytic

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[19]Louis L. McQuitty, "Rank Order Typal Analysis, Educational and Psychological Measurements, XXIII (1963), 55-61.

methods. Typal analysis also yields hierarchical solutions.

Once typal members have been isolated, a prototype can be defined as some composite of the characteristics possessed by members of the type and such similar "factor loadings," it is possible to compute "typal relevancies" for each member of the prototype.

In typal analysis, "a type is defined as a category such that every member is more like some other member of that type than he is like any member of any other type."[20] Again, the actual procedures stemming from this definition are simple enough to be done in a very short time and by anyone who can add, once a matrix of interassociations is available. Furthermore, the approach is applicable to data concerning relations between people, institutions, objects, etc.

To demonstrate the practical applicability of such a typological model in political research, the author's study on The Socio-economic and Demographic Correlates in Voting in 1960 Oklahoma Presidential Election[21] has been selected.

The central hypothesis of this study was to investigate and relate statistically, the factors influencing voting in seventy-seven Oklahoma counties. The variables selected

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[20] Ibid., 56.

[21] A. K. Basu, Socio-Economic and Demographic Correlates in Voting in 1960 Oklahoma Presidential Election (Monograph, University of Oklahoma, Norman, Oklahoma, 1964).

were as follows:

1. Number of places 10,000 or more in each county.
2. Per cent urban.
3. Per cent rural.
4. Per cent change in population.
5. Per cent non-white.
6. Per cent 21 or over.
7. Median age.
8. Median family income.
9. Per cent income with less than $3,000.
10. Per cent income with more than $10,000.
11. Per cent white-collar.
12. Per cent other than white-collar.
13. Per cent manufacturing.

Table 1 shows the inter-correlations between these thirteen above-mentioned variables. Once such an inter-correlation was obtained, the following types were generated (Table 2). The final typal analytical sampling produced the order as presented in Table 3.

1.4 Conclusion

The usefulness of these logical models is a function of the level of generalization the model achieves and the logical consistency it portrays. In political science, these types of models' usages is still limited. In what sense then can a logical model be called adequate? Two such obvious signs are ridiculous answers and the failure of the

Table 1

Inter-correlations Between Socio-economic and Demographic Factors Affecting Voting in 1960 Oklahoma Presidential Election

	2	3	4	5	6	7	8	9	10	11	12	13
1	-.04	.05	.12	-.36	-.68	-.10	.51	-.51	.52	.02	-.00	-.17
2		-.99	.59	.04	-.35	-.44	.55	-.55	.44	.73	-.75	.33
3			-.59	-.03	.34	.43	-.55	.55	-.44	-.73	.76	-.33
4				-.15	-.50	-.70	.63	-.62	.55	.60	-.62	.18
5					.26	-.10	-.50	.53	-.43	-.02	.01	.34
6						.31	-.68	.71	-.56	-.36	.36	-.12
7							-.38	.35	-.31	-.37	.39	-.22
8								-.98	.89	.51	-.51	.02
9									-.84	-.48	.48	.05
10										.49	-.50	-.09
11											-.99	.30
12												-.31
13												

Table 2

Delineation of Types

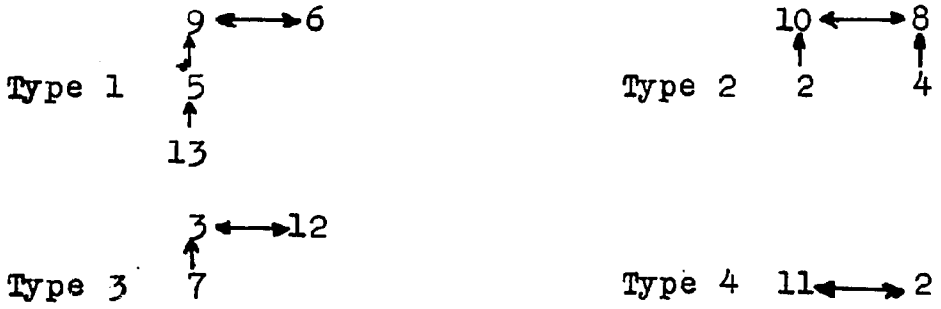

Table 3

Typal Order

	T_1	T_2	T_3	T_4
Prototype	% Income less than $3,000	Family Income	% Rural	% Urban % White Collar
	% 21 or over % Non-white % Manufact.	% Income over $10,000 Change in pop. Urban place 10,000 or more	% Other than white collar Median Age	

logical consistency. In the final analysis, the practicality of a model to a great extent will depend upon the level of symbolization one wishes to maintain.

2.1 This partly analytical-implicational model is geared largely by Weber-Fechner[22] formula. In individual sensory psychology this formula would apply to the stimulation. This logarithmic formula can be reexpressed in uncumulative form as the product of two variables equaling a constant "K."

$$X^{e}Y = K \quad \ldots\ldots\ldots \quad (1)$$

It is to be noted that the equation (1) is the general hyperbola or harmonic series. Also note that the equation is reduced to a simple hyperbolic function when the weighting exponent "e" becomes 1 and the equation also becomes a generalized hyperbola for other positive values of "e." This harmonic series (equation 1) in its cumulative or log. form was hypothesized as a model for a stimulus-response, decision-outcome or in other words "making-undertaking" in policy matters.

FORMULA:

From (1)

$$e \log x \log y - \log k$$

$$\text{or } e \log (x+y) = \log k$$

$$\text{or } e = \frac{\log k}{\log (x+y)}$$

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[22] J. P. Guilford, Psychemetric Methods (New York: McGraw-Hill Book Co., 1936), 139.

Decision "Making"

Science and statistical decision "speak the same language" both in literal and figurative sense. Statistical decision attempts to deal with the problem of action in the real world, but there are many ways of looking at the real world.

Decision making requires the selection of a course of action which may be called at this point as the guide lines of the game. These are:

(1) Say, in a foreign policy "making" there may be two or more actions possible which may be symbolized by X_1, X_2, X_3, ... X_n. The rule of the game here is that only one of those lines of action may be taken.

This last sentence is a restrictory one which does not limit the practical problem in any way. Any combinations of actions may be considered as a single action.

(2) The process of decision will select from these alternative actions, a single course of action which will actually be carried out.

To be specific, a foreign policy may emerge from a long, continuous, mutually exclusive action by several board members and finally from the head of state.

(3) The third and last rule of the game is to select

a course of action made so as to accomplish some designated purpose.

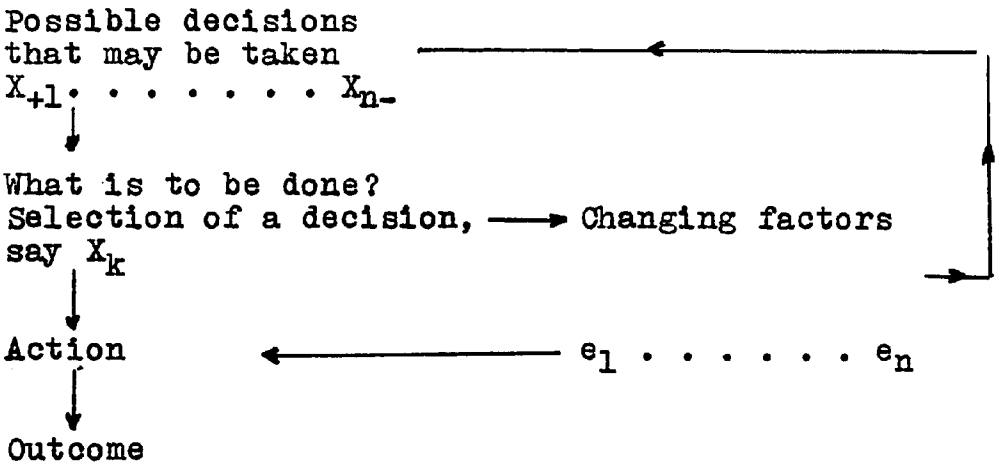
Generally the purpose will be to select an action which will lead to desirable situation in the real world in the future.

It is to be noted that time may play a very important role in the decision-making process.

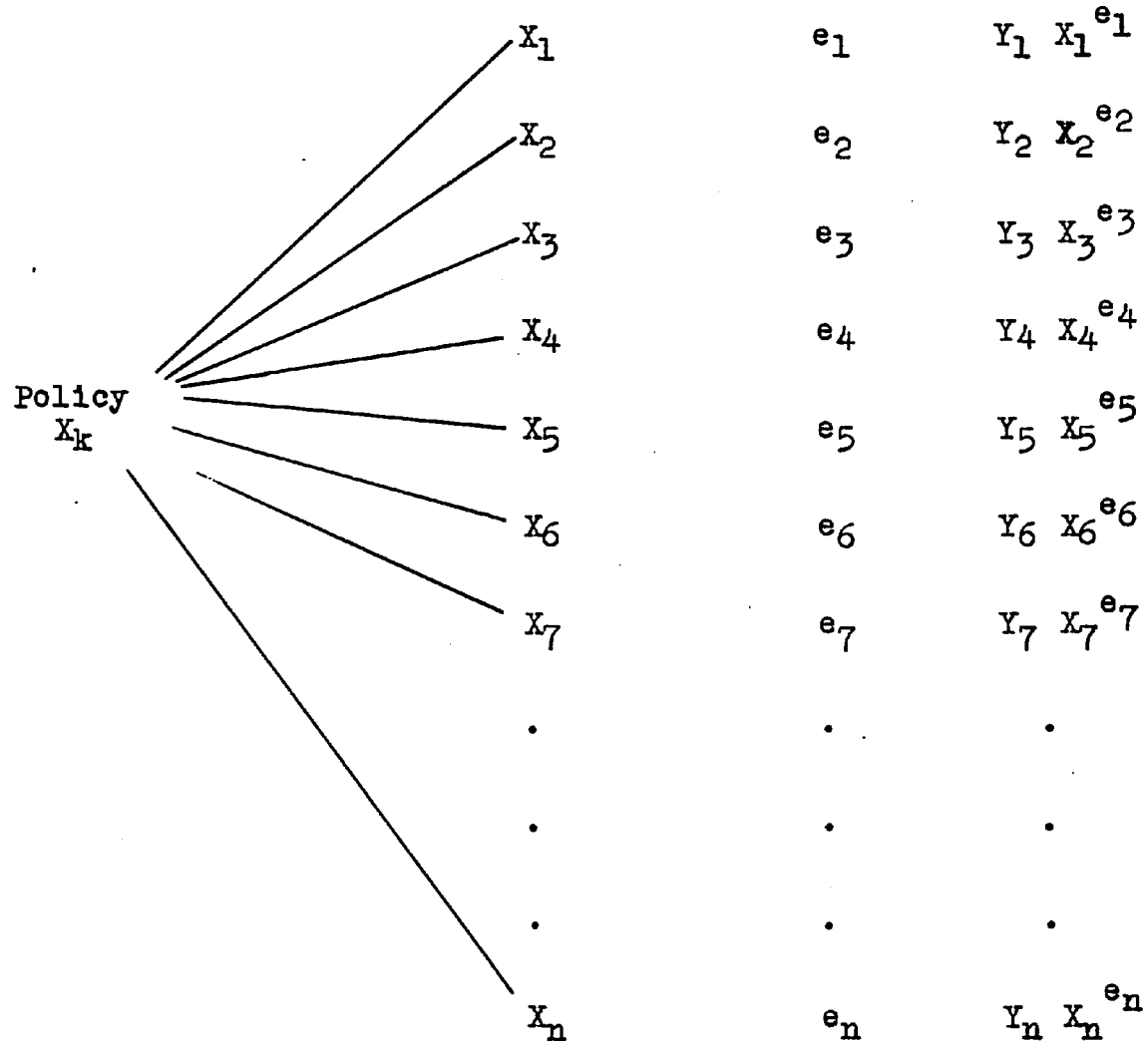
Let us refer to our equation at this point.

Let's denote a specific decision made at four o'clock today as X. Then there is the time of realizing, four o'clock tomorrow. Whether or not the decision (X) was satisfactory will depend on what situation exists in the real world at this future time (which we will denote by Y). Thus "e" in equation (1) will be called an accumulative-exponential changed factor.

The formula, in essence, boils down to the diagram drawn below:



2.2 To make a decision we must trace down the consequences of each of the alternative lines of action. Thus a flow chart drawn below might originate:



2.3 The consideration of "e" factor of this writer's knowledge has been introduced for the first time. In real life terms it may be noted that no decision is carried out in its exact form and order. With the increasing use of the data collecting and data processing constant interpretation and evaluations of the existing policies are made.

CHAPTER III

CAUSALITY: A METHODOLOGICAL INQUIRY

1.1 A Causal Odyssey

The explanatory function of the idea of cause and effect seems clearly evident as such in the building of models in political science. Its exploitation without understanding much as in the case of electricity in our own lives, seems to have begun with its use as a philosophic tool, a necessary if not sufficient condition for the attainment of puberty by that discipline. A similar necessary if not sufficient condition, in the case of emergent science, would then be the rupture of continued and accepting use of the idea of causality and the numerous embarkations upon its sea of discontent. The resulting history of explorations seeking the nature of causality fill many books.[1] Only a few

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[1]Some of them are: Mario Bunge, Causality (Cambridge: Harvard University Press, 1959); Herbert Feigl and Wilfrid Sellars (eds.), Readings in Philosophical Analysis (New York: Appleton-Century-Crofts, 1949); Herbert Feigl and May Brodbeck (eds.), Readings in the Philosophy of Science (New York: Appleton-Century-Crofts, 1953); Moritz Schlick, "Causality in Everyday Life and in Science," University of California Publications in Philosophy, XV (1932); Hans Reichenback, The Rise of Scientific Philosophy (Berkeley:

names involved in the maturation of definitions of causation will be mentioned here.

Generally, schools of conviction concerning the nature of cause fall into a few categories.[2] Probably the most primitive would be that of Causal Pluralism which says that the world is made up of causal systems which are independent of each other. Thus, coitus brings enjoyment but dancing and ritual brings babies. In Causal Monism, the antithesis, the universe is composed of a single causal system in practice consisting arguments which tend to lead back to a first cause, and in structure lead up the ladder of abstractions just as fast as one may find verbal legs to carry him. We daresay it is the argument most often soliciting a blow on the schnozz. The swing back toward synthesis is characterized by the elaboration of preceding arguments, and produces two forms of multiple causation theory.

University of California Press, 1951); Max Born, Natural Philosophy of Cause and Chance (2nd ed., Oxford: Clarendon Press, 1951); Leon Brunschvicg, L'experience Humaine et la Causalite Physique (Paris: Presses Universitaires de France, 1949); Ernest Nagel, The Structure of Science (New York: Harcourt, Brace and World, Inc., 1961).

[2]Aristotle in Metaphysics, Translated by H. Tredennick (London: Heinemann Publishers, 1947), Book I, Chapter 3, 983a, b, recognised four types of causes. "Of these we hold that one (the formal cause) is the essence or essential nature of the thing. (Since the 'reason why' of a thing is ultimately reducible to its formula, and the ultimate 'reason why' is a cause and principle); another (the material cause) is the matter or substrate; the third (the efficient cause) is the source of motion; and the fourth (the final cause) is the cause which is opposite to this, namely the purpose or good" for this is the end of every generative or motive process."

Multiple Causation I states that many causes produce the same consequential effect, as in all the roads by which might reach this address, and upon examination we all must have taken a variety of roads. In the theory of Multiple Causation II, which neither affirms nor denies the other multiple-causative theory, any consequent is said to result from the coexistence of two or more factors, so that if one of these factors should exist without the other then the consequent does not occur.

David Hume[3] argued that there were three sorts of connections which were sufficient to explain all relations among ideas:

> ". . . a picture naturally leads our thought to the original (resemblance), mention of one apartment in a building naturally introduces an enquiry or discourse concerning the others (contiguity), and if we think of a wound, we can scarcely forbear reflecting on the pain which follows it (cause and effect)."

His emphasis on seeking the relations among ideas stemmed from his conviction that one can only deal with mental impressions, connected by habits which lead to his conclusion that we can never prove cause but can only apprehend custom, or customary mental operations.

Karl Pearson,[4] a forefather of modern statistical methods, said:

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[3]David Hume, An Inquiry Concerning the Human Understanding, and An Enquiry Concerning the Principles of Morals (Oxford: Clarendon Press, 1894), 24.

[4]Karl Pearson, The Grammar of Science (London: Adam and Charles Black, 1911), 170-171.

> "What is the cause of it is a question which it may be absolutely impossible to answer, whereas the question. To what degree are other phenomena associated with it may admit of easy solution, and result in invaluable knowledge."

Thus Pearson utilized a technique of many scientists who, when faced with a difficult task, simply change the job. Even then, with the sophisticated answer of statistical association, he came near the answers most recently developed through semantic and operational definitions. Yet, like Hume he accepted the historical version of the problem, how to find causes, and upon deciding none could be proved changed his task for another.

John Stuart Mill[5] came up with his Canons of Causation, which must be mastered by all novices of experimental design. They are stated as:

> a. The Method of Agreement--if two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all instances agree, is the cause (or effect) of the given phenomenon.
>
> b. The Method of Difference--if an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur have every circumstance in common save one, that one occurring in the former; the circumstances in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause of the phenomenon.
>
> c. The Method of Concomitant Variation--Whatever phenomenon varies in any manner whenever another phenomenon varies in some manner, is either a cause or an effect of this phenomenon, or is connected with it through some fact of causation.

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[5]Morris R. Cohen and Ernest Nagel, An Introduction to Logic and Scientific Method (New York: Harcourt, Brace and Company, War Department, Education Manual, EM621, 1934), ch. 13.

Other than a pervasive equivocation, throughout the canons, there are noticeable limitations to their usage. The method of agreement presupposes having knowledge of the consequences and so is limited to observational uses. The method of difference presupposes having knowledge of the antecedent and so focuses upon experimental design. Thus, the method of agreement cannot be used for discovery, and the method of difference requires knowledge of "every circumstance" which is rather hard to acquire. The method of concomitant variation presupposes knowledge not included in the canon, and furthermore is limited to only being able to affirm that antecedent and consequent are not causally related if antecedent and consequent do not vary concomitantly.

1.2 Explanation, Verstehen and Types

In 1952, appeared Florian Znaniecki's[6] book outlining his major theoretical system, The Cultural Sciences: Their Origin and Development. The thesis was that all social action is based on values and that all social actions are the result of human interaction and must be studied in terms of their meanings to the individuals involved in the actions. Znaniecki referred to the required emphasis upon this factor as the inclusion of a "humanistic coefficient" in social theory and research.

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[6]Florian Znaniecki, Cultural Sciences: Their Origin and Development (Urbana, Illinois: University of Illinois Press, 1952).

This focus upon a "humanistic coefficient" necessary to the social sciences is a latter-day re-expression of a concept which has a long history in social thought. Vico, Comte, Dilthey, Weber, Cooley, MacIver, Sorokin and others have passed along a traditional insistence upon the necessity of including something other than pure logic or mathematics for the meaningful analysis and conceptualization of society. This factor, supposedly related to a necessarily different kind, qualitative difference, of data concerned in the social, cultural, behavioral, etc., disciplines, has come to be referred to as a methodological concept in itself, and labelled as "Verstehen." The consideration of this verstehen "operation" has become a central concern in the behavioral sciences, which studies socio-epistemological determinants of varieties and kinds of knowledge produced through political processes.

"Verstehen" is a German word somewhat different than their usual word for "understanding" as it implies a particular kind of understanding which is primarily applicable to human behavior. The ordinary term would be "Begriefen."

In 1948 there appeared an article by Abel[7] called The Operation Called Verstehen which was a definitive contribution to the issue. Abel showed that the distinct

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[7] Theodore Abel, "The Operation Called Verstehen" in Herbert Feige and May Brodbeck, Readings in the Philosophy of Science (New York: Appleton-Century Crofts, Inc., 1953), 677-687.

nature of social science phenomena has made many theorists search for a unique methodology deemed necessary for the understanding of these phenomena. Many found the answer in an operation called verstehen. Abel then proceeded to show that the verstehen procedure cannot provide new knowledge because it cannot be used as a means of verification--though it may perform auxiliary functions in scientific investigations, such as providing hunches that seem necessary in the formation of hypotheses.

It is not our purpose here to defend any portion of the issues concerned here, but only to show how earlier stages in attempts at explanation in political theory and research converge with the very general usefulness of the typal analytic and implicational analytic methods as used today in many studies. This type, and typological method, become a characteristic means in the social sciences for the rigorizing of conceptualization arising through the verstehen process. Methodologically, the formation of types become the device by which comparisons in the social sciences have been made more precise.

Tonnies,[8] like Durkheim and other social scientists, attempted to tighten up, through the use of types, the comparative method inherited from Comte, Spencer, et al. He felt that the intuitive and intellectual understanding

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[8]Ferdinand Tonnies, "Fnm Gemeinschaft und Geseuschaft," in Robert Bierstedt (ed.), The Making of Society (New York: The Modern Library, 1959), 294-303.

of social wholes could be made easier and more readily grasped through classification of types. A type was conceived as comprising the characteristic of all examples of respective groups before they were differentiated. Thus, a type was more nearly perfect than individuals represented through it because the type embodies those forces and latent capacities which wither away through lack of use. But, types are also more imperfect, as they lack the qualities which have been developed to a higher degree in reality.

The type became a major tool. Howard Becker[9] more recently has generalized the tool into that of "constructed types," holding that constructive typology was the heuristic method most fruitful in sociology. He differentiates such types from the pure fictional types of Hans Vaihinger[10] which are only logically possible and have little or no empirical probability whereas ideal or constructed types may have and should have objective probability.

It was Max Weber, who generated appreciation among social scientists for the utility of what he called the "ideal type" and which he keenly developed for the implementation of his own method of verstehen. His work The

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[9]Howard Becker, Through Values to Social Interpretation (Durham: Duke University Press, 1950), 5 stated that "Societies composed of social action clusters can be viewed as embodiments of system of value."

[10]Hans Vaihinger, The Philosophy of 'As if' translated by C. K. Ogden (London: K. Paul, Trench, Frubner and Company, Ltd., 1924).

Methodology of the Social Sciences[11] has been referred to above as a major source for study of the ideal type. Martindale[12] discusses Weber's development of the ideal type in the context of conceptual problems arising in the maturation of sociological theory. Many early social scientists paid lip service to experimentation as the ideal method of science, but could not quite see how to employ it in their studies. The statistical method was not yet developed and so could not be relied upon. Under these circumstances, political studies took the only possible form, that of employing the comparative method based on historical data. These data were soon amplified by that from the growing field of behavioristic. However, in the face of both the ideological atmosphere of the times and the lack of any but common-sense criteria for comparing data, early political science soon developed an array of conflicting explanations of similar things which brought the whole science into question.

Weber[13] in this milieu, took the position that social science was a scientific discipline working with materials from history and that a properly developed

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[11]Max Weber, The Methodology of the Social Sciences, translated by Edward A. Shils and H. A. Finch (Glencoe, Illinois: The Free Press, 1949).

[12]Don A. Martindale, The Nature and Types of Sociological Theory (Boston: Houghton Mifflin Company, 1960), 381-383.

[13]Weber, op. cit.

typological procedure was the primary device for increasing methodological precision. The problem for comparative method was to get cases that could actually be compared. His solution was the "ideal type." As Weber conceived them, ideal types are hypothetically concrete individuals, constructed from their relevant components by the researcher for the purpose of instituting precise comparisons. Ideal types, being not general or abstract concepts but hypothetical individuals, consisted of a selection of items which could appear in reality; to that extent being like stereotypes. However, stereotypes are evaluative concepts designed to close rather than open up analysis. Also, ideal types are not to be seen as averages, since these are only arithmetic computations appropriate only for the analysis of quantitative variations along a single dimension. To be sure, Weber never pursued the development, per se, of his methodology apart from his keen and sage use of it in his own theoretical and philosophical studies. This default partly accounts for numerous conflicting interpretations which have arisen in connection with later appreciations of his ideal typological method.

Martindale[14] proceeds to describe the evolved nature of the ideal type. It is a strategy in empirical explanation. It is framed in terms of scientific knowledge available to the researcher at the time he does his study

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[14]Martindale, op. cit., 383.

and in terms of the empirical situations he tries to understand. The moment he wins such understanding, the ideal type loses its utility, though perhaps not for further use as a pedogogical device or as a diagnostic instrument for practitioners. Criteria for constructing an ideal type are objective possibility and adequate causation. An item for inclusion in such a type is acceptable only if it does not violate existing scientific knowledge already possessed by the researcher. Also, the entire purpose of the type is to isolate configurations of facts having causal influence on the course of social events. The relevance, causally, of any one item may vary from none to total. Any such item included is subject to the test of adequate causation, which is to say that it should be causally relevant to the result. Once the type has been formulated, and Martindale adds that no social or natural science is without them, the type should permit us to compare various kinds of situations more precisely than we could without it. If the ideal type doesn't do this, it should be eliminated. And, we can't play games with nature in its use; we compare different empirical configurations, not empirical configurations and types. When the new level of understanding is thus gained, the work of the type is done.

1.3 Conceptual Instruments

In applied social research, a variety of needs compel the usage of the data. These range from rigorous

derivation of quantitative measures through qualitative derivation of findings or expressions which may facilitate the process of interpretation for "action" goals. These latter qualitative expressions need be no less rigorous in their derivation. This is one of the major points to be demonstrated here so far as the inquiry or exploratory stage of our studies allow.

Reisman[15] discusses the tremendous pressure for all concerned to take sides in the "theory" or in the "data" camps. Students of research commonly discover the extraordinary difficulties of linking any important generalization to measurable data--a dilemma[16] which seems irresolvable but is no one's "fault." It makes no sense on the one hand to reject the means of technic as grubby and inartistic and on the other to discard the humanly valuable evidence of social science's power as seen in the impact of past works to illuminate and describe the experience and details of socio-political life. Yet, it is difficult to convince many that

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[15]David Reismann, Individual Reconstructed (Glencoe, Illinois: The Free Press, 1954).

[16]It may well be a genuine schism and may remain with us for generations. As Jose Ortega y Gasset in The Modern Theme, translated by James Claugh (New York: Harper and Row, Publishers, 1961), 36, stated that ". . . the problem of truth divided the men of the generations anterior to our own into two hostile schools of thought: relativism and rationalism. Each of them renounces what the other retains. Rationalism clings to truth and abandons life: relativism prefers the mobility of existence to the calm and immutability of truth."

one has not, even surreptitiously, taken a stand for data or for theory. Many humanists fail to realize that their data require supporting data and some more formal and systematic effort to demonstrate that what they and authors refer to as matters of common knowledge are really so. Too often, our obsession with the image of natural sciences tends to make us think of data as only verification, as supporting a theory or destroying it. Yet the value of data as simply reporting on the quality and details of social life has been a most significant part of social science. Likewise, those who scorn so frequently the "gadgetterrs," from both within as well as without the ranks of social science, fail to grasp how much we owe in all sciences to sheer fooling around with methods and techniques more or less for their own sakes.

There are, according to the social researcher, Paul Lazarsfeld,[17] six major themes which occupy today's methodologists: (1) the location of topics, (2) clarification of terms, (3) explication of research techniques, (4) interrelation of research techniques, (5) systematization of empirical findings, and (6) formalization of reasoning.

Especially as regards exploratory and diagnostic research, the comments of Vidich and Bensman[18] are appropos:

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[17]Paul F. Lazarsfeld, "Problems in Methodology" in Robert K. Merton, Leonard Broom and Leonard S. Cottrell, Jr. (eds.), Sociology Today (New York: Basic Books Inc., 1961), 40-45.

[18]Arthur J. Vidich and Joseph Bensman, Small Town in Mass Society (Garden City, New York: Doubleday and Company, Inc., 1958).

that the level of detail of data, the precision of the analysis, and the concepts employed are functions of the emerging perspectives of the researcher once assimilative in the field. To exhibit all possible dimensions of a problem in advance, codification would have to be extremely complex and cumbersome and generally unworkable. Because of inherent complexity, one is forced to work with heuristic concepts rather than with the full range of logically deducible possibilities. As a result, the researcher-theorist must continuously refine his theoretical analysis in terms of his problem and data. (They add that this constitutes the familiar phenomena of knowing better how to make the survey after it is done than at the beginning.) In no case will the researcher worker feel that he has fully solved his problem--at most he can feel that he has advanced along an infinite path.

Such heuristic concepts as promote the work involve, as implied in the discussion of typal constructs above, the continual search for significant entities, patterns of relations which may be usefully inferred. Thus an inferred entity is a "supposed real existent" whose existence is inferred if and only if a given substantive hypothetical proposition about it is "confirmed" whereas a construct is that entity whose "systematic existence" is affirmed by the confirmation of the relevant "hypothesis." Thus according to Beck[19] an inferred entity has the function of

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[19]Lewis White Beck, "Constructions and Inferred

summarizing from observed facts, is an object of search, and can predict and explain further facts. Four stages of scientific work involve description, establishment of symptom-relations, elaborations from these of inferred entities, and then verification of them. Furthermore, ". . . confirmation of an inferred entity can come only through disconfirmation of all alternative hypotheses through the evidential denial of at least one consequent of such alternative and the absence of denial of any consequent common to both or alternative and to the hypothesis in question."[20]

The hypothetical constructs to be gained from the inference of such entities depend upon the abstraction of patterns from empirical relationships. MacCorquodale and Maehl[21] agree that the only rule for the propriety of such abstracted patterns is that of convenience, as means must be found for the hypothetical constructs to have cognitive, factual reference in addition to the empirical data which constitute their support.

In this process of inferring convenient entities, common sense is unable to make right combinations of ideas. Theoretical sociology employs combinations of ideas in

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Entities," in Herbert Feigl and May Brodbeck (eds.), Readings in the Philosophy of Science (New York: Appleton-Century-Crofts, Inc., 1953), 368-384.

[20] Ibid., 377.

[21] Paul E. Maehl and Kenneth MacCorquodale, "On a Distinction Between Hypothetical Constructs and Intervening Variables," Psychological Review, LV (1948); 95-107.

systematic ways unlikely to be hit upon by lay thinking. A prime preoccupation of the theoretical sociologist according to Zetterberg is with systematic combinations of propositional ideas. The social scientist is advised by Zetterberg to be on the lookout for devices that aid him in making correct combinations of simple ideas. He numbers among these devices a technical vocabulary, even mathematical and computer language, inasmuch as ordinary language combines ideas in haphazard manner.[22]

Lasswell announces that systematic delineations fail to disclose "gaps" in our analysis, as well as in general knowledge, saying "It is the discovery of gaps that transforms into a comprehensive enterprise the cumulative accretions that confer so much bulk upon the central core of descriptive knowledge."[23] In accordance with this statement, we would like to suggest here the proposition that uniquely authored paradigms of the type most successful in convergent descriptions of this world or in the instigation of fruitful theoretical perspectives may be co-actuating on different levels of inquiry, and therefore to suggest a need for techniques of symbolic interpretation which will allow for the establishment of theoretical translation between the

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[22]Hans L. Zetterberg, Social Theory and Practice (New York: Bedminster Press, 1962).

[23]Harold D. Lasswell, "Strategies of Inquiry," in Daniel Lerner (ed.), The Human Meaning of the Social Sciences (New York: The World Publishing Co., 1963), 92.

dialectic and the configural. Probably, the techniques exist and only an interested effort needs to be focused.

Lasswell continues in his paper Strategies of Inquiry toward some points which indirectly underline our proposition above. He says that our approach to the future is insufficiently contextual. We are accustomed to extrapolate demographic or other special trends into the future, but there are relatively few occasions on which the flow of developments is seen in its wholeness:

> "The methods by which the future is presented do not foster vivid perceptions. It is well known that a trained imagination is necessary before one can perceive with full vividness the significant events referred to in a table of figures, a map, or a chart. ---Presentations are often lacking in transition. Very often the potential future is described at a cross-section in time with no attempt to relate the cross section to the state of affairs at present. --Alternatives are disproportionately treated . . . attention tends to be diverted from unorthodox assumptions."[24]

He emphasizes the forward looking character of thought that has to do with policy. All choices refer to future events, whether the choice related to the program of inquiry pursued by the scientist or the policies to be adopted by the nation. Our traditional patterns of problem-solving are flagrantly defective in presenting the future in ways that contribute insight and understanding. He proposes as a rational assumption that vivid and contextual presentation of the future increases the likelihood that new policy alternatives will be invented, and that these alternatives

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[24] Ibid., 89-113.

will prove to be relatively efficient means of strengthening social values at optimal levels. The contextual frame of reference, says Lasswell; ". . . the orientation toward the future and toward decision making, is a 'shot in the arm.' It makes the past pertinent to the present and the future."[25]

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[25] Ibid., 105.

CHAPTER IV

A GAME THEORY APPROACH TO THE PROBLEM OF OPTIMUM ALLOCATION IN POLITICAL DECISION

1.1 In recent literature, the application of the game-models in political decision-making has increased. In Chapter I a detailed analysis of literature on game models has been presented. The purpose of this paper is twofold, (a) to construct a game theory model for obtaining optimum allocation in stratified sampling, and (b) to apply this model to a concrete political event.

The problem of optimum allocation in sampling when only one variable is under study has been investigated by Neyman.[1] When multiple characters are under observation, different plans for allocation have been suggested according to various criteria of optimality by Cochran.[2] In this paper the problem of optimum allocation is formulated as a normalized zero-sum game between two players. If there are "m" characters denoted by a variable "j", the first player

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[1] H. Neyman, Probability and Statistics (New York: Henry Holt Co., 1950).

[2] T. Cochran, Sampling Technique (New York: John Wiley and Sons, Inc., 1953).

weighs the relative importance of the different characters and chooses a randomized strategy in the space I_m of the set of integers (1,2,3,...m). The second player chooses a point $(n_1, n_2, n_3, \ldots n_k)$ in the (k-1) dimensional space $(n_1 + n_2 + \ldots + n_k = N)$, which gives the sample numbers to be allocated to the "k" different strata. When the first player chooses the pure strategy "j" and the second player the point "n", the pay-off is the variance of the estimate of the mean of the j-th character. A complete class of strategies as well as the minimax procedure of the second player, i.e., the choice of n's, are characterized. Though in this formulation the correlation of the variables have been ignored, it will be clear from the remarks and the discussion that a preliminary analysis of the characters into principal components will make the results of the paper applicable at least to the case of same correlations with each stratum.

1.2 Suppose that we want to measure the means of "m" uncorrelated random variables $X_1, X_2, \ldots X_m$ on the basis of a stratified random sample of size N^2 from a population stratified into "k" different strata. The estimates are the sample means with variance for the "j"-th estimate as:

$$\sum_{h=1}^{k} \frac{1}{nh^2} \frac{N_h^2 S_{jh}^2}{N_o^2} - \sum_{h=1}^{k} \frac{N_h S_{jh}^2}{N_o^2} \quad \ldots\ldots \quad (1)$$

where,

N_h = number of units in the h-th stratum

$N_o = \Sigma N_h$

S^2_{jh} = variance as defined by Cochran (2) for the j-th character within the h-th stratum.

The problem is to choose the n's, satisfying $n_h = N$ in such a way that the variances attain optimum values in some sense.

1.3 Let Y be the set of all $N = (N_1, \ldots N_k)$ satisfying

$$n_1 + \ldots + n_k = N \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$n_h + 1,\ h = 1,\ 2, \ldots k \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Let I_m be the set of m integers $1,1,\ldots m$. Let a^2_{jh}'s and b_j's $(j = 1,\ldots m)$ and $(h = 1,2,\ldots k)$ be $m(k + 1)$ positive constants, and define

$$M(j,n) = \prod_{I}^{k} \frac{a^2_{jh}}{n_h - b_j} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

We now think of two players I and II, playing a two-person zero-sum normalized game with pure strategies I_m and Y. If player I chooses "j" and player II chooses n, then the pay-off to player I is M(j,n). Clearly, this is an "S" game as defined by Blackwell and Girshick[3] and the game may be denoted by the triplet (I_m, S_m, M).

In the final formulation,

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[3]H. Blackwell and J. Girshick, Theory of Games and Statistical Decisions (New York: John Wiley and Sons, Inc., 1954).

$$a_{jh}^2 = \frac{N_o^2 S_{jh}^2}{N_o^2 b_j} = \sum_{h=1}^{k} \frac{N_h S_{jh}^2}{N_o^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

With such choices of a_{jh}^2 and b_j, $M(j,n)$ becomes the variance for the j-th estimate when $n = (n_1, \ldots n_k)$ specifies the size of the sample allocated for the different strata. Thus, when the total sample size $N = n_1 + n_2, + \ldots + n_k$ is kept fixed, and different sampling plans are rated entirely on the basis of the different variances, then the problem of optimum allocation becomes the problem of optimum strategies for player II.

1.4 As a simple example, consider the following. Take that:

$$k = 2$$
$$m = 2$$
$$N_1/N_o = N_2/N_o = 1/2$$
$$S_{11}^2 = S_{22}^2 = a$$
$$S_{12}^2 = S_{21}^2 = b$$

It is a simple matter to show that in this case the proportional allocation of variance is minimax and satisfies the criteria of Cochran (2). The variances and sample sizes are given below for $a = 25$, $b = 100$ and $n_1 + n_2 = N = 1500$, $N_h = N_o$ being taken large enough to neglect the finite population correction.

Sample Size (n)	Neyman's solution for 1st character	Neyman's solution for 2nd character	Minimax solution
1st stratum	500	1000	750
2nd stratum	1000	500	750
Estimate of the variances:			
1st character	.038	.056	.042
2nd character	.056	.038	.042

CHAPTER V

MULTI-VARIATE ANALYSIS IN POLITICAL SCIENCE

Continuing developments in theory and methodology of models have indicated the inappropriateness of certain traditional statistical procedures for some of the important contemporary problems and areas of Political Science. In particular, concern has been registered about the general absence of techniques that permit an effective evaluation of complex social-political situations.[1] Criticism has been

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[1] Such concern has been primarily expressed explicitly or implicitly in those works concerned with survey analyses of various types and with the analysis of complex social systems: Patricia L. Kendall and Paul F. Lazarsfeld, "Problems of Survey Analysis," in Robert K. Merton and Paul F. Lazarsfeld (ed.), Continuities of Social Research. Studies in the Scope and Method of "The American Soldier" (Glencoe, Illinois: The Free Press, 1950), pp. 133-196; Paul F. Lazarsfeld, "Interpretation of Statistical Relations as a Research Operation," in Paul Lazarsfeld and Morris Rosenberg (ed.), The Language of Social Research (Glencoe, Illinois: The Free Press, 1955), pp. 115-125; Peter F. Blau; "Determining the Dependent Variable in Certain Correlations," Public Opinion Quarterly, XIX, 1 (Spring, 1955), 100-105; Herbert Hyman, Survey Design and Analysis (Glencoe, Illinois: The Free Press, 1955), especially pp. 242-274; Seymour Lipset, Martin Trow, and James S. Coleman, Union Democracy (Glencoe, Illinois: The Free Press, 1955), especially the "Methodological Note," pp. 419-432; Alvin Gouldner, Patterns of Industrial Bureaucracy (Glencoe, Illinois: The Free Press, 1954), p. 282; and Howard S. Becker and Blanche Geer, "Participant Observation: The Analysis of Qualitative Field Data," in Richard N. Adams

levelled, too, at the employment of statistical techniques in model-building that rest on assumptions which cannot be met by research conditions.[2] In Chapter I, a detailed analysis has been presented on multi-variate analysis in political models.

Lazarsfeld, Hyman, Kendall, et al., have stressed the appropriateness of the multi-variate mode of analysis for certain complex social situations.[3] Their several alternative schemes for examining the relations between three dichotomies (2 x 2 x 2 table) are well known. Essentially, their several schemes attempt to clarify the relationship between two variables or attributes through the introduction of a third "test" variable or attribute. Through this controlling or partialling effect, the researcher is able to examine the limits of generalizations and confront

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and Jack J. Preiss (eds.), Human Organization Research (Homewood, Illinois: The Dorsey Press, 1960), pp. 267-289; James S. Coleman, "Relational Analysis: The Study of Social Organizations with Survey Methods," Human Organization, 17 (Winter, 1958-59), pp. 28-36; James G. March and Herbert A. Simon, Organizations (New York: John Wiley and Sons, 1958), p. 212.

[2]Hanan C. Selvin, "A Critique of Tests of Significance in Survey Research," American Sociological Review, 22 (October, 1957), pp. 519-527; Lipset, Trow, and Coleman, op. cit., pp. 419-432; Robert McGinnis, "Randomization and Inference in Sociological Research," American Sociological Review, 23 (August, 1958), pp. 408-414; and Leslie Kish, "Some Statistical Problems in Research Design," American Sociological Review, 24 (June, 1959), pp. 328-338.

[3]Lazarsfeld in Lazarsfeld and Rosenberg, op. cit., pp. 115-125; Hyman, op. cit., pp. 242-274; and Kendall and Lazarsfeld in Merton and Lazarsfeld (eds.), op. cit., pp. 133-196.

more directly the problem of spuriousness in findings.

Despite the contributions of these methodologists and additional contributions to the Social Scientist's repertoire for handling the 2 x 2 table, the twenty-five year old comments of Bartlett about the 2 x 2 x 2 table still seem fitting.

> Although the structure and analysis of ordinary contingency tables with two-way classification have been subjected to much critical examination, the complex table involving more than two ways of classifying the data seems, perhaps because it is rather unusual, to have been comparatively ignored.[4]

While contemporary methodologists have neglected available measures of independence for the 2 x 2 x 2 table, classification problem of this order are not unusual but, indeed, are commonplace today.

Traditionally, Social Scientists have examined these more complex tables by dividing respondents according to the third dichotomous variable and then computing measures of association, chi-squares, percentage differentials by rows and columns, or ratios, for <u>each</u> 2 x 2 table resulting from this division.[5] Although such computations do allow for a

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[4]M. S. Bartlett, "Contingency Table Interactions," <u>Supplement to the Journal of the Royal Statistical Society</u>, II, 2, 1935, pp. 248-252.

[5]Examples of each of these approaches may be found in the following: Melvin DeFleur and Otto N. Larsen, <u>The Flow of Information</u> (New York: Harper and Brothers, 1958), especially Chapter 7, "The Identity of Knowers and Nonknowers," pp. 151-165; Hyman, <u>op. cit.</u>, especially Chapter 6, "The Introduction of Additional Variables and the Elaboration of the Analysis," pp. 275-329; and Kendall and Lazarsfeld

crude comparison of the degrees of relationship in two such tables, no precise statistical test for the existence of a difference between degrees of relationship in the tables is ordinarily employed. In fact, the sampling distribution of differences between measures of relationship for 2 x 2 tables (e.g., phi) is unknown, and therefore no test of this type for the difference in degree of relationship is possible. Yet the evaluation of the difference between two such measures of relationship essentially constitutes the problem of evaluating the relation between the two tables. Chi-squares, computed for each table separately, do not provide a solution to this problem. Although the chi-squares values and degrees of freedom for the tables may be pooled for a single test,[6] this too leaves unanswered the question of whether or not a different degree of relationship is obtained in the two tables. Despite this common form of reporting research findings in 2 x 2 x 2 table form, a guide for evaluating the relationship between the two tables has been notably absent, and often imprecise, and inconsistent interpretations are the result.

Bartlett and Snedicor, in turn, have made available a single chi-square test for the two fourfold tables, with

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in Merton and Lazarsfeld (eds.), op. cit., pp. 163-164 and pp. 150-151.

[6]See Hubert M. Blalock, Jr., Social Statistics (New York: McGraw-Hill Book Company, Inc., 1960), pp. 238-239.

a single degree of relationship between the two tables.[7] They report a test of the partialling effect or of second order interaction for three sets of dichotomous attributes. Second order interaction refers to the ratio of first order interactions. While in Table 4 the first order interaction is ad/bc, the second order interaction in Table 5 is the ratio of the first order interactions, i. e., $\frac{\frac{ad}{bc}}{\frac{a'd'}{b'c'}}$ or $\frac{adb'c'}{a'd'bc}$. Conventional procedures, e. g., comparing phi coefficients or chi-square values (especially the latter) are unsatisfactory because of differences in the size of n in the two tables. The procedure suggested here avoids this difficulty; it is reasonable to assume that if the ratios of the diagonal products are the same for the two fourfold tables, then the degree of association in the two may be regarded as identical regardless of differentials in the size of n. Furthermore, the procedure suggested here yields a chi-square value for which the sampling distribution under the null hypothesis of no difference in degree of relationship is known.

Consider the following interpretation from some of the unpublished research for a discussion of the utility of such a test to the researcher.

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[7] Bartlett, op. cit., p. 249; George W. Snedicor, Statistical Methods (Fourth Edition; Ames, Iowa: The Iowa State College Press), p. 203.

Table 4

Relation Between Religion and Attitude Toward Fertility Measure in a West Bengal Village, India*

	ATTITUDE TOWARD FERTILITY MEASURE		
	Not Favorable	Favorable	Total
RELIGION Hindu	105	87	192
Muslim	38	32	70
Total:	143	119	

*Data obtained from Indian Statistical Institute, Calcutta, India.

Table 5

Relationship Between Religion and Attitude Toward Fertility Measure in a West Bengal Village, India, Controlling Discussion

LOW DISCUSSION

	ATTITUDE TOWARD FERTILITY MEASURE		
	Not Favorable	Favorable	Total
Hindu	a79	b46	125
RELIGION			
Muslim	c30	d26	56
	109	72	

$x^2 = 1.73$

HIGH DISCUSSION

	ATTITUDE TOWARD FERTILITY MEASURE		
	Not Favorable	Favorable	Total
Hindu	a'26	b'41	67
RELIGION			
Muslim	c' 8	c' 6	14
Total	34	47	

$x^2 = 1.41$

In Table 4, a chi-square test of independence between religion and attitude toward fertility measures in an Indian village leads to acceptance of the hypothesis of independence and, in fact, the value of chi-square is approximately zero, (.003). The phi coefficient is a similarly minute .003. In the tradition of Lazarsfeld, et al., a third or "test" variable is introduced to help clarify the relationship between the two original attributes. To explore the effect of high and low discussion on the relationship, this third attribute is introduced in Table 5.

Several alternative procedures might be followed in analyzing Table 5. Whatever the analytical procedure, however, the central question posed by the data in the form of two such tables is this: Is the relationship between religion and attitude toward fertility measure different in high and low discussion groups? Various types of differences in this relationship might be observed, e. g., positive relationship in one table and negative in the other; positive or negative relationship in one table and no relationship in the other; high relationship in one table and low in the other. On the other hand, the same degree of relationship (whatever it might be, including no relationship) may hold in both tables. One way of comparing the relationship in the two tables, which has the advantage of indicating direction, is to utilize some measure or relationship, e. g., phi. For the low discussion respondents, phi = .10 and for the high

discussion respondents phi = -.13; hence, the relationship is low and positive in one table, low and negative in the other. We have, however, no procedure for evaluating the possibility that such a difference in degree (and direction) of relationship for the two tables might have arisen simply from sampling variability. Although the chi-square values for the two tables separately are larger than the chi-square value for Table 4, these values are still small and neither reaches the normally accepted level of significance. But this does not necessarily indicate that we should abandon the possibility of a difference in the degree and/or direction of relationship in the two tables. In order to evaluate this pattern of difference between two tables, Table 5 may be treated as a 2 x 2 x 2 table and a single chi-square computed, following Bartlett and Snedicor.

Corresponding to the usual test in a single fourfold table that:

$$ad = bc \qquad (1)$$

the hypothesis now becomes

$$adb'c' = a'd'bc \qquad (2)$$

Just as equation (1) states that first order interaction is unity, equation (2) (the null hypothesis here) states that second order interaction is unity and hence that the degree of relationship is identical for both tables.[8]

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[8] Snedicor, op. cit., p. 201.

The statistical inference problem is a problem of deciding, in effect, whether the difference between the left and right member of equation (2) is too large to be attributed to sampling variability. If so, we would conclude that the degree of relationship is not the same in the two fourfold tables and if not, we would conclude that the degree of relationship is the same or rather, that the current data cast no doubt on the assumption that they are the same.

Such a test of independence in this 2 x 2 x 2 table involves essentially two steps. First, the expected numbers corresponding to the hypothesis must be determined. This involves the calculation of the quantity x which represents the number to be subtracted from the cell frequencies in the left member of equation (2) and added to the cell frequencies in the right member of equation (2). Calculation of x yields the quantity by which the frequencies in Table 5 must be altered in order for equation (2) to hold true. Fisher, Bartlett, and Snedicor have indicated that the value of this deviation x can be determined by solving the following cubic equation:[9]

$$(a-x)\ (d-x)\ (c'-x)\ (b'-x) = (c+x)\ (b+x)\ (a'+x)\ (d+x) \qquad (3)$$

The second step involves the utilization of quantity x in finding the expected numbers for each of the cells in Table 5

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[9] Bartlett, op. cit., p. 249; Snedicor, op. cit., pp. 202-203.

and, hence, the adjusted chi-square statistic.[10] Thus:

$$x^2 = (x-.5)^2 \left[\frac{1}{z-x} + \frac{1}{d-x} + \frac{1}{c'-x} + \frac{1}{b'-x} + \frac{1}{cx} + \frac{1}{bx} + \frac{1}{a'x} + \frac{1}{d'x}\right] \quad (4)$$

The actual computation of chi-square for Table 5 proceeds from the substitution of values of Table 5 in equation (3) yielding the following equation:

$$(79-x)\ (26-x)\ (8-x)\ (41-x) = (30+x)\ (46+x)\ (26+x)\ (6+x)$$

$$673{,}712 - 135{,}086x + 7{,}527x^2 - 154x^3 + x^4 = 215{,}280 + 56{,}016x$$

$$+ 3{,}968x^2 + 108x^3 + x^4 - 262x^3 + 3{,}559x^2 - 191{,}102x + 458{,}432 = 0$$

The method of solving for x involves the following sequences of procedures:[11]

1. Elimination temporarily of the first two elements of the cubic equation and solution of the remaining portion of the equation, thus producing a first approximation of x and its powers. In this case:

$$-191{,}102x + 458{,}432 = 0$$

$$-191{,}102x = -458{,}432$$

$$x = 2.40$$

2. Substitution of the first approximating values for x, x^2, and x^3 in the cubic equation. If the approximation for x is correct, the positive and negative numbers should equal one another and the resulting difference should be zero. In this case the result of the first approximation

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[10] Snedicor, op. cit., p. 203.

[11] See any college algebra for an elaboration of these procedures.

is 478,932 - 462,266 or a positive difference of 16,666.

3. Arbitrary selection of successive approximations to x designed to make the resulting difference in step 2 disappear.
4. If the correct value of x is somewhere between the values of x which have been tried, interpolation should be utilized to reduce the number of approximations by estimating the proportion that x should be increased or decreased. Final approximation of x in this case is 2.4934.

The correct value of x is then substituted in equation (4). In the case of Table 5, the single chi-square value is 1.86 for a 2 x 2 x 2 classification with a single degree of freedom. By itself, this chi-square value suggests that the evidence is not strong enough for us to assume there is a significantly different type of relationship between the two attributes in the different discussion groups.

Had this test led to a rejection of the null hypothesis, this conclusion plus some indication of the relative degree of association under each of the control categories (e. g., the previously indicated values for the two phi coefficients) would have summarized the relationships among the three variables considered here. On the other hand, having concluded that the third variable makes no significant difference in the degree of relationship between the other two, we may proceed one step further and ask whether the

data show a significant relationship between the two original variables (religion and attitude toward fertility measures in this illustration), controlling for the minor (and statistically nonsignificant) effects of level of discussion. This may be accomplished by adding the chi-square values for the two fourfold tables of Table 5 and also adding their degree of freedom.[12] The result is a chi-square value of 3.14 (i. e., 1.73 + 1.41), a test statistic distributed as a chi-square with 2 degrees of freedom (one degree of freedom for each fourfold table). These data thus show a nonsignificant relation, even when the effects of discussion are controlled. Our final conclusion must therefore be to the effect that (1) the third variable does not affect the relation between the other two and (2) the other two variables are not related even with the third variable controlled.

Bartlett indicates appropriate methods for examining interactions in other complex table forms as well as the 2 x 2 x 2 table; however, it is proper to point out that further complications arise when additional complexities are introduced.[13]

Despite the obvious laboriousness attached to the computation of chi-square for these more complex contingency table forms, their calculation can become routine when

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[12]Blalock, op. cit., pp. 238-239.

[13]Bartlett, op. cit., pp. 251-252.

programmed for high speed computers. This is but one more example of the impact that such computers can have on the types of problems and methods to be employed in behavioral science. It is this writer's belief that these procedures for the calculation of chi-square can offer a valuable assist for certain types of problems of interpretation which involves the multi-variate mode of analysis. In cases where these procedures are deemed appropriate, Snedicor's familiar comments still clearly apply:

> It is the investigator's responsibility to integrate all this evidence (collateral information and reports of other research) and to reach a decision. He cannot evade this responsibility merely by citing a value for chi-square.[14]

In the next two chapters, two studies in multi-variate analysis will be presented.

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[14]Snedicor, op. cit., p. 23.

CHAPTER VI

CORRELATES OF POLITICAL CONSERVATISM

1.1 Problems and Hypothesis

This paper[1] is a report of a research study[2] in multi-variate analysis. Much of the literature on the nature of conservatism is theoretically oriented. Very little, almost none to be honest, deals empirically with variables affecting the political behavior known as conservatism.

In psychological literature[3] authoritarianism is being conceived as a "character structure" and the social forces affecting such a variable are to be understood as a final crystallization of many determining forces. Many characteristics of the "authoritarian person" are already well known. But these characteristics have not been tied

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[1] Read at the Southwestern Political Science Conference, March 28, 1964.

[2] The author wishes to thank Prof. Oliver E. Benson for his invaluable advice.

[3] T. W. Adorno et al., The Authoritarian Personality (New York: Harper and Brothers, 1950) and also Milton Rokeach, The Open and Closed Mind (New York: The Basic Books, 1960).

together under a unifying principle which could succeed in giving them a hanging-togetherness and make possible a unified understanding of the "total man."

Several studies probed deeply into the nature of authoritarianism and in doing so had shed light on the process by which a man constructs and organizes his "systems of belief." Most of these studies depended heavily on "personality structure." As Rokeach[4] stated: "studies of the structure of a person can teach as much about what consistencies we may expect of him in different situations, for it is what the person brings to the situation that gives meaning to it." He assumed that a person's "belief-disbelief" system as potentially a relatively enduring structure and that this system was manifested in terms of the personality structure of the individual.

"In common sense language," Janowitz and Marvick[5] pointed out that an authoritarian person was the one ". . . who is concerned with power and toughness and who is prone to resolve conflict in an arbitrary manner . . . ." They concluded that ". . . the predisposition of the authoritarian individual to conform to an authority was directly relevant to the study of political behavior in a democratic society."

In a "democratic personality pattern" the individual,

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[4]Rokeach, op. cit., 402.

[5]Morris Janowitz and Dwaine Marvick, "Authoritarianism and Political Behavior," Public Opinion Quarterly, XVII (1955), 185-201.

thought Maslow,[6] was more willing to allow others, for their own tastes, goals and personal autonomy so long as no one else is hurt thereby. Furthermore, the individual tended to "like" others rather than "dislike" and to assume that probably they were, if given the chance, "essentially good rather than bad individuals."

Janowitz and Marvick[7] in their nation-wide study hypothesized that ". . . high authoritarians would tend to participate less and have less political self-confidence than low authoritarians in politics." Battery of tests used by the authors were mostly a "modified" version of Berkeley F. Scale.

Their findings were as follows:

a. ". . . there was a statistically significant tendency for younger people to register as low authoritarians more frequently than older people."

b. People with less education were found to be "high authoritarians."

c. The degree of authoritarianism was significantly related to "political isolationism" and, to the feelings of political inefficacy, and also to "non-voting."

Adorno, Frenkel-Brunswik, Levinson et al. classic

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[6]A. H. Maslow, "The Authoritarian Class-Structure," Journal of Social Psychology, XVIII (1943), 401-411.

[7]Janowitz and Marvick, op. cit.

study[8] hypothesized that ". . . the political, economic and social convictions of an individual often form a broad and coherent pattern, as if bound together by a "mentality," a "spirit" and that this pattern was an expression of "deep lying trends" in his personality." Here again like Rokeach[9] the basic stress was mainly on individual personality pattern. The researchers defined an authoritarian individual as one "potentially fascistic" whose structure is such as to render him particularly susceptible to anti-democratic propaganda." The basic research technique was essentially Freudian. As they stated:

> For theory as to structure of personality we have leaned most heavily upon Freud while for a more or less systematic formulation of the more directly observable and measurable aspects of personality we have been guided primarily by academic psychology.

The quantitative aspect of political authoritarianism in their study was measured in terms of "Politico-Economic Conservatism Scale."[10] The hypothesis was that the individual scoring high on P-E-C Scale would present extreme conservatism and such a variable was thought to affect "fascist syndrome."

The results validated the hypothesis. The results, also in general, supported earlier studies by Levinson and

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[8]Adorno et al., The Authoritarian Personality.

[9]Rokeach, The Open and Closed Mind.

[10]Adorno et al., The Authoritarian Personality, Ch. 5.

Sanford[11] where anti-semitism was found to be correlated significantly with opposition to labor unions and socialistic institutions (socialized medicine, government ownership of utilities, etc.). Republicans were found to be on the average more anti-semitic than Democrats. The researches of Newcomb,[12] Lentz,[13] Murphy and Likert,[14] and Kerr[15] yielded similar results. Stewart and Hoult[16] proposed a socio-psychological theory of the authoritarian personality to replace the psycho-analytic theory that had been used heretofore. The authors suggested that the degree of so called authoritarianism manifested by a particular individual was, on the average, negatively correlated with the number of social roles, he mastered. Several implications of this hypothesis suggested by the authors were:

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[11]Daniel J. Levinson and R. Nevitt Sanford, "A Scale for the Measurement of Political-Economic Conservatism," American Psychology, I (1946), 451.

[12]Theodore M. Newcomb, Personality and Social Change (New York: Dryden Press, 1943).

[13]Theodore F. Lentz, "Personage Admiration and Other Correlates of Conservatism--Radicalism," Journal of Social Psychology, X (1939), 81-93.

[14]Gardner Murphy and Rensis Likert, Public Opinion and the Individual (New York: Harper and Brothers, 1943).

[15]W. A. Kerr, "Correlates of Politico-Economic Liberalism-Conservatism," Journal of Social Psychology, XX (1944), 61-77.

[16]Don Stewart and Thomas Hoult, "A Socio-Psychological Theory of the Authoritarian Personality," American Journal of Sociology, LXV (1959), 274-280.

a. If the individual as a child was reared in a social milieu conducive to authoritarianism his perception will be affected. As a result of which he will have had fewer opportunities to develop role-taking.

b. Those individuals would fail in "acting out" several "social roles" and would tend to rely more and more upon the roles which he would feel was most acceptable to the reference group.

c. Those groups directly opposing his viewpoints would be defined by the individual as "hostile," "inferior," etc. and the individual would rationalize his own failures by projecting blame on the "outgroup."

On this point, Sherif,[17] and Newcomb,[18] would seem to share the same opinion with Stewart and Hoult.[19] In their empirical study using the above stated theoretical frame of reference, the following findings were worth noting. The study established that the "personality syndrome" known as authoritarianism was particularly evident among:

a. the less educated;

b. the aged;

c. the rural dwellers;

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[17]Muzafer Sherif and Carolyn Sherif, An Outline of Social Psychology (New York: Harper and Brothers, 1956).

[18]Theodore M. Newcomb, "Attitude Development as a Function of Reference Groups," in Muzafer Sherif, An Outline of Social Psychology (New York: Harper and Brothers, 1948).

[19]Stewart and Hoult, op. cit.

d. the members of "disadvantaged minorities;"

e. the more dogmatic religious organizations;

f. the lower economic strata;

g. the social isolate

Findings of a somewhat similar nature were reported by Campbell et al.[20]

Shils[21] suggested that there may be a transition from an historical "pluralistic politics" to "extremist politics" which predisposed authoritarianism. The theory of a balance of power among a plurality of groups had been the dominant analytical tool of American political scientists. The best description of this process in contemporary political science is to be found probably well expounded by Truman[22] and Key.[23] However Shils[24] along with Leites[25] denied such a rise in "extremism." They agreed that modern society by reason of "mass conditions" may best be described as "qualitatively different" from earlier Western societies.

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[20]Angus Campbell et al., The American Voter (New York: Wiley and Sons, 1960), 512-515.

[21]Edward A. Shils, The Torment of Secrecy (Glencoe, Illinois: The Free Press, 1955), 231.

[22]David Truman, The Governmental Process (New York: A. A. Knopf, 1951).

[23]V. O. Key, Jr., Parties, Politics and Pressure Groups (New York: A. A. Knopf, 1947).

[24]Edward Shils, The Torment of Secrecy, op. cit.

[25]N. Leites, On the Game of Politics (California: Stanford University Press, 1959).

However, several writers[26] had utilized the same concept to maintain that Western societies increasingly show characteristics of "mass organization" which sharply differ from the features of such societies in nineteenth and earlier centuries. "Mass societies," in this view, originated a form of socio-political value systems which may be characterized as "authoritarian" in nature. This so called "authoritarian movement" in present day had been interpreted by several researchers to mean that the people holding such "value-systems" were marked by a low degree of commitment to the values of procedure in "democratic institutions." For such "authoritarian norms," according to Stouffer,[27] have produced "intolerance." Lipset,[28] Kornhauser, Sheppard and Mayer,[29] McKinnon and Centers[30] suggested that in the relation

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[26]Authors advocating such a thesis are: Hannah Arendt, The Origins of Totalitarianism (New York: Harcourt, Brace and Co., 1945); Sebastian de Grazia, The Political Community: A Study of Anomie (Chicago: The University of Chicago Press, 1948); Arthur Kornhauser, The Politics of Mass Society (Glencoe, Illinois: The Free Press, 1959); Karl Mannheim, Man and Society in an Age of Reconstruction (London: Routledge and Kegan Paul, 1940); Robert A. Nisbet, The Quest for Community (New York: Oxford University Press, 1953); For a detailed bibliography on "Mass Society" approach, see Eric and Mary Josephson, Man Alone (New York: Dell Publishing Co., 1962).

[27]Samuel Stouffer, Communism, Conformity and Civil Liberties (New York: Doubleday Publishing Co., 1955).

[28]Seymour M. Lipset, "Democracy and Working Class Authoritarianism," in Political Man (New York: Doubleday Co., 1946), 97-130.

[29]Arthur Kornhauser et al., When Labor Votes: A Study of Autoworkers (New York: University Books, 1956).

[30]William J. McKinnon and Richard Centers,

to American class structure this value-system may be termed as "working-class authoritarianism."

Durkheim[31] defined "Anomie" as "lack of rules." According to him, a society which lacked clear-cut norms to govern man's aspirations and moral conduct was characterized by "anomie." Quite often in social science literature "anomie" akd "alienation" had been used interchangeably. In his letters "Ueber die aesthetische Erziehung des Menschen" Schiller[32] magnificently described man in modern society. What Schiller described so impressively was what Hegel and Marx were to characterize as "alienation." Schiller[33] contrasted the "polypus nature" of the Greek states "where each individual enjoyed an independent existence and if necessary could become a whole" with modern society which manifests itself in a hierarchical "division of labor."[34] Mills[35] suggested that modern society had

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"Authoritarianism and Urban Stratification," American Journal of Sociology, LXI (1956), 610-620.

[31]Emile Durkheim, Suicide, translated by George Simpson (Glencoe, Illinois: The Free Press, 1951).

[32]J. Weiss, The Aesthetic Letters, Essays and the Philosophical Letters of Schiller (Boston: The MacMillan Co., 1845).

[33]Ibid., 22.

[34]Emile Durkheim, The Division of Labor, translated by George Simpson (Glencoe, Illinois: The Free Press, 1949).

[35]C. W. Mills, The Power Elite (New York: Oxford University Press, 1956).

produced a different sort of "public," known as "mass" who were an "alienated group of individuals" and who occupied a less significant role in societal power structure.

For Marx[36] it was the commodity that determined human activity--the objects which were supposed to serve man become the tyrant of man. To Marx man was free if he "recognizes himself in a world he has himself made." But that did not happen. Since alienating labor, it alienated man from nature, alienated "him from himself," his own active function, ". . . his life's activity, it alienated man from his species."[37]

Theories of alienation developed by Marx had been supplemented and deepened by several social theorists.[38] At this point, in the fashion of Neumann[39] three strata of alienation may be distinguished, a) the stratum of psychology, b) that of society and c) that of politics. For the present purpose, our main interest would be geared towards political aspect of alienation.

Political anomie, the other independent variable, stimulated less empirical studies than had authoritarianism.

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[36]Karl Marx and Frederich Engels, Economic and Philosophical Manuscripts of 1844 (Moscow, 1949), First division, III, 89.

[37]Ibid., 87.

[38]Arendt, Totalitarianism and also Fromm, Freedom.

[39]Franz L. Neumann, The Democratic and the Authoritarian State (Glencoe, Illinois: The Free Press, 1957).

Its first use in empirical political research apparently occurred in the Survey Research Center's 1952 Presidential election study.[40]

McDill and Ridley[41] found that low social status and political alienation of a sample of suburban residents were significantly related to a negative vote and unfavorable attitude on the issue of metropolitan government in Nashville, Tennessee. They concluded that political alienation may be effectively used to study the direction of participation in the local political issues.

McDill[42] suggested that there is a strong correlation between anomie and authoritarianism. His study revealed that the authoritarianism and anomie were equally important in accounting for intolerant attitudes towards minority groups. A highly statistically significant test using factor analysis technique supports such a view.

Faris[43] using a "descriptive-explanatory" study on Tuscaloosa, Alabama, white males found political anomie varied directly with nationalism.

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[40]Angus Campbell et al., The Voter Decides (Glencoe, Illinois: The Free Press, 1954).

[41]E. McDill and J. C. Ridley, "Status, Anomia, Political Alienation and Political Participation," American Journal of Sociology, LXVIII (1962), 205-213.

[42]E. McDill, "Anomia, Authoritarianism, Prejudice and Socio-Economic Status: An Attempt at Clarification," Social Forces, XXXIX (1961), 239-245.

[43]C. D. Faris, "Selected Attitude on Foreign Affairs as Correlates of Authoritarianism and Political Anomie," Journal of Politics, XXII (1960), 50-67.

Nisbet[44] and de Grazia[45] focused the consequences of political anomie in community settings. As de Grazia[46] stated: "To move more systematically, one can find in modern American life protests against the competitive and activist directives and better, actual descriptions . . . of anomie." To continue de Grazia:[47] ". . . anomie has existed in the United States and it still exists in its attentuated form . . . ." As a result of which according to the author there has been a rise in "mental disorder, war, political associations, and mass movements."

"The idea of nationalism" according to Morgenthau[48] ". . . is intimately connected with the idea of freedom." In his article he further asserted that

> . . . Nationalism as a political phenomenon must be understood as the aspiration of two freedoms, one collective, the other individual: the freedom of a nation from domination by another nation and the freedom of the individual to join the nation of his choice.

Taking a historical approach, the researcher saw ". . . inherent paradoxes of nationalism" that ". . . have taken on a novel urgency, threatening to overwhelm the remnants of international order." With a somber, pessimistic note

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[44]Nisbet, The Quest for Community.

[45]de Grazia, op. cit.

[46]Ibid., 15.

[47]Ibid., 100.

[48]Hans J. Morgenthau, "The Paradoxes of Nationalism," The Yale Review, XLVI (1957), 481-496.

Morgenthau[49] concluded that

> . . . nationalism has had its day, it was the political principle appropriate to the post-feudal and pre-atomic age. In the atomic age, it must make way for a political principle of larger dimensions, in tune with the world-wide configuration of interest and power of the age.

To be particular, in the American political scene, Kohn[50] believed that "nationalism in the United States differs in many ways from the usual pattern of national movements." For Kohn[51] thought

> the American constituted themselves as a nation not on the basis of some peculiar and exclusive biological or traditional characteristics but on the basis of a universal idea. They started as the heirs and guardians of the English tradition of individual liberty and representative government.

Faris[52] defined nationalism as ". . . an exaggerated patriotism and an endorsement of a relatively aggressive or bellicose policy in foreign affairs." In an empirical study, Faris[53] found that the less authoritarian a respondent was, the more likely he was to be low on nationalism and on expectations of war. Correspondingly, the less anomic a respondent was, the more likely he was to be low on nationalism and expectations of war.

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[49] Ibid., 496.

[50] Hans Kohn, American Nationalism (New York: The MacMillan Co., 1957), 3.

[51] Hans Kohn, The Age of Nationalism (New York: The MacMillan Co., 1962), 14-15.

[52] Faris, op. cit.

[53] Ibid.

Stagner[54] in setting up a scale to measure nationalistic opinions included (a) patriotism and internationalism; (b) national honor and anti-imperialism; (c) tariffs; (d) militarism; (e) Socialism and Communism and (f) international relations. The validity of such conclusions based upon this type of study of attitude patterns--the tetrachotic correlation of specific response items, rested to a considerable extent upon the determination of the reliability of the method. Stagner[55] claimed that reliability ranged anywhere from +.02 - +.62.

Riegel's[56] study on nationalism in Press, Radio and Cinema was done, because he thought that by studying mass media the influence of nationalism may be seen with greater clarity. "Reliance upon acceptance factors in the press" to continue Riegel[57]

> . . . tends to give comfort to the growth of nationalism in two ways. In a positive way, it tends to give currency to the symbols of nationalism which may be classified among the least common denominations of mass appeal. . . In a negative way, reliance upon acceptance factors tends to reduce the zeal of the newspaper press to pursue truth and reason under the old laissez faire theory of the free press . . . .

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[54]Ross Stagner, "Correlational Analysis of Nationalistic Opinions," Journal of Social Psychology, XII (1940), 197-212.

[55]Ibid., 210.

[56]O. W. Riegel, "Nationalism in Press, Radio and Cinema," American Sociological Review, III (1938), 510-515.

[57]Ibid., 511.

In concluding, Riegel[58] foresaw that in the future, agencies of communication will not raise "any effective obstacles" in the path of nationalism.

The principal task in this review has been to bring the readers up to date on the literature bearing on "concept areas." The "originating question" seems to have been lost in the over-simplification of theoretical proposition. Very few empirical studies had been undertaken to know enough about the factors influencing nationalism, authoritarianism and political anomie. To this writer's mind "ample precedent" should now be directed toward the empirical researches in these closely related "attitude areas."

1.2 Operational Hypothesis

The major hypothesis of the study reported here is that a politically conservative person is one who is characteristically (a) high on authoritarian responses, (b) high on nationalistic responses, and (c) low on political anomie.

1.3 Method

The questionnaire utilized included (a) a Liberalism-Conservatism scale (PEC from Adorno et al.), (b) a Nationalism scale (N scale as derived by Stagner), (c) an Authoritarian scale (F scale as devised by Adorno), and (d) a Political Anomie scale (PA scale as used by Faris).

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[58] Ibid., 513.

Pre-Test: A total of 37 questions were incorporated in the questionnaire schedule and were pre-tested using students (N = 57) from the University of Oklahoma at Norman. Reliability on all four scales, using the "Test-Retest" method, was found to be at the .81 level, scarcely questionable. Also, the four chosen scales satisfy Guttman's assumptions of unidimensionality.

Table 6. PEC Pre-Test Correlations

(Product-Moment Correlations. N = 57)

	N	F	PA
PEC	.86	.91	.72

Test: Since the overall statistical results, from pre-testing associations between the dependent variable and the other measures, were very significant, it seems safe to assume that the basic procedure of scale construction was sufficiently rigorous and could now be administered with confidence.

Subjects: An Oklahoma town was initially selected for study. A random sample of 117 persons from that town were administered the questionnaire. Background data on party preference, age, income and number of years of formal education completed were obtained from the qeustionnaire.

Analysis of Data: Multiple-correlation techniques were employed in analyzing the raw data. As Guilford[59] states: "A coefficient of correlation is a single number that tells us to what extent two things are related; to what extent variations in one go with variations in the other."

Findings:

Table 7. PEC Scale Correlations

(N = 117)

	N	F	PA
PEC	.87	.81	.42

Minor Hypotheses Tested:

I. With increase in age, individuals will tend to have more conservative responses.

II. With increase in age, individuals will tend to have Republican Party membership.

III. With increase in income, individuals will tend to have more conservative responses.

IV. With increase in income, individuals will tend to have Republican Party membership.

V. With increase in level of formal education completed, individuals will tend to have more liberal responses.

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[59] J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw-Hill, Inc., 1942), 198.

VI. With increase in level of formal education completed, individuals will tend to have Democratic Party membership.

The correlations resulting from comparing associations discovered between these variables are as follows:

Table 8. Scale-Variable Correlations (Rank-order Correlations)

	PEC	Republican
Age	.72	.86
Income	.91	.89
Education	.36	.29

Analysis of mutual consistencies among N, PA and F scale scores has been reported by this researcher in an earlier research report.[60] The inner-correlations of these three scales are presented here for the interested reader.

Table 9. Inter-Scale Correlations

	N	F	PA
N	-	.63	.46
F		-	.38
PA			-

[60] A. K. Basu, "Nationalism as Correlated with Authoritarianism and Political Anomie," (Mimeographed, Bureau of Government Research, Oklahoma University, Norman, Oklahoma, 1963).

1.4 Discussion

These results would seem to validate our major hypothesis that the higher the conservatism, the higher the authoritarianism and the nationalism, and the lower the political anomie (i. e., political activist). In other words, a conservative person may be characterized as more authoritarian, more nationalistic and less politically apathetic.

1.5 Conclusion

As implied earlier, this progress report should not be considered conclusive. According to the manner in which the original research design was envisaged, a sample from among the respondents will be interviewed. In designing the interview, their perception of political events and the nature of their "political philosophy"--in short, a close look at their political personality--will be sought.

Applications from this type of research are many. Once mere variable "types" are isolated, a more extensive technique such as factor analysis may be accomplished in order to isolate important clusters of political and other variables and to determine their relative degrees of significance.

CHAPTER VII

SOCIO-ECONOMIC AND DEMOGRAPHIC CORRELATES IN VOTING IN OKLAHOMA'S 1964 PRESIDENTIAL ELECTION

1.1 This study investigated socio-economic and demographic correlates of voting behavior in 1964 Oklahoma Presidential election. The characteristics of each county were treated as independent variables affecting voting.

Much of the voting literature has been mainly geared to national studies.[1] Few researchers have paid close attention to the socio-economic and demographic characteristics in the state voting milieu.

The central hypothesis of this study is to relate statistically the following characteristics, to the voting pattern of seventy-seven Oklahoma counties on the Presidential Election of 1964:

I. Socio-economic status (S.E.S.)

A. Occupation

1) White-collar

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[1]Among these are: B. R. Berelson et al., Voting (Chicago: The University of Chicago Press, 1954); A. Campbell and R. L. Kahn, The People Elect a President (Survey Research Center, Institute for Social Research, University of Michigan, 1952).

2) Other than white-collar

B. Income

1) Median income

2) Per Cent with income below $3,000

3) Per Cent with income above $10,000

C. Education

1) Median education

II. Demographic characteristics

A. Change in population

B. Per cent urban

C. Per cent rural

D. Population 21 or over

E. Median age

F. Per cent manufacture

G. Per cent non-white

H. Urban place 10,000 or more

The complex political system of Oklahoma as influenced by the changing demographic and institutional influence has been well-documented by Holloway.[2] As the study, Oklahoma Votes 1907-1962[3] suggests, Oklahoma may be classified as "modified one-party" state. After three successive ('52, '56, and '60) Republican majorities in the Presidential

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[2]H. Holloway, "Oklahoma Goes Republican" (Unpublished Manuscript, The University of Oklahoma, Norman, Oklahoma, 1963).

[3]O. Benson (ed.), Oklahoma Votes: 1907-1962 (The University of Oklahoma, Bureau of Government Research, Norman, Oklahoma, 1963).

elections, Democrats in 1964 pulled ahead. In 1964, President Lyndon Johnson polled 519,834 votes or 55.75 per cent of the total votes in Oklahoma. Holloway has proposed that the "deepest division is probably the urban-rural. Beyond that issue differences crop up over personalities, interests, patronage and how to divide up limited state funds between roads, schools and the like."[4]

However, many of these studies[5] failed to correlate empirically the nature of party voting in county levels with the socio-economic or the demographic characteristics of the state.

In the nation-wide studies, S.E.S. affecting voting behavior has been well-documented. The hypothesis what "the higher the S.E.S., the more Republican the voting" was validated in the studies by Lazarsfeld et al.,[6] Ziff,[7] Milne and Mackenzie,[8] Janowitz and Marvick,[9] and Berelson

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[4]Holloway, op. cit., 5.

[5]Ibid., and also T. D. Patterson, "Dimensions of Voting Behavior in a One Party State Legislature," Public Opinion Quarterly, XXVI (1962).

[6]Lazarsfeld et al., op. cit.

[7]R. Ziff, "The Effect of the Last Three Weeks of a Presidential Campaign on the Electorates" (M.A. Thesis, Columbia University, 1948).

[8]R. S. Milne and H. C. MacKenzie, A Study of Voting Behavior in the Constituency of Bristol North-East at the General Election, 1951 (London: Hausard Society, 1954).

[9]M. Janowitz and D. Marvick, "Campaign Pressure and Political Consent in the 1952 Presidential Election" (Mimeographed, 1953).

et al.[10]

Using income as a variable affecting the S.E.S., Campbell et al.[11] in their study found that "the higher the income, the more Republican is the individual." The studies by Korchin,[12] Kahn and Campbell[13] and Milne and Mackenzie[14] supported the same thesis.

Key[15] suggested that "occupation remains the most satisfactory index of status." Inkeles and Rossi[16] and Inkeles[17] thought that the popular attitudes in an industrial society is to rank occupation in a relatively standardized scale. Korchin,[18] Kahn and Campbell,[19] Benney and Geiss,[20]

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[10]Berelson et al., op. cit.

[11]Campbell et al., loc. cit.

[12]S. J. Korchin, "Psychological Variables in the Behavior of Voters" (Doctoral dissertation, Harvard University, 1946, Abstract).

[13]Campbell et al., op. cit.

[14]Milne and MacKenzie, op. cit.

[15]V. O. Key, Jr., Public Opinion and American Democracy (New York: A. A. Knopf, 1961), 122.

[16]A. H. Rossi and A. Inkeles, "National Comparisons of Occupational Prestige," American Journal of Sociology, LXI (1956), 329-339.

[17]A. Inkeles, "Industrial Man: The Relation of Status to Experience, Perception and Value," American Journal of Sociology, LXVI (1960), 1-31.

[18]Korchin, op. cit.

[19]Campbell and Kahn, op. cit.

[20]M. Benney and P. Geiss, "Social Class and Politics in Greenwich," British Journal of Sociology, I (1950), 310-327.

Campbell et al.[21] found that there was a direct relationship between the ascendency in occupation ladder with Republican voting. However, Lazarsfeld et al.[22] found that when the S.E.S. is held constant, occupation did not play a vital role in party identification. Benney and Geiss[23] in their studies concluded that as indicated by party choice the white collar and business groups have "greater political solidarity."

In the socio-economic correlates in voting, size of community has been correlated to voting preferences. Lazarsfeld et al.,[24] Korchin,[25] Milne and Mackenzie,[26] Campbell et al.,[27] Epstein,[28] Masters and Wright[29] found that the urban residents tend to vote Democratic. However, that the "residents of metropolitan areas and open country vote more Democratic than residents of middle-size towns

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[21]Campbell et al., op. cit.

[22]Lazarsfeld et al., op. cit.

[23]Benney and Geiss, op. cit.

[24]Lazarsfeld et al., op. cit.

[25]Korchin, op. cit.

[26]Milne and MacKenzie, op. cit.

[27]Campbell et al., loc. cit.

[28]L. D. Epstein, "Size of Place and the Two-Party Vote," Western Political Quarterly, LX (1956), 138-150.

[29]N. A. Masters and D. S. Wright, "Trends and Variations in the Two-Party Votes: The Case of Michigan," American Political Science Review, LII (1958), 1078-1090.

and cities" were found by Campbell and Kahn[30] and Key.[31]

Campbell and Kahn,[32] Milne and Mackenzie,[33] Campbell et al.,[34] Berelson et al.[35] found that the younger people tend to vote more Democratic. However, controlling for S.E.S., Ziff[36] found that there existed "no age difference."

In the racial scene, Campbell and Kahn,[37] Berelson et al.[38] concluded that the non-white, especially the Negroes, tend to vote more Democratic than the white people.

In a large measure, the assumption that the ideas and actions of men are conditioned by their socio-economic position in society has been deeply rooted in the analysis of political motivations and behavior.

Different theories and ideas concerning differences in class as being responsible for various political viewpoints are in some cases supported by empirical studies. For example, Saengar pointed out that ". . . most of the recent studies in the field of public opinion stress a high

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[30]Campbell and Kahn, op. cit.

[31]Key, op. cit.

[32]Campbell and Kahn, op. cit.

[33]Milne and MacKenzie, op. cit.

[34]Campbell et al., loc. cit.

[35]Berelson et al., op. cit.

[36]Ziff, op. cit.

[37]Campbell and Kahn, op. cit.

[38]Berelson et al., op. cit.

correlation between the voter's socio-economic status and his voting tendency."[39] Several studies cited above would tend to support Saenger's viewpoint. These researchers thus boldly state that ". . . the social characteristics determine political preference."

Lipset[40] has presented a very interesting concept concerning the question of class and political behavior. He argues that there is a workers-class, middle-class and upper-class. The workers-class and the upper-class for Lipset are ". . . extremists at either end of the political continuum." However, he thought that the so-called "middle-class liberals" become "facists" when threatened.

In the light of present discussion, this writer feels much of voting behavior has been guided by both "primary" and "secondary" variables. By "primary variable, the writer means the impact of primary relationship, e. g. family, religion, etc., upon the political behavior of the individual. However, with the increasing "secondary contacts," the political behavior has seen a change.

For example, Benney and Geiss,[41] Janowitz and Marvick,[42] found that people generally tend to vote with

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[39]R. Bendix and S. M. Lipset (eds.), Class, Status and Power (Illinois: The Free Press, 1953), 348-358.

[40]S. M. Lipset, "Social Stratification and Right-Wing Extremism," The British Journal of Sociology, X (1959).

[41]Benney and Geiss, op. cit.

[42]Janowitz and Marvick, op. cit.

their friends and coworkers. Controlling for other factors, Milne and Mackenzie,[43] Campbell et al.,[44] and Berelson et al.[45] found that membership in labor unions was correlated with Democratic vote.

Urban-rural dichotomy has been a persistent feature in political science literature. Friedman suggested

> . . . accessibility of census data, persistence of nineteenth-century stereotypes of rural virtue and urban corruption and a revolutionary shift in the population of the United States from country-side to city have all encouraged researchers to treat urban-rural differences as a critical variable in social processes.[46]

Although fruitful results have been obtained from the investigations basically oriented upon "attitude differences," treatment of urban-rural dichotomy on voting literature is scanty. Friedman[47] suggested that "studies of voting behavior incorporating urban-rural conflicts as a variable have been of two kinds--electoral behavior and legislative roll calls." V. O. Key[48] concluded that "the cleavage between metropolitan residents and rural and small town dwellers has become a most significant foundation for

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[43]Milne and MacKenzie, op. cit.

[44]Campbell et al., loc. cit.

[45]Berelson et al., op. cit.

[46]R. S. Freidman, "The Urban-Rural Conflict Revisited," The Western Political Quarterly, XIX (1956), 138-150.

[47]Ibid., 481.

[48]V. O. Key, Jr., American State Politics: An Introduction (New York: A. A. Knopf, 1956), 229-230.

dual systems of state politics." Several researchers[49] have employed significant statistical techniques to validate such a dichotomy.

The principal task in this review has been to put forth a straight forward thesis that political behavior--in turn voting behavior as affected by socio-economic and demographic characteristics play a very important role in political-decision making. The "originating question" this writer hopes has not been lost in the over-simplification of the theoretical propositions.

The second part of this paper will solely be devoted to validate the theoretical propositions by using what Eldersveld[50] has called "hypothesis-testing factorial analysis."

1.2 Operational hypothesis:

A. Dichotomous Variables

1. Those rural counties in Oklahoma as designated by census will tend to vote Democratic.
2. Those counties with a higher percentage of white-collar workers will tend to vote

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[49]These are: J. Turner, Party Constituency and Pressure on Congress (Baltimore: Johns Hopkins Press, 1951), Chapter 4; Key, loc. cit.; H. W. Beers, "Rural-Urban Differences: Some Evidence from Public Opinions Polls," Rural Sociology, XVIII (1953); 1; S. Lubell, The Future of American Politics, Chapter 2 and 3 and others.

[50]J. Eldersveld, "Theory and Method in Voting Behavior Research," The Journal of Politics, XIII (1951), 70-87.

Republican; whereas those counties with a higher percentage of other than white-collar workers will tend to vote Democratic.

3. Those counties with a higher percentage of non-whites will tend to vote Democratic.

B. Linear Variables

1. An increase or decrease in population (as reported by the census) in the counties of Oklahoma will result in an increase in Democratic voting.
2. The younger the median age of the county, the more Democratic the county will tend to vote.
3. Those counties with a high median income will tend to vote Republican.
4. Those counties in Oklahoma where there is a larger percentage of manufacturing will tend to vote Democratic.
5. The urban places in the counties in Oklahoma with population over 10,000 or more will tend to vote Democratic.
6. The percentage of people below an income of $3000 in the counties of Oklahoma will tend to vote Democratic; whereas those counties with a higher percentage of people in the $10,000 or above category will tend to vote Republican.
7. The counties with a high median education will tend to vote Democratic.

Results[51]

Table 10

Presidential Election 1964[52]
Rank order correlation on all counties (n=77)

Variables	Democrat	Republican
Per cent urban	.60	.39
Per cent rural	.59	.40
Change in population	.58	.42
Median age	.58	.41
Median family income	.39	.61
Per cent with income under $3,000	.68	.31
Per cent with income above $10,000	.30	.70
White collar	.50	.49
Other than white collar	.68	.31
Per cent manufacturing	.62	.38
Urban places 10,000 or more	.59	.39
Median education	.50	.49

Table 10 indicates that all the postulates have been validated. As indicated earlier, the central hypothesis of this article is to investigate the influences of (a) socio-economic and (b) demographic conditions in voting milieu.

[51]Data Source: Oklahoma Votes: 1907-1962 and U. S. Bureau of Census, Washington, D. C.

[52]I.B.M. 1620 analysis.

Tables 11 and 12 validate such postulations. Both S.E.S. and demographic characteristics have highly significant correlations with party-voting tendency. Tables 11 and 12 clearly point out the degree of strength of relationship.

Table 11

S.E.S. Index Correlates
Rank Order Correlations

S.E.S.	Democrat	Republican
Income	.39	.61
Occupation	.56	.44
Education	.58	.42

Table 12

Demographic Correlates
Rank Order Correlations

Demographic Variables	Democrat	Republican
Change in population	.58	.42
Per cent urban	.60	.39
Per cent rural	.59	.40
Median age	.58	.41
Per cent manufacturing	.62	.38
Per cent non-white	.78	.22
Urban place 10,000 or more	.59	.39

1.3 Discussion

The results in general validated the hypothesis. It in effect also validated some of the earlier empirical studies mentioned in the theoretical review of this article.

Much of the recent literature[53] on urbanization have been cited as an influencing factor in voting behavior. In our studies in Table 13, five variables have been isolated to test such a hypothesis.

Table 13

Urbanization Index Correlates
Rank Order Correlations

Variables	Democratic	Republican
Per cent urban	.60	.39
Per cent non-white	.78	.22
White collar	.50	.49
Other than white collar	.68	.31
Per cent manufacturing	.62	.38

$x^2 = .04$ d.f. = 4

A chi-square test resulted in almost insignificant statistical measure of strength of relationship between urbanization and voting behavior. According to nature of data tested here, it may be safe to conclude the overall

[53] Beers, op. cit., and Epstein, op. cit.

pattern or urbanization affected very little in 1964 Presidential election.

1.4 Conclusion

In the local political scene, the voting studies have remained as a neglected field of research. This writer hopes this study has tried to show a few important correlates in county voting patterns. In concluding, it must be recalled that S.E.S. and demographic characteristics are not the two sole determinant causes in voting-decision-making. If it were so, the studies in political decision making would have been a simple and naive task.

CHAPTER VIII

A MODEL OF PARTY COMPETITION

1.1 A Measure of Party Competition

Conflict theory, as discussed earlier, has been a major mode of analysis in political science. In this chapter a model on conflict and a resulting effect of party competition will be presented. One of the crucial variables in American state and local politics is the factor of party competition. Such factors as "party cohesion and organization,"[1] "party nominations,"[2] "social and economic conditions,"[3] "the structure of political careers"[4] and "the type of government,"[5] have been attributed to party competition.

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[1]Duncan MacRae, Dimensions of Congressional Voting (Berkeley: University of California Press, 1958).

[2]Julius Turner, Party and Constituency: Pressure on Congress (Baltimore: Johns Hopkins Press, 1951).

[3]V. O. Key, Jr., Southern Politics in State and Nation (New York: A. A. Knopf, 1949).

[4]Joseph Schlesinger, "The Structure of Competition for Office in the American States," Behav. Science, 5, 197-210.

[5]Duane Lockard, New England State Politics (Princeton, New Jersey: Princeton University Press, 1959).

However, few studies have been made which provide a measurement for the party competition.

The main reasons, as Schlesinger suggests may be attributed to the "literary" and "classical" concepts of two-party system.[6] To continue Schlesinger,[7] "this approach which starts from the assumption that one and only one party can be called the government while the other is necessarily the opposition."

The measure of party competition by using the "closeness of votes" has been used by Ranney and Kendall[8] and Key.[9] This method is straightforward, in a sense that it uses actual "raw"[10] voting records.

The position of leaders and alternation of leaders, has been another approach in studying party competition. But as Stokes noted the "cognitive factors"[11] should be taken into account. Using such an approach, he[12] concludes, the significant differences in party over time may be observed.

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[6]Schlesinger, op. cit., 197.

[7]Ibid.

[8]Austin Ranney and Wilmore Kendall, "The American Party Systems," American Political Science Review, 48, 477-485.

[9]Key, op. cit.

[10]Ranney and Kendall, op. cit., 477.

[11]Donald E. Stokes, "Spatial Models of Party Competition," The American Political Science Review, 57, 368-377.

[12]Ibid.

In a report in 1961, David[13] concluded that "the party system as a whole now occupies what is probably the most highly competitive position it has ever reached in national politics." His conclusions were based on the following factors:

(1) The nature and the type of campaign;

(2) The closeness of race in the number of states;

(3) Party efficiency;

(4) The number of close votes on major bills in the President's legislative program;

(5) Leadership qualities in both parties.[14]

American party system may be looked upon as a system of inter-group relationship.[15] The stands on specific items of political life, is a system of communication through which the political parties have symbolized to be a way of action in this popular government. Party structures like any other formal organizations have group properties. This particular group called a political party, is a socio-political unit which is consisted of a number of individuals who stand in a direct relationship to the party. The attitudes formed in a political party is consistency in response to political objects.

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[13]Paul T. David et al., The Presidential Election and Transition 1960-61 (Washington, D. C.: The Brookings Institution, 1961), 339.

[14]Ibid.

[15]Muzafer and Carolyn Sherif, An Outline in Social Psychology.

Defining political party as an attitude system, the concept of political competition may be looked upon as an inter-group conflict. The conflict then is an outcome of internal factors which determine the political structuring at the time. In short, party (inter-group) behavior like any other group behavior can be understood only within the appropriate frame of reference.

With this theoretical frame of reference in mind the party competition in Oklahoma will be investigated. The basic data have been drawn from a study on Oklahoma Votes.[16]

1.2 Operational Definition:

Applying the traditional form of Laplace's theorem, the operational definition of the party competition area would be defined as the extent to which each party crosses the fifty percent limit line.

1.3 Method:

The area associated with Democratic and Republican voting in each election period represents a trapezoid. The trapezoidal rule is based on the idea of representing a definite integral. The basic formula may be given as:

$$\int_a^b f(x)dx \qquad (1)$$

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[16] Oliver Benson (ed.), Oklahoma Votes (Norman, Oklahoma: Bureau of Government Research, The University of Oklahoma, 1964).

For the Area of a trapezoid:

$$A = \tfrac{1}{2}(y_0+y_1)h + \tfrac{1}{2}(y_1+y_2)h + \ldots + \tfrac{1}{2}(y_{n-1}+y_n)h \qquad (2)$$

$$= \tfrac{1}{2}h(y_0+2y_1+2y_2+\ldots+2y_{n-1}+y_n) \qquad (3)$$

Hence the trapezoidal function:

$$\text{if } y = f(x) \quad \text{and} \quad \int_a^b f(x)dx = \int_a^b ydx$$

$$\text{or} \int_a^b ydx = h/2(y_0+2y_1+\ldots+2y_{n-1}+y_n)$$

where, the interval $(a_1 b)$ is divided into "n" equal sub-intervals each of length "h".

1.4 Discussion:

Figure 1 represents the party competition in Oklahoma in the Presidential election 1932-64. Employing the Laplace limit theorem, we find that the Democratic advantage over the Republican ground has been 220.9 and the Republican advantage over Democratic area has been only 69.0.

The party advantage ratio is a co-efficient of Democratic party advantage area over the Republican advantage area. It may be noted that the lower the co-efficient the greater is the competition. In Figure 1, it is 3.2, which may be classified as moderately one-party state.

In Figure 2, the party competition in the Gubernatorial election is somewhat different. It may be safe to conclude that in the Gubernatorial elections Democrats have

FIGURE 1: PARTY COMPETITION IN PRESIDENTIAL ELECTIONS '32-'64.

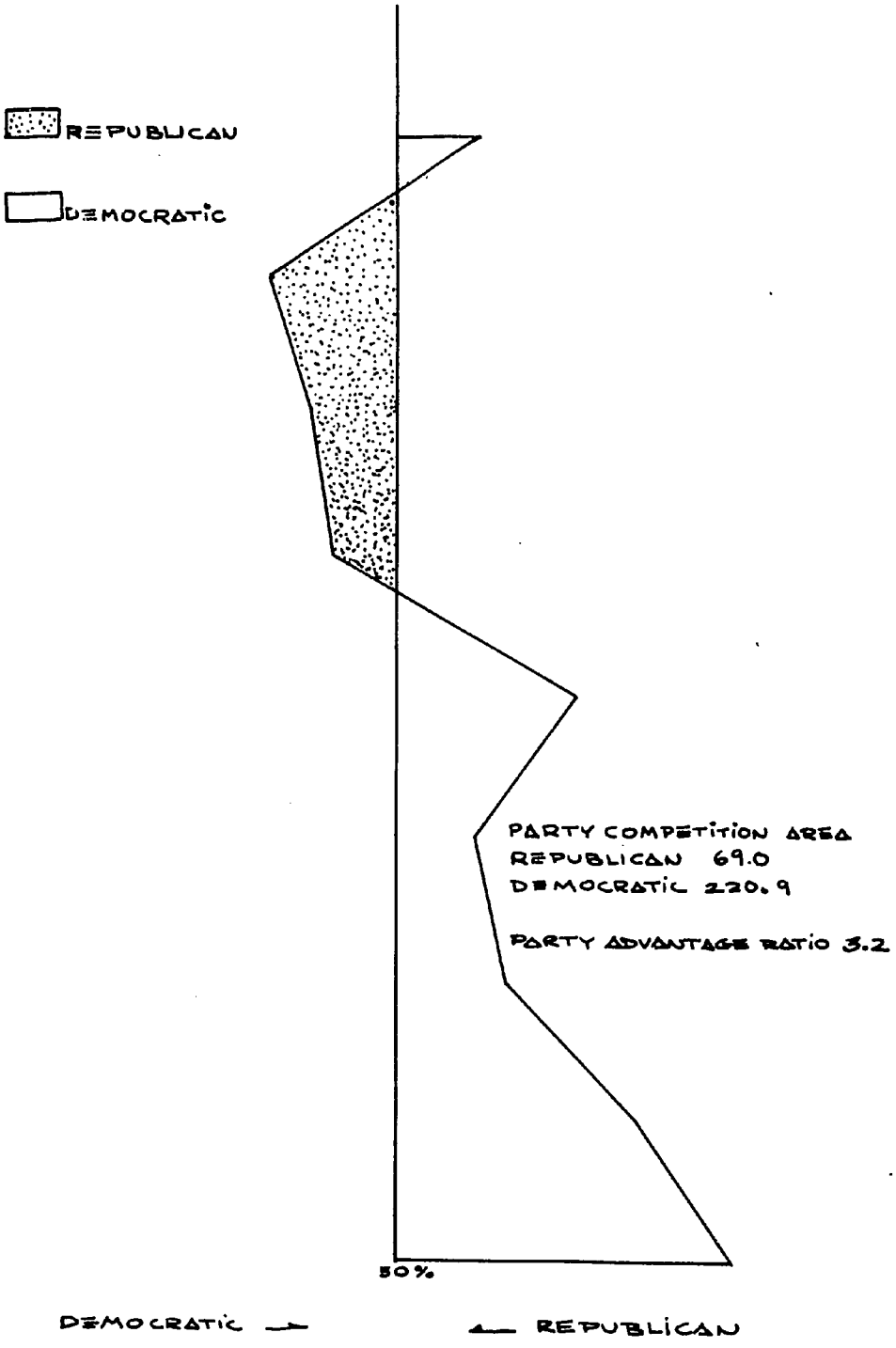


FIGURE 2 : PARTY COMPETITION IN GUBENATORIAL ELCTION '34 - '62

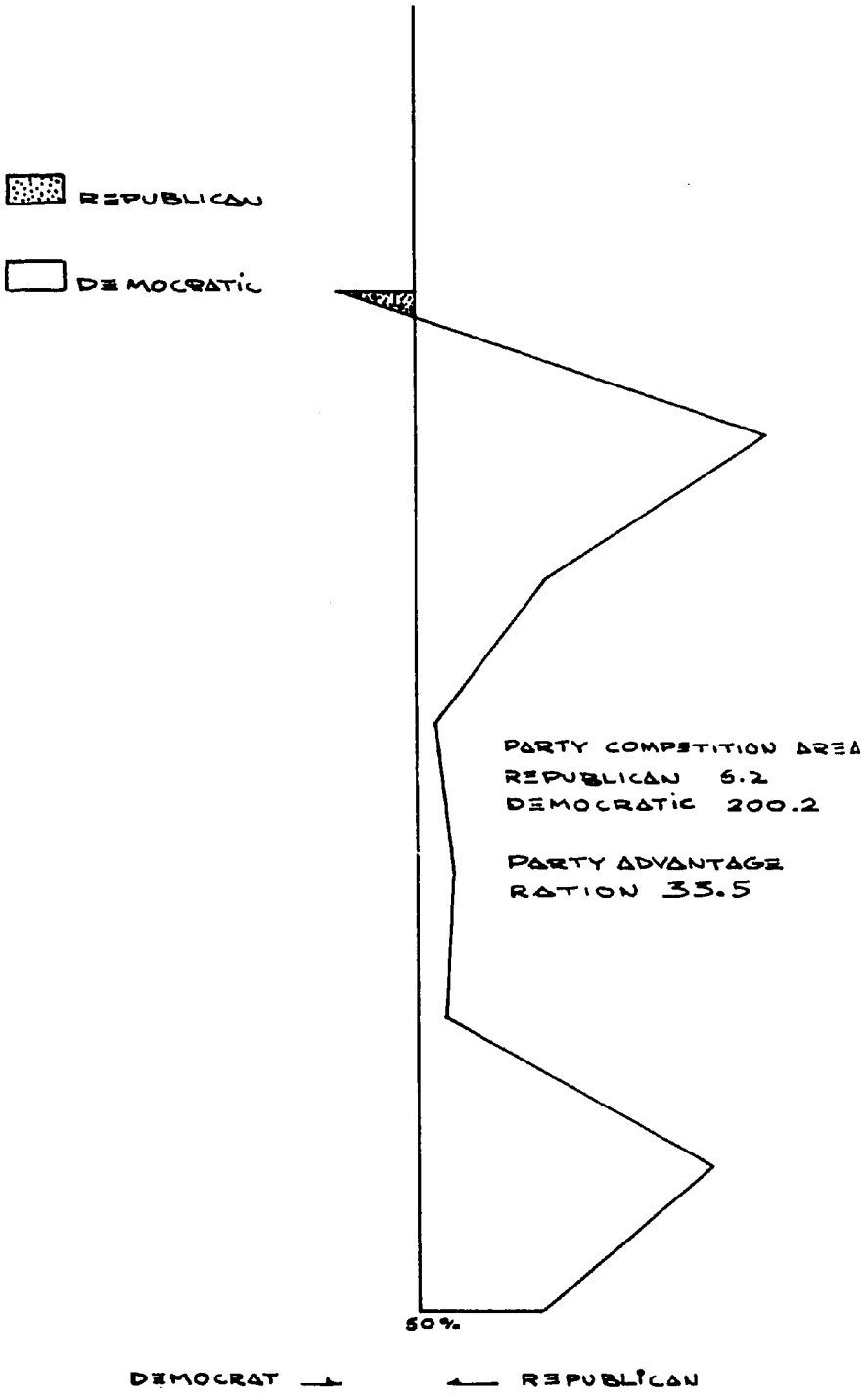


FIGURE 3: PARTY COMPETITION IN SENATORIAL ELECTION '32-'64

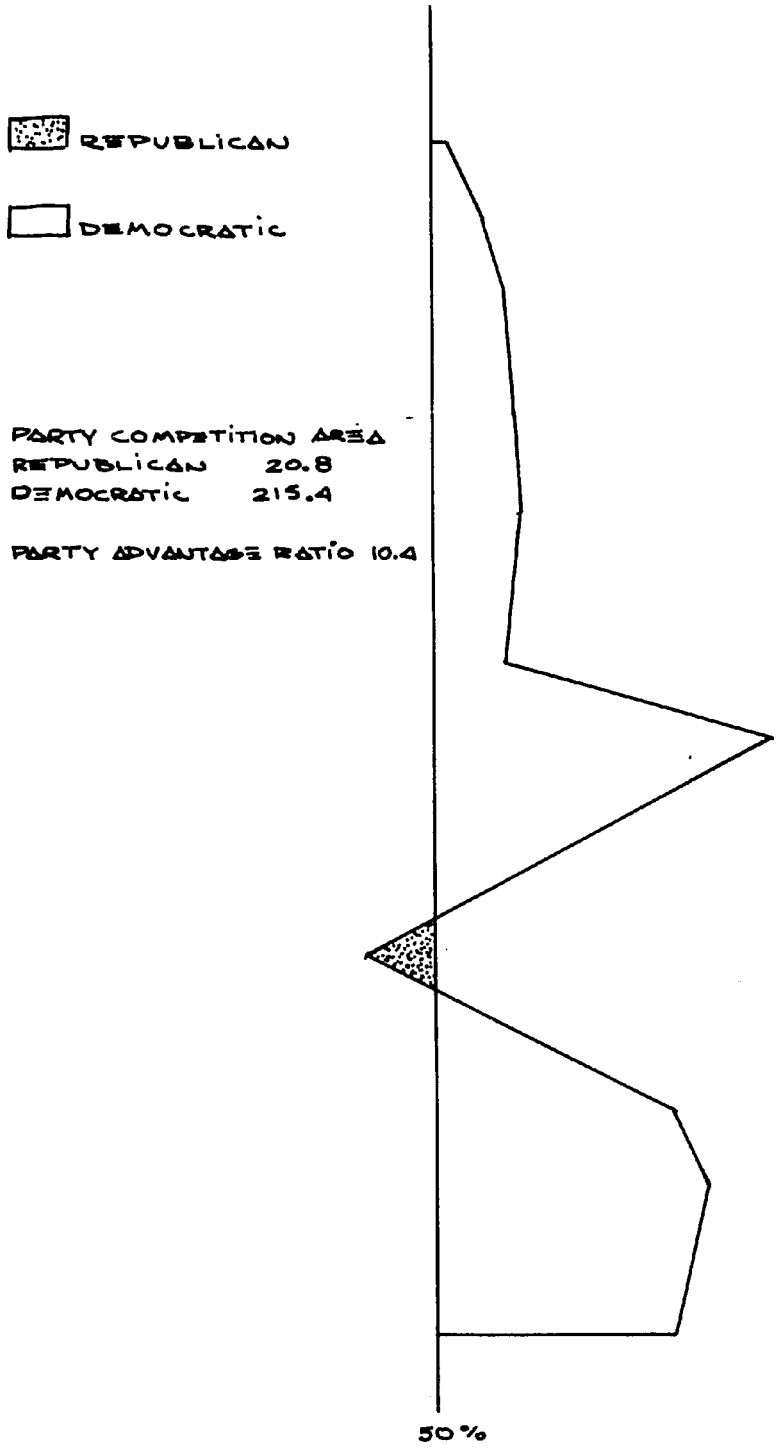
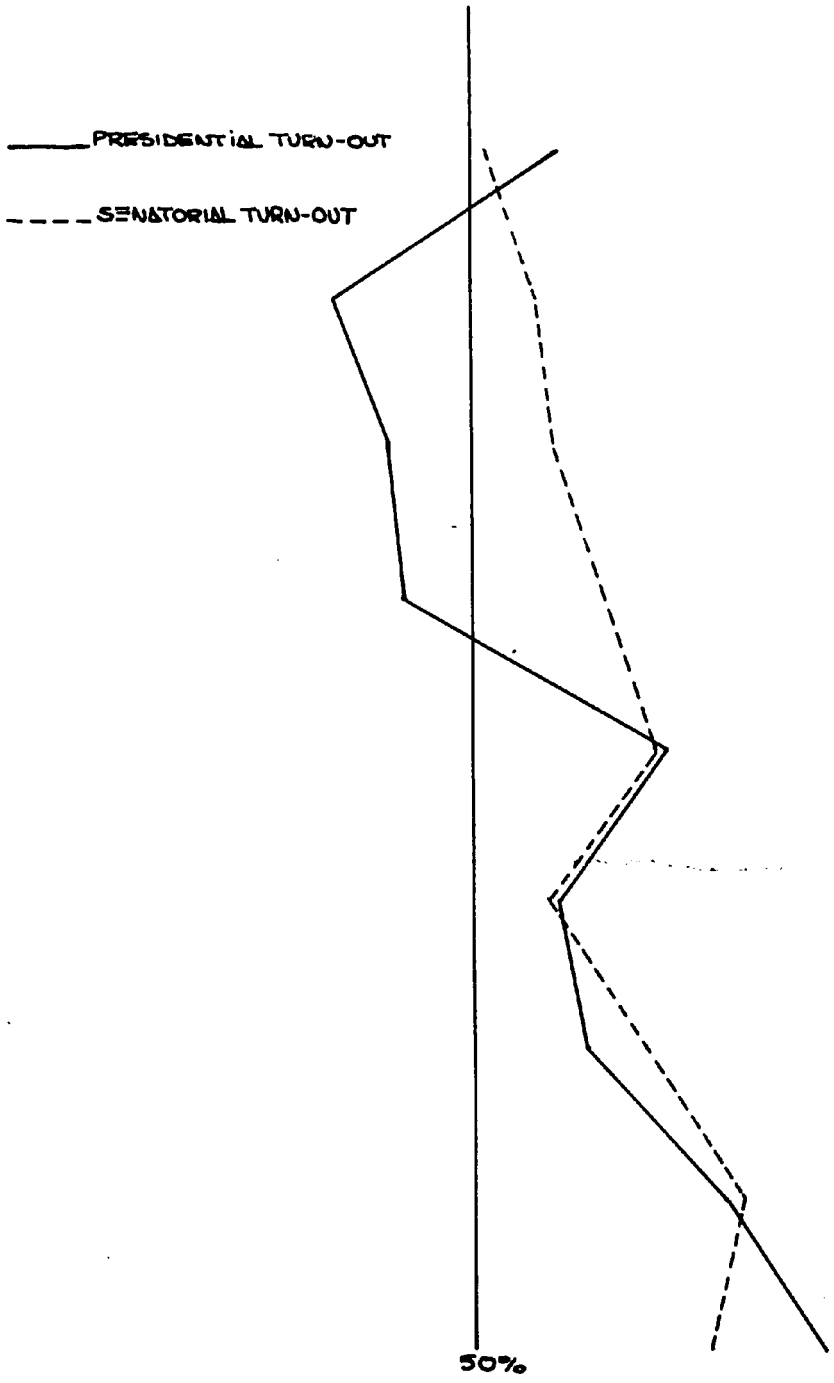


FIGURE 4: COAT-TAIL EFFECT IN PRESIDENTIAL AND SENATORIAL ELECTION '32-'64.



showed a far greater command than the Republicans. In fact, during 1932-64, only one time (1962) the Republicans have been able to place their candidate in the Governor's office. The party advantage ratio is 4.0. This places Oklahoma's Gubernatorial election system in almost one-party category.

Figure 3 represents party competition in the Senatorial election 1932-64. As the party advantage ratio shows, Oklahoma in this realm may definitely be classified as one party state. The Democratic competition area is 215.4 as compared to the Republican area of 20.4.

1.5 Coat-Tail Effect:

Much has been said about the coat-tail effect.[17] In this study, Figure 4 represents such an attempt to measure the effect. The table on the following page substantiates the graphic illustration.

The deviation ratio is a measure of Presidential turnout over the Senatorial turnout. It may be concluded that the smaller the deviation ratio the more substantial may be the coat-tail effect.

However, the closeness of the Presidential and Senatorial elections as has been pointed out by writers[18] should

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[17] Charles M. Moos, Politics, Presidents and Coat-tails (Baltimore: Johns Hopkins Press, 1952).

[18] V. O. Key, Jr., Politics, Parties and Pressure Groups (New York: Thomas Y. Crowell Co., 1964), chs. 19 and 20. Also Warren E. Miller, "Presidential Coat-tails: A Study in Political Myth and Methodology," Public Opinion Quart., 19, 353-368.

not be considered as the only measure to coat-tail effect. The data have been presented here with the idea that they may throw some more light on the nature of coat-tail effect.

Table 14

Coat-Tail Effect
% Democratic Turnout

Year	Presd.	Senat.	Dev. Ratio Presd./Senat.
1932	73.2	65.6	1.2
1936	66.8	67.9	0.8
1944	55.5	55.6	-0.02
1948	62.7	62.2	0.08
1956	44.8	55.3	-2.34
1960	41.0	54.8	-3.34
1964	55.7	51.1	0.90

1.6 Conclusion:

This measure of the party competition is an unique one and it presents a substantial change in the general competition measures as has been practised up to date. Its uniqueness lies in the actual calculation of the party competition areas and resulting in the party advantage ratio. The next step would be now to employ such a technique in the measurement of party competition areas in all the fifty states. Once such a task has been performed a general norm of party competition may be established.

CHAPTER IX

COMMUNISM "AS A WAY OF LIFE" IN NON-WESTERN COUNTRIES: A THEORETICAL OVER-VIEW

1.1 Conflict as an idea system has also been predominant in political analysis. This chapter will discuss the conflict of "Communism" as "a way of life" in non-Western countries.

In the history of human civilization basic idea-systems have motivated human civilization. Idea-systems, broadly speaking, may be considered as a basis for theories of action.

Using history as a guide line for this evolutionary growth of idea systems, in Western philosophy an "attitude" (as differentiated from fact) may be developed.[1] History, as well as human life, is not a shapeless succession of events: it is a "system." In short, a thought is called a system according to the role it plays in human existence. Plato, St. Thomas Aquinas, Hegel, Marx, and, until recently, Spengler, Toynbee and Ortega Y. Gasset would be included in

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[1] The author has largely been guided by Jose Ortega Y. Gasset, The Modern Theme (New York: Harper and Row Publishers, 1961).

the list of first-rate thinkers. For most, history has been given the promiscuous task of "fact-finding"--a secondary approach in finding the sentiments of that period.

Since "attitude" has little implicit philosophic history, the precise meaning given to it in this study is difficult to state. What seems useful is to review perhaps three important philosophies--and relate them to communism.

Underlying the general concept of communism are three basic doctrines.[2] The first is that of the state of nature or jus naturale, which has dominated the basic sentiments of Western philosophy. That man is a product of nature and reason can be found by observing that nature has influenced many a philosopher since the days of Plato and Aristotle. History of human events, to these naturalist philosophers, then, is to be defined as a "natural process" growing out of the natural laws and standing in direct proportion to man, nature and God.

A second doctrine of communism is that dualism considers human history as a ceaseless contest between good and evil, spirit and matter, and light and darkness. Since private property has put man to worldliness and materialism, he would overcome "evil" only through its renunciation. Since private property and personal accumulation is the basic form of alienation among human beings--a kind of nature of man which automatically contradicts "the basic

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[2]Encyclopedia of Social Science, Vol. II, p. 81.

goodness" of man, was in later days to be refuted by Max Weber (in Protestant Ethic) as detrimental to "progress."[3]

The third doctrine is the implicit belief in a hierarchy of values, not as a natural, but as an "essential" process in the development of human civilization which in later years became a working hypothesis for the industrial revolution. In short, the synthesis of the individual with his world is made possible through withdrawal from it, not a domination of it by an overriding natural tour de force, but rather by a co-operation with it.[4] The definition of "man" from such a theoretical perspective would be, then, a homo faber who instrumentalizes and his instrumentalization implies an upgrading of all things into means, their gain of intrinsic and dependent value, so that eventually not only the objects of fabrication, but also "the earth in general and all faces of nature," would clearly come into being with the help of man and have an existence dependent of the "human" world.

1.2 Normative Definition of Communism:

Communism as an idea-system is, then, according to this writer, an integral part of:

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[3]Reinhard, Bendix, Max Weber: An Intellectual Portrait (Garden City, New York: Doubleday and Company, Inc., 1962), pp. 49-70.

[4]T. V. Smith, "Dewey's Theory of Value," Monist, XXXII, p. 339.

> . . . The ancient myth of the golden age, the idealization of civilized man of the primitive, natural or tribal stage of human history. It was reaction from the growing complications of ages of transition from nature bound existence to cultural exertions characterized by a more settled agricultural life. . . . differentiation of society into various ranks with discordant interest . . . .[5]

Attitude, in the doctrine of communism, is, then, to be found in both poles of individual and world. Perceived as a grand system, communism allows man's submission to age-old desires or to contemplation of his natural rights existent since the timeless past; yet man may subordinate them through compliance with living history, which after all, he thinks determines them. Man may, however, comply in the present with the necessary stages of material history, by reflecting them economically as they come and go.

Definition of the Problem:

In this paper, this writer will examine the following questions:

1. Are the basic values of non-Western traditional nations compatible with the communistic idea-system?

2. In which institutional realm of life in non-Western countries is practical replicability of communism possible?

3. If, as some authors seem to suggest, the two basic systems overlap, where, then, is the middle-ground of acceptance or rejection?

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[5]Theodore B. H. Bramfeld, A Philosophic Approach to Communism (Chicago, Illinois: The University of Chicago Press, 1933), p. 17.

1.3 Traditional Way of Life in Non-Western Countries

Society has been defined in so many ways that one feels it is almost undefinable. Still we may accept as a working basis the following statement: Society means the total accumulation of value systems, ideas, symbols, beliefs, sentiments--in short, "a way of life"--which are passed from one generation to another. The concept of traditional society, however, introduces complexities. It carries a value loading and implies that what is traditional is worth conserving as against what is novel; this generally implies a static society and in the human history it has seldom been accepted in its fullest term. There is no tradition that has not been changing in one way or another with time; it is equally true that such changes have seldom resulted in total loss of continuity and eventual disruption of the former system. But this process of the gradual evolution and/or assimilation of new values due to internal growth or external contacts is very different from the present crisis in which many Non-Western countries attempt a quick transformation on all fronts of age-old societies into modern progressive Western communities.

In this section, this writer will examine the underlying value-systems of traditional Non-Western nations.

Basic to the functional analysis of such a social system are the notions of the level and scale of values or ethics and of the major status and roles of individuals and

institutions that serve to maintain the social order and keep the various interpersonal relationships, groups and institutions geared to one another. The structual-functional relationships of values thus provide the central integration core in the theoretical formulation of the social sciences. These values in the case of traditional nations are strongly being attached to individual roles and status.

Levy in The Structure of Society has developed a sound theory of traditional values that rests on the inter-alliances of the stages and the levels of valuation as embodied in the traditionally defined goals, ideas and norms; the graduation and the interrelationship of values and their relation to social roles; the ordering, augmentation, protection, equalization and transmission of values by the vast ramifying framework of traditions, institutions, laws, morals and education and the functional interdependence between the type of group participation, the depth-level of personality and the quality of moral consciousness.[6]

Thus, Levy defines tradition:

> . . . as an institution whose perpetuation is institutionalized. An institution will be considered more or less traditional or more or less traditionalized to the extent that its perpetuation is institutionalized without regard to changes in the functional implications of its operation . . . a tradition in this sense has a double institutionalization: (1) the pattern concerned is an institution, and (2) the perpetuation of the pattern is also an institution.[7]

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[6]Marion J. Levy, Jr., The Structure of Society (Princeton, New Jersey: Princeton University Press, 1952).

[7]Ibid.

In the social science literature, there are several writers who have tried to examine traditional values. However, in broad categorical terms, very few authors have delineated the basic value-differences between West and Non-Western countries.

This author's[8] conceptual scheme of reference, to the above question has been presented as follows:

Value-Orientation	Non-Western	Western Value-System
Human Nature	Basically spiritual (man, nature, and God)	Combination of Mutable and Immutable (e.g., Protestant Ethic)
Man and Nature	Subjugation to Nature	Mastery of Nature
Time Orientation	Past	Future
Activity	Being	Doing
Relational (e.g., Family)	Lineality	Individuality

In the history of Non-Western nations, be it an Islamic State, a Buddhist state, a Shinto kingdom, the above mentioned underlying values have played a very important role in the shaping of thoughts and actions of Non-Western minds.

[8]The author has been largely guided by Florian Znaniecki, The Social Role of the Man of Knowledge.

So far in the paradigm, we have spoken of Non-Western countries to include an array of intra-traditional cultures which by themselves have set definite norms, role-prescriptions, to their people. The "mentality" of, say, Hindu life stems from the Vedas and embraces a period of some 5,000 years. The mentality of Asia proper arises out of Buddhism, Taoism, Confucianism, Hinduism and Islamic beliefs. The solidarity of Asians, then, lies in their basic value-orientation--in short, a view of life--is aptly reflected in their institutional setting.

Religion, family, polity and economics, as institutional elements play a very important role in Non-Westerners traditional way of life. All of them are conceived of as a unit in their codification of reality. To separate one from another would be for a Non-Westerner a perilous and dangerous task; for this organic institutional setting, so to say, nurtures the individual as related to the group. The modern separation of values, in the institutional realm, as evidenced in individual acts, would throw a traditional Non-Westerner completely off-balance.

The scientific explorations in the West, with its rationalistic definition of the state of nature, is beginning to conceive of "reality" as a set of principles as guided by a set of ideas only to be found in rational levels; whereas, to a Non-Westerner the way of knowing an individual "thing-in-itself," as an instance of a theoretically constructed

determinate law, is as significant for engineering and technology as it is for politics, religion, law, etc. In short, this world of events is a mutually inclusive set of ideas, rather than discrete entities, which can be safely applied in one instance, and in other cases, would fail miserably. In short, to a traditional Non-Westerner, an idea must have a universal applicability. To quote Northrop,

> . . . neglect of the philosophy of physics throughout modern times has had the tragic effect of giving modern man powerful and even devastatingly dangerous scientific instruments without at the same time educating him in the more moral legal and religious norms necessary to distinguish good from bad use of those instruments.[9]

1.4 The Social Framework and Economic Development

A discussion of economics should adequately take into account "cultural" and "social" or "institutional" factors. For the economic growth in the underdeveloped countries, economists have taken as a norm, entrepreneurship, capital formation, labor transfer, technological innovation or rationalization of production and economic distribution dependent upon an interaction with a complex social matrix.[10]

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[9] F. S. C. Northrop, The Taming of the Nations (New York: The MacMillan Company, 1954), p. 216.

[10] See especially, Everett E. Hagen, "The Process of Economic Development," Economic Development and Cultural Change, v. (1957), pp. 193-215. And also, Simon Kusnets, "Toward a Theory of Economic Growth," in Robert Lekachman (ed.), National Policy of Economic Welfare at Home and Abroad (Garden City, New York: Doubleday and Company, Inc., 1955).

Moore in this context places great emphasis on the integrative function of "values." The emphasis is not misplaced, if it stops with the functional importance of ultimate explanations and justifications for specific beliefs, rules and patterns of actions. The emphasis is misplaced, however, if such values are regarded as immutable and therefore as "permanent" sources of differences in social systems or at least a tremendous barrier to the acceptance of any such social novelty as new forms of economic activity.[11]

In this part of this paper, the following thesis will be presented: the underdeveloped countries have a so-called "non-industrial" outlook, as opposed to the "secular-industrial-oriented mind," Communism enunciates.

Communistic Economic Doctrine

Communist economic doctrine consists mainly, as suggested earlier, of some fundamental Marxist principles. This economic doctrine was in part influenced by David Ricardo, who in turn had developed his main ideas from Adam Smith. Karl Marx following the above mentioned economist constructed a "labor theory of value" incorporating a "theory of surplus value," "historical materialism" and "economic interpretation of history" as his "prime movers."

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[11]Wilbert E. Moore, "The Social Framework of Economic Development," in Ralph Braibanti and Joseph J. Spengler (eds.), Tradition, Values and Socio-Economic Development (North Carolina, Durham: Duke University Press, 1961), p. 59.

The Theories of Value and Surplus Value:

Two main sources: Critique of Political Economy[12] and Capital[13] will be used here for underlying the basic communist economic philosophy.

(1) In the period of simple commodity production, the value of the labor is what one puts into it. The value of a commodity is thus expressed in the simple equation:

$$v = c + n$$

v = value of the commodity
c = costs
n = new value

(2) In capitalistic production, the equation becomes one of a difference equation in nature, i.e.

$$M - C - M'$$

where $M' > M$

and surplus value $= M' - M$

Here the labor power of the craftsman has become a commodity, the craftsman has become a wage laborer.

(3) Thus, new value now contains both the cost of labor power and the surplus value created by the labor power. The scheme of the capitalistic production now assumes a new equation:

$$V = (C + V) + s$$

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[12]Lewis S. Feuar (ed.), Marx and Engels: Basic Writings on Politics and Philosophy (Garden City, New York: Doubleday and Co., Inc., 1959), pp. 42-47.

[13]Karl Marx, Capital (New York: Random House Inc., 1906).

where

V = Value of Commodities
c = constant capital
v = variable capital
s = surplus value

(4) The rate of capitalistic profit, now may be expressed as

$$R = \frac{s}{c+v}$$

where

R = rate of capitalistic profit.

Marx was not the first to use the concept of "surplus value," but Marx based his theory upon such a concept, to criticize capitalistic motive.

(5) Using Marxian logic, then, the labor-time used to produce the surplus value would be "surplus labor." This all important "Surplus labor" is used, according to Marx, for sheer capitalistic gains. So, now, the final equation boils down to:

$$P = (c + v) + r$$

Where

P = Production price

r = average rate of profit

Thus, production price now expropriates basic human values. To quote Marx:

> The expropriation of one part of society and the monopolistic ownership of the means of production by another part naturally modify the conditions of exchange. . . . However, since exchange is transacted between equal entities, the inequality now no

> longer appears in the equality of value but in that of production prices. . . . The products are sold not according to their value, but according to production prices.[14]

In short, this is the communistic economic system. Till today in most forms, Soviet economists have employed most of their effort in negating the capitalistic mode of production, rather than setting up a purportive thesis of their own. Soviet economists remain under pressure to make use of a labor theory of value instead of a flexible price system and associated indicators. Thus, the cardinal task of the communist state has become, what Lenin called,

> to organize Socialist production with broad participation of masses, to manage the economy, to arrange an extremely intricate and delicate system of new organizational relationships extending to the planned production and distribution of goods. . . . It is the most difficult task, because it is a matter of organizing in a new way the most deep-rooted, the economic, foundations of life of scores of millions of people.[15]

1.5 Idealogy and Non-Western Economics

In Section II, an elaboration was made on the "way of life" in underdeveloped countries. Within this, it was concluded that Non-Western content of the mind deals with the idealogical as opposed to the rational selection of means to ends. In the present section, we will deal primarily with the ideological content of Non-Western

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[14]Rudolf Hilferding, Finanzkapital (Vienna, 1923), p. 96.

[15]V. I. Lenin, The Immediate Tasks of the Soviet Government (Moscow, 1955), pp. 10-13.

economics. As Shils noted:

> The . . . conceptions which are expressed in the prevailing notions of . . . development rest on a deep-lying image of the nature of society and of the right ordering of life . . . What are called the 'economic motives' are distrusted because it is believed that no intrinsic value resides in the economic-sphere in the way in which the religious and political spheres possess the intrinsic value connected with sacred things.[16]

Professor Leibenstein[17] has compiled an admirable list of criteria which characterizes Non-Western economy:

1. A high proportion of the population employed in agriculture.
2. Over population in agriculture.
3. Considerabledegree of disguised unemployment.
4. Very low or close to zero savings for the large majority of people.
5. High mortality and fertility rates.
6. High rates of illiteracy.
7. Absence of, or weak middle-class.
8. Inadequate communication and transportation systems.
9. Crude technology.
10. Occupational immobilities and rigid social structures.
11. Tradition-oriented values and motivations.
12. Political instability and administrative disorganization.

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[16]Edward E. Shils, "The Concentration and Dispersion of Charisma: Their Bearing on Economic Policy in Underdeveloped Countries," World Politics, XI (1958), p. 2.

[17]Harvey Leibenstein, Economic Backwardness and Economic Growth (New York: John Wiley and Sons, 1957).

13. Weak tax systems and tax evasion.

14. Lack of organized money and capital markets.

15. High foreign trade orientation.

The above objectification seems to be a useful measuring rod for what the noted economic historian, W. W. Rostow,[18] called the "take off stage."

However, an overall synthesis of such preconditions time and time again brings forth the basic ideological differences. And, at this point, it may be safe to conclude, that such preconditions, as designated here to be "traditional norms" do influence the kind of "social universe," a Non-Westerner will try to put into effect. As a result, the "universal principle"[19] would find a place in itself in the general institutional pattern of life, of which economic activity would be a major form. For a clear cut example, one may turn to the thought and practice of Moslem lands. Here the use of interest (a practical measure) to stimulate saving and to facilitate the appropriate allocation of capital is deemed contrary to institutional sanctions.[20] Here is a case where individual's integrative function is largely guided by the societal norms.

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[18]W. W. Rostow, The Stages of Economic Growth (Cambridge University Press, 1960).

[19]Levy, op. cit.

[20]Ishitiag H. Qureshi, "Islamic Elements in the Political Thought of Pakistan," in Braibanti and Spengler (eds.), Tradition, Values, and Socio-Economic Development, pp. 139-181.

Conclusion

1.6 What then is the central theme of the preceding section? This writer believes the communistic nation is not only an organization with definite "practical aims" but, above all, a "philosophy in action." This fact is only too often ignored by the author's evaluating communistic gains in Non-Western countries. For Non-Western countries, as has been shown, possess an ideology, a traditional norm, a view of universe, which is far too different from the communistic view of life.

In this concluding section, a clear thesis will also be made that whatever "measurable" communistic gains have been made, in "underdeveloped" Non-Western countries, are due to the industrial temptation.

The most important fact in the recent history of the community of nations is the emancipation of the Afro-Asian world; the achievement of independence by countries which for centuries had colonial status. In this realm of imperialistic "allocation of values," Lenin[21] took the Western countries to task. To the colonials (now independents), "the productive spirit" according to the communistic thought should not be "self-determination" (which Lenin equated with nationalism). The ensuing independent history has shown to have created some frictions.

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[21]V. I. Lenin, Right of Nations and Self-Determination (Moscow), and also Imperialism: The Highest Stage of Capitalism (New York: International Publishers, 1939).

The histories of individual countries that have long since achieved their independence provide further evidence.

The process of industrialization of these new nations, a potent "philosophy of action" was also in later days to have become a very important tool for the communist. For here they are using a time honored psychological fruitcake called "wants create more wants." As a result, the so called Non-Western, underdeveloped countries are faced with what the social scientists have aptly designated as "the rising level of expectations." Here also, the histories of individual countries that are industrial today provide further evidence.

In Britain, the industrial revolution which gathered force gradually in the eighteenth century followed more than two centuries of tension.

In Western Europe, the industrial revolution accompanied a series of upheavals in social order and stretched from the French Revolution to the revolutions of mid-nineteenth century.

In Japan and Russia, the industrial revolutions also followed years of discontentment.

But, as many authors have noted, with Non-Westerners, "the revolution is chaotic." For, it would mean surrendering age-old customs only to be replaced by "foreign values."

However, with communist thinkers, industralization, in their own term was inherently good. To quote Walker:

> Marx and Engels were keen observers of the social ills and human hardships that accompanied the introduction of modern technological change in nineteenth-century England. But they did not, generally speaking, attribute the misery and difficulties to the industrialization process itself. For them, no less than for the classical economists and early capitalists, industrialization was economic 'progress' and inherently good. The evils they so passionately recorded were, they believed, due to capitalism and the exploitation of working class. Although they did not visualize . . . in their writings or doctrines to suggest to their twentieth-century followers that there were human problems . . . inherent in the actual process of industrialization.[22]

Thus, this writer concludes, this short lived "temptation gap" communism may very well fill; but, as soon as a substantial progress has been made in the overall industrial pattern, human values and above all, an ideology, will become all too important. One has only to go through the writings of the student of Russian labor expert, Jerezy Gliksman,[23] to validate our ideas.

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[22]Charles R. Walker, Modern Technology and Civilization (New York: McGraw-Hill Book Co., Inc., 1962), p. 346.

[23]Jerezy Gliksman, "Recent Trends in Soviet Labor Policy," Monthly Labor Review, LXXIX (No. 7), July 1956; and "Soviet Labor and the Question of Productivity," Monthly Labor Review, LXXX (No. 6), June, 1957.

CHAPTER X

A MATHEMATICAL MODEL TO MEASURE THE DEVELOPMENT OF UNDERDEVELOPED COUNTRIES

Introduction

During the last decade underdeveloped areas have become a focal point of international interest. Unfortunately, the term has been carelessly used. As a result it has become a catch word for human scientists. Ellis and Buchanan define an underdeveloped area as ". . . one which on the average affords its inhabitants an end product of consumption and material well-being appreciably inferior to that provided by the economics of the developed countries."[1] According to Viner

> . . . an underdeveloped country . . . is a country which has a good potential prospect for using more capital or more labor or more available natural resources, or all of these to support its present population on a higher level of living, or, if its per capita income level is already fairly high, to support a larger population not a lower level of living.[2]

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[1] T. Buchanan and E. Ellis, Approaches to Economic Development (New York: Twentieth Century Fund, 1955), pp. 3-4.

[2] J. Viner, International Trade and Economic Development (Glencoe: The Free Press, 1952), p. 125.

The acceptance of the above stated definitions limits one to think of underdevelopment in terms of a purely practical base, e. g., "per capita" income, education, increase in natural resources, etc.

In this paper the writer has thus attempted to present a very clear cut mathematical model in order to measure a change in the development of an under-developed country.

History

Basically, the equation has been obtained from N. Rashevsky's "Imitative Behavior Studies." However, Rashevsky in turn obtained a general idea in the formulation of his model from human cell study. The human brain is composed of a very large number of tiny nerve cells. To be exact, there are about 10^{10} nerve cells; each is called a neuron. Bio-physicists found with an injection of "Stimulus" these cells go through a certain "Excitation" process and thereby form a complete different structure. Bio-physicists that time were interested to measure this change. Rashevsky borrowed this general idea to measure social behavior models. A lengthy account of his works can be found in the book entitled Mathematical Thinking in Social Sciences by Lazersfeld.

$$E = (m + n - h)^k \qquad (1)$$

where k and h are constants.

$$\log E = k \frac{(\log m)\ (\log n)}{\log h}$$

Nomenclature:

E = measure the development of an underdeveloped country.

k = coefficient factor.

m = of 1st order.

n = of 2nd order.

h = political lag factor.

Thus, $\frac{dm}{dt}$ = changes in national aspect

$\frac{dn}{dt}$ = internal changes of that country under investigation

where "t" denotes time.

Equation (1) holds only for E 0, that is, for (m+n) h. If the value of (m+n) is very large, as is frequently the case, (m+n) h, then as a good approximation to (1), we find

$$E = (m+n)^k \qquad (2)$$

To Obtain "k"

Anderson has done some work on attitude study. However, most of them are one person attitude study. Gutman expounded his ideas and gave a constructive mathematical model to Anderson's studies.

As an example, in a fourfold study of joint occurrences two basic questions were asked.

IS WAR GOOD? (1)

and

IS WAR BAD? (2)

Each question was assigned with a certain value. Let us say, we assume to question number (1) an arbitrary value of 1, and to question number (2) a value of 2.

Thus we see, a rough probability model would be

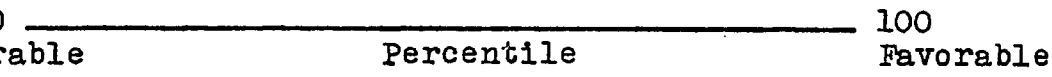
.9 .1

.8 .2

A fourfold study of joint occurrences would be like

		IS WAR GOOD?	
		Yes	No
IS WAR BAD?	Yes		
	No		

To carry it one step further, let us suppose there is an underlying continuum for the universe of attitude towards WAR. Let us represent it as a straight line in the following "percentile" metric.



Thus we see the more a person is favorable towards WAR, the higher the percentile he occupies compared to the rest of the respondents.

In our case, United Nations Data is used to determine the percentile position of each country. Subjects of data can be several, e. g., "per capita" income, age-composition, etc. However, one must remember one subject once used should be continued for other countries.

To Derive "m"

"m" as noted before is the change in first order. Thus, we see "m" is the summation of several factors, e. g., growth of total consumption, population change, production and consumption of commercial energy, food production, foreign trade, transportation.

1. A Mathematical Model for the Growth of Total Consumption:

The model considered here is essentially a development-planning model, clearly mathematical and marginally econometric. It was developed with a special reference to India by P. C. Mahalnobis and his staff. It formed a theoretical frame work for both India's Second Five-Year Plan (1956-62) and the subsequent Third Five-Year Plan.

(a) Paradoxical Income Growth Equation:

Let income during any time period t be donated by Y_t, the sum of total investment I_t and consumption by C_t, measured in monetary units of constant purchasing power. This is to say a society's income is composed of members expenditure for investment and consumption goods.

$$Y_t = I_t + C_t \qquad (3)$$

Let the capital stock K be the limiting resource on the side of production--not an unreasonable assumption for an overpopulated and underemployed country like India. More specifically let the magnitude of investment and consumption (I_t, C_t) be related to the capital stock at the end of preceding time period or the beginning of the

current one (K_{t-1}) in such wise that:

$$I_t = \alpha_i \beta_i K_{t-1} \tag{4}$$

and

$$C_t = \alpha_c \beta_c K_{t-1} \tag{5}$$

The terms in are allocations. A certain proportion of the capital stock is allocated, either by the market or by the economic planners to the investment or to consumption goods. However, the sum of ($\alpha_i \beta_c$) must equal unity. is the gross productives of capital measured as proportions of the capital produced in period t in each of two sectors of the economy.

Mahalnobis defines sum I and C sectors, into which many economists since Marx's day have seen fit to divide the economy, as including raw materials and parts.[3] However, Mahalnobis has reduced the entire economic problem to one of "supply". Demand is nowhere taken into account. He assumes any surplus, which may arise will be distributed through rationing. Thus Y_t and Y_{t-1} from equations 1, 2, and 3 become

$$Y_t = (\alpha_i \beta_i + \alpha_c \beta_c) K_{t-1} \tag{6}$$

and

$$Y_{t-1} = (\alpha_i \beta_i + \alpha_c \beta_c) K_{t-2} \tag{7}$$

These equations permit us to define the percentage growth rate of income which we shall call "g" (Mahalnobis

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[3]K. Marx, "Das Capital" (Department I and II).

does not use this symbol)

$$g = \frac{Y_t - Y_{t-1}}{Y_{t-1}} + \frac{(\alpha_i \beta_i + \alpha_c \beta_c)\ (K_{t-1} - K_{t-2})}{(\alpha_i \beta_i + \alpha_c \beta_c)\ K_{t-2}} \qquad (8)$$

In symbols $K_{t-1} - K_{t-2} = I_{t-1}$, we shall note that

$$I_{t-1} = \alpha_i \beta_i\ K_{t-2} \qquad (9)$$

Making the substitutions and carrying out the equation we obtain a very simple form

$$g = \alpha_i \beta_i \qquad (10)$$

This equation clearly shows us that the growth rate of national income as a whole depends only upon the allocation of the capital to the investment and upon its productivity.

To obtain a growth path or equation for income, let us write Equation (1) as a difference equation, making use of the definition of the growth rate "g":

$$Y_t - Y_{t-1} = \alpha_i \beta_i\ Y_{t-1} \qquad (11)$$

or,

$$Y_t - (1 + \alpha_i \beta_i)\ Y_{t-1} \quad 0 \qquad (12)$$

(b) Consumption Growth Pattern:

Defining g' as the percentage rate of growth of total consumption, we obtain the final formula

$$g' = \frac{C_t - C_{t-1}}{C_{t-1}} = \frac{(\alpha_c \beta_c)\ (K_{t-1} - K_{t-2})}{(\alpha_c \beta_c)\ K_{t-2}} \qquad (13)$$

2. Population Growth:

Population growth has become a very significant item in any field of human study. United Nations publication on "The Future Growth of World Population" states that "the rate of world population growth will probably continue to rise until the end of the century. . . ." Population growth is most rapid in the economically underdeveloped areas of Africa, Asia, and Latin America where well over half of the world's people live in abject poverty. At least two-thirds of the babies born each year are in these areas. Thus, we see population growth has a very important place in this model.

There are several methods in obtaining net population growth. However, here the author will use the concepts of Dublin and Lotka. The reasons for such a use are several. The main reason being the inadequacy of data obtained from more than two-thirds of the country. A cohort analysis in this case will be useless since it stresses accuracy of census data.

In 1911, Sharpe and Lotka had shown that a population continuously subject to a fixed set of fertility rates for women of each age and a fixed set of mortality rate for each age, in the absence of migration, ultimately will assume stable age distribution.[4] The ultimate birth rate,

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[4]L. Sharpe and V. Lotka, "A Problem in Age Distribution," Philosophical Magazine, 21, pp. 435-438.

death rate and rate of natural increase, therefore could be computed. These ultimate rates were called true birth and death rates and their difference, the true rate of natural increase. For further explanation of this concept writer will refer to an article in the Journal of the American Statistical Association in 1925 written by Dublin and Lotka.

3. Per Capita Production of Commercial Energy and Consumption, Food Production, Foreign Trade, Transportation:

Data on these are obtained from "Statistical Paper Series," United Nations, New York.

To Derive "n"

"n", appropriately, can be called as changes in second order of that particular nation under research. A study of this kind will enable us to show the pattern changes inside the society.

1. Different Party Affiliation:

The model set forth by Lazarsfeld, Berelson, and Gaudet called "Peoples Choice" will be used in this study.

2. Religious Affiliation:

Data to be obtained from United Nations Year Book.

3. Newspaper Circulation:

The circulation of daily newspaper appears to be closely related to the status of an area as developed or undeveloped. The circulation of daily newspapers vary from

none to 600 newspapers per 1000 population. Data on different countries may be obtained from United Nations Statistical Year Book.

4. Radio:

The number of radios per 1000 population, as in the case of newspapers, is highly correlated with development. From the data at hand we see radios vary from 1 radio per 1000 population to 700 radios per 1000 population. The essential data on this too may be obtained from United Nations Statistical Year Book.

5. Literacy:

This is a highly pertinent data. Definitions of literacy are quite varied but it may be that the demands of societies are so different that variations in definition are quite justifiable even attempts at international comparison are being made. These data may be obtained from United Nations Statistical Year Book.

Some More Discussions on Three Variables (m, n, and E and K):

Using Spearman's formula of factor analysis we know:

$$\alpha_{mnK} = \frac{(\alpha_{mn} - \alpha_{mK})\ \alpha_{nK}}{1 - \alpha^2_{mK} - 1 - \alpha^2_{nK}} \qquad (14)$$

It is evident that

$$\alpha_{mn} = \alpha_{mK}\ \alpha_{nK} \qquad (15)$$

Similarly $\alpha_{mE} = \alpha_{mK} \quad \alpha_{EK}$ (16)

and $\alpha_{nE} = \alpha_{nK} \quad \alpha_{EK}$ (17)

Multiplying (15) and (16) and dividing it by (17) we get

$$\frac{\alpha_{mE} \quad \alpha_{mn}}{\alpha_{nE}} \qquad \frac{\alpha_{mK} \quad \alpha_{nK} \quad \alpha_{mK} \quad \alpha_{EK}}{\alpha_{nK} \quad \alpha_{EK}}$$

$$= \alpha_{mK}^2 \qquad (18)$$

Therefore $$\alpha_{mK} = \frac{\alpha_{mE} \quad \alpha_{mn}}{\alpha_{nE}}$$

Similarly, we can find relations for

$$\alpha_{nK} \text{ and } \alpha_{EK}$$

Conclusion

"Development" according to Webster's new International Dictionary is defined as "The act, process or result of developing, or state of being developed." In mathematical terms it can be thought of as an expression of a function in form of a series. While any single variable of combination of several variables might be used as an index of development the author has chosen to combine a variety of indices in order to obtain an overall score of development, a score which is more likely to be representative. The author is well aware that the above model might not have covered all the factors of both internal and external in nature. However, the writer firmly believes this is one step forward in the march of mathematical thinking in the social sciences.

CHAPTER XI

CONCLUSION

Former chapters have elaborated the diverse application of models in Political Science. The theoretical formulations of logical consistencies and the causal elaborations in political models as a normative-empirical tool have been discussed. Much of the rigor of political science is very much in an infant stage. Unlike physical science the elements in political science are not well ordered as to seek meaningful empirical generalizations. The web of relationship of the individual or a group with the political process are complex and affective variations are multiple.

Often, even, by the empirically minded scientists the validity of models has been raised. To what extent do models represent the "real" phenomena? Some of the dissenters have questioned the level of abstractionism in models.

Mathematical models are in no sense to be understood as an all encompassing theory. As discussed in chapter one, the model is a form of abstractionism with valid logical contents. In social science this is specially hard to

think. In the formulations of human thinking mathematical abstraction is capable of varying to a great extent. Application of mathematical model in political science to that cause may represent a small facet of political drama.

Formal models as Nagel suggests[1] ". . . pay no less important role." Model often gives rise to the formulation of a "new Theory."[2] However as Nagel suggests:

> It would be a mistake to conclude . . . that once the new theory has been formulated the model has played its part and has no further function in the use made of theory. In the first place, the task of the theoretical scientist is not completed when he has simply formulated the main assumptions of the theory. Those assumptions must be explored for consequences that may lead to the systematic explanations of diverse . . . clues.[3]

The formulation of a theory in terms of some model is nevertheless not free from dangers. A model may be a potential intellectual trap as well as an invaluable intellectual tool. The chief dangers are two fold: in political analysis some substantive model may be mistakenly assumed to constitute an indispensable theory embedded in it and the model may be confused with the theory itself. In consequence, the search for a political theory may be rooted in a wrong direction and the pursuit of the pseudo-problems may distract main attention from the theoretical body

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[1]E. Nagel, The Structure of Science (New York: Harcourt, Brace and World Inc., 1961), 115.

[2]Ibid.

[3]Ibid., 115-116.

of knowledge so urgently needed.

The practicality of logical models is a function of the level of generalization it achieves. That is, its usefulness depends to a great extent upon the level of symbolization one wishes to obtain. In political science these usages of models are limited; the obvious point in which it proves to be inadequate is the failure of logical consistency.

Quantification in political science has its disadvantages. It represents only a partial picture of the whole; this incomplete aspect of models is a definite limitation which risks losing other pertinent realities and discolors the totality of a phenomenon; i. e. scale models as used in this dissertation are not wholistic in fashion. Attributes in the scale model do not take all factors into account.

According to Landau[4] two features of a model are often overlooked.

1. A model is a linguistic system. It requires a precise vocabulary in which (if not stated in an operational scientific language) the logic of a model is vague and ambiguous. Making the transition from a natural to a scientific language involves considerable semantic difficulties for political scientists.

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[4]Martin Landau, "Political Theory and Due Process of Inquiry," read at Am. Pol. Science Assc., Chicago, 1964.

2. A model always presupposes an analogy. When a model is applied to a problem, it is as though the problem is similar in structure and form to the model. This may or may not be correct.

The user of a model must understand well the characteristics of a model in order for it to serve him. Otherwise it is of no value. This includes the realization that it is a mechanical system and carries with it specific restrictions of behavioral predictions to which it is applied.

The predictive power of a model can be measured only when correspondence has been established. This involves complications in testing to prove that in certain instances a model may be empirically valid when applied to a problem.

Landau demonstrates the inherent involvements of the usefulness of a model, which he calls the "due process of inquiry." These stages are:

1. its initial selection, transfer or formulation--which is anyone's guess
2. the clarification of its logical properties and basic concepts
3. the stipulation of correspondence between the elements of the model and the problem under scrutiny
4. the derivation of hypotheses and their check
5. the acceptance, rejection, modification of the model itself on the basis of the research undertaken which in turn lead back to stage one.[5]

These are then the shortcomings of political models. It must nevertheless be acknowledged that there is no way of telling in advance whether a given model will prove to

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[5] Ibid., 8.

be an obstacle to the fruitful development of theory, since once a model has been presented one can ascertain the consistencies or the practical application in the real political world. Thus this writer suggests the search must continue and it must come up with viable, compatible generalizations based on "real" life conditions rather than intuitive knowledge or the shear search for "good life."

It is with this hope this dissertation is presented.

APPENDIX I

A MEASURE OF INTERNATIONAL TENSION

Variables:

Military force . . . . . Y

Political structure . . . . . Z

Economic structure . . . . . K

Social structure . . . . . M

Theorem: 1

Let Social structure be conceived of two elements

M_1 . . . . structural (wealth, class, status, etc.) The forces which are dividing (fissiparous) in nature.

and M_2 . . . . Nominal (Religion, wealth, sex, etc.) The forces which are unifying in nature.

$$M \propto M_2 \quad . . . . . (1)$$

and $$M \propto \frac{1}{M_1} \quad . . . . . (2)$$

therefore $$M \propto \frac{M_2}{M_1} \quad . . . . . (3)$$

where $M_2 \propto M_1$

Theorem: 2

Military force of any nation is directly related to the economic force

therefore $$Y = K \quad . . . . . (4)$$

Theorem: 3

Hypothesis: The more coherent is the social structure the more stable is the political structure.

therefore $Z \propto M$ . . . . . (5)

or,

combining theorems 1 and 3 $Z \propto \frac{M_2}{M_1}$ . . . . . (6)

Theorem: 4

Military force has earlier been designated as Y

let,

internal self-defense be designated as Y_1

and external commitments be designated as Y_2

also let,

military personnel be designated as p

and military strength be designated as m

Hypothesis: Y_1 where less m and less p are required
also Y_2 where more m and more p are required.

since this is true:
Y_2 should be greater than Y_1 in order that Y_2 should become a tangible strength.

therefore $Y = \frac{Y_1}{Y_2}$ . . . . . (7)

Theorem: 5

Economic structure is directly related to the personnel and material potentialities.

In fact, we find the higher the economic growth the more capable the nation is in enlarging the material resources regarding the military power and the less dependent on personnel.

therefore $K \propto \frac{m}{p}$ . . . . . (8)

Combining theorems 2 and 5, we find

$$Y \propto K \propto \frac{m}{p} \propto \frac{Y_1}{Y_2} \quad . . . . . (9)$$

or, $$mY_2 = Y_1 p \quad . . . . . (9a)$$

Theorem: 6

Economic structure (K) and political structure (Z) have been found to be related in international politics.

In fact, if we consider this following economic spectrum,

free-enterprise (K_f) ——— collective (K_c)

we find, almost all nations are using a combination of both. K_f and K_c. However, it is to be noted that the usages of K_f and K_c may vary from country to country, for example, in the U.S.A. K_f K_c whereas, in Russia K_c K_f.

thus $$Z = (K_c + K_f) \quad . . . . . (10)$$

Combining theorems 3 and 6, we find

$$Z \propto (K_c + K_f) \propto \frac{M_2}{M_1} \quad . . . . . (11)$$

thus defining,

$$\text{TENSION } (T) = \frac{\text{STRESS}}{\text{STRAIN}}$$

we find,

$$T = \frac{(K_c + K_f) \quad M_2/M_1}{mY_2 \quad Y_1 p} \quad . . . . . (12)$$

or,

$$\text{stress} = (K_c + K_f) = c_1 \frac{M_2}{M_1}$$

or,

$$c_1 = \frac{M_1(K_c + K_f)}{M_2}$$ where c_1 is const

and also,

$$\text{strain} = mY_2 = c_2 Y_1 p$$

or, $$c_2 = \frac{mY_2}{Y_1 p}$$ where c_2 is const

or,

$$T = \frac{c_1}{c_2} = \frac{M_1}{M_2} \cdot \frac{Y_1}{Y_2} \cdot \frac{p}{m} \cdot (K_c + K_f) \quad . \quad . \quad . \quad .$$

or,

$$T = \frac{Y(K_c + K_f)}{MK} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad .$$

Combining formulas 10 and 14, we find

$$T = \frac{c_1}{c_2} = \frac{Y\, c_3 Z}{MK} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad .$$

where c_3 is constant.

or,

$$\frac{c_2 \cdot c_3}{c_1} = \frac{MK}{YZ} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad .$$

or,

$$T = C = \frac{MK}{YZ} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad .$$

where $C = \frac{c_2 c_3}{c_1}$

or,

$$T = \frac{MK}{YZ} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad .$$

$$c_1 = \frac{M_1(K_c + K_f)}{M_2} \qquad \text{where } c_1 \text{ is constant.}$$

and also,

$$\text{strain} = mY_2 = c_2 Y_1 p$$

or, $$c_2 = \frac{mY_2}{Y_1 p} \qquad \text{where } c_2 \text{ is constant.}$$

or,

$$T = \frac{c_1}{c_2} = \frac{M_1}{M_2} \cdot \frac{Y_1}{Y_2} \cdot \frac{p}{m} \cdot (K_c + K_f) \quad . \quad . \quad . \quad . \quad . \quad . \quad (13)$$

or,

$$T = \frac{Y(K_c + K_f)}{MK} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (14)$$

Combining formulas 10 and 14, we find

$$T = \frac{c_1}{c_2} = \frac{Y\, c_3 Z}{MK} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (15)$$

where c_3 is constant.

or,

$$\frac{c_2 \cdot c_3}{c_1} = \frac{MK}{YZ} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (16)$$

or,

$$T = C = \frac{MK}{YZ} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (17)$$

where $C = \frac{c_2 c_3}{c_1}$

or,

$$T = \frac{MK}{YZ} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (18)$$

BIBLIOGRAPHY

Adams, R. and Preiss, Jack (eds.). Human Organization Research. Illinois: The Dorsey Press, 1960.

Adorno et al. The Authoritarian Personality. New York: Harper and Brothers, 1950.

Alker, Hayward, Jr. "Dimensions of Conflict in the General Assembly," Amer. Pol. Science Rev. 58 (Sept. 1964), 642-57.

_____. Mathematics and Politics. New York: The MacMillan Co., 1965.

Anderson, T. W. "Probability Models for Analyzing Time Changes in Attitudes," in Paul F. Lazarsfeld (ed.).

Aumann, Robert J. "Acceptable Points in the Co-operative Game," in Tucker and Luce (1959).

_____. "Cooperative Game with No Side Payments," in Morgenstern et al. (1962).

Arendt, Hannah. The Origins of Totalitarianism. New York: Harcourt, Brace and Co., 1945.

Aristotle, Metaphysics. Translated by H. Tredennick. London: Heinemann Publishers, 1947.

Arrow, Kenneth J. "Mathematical Models in the Social Sciences," in Daniel Lerner and Harold D. Lasswell (eds.). The Policy Sciences. Stanford: Stanford University Press, 1951, 129-154.

Baker, Stephen F. Philosophy of Mathematics. New Jersey: Prentice-Hall, 1964.

Bartlett, M. S. "Contingency Table Interactions," Supplement to the Journal of the Royal Statistical Society, 2 (1935), 248-252.

Basu, A. K. Socio-Economic and Demographic Correlates in Voting in 1960 Oklahoma Presidential Election, Oklahoma Govt. Bulle., 2 (1964).

Becker, Howard. Through Values to Social Interpretation. Durham: Duke University Press, 1950.

Beers, H. W. "Rural-Urban Differences: Some Evidence from Public Opinion Polls," Rural Socio., 18 (1953), 1-15.

Bendix, R. and Lipset, S. M. (eds.). Class, Status and Power. Glencoe: The Free Press, 1953.

Bendix, Reinhard. Max Weber: An Intellectual Portrait. New York: A Double Day Anchor Book, 1962.

Benney, M. and Geiss, P. "Social Class and Politics in Greenwich," Brit. Jour. of Socio., 1 (1950), 310-327.

Benson, Oliver. "Classical International System: Four Models of Power Politics," from Models of World Politics and the Concept of Problem Relevance, Forthcoming.

_____. "Simulation of International Relations and Diplomacy," from Harold Borkol (ed.). Computer Applications in the Behavioral Sciences. New Jersey: Prentice-Hall, 1962.

_____. Quantitative Methods in International Relations. University of Minnesota, 1964.

_____. "A Simple Diplomatic Game," in Rosenau (ed.). 504-511.

Bentley, Arthur. The Process of Government. Chicago: Univ. of Chicago Press, 1908.

Bernard, Jessie. "Parties and Issues in Conflict," J. of Confl. and Reso., 2 (June 1957), 111-122.

Berelson, B. R. et al. Voting. Chicago: The Univ. of Chicago Press, 1954.

Bierstandt, Robert (ed.). The Making of Society. New York: The Modern Library, 1959.

Blalock, Hubert. Social Statistics. New York: McGraw Hill, 1960.

Blalock, Hubert, Jr. "Theory Building and the Statistical Concept of Interaction," Amer. Soc. Rev., 30 (June 1965), 374-80.

Blackwell, H. and Girshick, J. Theory of Games and Statistical Decisions. New York: John Wiley and Sons, 1954.

Blau, Peter F. "Determining the Dependent Variable in Certain Correlations," Pub. Opinion Quart., 19 (Spring 1955), 100-105.

Borko, Harold (ed.). Computer Applications in the Behavioral Sciences. New Jersey: Prentice-Hall Inc., 1962.

Born, Max. Natural Philosophy of Cause and Chance. Oxford: Clarendon Press, 1951.

Boulding, Kenneth E. "National Images and International Systems," Journ. of Conflict and Resolution, 2 (June 1959), 120-131.

_____. Conflict and Defense. New York: Harper and Brothers, 1962.

Braibanti, R. and Spenster, Joseph (ed.). Tradition, Values and Socio-Economic Development. Durham: Duke Univ. Press, 1961.

Bramfeld, Theodore B. H. A Philosophic Approach to Communism. Illinois: The Univ. of Chicago Press, 1933.

Braybrooke, David, and C. E. Lindblom. A Strategy of Decision. New York: Free Press, 1963.

Brunschvicg, Leon. L'experience Humaine et la Causalite Physique. Paris: Presses Universitaries de France, 1949.

Buchanan, T. and Ellis, E. Approaches to Economic Development. New York: Twentieth Century Fund, 1955.

Bunge, Mario. Causality. Cambridge: Harvard University Press, 1959.

Bush, Robert R. See Mosteller and Bush (1954).

Campbell, Angus, et al. The American Voter. New York: Wiley and Sons, 1960.

Campbell, Angus et al. The Voter Decides. Glencoe: The Free Press, 1954.

Campbell, A. and Kahn, L. The People Elect a President. Survey Research Center, Univ. of Michigan, 1952.

Caplow, Theodore. "A Theory of Coalition in the Triad," Amer. J. Socio. 21 (Aug 1956), 489-93.

_____. "Further Development of a Theory of Coalition in the Triad," Amer. J. Socio. (March 1959), 488-93.

Cartwright, Dorwin, and Alvin Zander. Group Dynamics. Evanton: Row, Peterson, 1960.

Cecile, Robert. The Hungarian and Suez Decisions--1956: An Analysis of Decision-Making in American Foreign Policy. Unpublished M. A. Thesis, Univ. of Oklahoma, Norman, 1963.

Chamberlin, Edward H. "An Experimental Imperfect Market," J. Pol. Econ. 56 (April 1948), 95-108.

Chapins, A. "Men, Machines and Models," Am. Psych., 16 (1961), 112-117.

Cochran, John. Sampling Techniques. New York: Wiley and Sons, 1953.

Cohen, Morris R. and Nagel, E. An Introduction to Logic and Scientific Method. New York: Harcourt, Brace Co., 1934.

Coleman, James S. Introduction to Mathematical Sociology. New York: Macmillan Press, 1964.

Coleman, James. "Relational Analysis: The Study of Social Organizations with Survey Methods," Human Org. 17 (Winter '58-'59), 28-36.

Colin, Cherry. On Human Communication. New York: Wiley and Sons, 1957.

Coombs, C. H. et al. "Some Views on Mathematical Models and Measurement Theory," in R. M. Thrall et al. (eds.). Decision Process. New York: John Wiley and Sons, Inc., 1954.

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

Dahl, Robert A. "The Concept of Power," Behv. Science 2 (July 1957), 201-15.

David, Paul T. et al. The Presidential Election and Transition 1960-61. Washington, D. C.: Brookings Inst., 1961.

de Fleur, M. and Larsen, Otto. The Flow of Information. New York: Harper and Brothers, 1958.

de Grazia, S. The Political Community: A Study of Anomie. Chicago: The Univ. of Chicago Press, 1948.

Deutsch, Karl W. "Shifts in the Balance of Communication Flows: A Problem of Measurement in International Relations," Pub. Opinion Q. (Spring 1956), 143-60.

_____. The Nerves of Government. New York: Free Press, 1963.

Deutsch, Karl. "Machanism, Organism and Society," Philo. of Science, 18 (July 1951), 230-252.

_____. "Game Theory and Politics," The Canadian Jour. of Economics and Pol. Science, 20 (Feb. 1954), 76-83.

_____. "On Communication Models in the Social Sciences," Pub. Op. Quart., 16 (1952), 356-380.

Dresher, M., L. S. Shapley, and A. W. Tucker (eds.). Advances in Game Theory. Annals of Mathematical Studies 52, Princeton, 1964.

Durkheim, Emile. The Division of Labor. Trans. by George Simpson. Glencoe: The Free Press, 1949.

_____. Suicide. Trans. by George Simpson. Glencoe: The Free Press, 1951.

Duverger, Maurice. Political Parties. London: Methuen, 1959.

Edwards, A. L. (ed.). Techniques of Attitude Scale Construction. New York: Wiley and Sons, 1942.

Eldersveld, J. "Theory and Method in Voting Behavior Research," Jour. of Politics, 13 (1951), 70-87.

Epstein, L. D. "Size of Place and the Two-Party Vote," Western Pol. Quart., 60 (1956), 138-150.

Ewing, George M. Mathematical Models: Their Generation and Use. Mimeographed. The Univ. of Okla., Norman, Okla., 1961.

Faris, C. D. "Selected Attitude on Foreign Affairs as Correlates of Authoritarianism and Political Anomie," Jour. of Politics, 22 (1960), 50-67.

Feigl, H. and Sellars, W. (eds.). Readings in Philosophical Analysis. New York: Appleton-Century-Crofts, 1949.

Feigl, H. and Brodbeck, M. (eds.). Readings in the Philosophy of Science. New York: Appleton-Century-Crofts, 1953.

Festinger, Leo. A Theory of Cognitive Dissonance. New York: Row-Peterson, 1957.

_____. "The Treatment of Qualitative Data by Scale Analysis," Psych. Bulle., 44 (1947), 159-163.

Feuar, Lewis S. (ed.). Marx and Engels: Basic Writings on Politics and Philosophy. New York: Doubleday and Co., Inc., 1959.

Ford, R. N. "A Rapid Scoring Procedure for Scaling Attitude Questions," Pub. Opinion Quart., 14 (1950), 507-532.

Francis, Roy G. The Rhetoric of Science: A Methodological Discussion of the Two-by-Two Table. Minneapolis: The University of Minnesota Press, 1961.

Freidman, R. S. "The Urban-Rural Conflict Revisited," West. Pol. Quart., 19 (1956), 138-150.

Gamson, William A. "A Theory of Coalition Formation," Am. Socio. Rev., 26 (June 1961), 373-82.

Gasset, Ortega Y. The Modern Theme. Trans. by James Claugh. New York: Harper and Row Publishers, 1961.

Goldhamer, H. and Speier, H. "Some Observations on Political Gaming," World Politics, 12 (1959), 71-83.

Gouldner, Alvin. Patterns of Industrial Bureaucracy. Glencoe: The Free Press, 1954.

Gouldner, Alvin W. and Peterson, R. A. Notes on Technology and the Moral Order. New York: The Bobbs-Merrill Co. Inc., 1962.

Grazia, Alfred de. "Nature and Prospects of Political Interest Groups," Annals, 319, 113-122.

Gregg, Philip M. and Banks, Arthur S. "Dimensions of Political Systems: Factor-Analysis of a Cross-Polity Survey," Am. Pol. Science Rev., 59 (Sept. 1965), 602-614.

Grum, John G. Quantitative Methods in Legislative Behavior: Probability Models, Cluster Analysis and Factor Analysis. Mimeographed, 1962.

Guetzkow, Harold. "A Use of Simulation in the Study of International Relations," Behv. Science, 4 (July 1959), 183-191.

_____ (ed.). Simulations in International Relations. New Jersey: Prentice-Hall, 1963.

_____. Simulation in Social Science Readings. New Jersey: Prentice-Hall, 1962.

Guilford, J. P. Fundamental Statistics in Psychology and Education. New York: McGraw-Hill Inc., 1942.

_____. Psychometric Methods. New York: McGraw-Hill Book Co., 1936.

Guttman, L. "A Basis for Scaling Qualitative Data," Am. Socio. Rev., 9 (1944), 139-150.

_____. "On Festinger's Evaluation for Scale Analysis," Psych. Bulle., 44 (1947), 451-465.

_____. "The Cornell Technique for Scale and Intensity Analysis," Ed. and Psych. Meas., 7 (1947), 247-249.

_____. "The Principle Components of Scalable Attitudes," in Paul F. Lazarsfeld (ed.).

Hagen, Everett E. "The Process of Economic Development," Econ. Dev. and Cult. Change, 5 (1957), 193-215.

_____. "Analytical Models in the Study of Social Systems," Am. J. of Socio., 67 (1961), 144-151.

Hare, A. Paul, E. F. Borgatta and Robert F. Bales. Small Groups. New York: A. A. Knopf, 1955.

Harsanyi, John C. "A Bargaining Model for the Cooperative n-Person Game," in Tucker and Luce (1959).

Harsanyi, J. C. "On the Rationality Postulates Underlying the Theory of Cooperative Games," J. of Conflict and Resolution, 5 (1961), 179-96.

Holloway, Harry. Oklahoma Goes Republican. Unpublished Manuscript, The Univ. of Oklahoma, Norman, Okla., 1963.

Homans, George C. Social Behavior: Its Elementary Forms. New York: Harcourt and Brace, 1961.

Horvath, William J., and Caxton Foster. "Stochastic Models of War Alliances," J. Conflict and Reso., 7 (June 1963), 110-16.

Hull, C. L. A Behavior System. New Haven: Yale Univ. Press, 1952.

Hume, David. An Inquiry Concerning the Human Understanding. Oxford: Clarendon Press, 1894.

Hyman, Herbert. Survey Design and Analysis. Glencoe: The Free Press, 1955.

Inkeles, A. "Industrial Man: The Relation of Status to Experience, Perception and Value," Am. Jour. of Socio., 66 (1960), 1-31.

Janowitz, M. and Marvick, Dwaine. "Authoritarianism and Political Behavior," Pub. Opin. Quart., 17 (1955), 185-201.

Josephson, Mary and Eric (eds.). Man Alone. New York: Dell Publishing Co., 1962.

Kaplan, Abrham. The Conduct of Inquiry. San Francisco: Chandler Publishing Co., 1964.

Katz, Daniel and Janis, I. L. "Reduction of Intergroup Hostility," The J. of Conflict and Reso., 3 (1959), 80-100.

Kemeny, J. C. and Snell, J. L. Mathematical Models in the Social Sciences. New York: Ginn and Co., 1964.

Kerr, W. A. "Correlates of Politico-Economic Liberalism-Conservatism," Jour. of Social Psych., 20 (1944), 61-77.

Key, V. O., Jr. American State Politics: An Introduction. New York: A. A. Knopf, 1956.

Key, V. O., Jr. Public Opinion and American Democracy. New York: A. A. Knopf, 1961.

_____. Southern Politics in State and Nation. New York: A. A. Knopf, 1949.

_____. Parties, Politics and Pressure Groups. New York: A. A. Knopf, 1947.

Kish, Leslie. "Some Statistical Problems in Research Design," Am. Socio. Rev., 24 (June '59), 328-338.

Kohn, Hans. The Age of Nationalism. New York: The MacMillan Co., 1962.

_____. American Nationalism. New York: The MacMillan Co., 1957.

Koopman, B. O. "The Axioms and Algebra of Intuitive Probability," Annals of Mathematics, 2 (1940), 269-292.

Kornhauser, Arthur et al. When Labor Votes: A Study of Autoworkers. New York: University Books, 1956.

Kornhauser, Arthur. The Politics of Mass Society. Glencoe: The Free Press, 1959.

Kuhn, Harold. "Game Theory, Bargaining, and International Relations," J. Con. and Reso., 6 (March 1962).

Lasswell, Harold and A. Kaplan. Power and Society. New Haven: Yale Univ. Press, 1950.

Lazarsfeld, Paul and Rosenberg, Morris (eds.). The Language of Social Research. Glencoe: The Free Press, 1955.

Lazarsfeld, Paul F. (ed.). Mathematical Thinking in the Social Sciences. Illinois: The Free Press, 1954.

Lazarsfeld, Paul F. "Evidence and Inference in Social Research," Daedalus, 87 (Fall 1958).

Lazarsfeld, Paul F. (ed.). Mathematical Thinking in the Social Sciences. Glencoe: The Free Press, 1954.

Leibenstein, Harrey. Economic Backwardness and Economic Growth. New York: John Wiley and Sons, 1957.

Leiserson, Michael Avery. Coalition in Politics: A Theoretical and Empirical Study. Unpublished Doctoral Dissertation, Yale University, New Haven, 1966.

Leites, N. On the Game of Politics. California: Stanford Univ. Press, 1959.

LeKachman, Robert (ed.). National Policy of Economic Welfare at Home and Abroad. New York: Doubleday and Co., 1955.

Lenin, V. I. The Immediate Task of the Soviet Government. Moscow, 1955.

Lentz, T. F. "Personage Admiration and Other Correlates of Conservatism-Radicalism," Jour. of Social Psych., 10 (1939), 81-92.

Lerner, Daniel (ed.). The Human Meaning of the Social Sciences. New York: The World Publishing Co., 1963.

Levinson, D. J. and Nevitt, R. "A Scale for the Measurement of Political-Economic Conservatism," Am. Psych., 1 (1946), 451-462.

Levy, Marion J., Jr. The Structure of Society. Princeton: Princeton Univ. Press, 1952.

Lipset, Seymour, Trow, M. and Coleman, James. Union Democracy. Glencoe: The Free Press, 1955.

Lipset, Seymour. Political Man. New York: Doubleday Co., 1946.

Lipset, S. M. "Social Stratification and Right-Wing Extremism," The Brit. Jour. of Socio., 10 (1959).

Lockard, Duane. New England State Politics. Princeton: Princeton Univ. Press, 1959.

Loevinger, J. "The Technique of Homogeneous Tests Compared with Some Aspects of Scale Analysis and Factor Analysis," Psych. Bulle., 45 (1948), 507-529.

Luce, R. Duncan. "Psi Stability: A New Equilibrium Concept," Mathematical Models of Human Behavior. Stanford, Conn.: Dunlap and Associates, 1955.

_____ and Arnold A. Rogow. "A Game Theoretic Analysis of Congressional Power Distributions," Behv. Sc., 1 (1956), 83-95.

Luce, R. Duncan and Howard Raiffa. Games and Decisions. New York: Wiley and Sons, 1957.

Luce, R. Duncan. "A Note on the Article 'Some Experimental n-Person Games,'" in Tucker and Luce (1959).

MacRae, Duncan. Dimensions of Congressional Voting. Berkeley: Univ. of Calif. Press, 1958.

Maehl, Paul E. and Corquodale, Kenneth. "On a Distinction between Hypothetical Constructs and Intervening Variables," Psych. Rev., 55 (1948), 95-107.

Mannheim, Karl. Man and Society in an Age of Reconstruction. London: Routledge and Kegan Paul, 1940.

March, James. "Measurement Concept in the Theory of Influence," J. Pol., 19 (1957), 202-26.

Marshak, Jacob. "Elements for a Theory of Teams," Management Science, 1 (Oct. 1954), 127-37.

Martindale, Don. The Nature and Types of Sociological Theory. Boston: Houghton Mifflin Co., 1960.

Maruyama, M. "Conjunctive-Implicational Model in Discrete Scales," Jour. of Exp. Ed., 30 (1962), 289-305.

Marx, Karl. Capital. New York: Random House Inc., 1906.

Maschler, M. "The Power of Coalition," Mang. Science, 10 (Oct. 1963), 8-29.

Maslow, A. H. "The Authoritarian Class-Structure," Jour. of Social Psych., 18 (1943), 401-411.

Masters, N. A. and Wright, D. S. "Trends and Variations in the Two-Party Votes: The Case of Michigan," Am. Pol. Science Rev., 52 (1958), 1078-1090.

McClosky, H., Hoffman, P. J. and O'Hara, R. "Issue Conflict and Consensus Among Party Leaders and Followers," Am. Pol. Science Rev.

McDill, E. "Anomia, Authoritarianism, Prejudice and Socio-Economic Status: An Attempt at Clarification," Social Forces, 39 (1961), 239-245.

McDill, E. and Ridley, J. C. "Status, Anomia, Political Alienation and Political Participation," Am. Jour. of Socio., 68 (1962), 205-213.

McGinnis, Robert. "Randomization and Inference in Sociological Research," Am. Socio. Rev., 23 (Aug. '58), 408-414.

McKinnon, William and Centers, Richard. "Authoritarianism and Urban Stratification," Am. Jour. of Socio., 61 (1956), 610-620.

McQuitty, L. L. "Elementary Factor Analysis," Psych. Reports, 9 (1961), 71-78.

_____. "Elementary Linkage Analysis for Isolating Orthogonal and Oblique Types and Typal Relevancies," Ed. and Psych. Meas., 17 (1957), 207-227.

_____. "Rank Order Typal Analysis," Ed. and Psych. Meas., 23 (1963), 55-61.

McQuitty, Louis L. "Isolating Prediction Patterns Associated with Major Criterion Patterns," Ed. and Psych. Meas., 17 (1957), 3-42.

Meadows, Paul. "Models, Systems and Science," Am. Socio. Rev., 22, 3-9.

Merton, Robert K. and Lazarsfeld, Paul (eds.). Continuities in Social Research. Glencoe: The Free Press, 1950.

Merton, Robert K., Broom, L. and Cottrell, L. (eds.). Sociology Today. New York: Basic Books Inc., 1961.

Miller, Warren. "Presidential Coat-tails: A Study in Political Myth and Methodology," Pub. Op. Quart., 19, 353-368.

Mills, C. W. Power Elite. New York: Oxford Univ. Press, 1956.

Mills, T. M. "Coalition Patterns in the Three Person Groups," Am. Socio. Rev., 19 (Dec. 1954), 657-67.

Milne, R. S. and MacKenzie, H. C. A Study of Voting Behavior in the Constituency of Bristol North-East at the General Election, 1951. London: Hansard Society, 1954.

Moos, Charles M. Politics, Presidents and Coattails. Baltimore: Johns Hopkins Press, 1952.

Morgenstern, Oskar. Economic Activity Analysis. New York: Wiley and Sons, 1954.

Morgenthau, Hans J. "The Paradoxes of Nationalism," The Yale Rev., 66 (1957), 481-496.

Mosteller, F. and P. Nogee. "An Experimental Measurement of Utility," J. Pol. Econ., 59 (1951), 371-404.

Murphy, Gardner and Likert, R. Public Opinion and the Individual. New York: Harper and Brothers, 1943.

Nagel, Ernest. The Structure of Science. New York: Harcourt, Brace and World Inc., 1961.

Nash, John. "Non-Cooperative Games," Annals of Math., 54 (1951), 286-95.

Newmann, Franz L. The Democratic and the Authoritarian State. Glencoe: The Free Press, 1957.

Newcomb, Theodore. Personality and Social Change. New York: Druden Press, 1943.

Neyman, H. Probability and Statistics. New York: Henry Holt Co., 1950.

Nisbet, Robert A. The Quest for Community. New York: Oxford Univ. Press, 1953.

Northrop, F. S. C. The Taming of the Nations. New York: The MacMillan Co., 1954.

Parsons, Talcolt and Shils, Edward (eds.). Toward a General Theory of Action. Illinois: The Free Press, 1954.

Patterson, T. D. "Dimensions of Voting Behavior in a One Party State Legislature," Pub. Opin. Quart., 26 (1962).

Pearson, Karl. The Grammar of Science. London: Adam and Charles Black, 1911.

Quandt, R. E. "On the Use of Game Models in Theories of International Relations," World Politics, 14 (Oct. 1961), 69-76.

Ranney, Austin and Kendall, Wilmore. "The American Party System," Am. Pol. Science Rev., 48, 477-485.

Rappoport, Anatol. Fights, Games and Debates. Michigan: University of Mich. Press, 1960.

_____. "Mathematical Models of Social Interaction," Ch. 14 in Luce et al. (eds.). Handbook of Mathematical Psychology. New York: Wiley and Sons, 1963.

Rappoport, Anatol. Strategy and Conscience. New York: Harper and Brothers, 1964.

Reichenback, Hans. The Rise of Scientific Philosophy. Berkeley: University of California Press, 1951.

Reismann, David. Individual Reconstructed. Glencoe: The Free Press, 1954.

Riegel, O. W. "Nationalism in Press, Radio and Cinema," Am. Socio. Rev., 3 (1938), 510-515.

Riker, William H. "A Test of the Adequacy of the Power Index," Behv. Sc., 4 (April 1959), 120-131.

_____. "Some Ambiguities in the Notion of Power," Am. Pol. Sc. Rev., 58 (June 1964), 341-49.

Riker, William. The Theory of Political Coalitions. New Haven: Yale Univ. Press, 1962.

Rokeach, Milton. The Open and Closed Mind. New York: The Basic Books, 1960.

Rome, Sydney C. and Rome, B. K. "Computer Simulation Toward a Theory of Large Organizations," in Borko (ed.).

Rosecrance, Richard N. Action and Reaction in World Politics. Boston: Little Brown and Co., 1963.

Rossi, A. H. and Inkeles, A. "National Comparisons of Occupational Prestige," Am. Jour. of Socio., 61 (1956), 329-339.

Rostow, W. W. The Stages of Economic Growth. Cambridge: Cambridge Univ. Press, 1960.

Russell, Bruce et al. World Handbook of Political and Social Indicators. New Haven: Yale Univ. Press, 1964.

Schelling, Thomas C. The Strategy of Conflict. Mass.: Harvard Univ. Press, 1960.

_____. "Experimental Games and Bargaining Theory," World Politics, 14 (Oct. 1961), 47-68.

Schlesinger, Joseph. "The Structure of Competition for Office in the American States," Behav. Science, 5, 199-210.

Schlick, M. "Causality in Everyday Life and in Science," University of California Publications in Philo., 25 (1962).

Schubert, Glendon. "Judicial Attitudes and Voting Behavior: The 1961 Term of the United States Supreme Court," Law and Contemporary Problems, 28 (1963), 100-142.

_____. Quantitative Analysis of Judicial Behavior. Illinois: Free Press, 1960.

Selvin, H. "A Critique of Tests of Significance in Survey Research," Am. Socio. Rev., 22 (Oct. '57), 519-527.

Shapley, N. S. "Simple Games: An Outline of the Descriptive Theory," Behv. Science, 7 (Jan. 1961), 59-66.

_____ and Martin Shubik. "A Method for Evaluating the Distribution of Power in a Committee System," Am. Pol. Science Rev., 48 (1954), 787-92.

Sharpe, L. and Lotka, V. "A Problem in Age Distribution," Philo. Mag., 21 (1911), 435-438.

Sherif, Muzafer and Sherif, Carolyn. An Outline of Social Psychology. Harper and Row Bros., 1956.

Sherif, Muzafer et al. Inter-group Conflict and Cooperation: The Robbers Cave Experiment. Norman: The University of Oklahoma Press, 1961.

Shils, Edward A. "The Concentration and Dispersion of Charisma: Their Bearing on Economic Policy in Under-developed Countries," World Politics, 11 (1958).

_____. The Torment of Secrecy. Illinois: The Free Press, 1955.

Shubik, Martin. Strategy and Market Structure. New York: Wiley and Sons, 1959.

_____ (ed.). Game Theory and Related Approaches to Social Behavior. New York: Wiley and Sons, 1964.

Siegel, S. "Level of Aspiration and Decision-Making," Psych. Bulle., 64 (1957), 253-262.

Simon, Herbert. Administrative Behavior. New York: Macmillan, 1951.

_____. Models for Man. New York: John Wiley and Sons, 1957.

Smith, T. V. "Dewey's Theory of Value," Monist, 32, 339-351.

Snedicor, George W. Statistical Methods. Ames: Iowa State College Press, Fourth edition.

Snyder, Richard C., H. W. Bruck, and B. Sapin. Decision-Making as an Approach to the Study of International Politics. Princeton Foreign Policy Analysis Series no. 3, 1954.

Sola Pool, Ithiel and Abelson, Robert. "The Simulmatic Project," The Pub. Opinion Quart., 25 (1961), 167-183.

Stagner, Ross. "Correlational Analysis of Nationalistic Opinions," Jour. of Social Psych., 12 (1940), 197-212.

Stewart, Don and Hoult, Thomas. "A Socio-Psychological Theory of the Authoritarian Personality," Am. Jour. of Socio., 65 (1959), 274-280.

Stokes, Donald. "Spatial Models of Party Competition," Am. Pol. Science Rev., 57, 368-377.

Stouffer, Samuel. Communism, Conformity and Civil Liberties. New York: Doubleday Publishing Co., 1955.

Truman, David. The Governmental Process. New York: A. A. Knopf, 1951.

Turner, J. Party Constituency and Pressure on Congress. Baltimore: Johns Hopkins Press, 1951.

Vaihinger, Hans. The Philosophy of 'As if', trans. by C. K. Ogden. London: Paul, Trench, Frubner and Co., 1924.

Verba, Sydney. Small Groups and Political Behavior. Princeton: Princeton Univ. Press, 1961.

_____. "Assumptions of Rationality and Non-rationality in Models of the International System," World Politics, 14 (Oct. 1961), 93-117.

Vidich, Arthur J. and Bensman, Joseph. Small Town in Mass Society. New York: Doubleday and Co., 1958.

Viner, J. International Trade and Economic Development. Glencoe: The Free Press, 1952.

Von Neumann, John and Oskar Morgenstern. Theory of Games and Economic Behavior. New York: Wiley Science Editions, 1964.

Walker, Charles. Modern Technology and Civilization. New York: McGraw-Hill Book Co., 1962.

Weber, Max. Methodology of the Social Sciences, translated by Edward A. Shils and H. A. Finch. Glencoe: The Free Press, 1949.

Zetterberg, Hans. Social Theory and Practice. New York: Bedminster Press, 1962.

Znaniecki, Florian. Cultural Sciences: Their Origin and Development. Urbana: University of Illinois Press, 1952.