The Conceptions of Model in Educational Theorizing

by Elizabeth Steiner Maccia

Center for the Construction of Theory in Education

Occasional Paper 62-114

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BUREAU OF EDUCATIONAL RESEARCH AND SERVICE / THE OHIO STATE UNIVERSITY

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Acknowledgment

This paper places the metatheoretical dimension of Project 1632, the methodology for constructing educational theory models and the rationale thereof, in the context of the ongoing endeavor of educational theorizing. This research is supported under the cooperative Research Program of the Office of Education, U. S. Department of Health, Education, and Welfare.

Here the Red Queen began again. "Can you answer useful questions?" she asked. "How is bread made?"

"I know that!" Alice cried eagerly. "You take some flour . . . "

"Where do you pick the flower?" the White Queen asked. "In a garden or in the hedges?"

"Well, it isn't picked at all," Alice explained, "It's ground . . . "

"How many acres of ground?" said the White Queen . . .

Introduction

While the term 'model' has been associated with educational theorizing at least since 1955,[1] it has been used in this connection with a variety of meanings. For the sake of a clear understanding of the role of the present venture of constructing educational theory models in that ongoing endeavor, what the conceptions of model are in educational theorizing should be presented. Conversation between the perverse Queens and perverse Alice should be made possible. Consequently, a survey has been undertaken of literature dealing with educational theory in which some conception of model was acknowledged,[2] and the present paper includes a report of that survey.[3]

This paper will consist of three parts. The first will set forth a system of categories for conceptions of model and the significance of each type of conception for educational theorizing. The second will set forth abstracts of the literature surveyed. In each abstract, the categories will be utilized to indicate the particular conception or conceptions of model. The third will generalize and evaluate the conceptions of model in educational theorizing. Evaluation will be in terms of significance for educational theorizing which was set forth in the first part.

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[1] Arthur P. Coladarci and Jacob W. Getzels, The Use of Theory in Educational Administration, Stanford: University Press, 1955.

[2] A conception of model could be used in educational theorizing, yet not be acknowledged.

[3] A. H. Jones, Research Associate, undertook the survey and abstracted the literature.

Categories and Their Significance[4]

According to what they are, models fall into two categories: object model and characterization model. Since there are objects and there are characterizations of them, the twofold distinction arises. If the characterization is about actually existing objects, then it is empirical. Our interest centers about empirical characterizations, for educational theorizing is an attempt to characterize actually existing objects falling within the domain of the educative process. In an empirical characterization, the statements not only express the nature of the objects, but also the way in which the objects are interrelated. The latter element or formal element of the empirical characterization if taken separately is a formal characterization. Our interest, therefore, includes formal characterizations.

An illustration should clarify these distinctions. Objects are being deliberately constructed and arranged--programmed computers[5]--to mimic phenomena of human behavior. Aspects of human problem solving have been so mimicked:

> Simulating human behavior in practical situations often turns out to be less difficult than might be expected. Ask a man to tell you how he goes about weighing salary, job

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[4]See the series of papers on the methodology for constructing educational theory models in which these categories and their significance for educational theorizing are developed: "The Ways of Inquiring," Publication 62-107; "Models and the Meaning of 'Retroduction,'" Publication 62-110; and "The Way of Educational Theorizing Through Models," Publication 62-111; The Center for the Construction of Theory in Education, The Bureau of Educational Research and Service, The Ohio State University, 1962.

[5]Only a programmed computer is a functioning computer, and so could have use as a model.

> security, and the quality of his co-workers in choosing a job; he will tell you that they all depend on each other. But investigators at M.I.T.'s Lincoln Laboratory have found that in mimicking his mental process on a computer it is not necessary to worry about the way the three considerations affect each other. They devised a test that requires a man to choose one of two hypothetical jobs. They then had him estimate the importance he attached to the three criteria. They found that a computer, programmed to combine these separate estimates, came out rather close to the job choices made by the group tested. The supposed interdependence of the criteria could just be ignored.[6]

The characterization of this proposed computer or object can be given partly in terms of algebra. The interrelation of elements--input, output, and inner elements--called 'logical nets' can be stated as logical formulae. These formulae in turn can be expressed in the notation of matrix algebra which can be transposed into more abstract algebraic terms. To this formal characterization, a substantive dimension must be added to complete the characterization. The elements must be described in terms of hardware, i.e. designation of components of the circuits.[7] Thus, an empirical characterization would emerge.

Not all objects or characterizations are models. In order to be a model, an object or characterization must be put to certain uses. It must be used either to represent or to be represented. In the first use, the object or characterization is a model of whatever is being represented; and in the second use, the object or characterization is a model for whatever it is represented in. A model of would be a representational model,

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[6]John Pfeiffer, "Problems, Too Have Problems," in Fortune, Vol. LXIV, No. 4, 1961, p. 146.

[7]The interrelation can be stated diagrammatically by circuits. However, expression of interrelation through algebra is more precise.

while a model for would be a non-representational model.

In terms of the illustration cited above, the programmed computer and its characterization could be either representational or non-representational models. The programmed computer can be used to represent an aspect of problem-solving. If it is, then it is a representational model of the object type. The programmed computer can be used as a functioning to be represented in human behavior. If it is, then it is a non-representational model of the object type. The characterization can be used to represent the programmed computer. If it is, then it is a representational model of the characterization type. The characterization can be used as one to be represented in another characterization, that of problem-solving. If it is, then it is a non-representational model of the characterization type. 'Either . . . or' is not being used in the exclusive sense. For example, the characterization of the programmed computer could be used both as a representational and a non-representational model. First the characterization could be used to represent the programmed computer, then it could be used to be represented in a characterization of human problem-solving.[8]

The tree diagram on the following page summarizes the conceptions of models according to what they are and their use, and expresses the limitation of characterization based upon the interest in educational theorizing.

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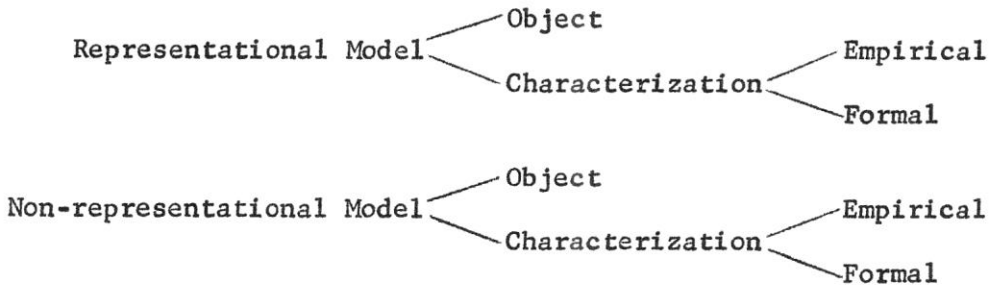
[8] In an earlier paper, "Models and the Meaning of 'Retroduction,'" op. cit., this twofold usage was indicated by the terms, 'first-order' and 'second-order.' First an object or characterization represents, then it is represented.



Tree of Conceptions of Model

Each conception of model is not significant for educational theorizing. In order to determine significance for such an endeavor, it is necessary to point once again to the three main stages of scientific inquiry as they relate to educational theorizing and to the conceptions of model.

The three main stages of scientific inquiry are: retroduction through which characterizations are devised, deduction through which characterizations are explicated, and induction through which characterizations are evaluated. Educational theorizing is devising and explicating characterizations for objects falling within the educative domain. The stages of retroduction and deduction, thus, are stages in educational theorizing. Evaluating characterizations has a bearing upon devising and explicating them, in so far as characterizations which are found not to apply to the objects of interest are modified or even discarded. If they are discarded, other characterizations are devised and explicated. The stage of induction, thus, is a stage that leads to educational theorizing.

Non-representational models of the characterization type, whether they are empirical or solely formal, relate to retroduction and deduction.

It is through non-representational such models that characterizations are devised and explicated. Other characterizations furnish points of view which can be represented; and so the wanted characterizations emerge and are made definite, or characterizations we already have are made definite. For example, the characterization of the programmed computer might function as a non-representational model of the empirical characterization type in devising and explicating a characterization of human problem-solving behavior, or in explicating an already existing characterization of such behavior. In regard to the latter and not the former alternative, the probability is in favor of the formal component of the characterization of the programmed computer--the algebra--taken separately functioning as a non-representational model of the formal characterization type.

Non-representational models of the object type are not usable in retroduction and deduction. Characterizations, not objects, furnish points of view. This same reasoning rules out representational models of the object type; although all representational models, even when they are characterizations, have no role in devising and explicating characterizations. What is wanted is a model for not a model of.

Both representational models of the object type and the characterization type (empirical and formal) relate to evaluation. It is through the representational model of the object type that we can represent the objects of interest in terms of available objects. This permits having objects through which characterizations can be checked. The characterization that the interdependence of criteria was important in job choices could not be checked out easily, if at all, in the usual instances available--people making job choices. Through the use of an object, the programmed computer,

representing the usual instances, the characterization was checked and found not to apply to instances. It is through representational models of the characterization type that we can represent the population of objects to which the instances being checked belong. This representation is in terms of the range of instances. Through such a representation, the degree of generalization from instances being checked to population can be ascertained. The result is evaluation of the characterization in terms of its application to the objects of interest. A familiar example of such a model would be the Gaussian distribution.

Conclusions as to the significance of the conceptions of model for educational theorizing now can be stated:

1. non-representational models of the characterization type are significant for doing the actual educational theorizing, i.e. devising and explicating educational theory; and
2. representational models of the object and the characterization types are significant for evaluating the results of educational theorizing, i.e. educational theory.

This discussion of the categories of the conceptions of model and their significance for educational theorizing can be summarized in the matrix on the following page which combines the categories set forth in the tree diagram[9] with categories of processes constituting or related to educational theorizing.

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[9]See p. 5 of this paper.

			Devising	Explicating	Evaluating
Representational Model	Object		0	0	1
	Characterization	Empirical	0	0	1
		Formal	0	0	1
Non-representational Model	Object		0	0	0
	Characterization	Empirical	1	1	0
		Formal	1	1	0

'1' denotes significance for educational theorizing

'0' denotes no significance for educational theorizing

Matrix of Significance of Conceptions of Model

for Educational Theorizing

Abstracts

Each abstract will consist of the following:

1. a statement of the purpose of the paper,
2. a summarization of the model or models, if any are presented, and
3. the conception or conceptions of model.

They will be presented in the alphabetical order of the authors' surnames.

1. Anderson, Robert H., Hagstrom, Ellis A., and Robinson, Wade M., "Team Teaching in an Elementary School," in School Review, 1960, Vol. 68, pp. 71-84.

   Purpose of the Paper: The purpose is to report the development and operation of a team teaching program in Franklin Elementary School, Lexington, Massachusetts.

   Model Presented: A program of personnel organization is presented, and may be summarized as follows:

   > "The teaching team is a formally organized hierarchy whose basic unit is the teacher /T./ . . . " (p. 76)
   >
   > "Above the position of teacher is that of senior teacher /S.T./. Depending on the size of the team and the age of the pupils, the team may have one or more senior teachers. A small team may have none." (p. 76)
   >
   > "At the apex of the team hierarchy is the position of team leader /T.L./." (p. 77)
   >
   > "The role of the principal under the teaching teams organization will probably become one of enhanced prestige and responsibility, somewhat akin to the present role of director of instruction." (p. 77)

   The figure on the following page presents a schema of the organization. This figure also shows the inclusion of the following:

   > "The part-time teacher (P.T.) is a fully trained teacher, usually experienced, who is unable to teach full time. A combination of two or three part-time teachers might fill a billet which would otherwise require one full-time teacher." (p. 83)
   >
   > "The intern (I.) is a trainee in a program of teacher education doing full-time supervised teaching in a school for one semester. The work of the intern is customarily directed by a senior teacher or team leader working with the training school supervisor." (p. 83)

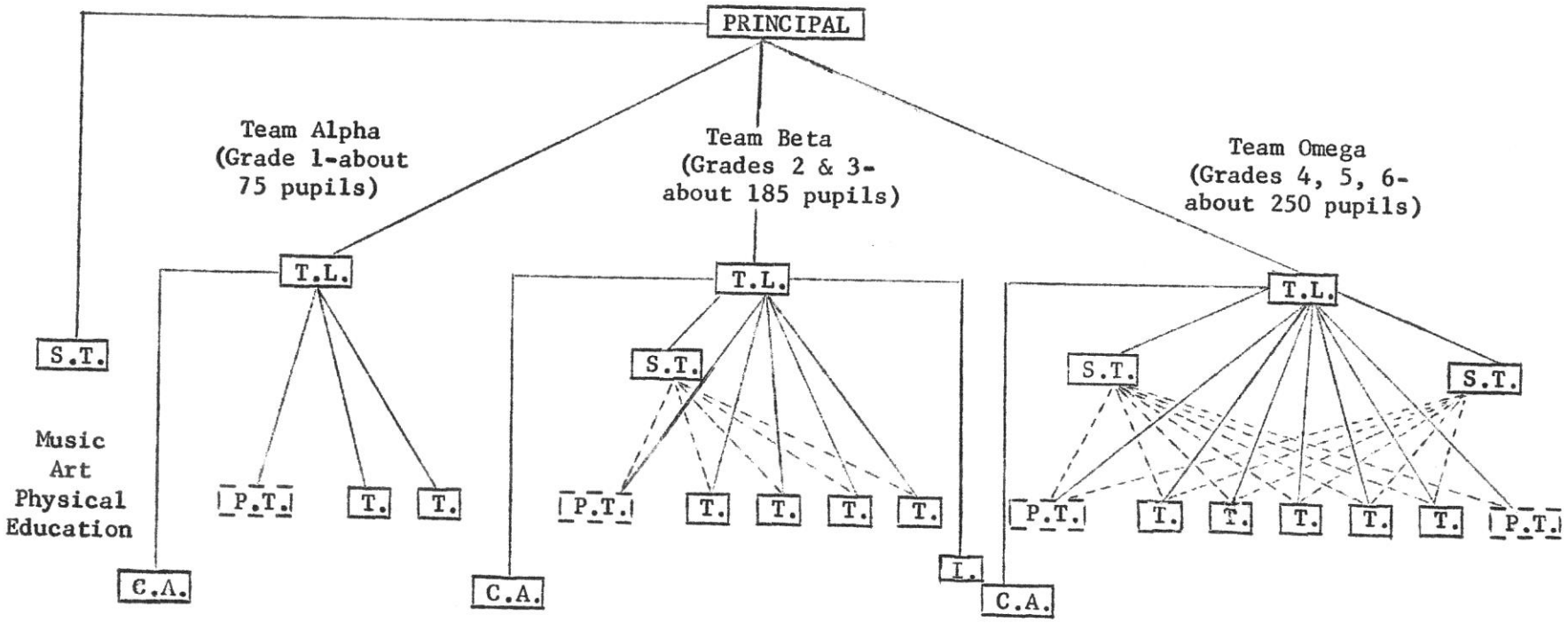


FIG. 2. Organization for team teaching in Franklin School for 1959-60. (p. 82)

> "The clerical aide (C.A.) requires no professional preparation. This person will help with the routine, non-technical aspects of team operation: typing, rexographing, filing. It is possible that other sub-professional roles can be developed in this category, for example, technicians capable of producing instructional and demonstration materials." (p. 83)

Conception of Model: The program reported is twice called 'a model,' as follows:

> "The project does not claim that all the components of its program or model are unique." (p. 81)
>
> "What is unique about the Teaching Teams Project at Franklin School is the number and the particular combination of elements in its model." (p. 81)

Since the program is essentially an organization theory used to represent educative phenomena related to personnel, the conception of model is representational and of the empirical characterization type.

2. Ausubel, David P., "Forward," in Review of Educational Research: Growth, Development, and Learning, 1961, Vol. 31, No. 5, pp. 449-450.

Purpose of the Paper: The purpose is to introduce an issue of the Review of Educational Research devoted to surveying studies in growth, development, and learning.

Model Presented: The survey to which the issue is devoted is the model.

Conception of Model: Since Ausubel states: "By . . . providing a programmatic model for systematically ordering relationships . . . it is hoped that this issue can influence . . . research trends . . ." (p. 450), the conception of model appears to be non-representational and of the empirical or formal characterization type. However, it could be the case that the survey presents the main outlines of characterizations which represent the phenomena of growth, development, and learning, and that Ausubel's intent is that more specific characterizations be devised in the progress of research from these. If so, the conception of model is representational and of the empirical characterization type.

3. Ausubel, David P. and Fitzgerald, Donald, "Meaningful Learning and Retention: Intrapersonal Cognitive Variables," in Review of Educational Research: Growth, Development, and Learning, 1961, Vol. 31, No. 5, pp. 500-510.

Purpose of the Paper: The purpose is to review research dealing with cognitive structure variables and cognitive style.

Model Presented: Bruner's theory that the memory of specific details of a discipline is a function of the degree to which the fundamental ideas or the structure of that discipline have been mastered is cited as a model.

Conception of Model: Since the theory is considered in relation to its use in representing educational phenomena related to learning, the conception of model is representational and of the empirical characterization type.

4. Campbell, Roald F. and Faber, Charles F., "Administrative Behavior: Theory and Research," in Review of Educational Research: Educational Organization, Administration, and Finance, 1961, Vol. 31, No. 4, pp. 353-367.

Purpose of the Paper: The purpose is to review recent literature dealing with the study of administrative behavior and of training programs in administration.

Model Presented: Organization theories as presented by March and Simon, and Hanlon's theory of administrative behavior are referred to and cited as models.

Conception of Model: Since the theories are considered in relation to their use in representing organization and administrative phenomena, the conception of model is representational and of the empirical characterization type.

5. Carroll, John B., "An Operational Model for Language Behavior," in Anthropological Linguistics, 1959, Vol. 1, No. 1, pp. 37-54.

Purpose of the Paper: The purpose is to present a model for language behavior; more specifically, by means of computer logic to represent such a model for the following aspects of language behavior: (1) original learning of language in the child, (2) learned verbal performance in a two- or multi-person communication situation, and (3) special verbal tasks demanded of individuals in certain psychological tests and experiments.

Model Presented: The model for language behavior is taken to be one which applies to all human behavior. It involves an individual with a central nervous system who is stimulated and who responds. Perception, discrimination, and reinforcement are taken for granted.

To the extent that "the contingencies /i.e., the particular conditions under which a response is reinforced/ are made uniform and tied in with a system of similar and coordinate responses, there can be said to exist a language" (p. 40). The three responses of particular interest are: (1) "a mand is any response which has been conditioned

to come under the control of some specific deprivation state in such a way that when emitted it tends to elicit from an outside source (e.g., another person) the specific gratification for that deprivation" (p. 40), (2) "A tact . . . is a response which has been conditioned to come under the control of a specific external stimulus by virtue of having received some sort of generalized reinforcement" (p. 40), and (3) echoic (imitative) response.

Representation through computer logic of original learning of language in a child is shown in the display taken from the paper and presented on the following pages.

Conception of Model: Since the model is a theory which is used to represent language behavior, the main conception of model is representational and of the empirical characterization type. However, Carroll implies a non-representational model of the formal characterization type by representing the model by computer logic and by stating that "the demands of programming for simulation by computer would force explicitness in assumptions" (p. 38). Furthermore, there is a sense of a representational model of the object type in that there would be an object to simulate the human verbal behavior. " . . . simulation by computer can help to narrow down the range of possible solutions, and it would enable one to generate large quantities of material which could be evaluated for vicisimilitudes." (p. 38)

6. Clymer, Theodore and Robinson, Helen M., "Reading," in Review of Educational Research: Language Arts and Fine Arts, 1961, Vol. 31, No. 2, pp. 130-144.

Purpose of the Paper: The purpose is to review research publications in reading for the period 1957-1960.

Model Presented: There is reference to a hypothesis by Smith and Carrigan, all reading disability is related to the balance of acetylcholine and cholinesterase at the junctions of the neurons, as a model.

Conception of Model: Since the hypothesis is used to represent educational phenomena related to reading, the conception of model is representational and of the empirical characterization type.

7. Coladarci, Arthur P. and Getzels, Jacob W., The Use of Theory in Educational Administration, Stanford: University Press, 1955.

Purpose of the Paper: The purpose is to show the value of and need for theory in educational administration, and to propose a theory of administration as a social process.

DISPLAY 1

BASIC PROGRAMS FOR ACQUISITION OF VERBAL RESPONSES IN EARLY LANGUAGE LEARNING

Assumed initial conditions of storage (the result of previous learning):

1. A repertoire of stimulus recognitions is available, i.e., responses to the routine PERCEIVE STIMULUS. This repertoire includes:
   (a) Recognitions of various environmental stimuli (material objects) and their gratification values, if any (positive or negative).
   (b) Recognitions of speech sounds of self and others, but the several sounds are not well discriminated.
2. A repertoire of speech motor habits is available, but the responses are not well shaped or discriminated. These speech motor habits are called by the routine BABBLE.

PROGRAM FOR SIMULATING THE ACQUISITION OF A MAND ("MANDACQ")

CALL BABBLE (= emits repertoire of speech motor habits; sequential dependencies will depend on relative degree of strength, perserveration, incidental reinforcement; activation of any given response remains momentarily in temporary storage)
/This routine continues until broken by a STIMULUS emitted from an external source programmed to emit the stimulus only when a verbal response of approximately a specified phonetic shape occurs.
So:/
STIMULUS
CALL PERCEIVE (= subroutine which contains instructions

PROGRAM FOR SIMULATING THE ACQUISITION OF A TACT ("TACTACQ")

STIMULUS (X) (from external source--either fortuitous or programmed)
CALL PERCEIVE (see description under MANDACQ)
CALL REINFORCE (because there is no uniformity in the response present in temporary storage, the gratification value of the stimulus is irrelevant)
CALL BABBLE (the probability that this routine is called may be enhanced by the presence of a strong stimulus; the operation of the program is facilitated if, in addition, some particular response from the repertoire BABBLE is prompted, possible as an echoic response (see

PROGRAM FOR SIMULATING THE ACQUISITION OF AN ECHOIC RESPONSE ("ECHOACQ")

(This is a 'shaping' program for a single echoic response using the paradigm of TACTACQ.)

STIMULUS (V) (= a verbal response from an external source)
CALL PERCEIVE (initially the only familiarity characteristic of (V) is its being the familiar voice of an adult; with repetition of the program, it is also perceived as similar to a response previously made, in which case CALL SIMILAR occurs)
(SIMILAR is a routine which places in temporary storage a distinctive similarity response.)
CALL REINFORCE (any

referring stimulus to storage determining familiarity and gratification value of stimulus, returning appropriate signals to temporary storage)
CALL REINFORCE (= subroutine which notes gratification value of stimulus in terms of any current deprivation states; the strength or availability of any response remaining in temporary storage is enhanced proportionally to the gratification value of stimulus; in this case the motor responses just made under routine BABBLE are reinforced)
RETURN

(This loop may be repeated many times; depending upon the uniformity of the contingencies established by an external source, the specific verbal response acquires the power to control gratification for a specified deprivation state; 'shaping' may occur if the external source is programmed to reinforce only a progressively narrower range of responses. Further, this program is called upon as many times as needed for each of a finite number of verbal response types.)
(In ordinary language, we may say that the machine 'learns' that a given response 'means' the stimulus which gratifies it; the response itself is then called a MAND.)

ECHOACQ program at right) from an adult speaker who 'names' the stimulus.)
STIMULUS (Y) (This has been programmed in an external source such that it is emitted only when the machine makes a verbal response of a form which the external source considers appropriate to the stimulus: this program will operate properly only if STIMULUS (Y) has a high reward value.)
CALL PERCEIVE
CALL REINFORCE (because STIMULUS (Y) has high reward value, it tends to reinforce the verbal response made in routine BABBLE)
RETURN (or leave program)

(This loop is repeated many times on different occasions; depending upon the programming of reinforcement a specific verbal response comes under the control of STIMULUS (X), i.e., STIMULUS (X) tends to be followed by CALL NAME OF X, a routine differentiated out of BABBLE.)

perceptual response to the stimulus is reinforced if the adult's voice has positive gratification value, but this reinforcement is mainly useful for enhancing the probability of calling the next subroutine)
CALL BABBLE (it is possible that certain responses from this repertoire would have been enhanced by a feedback mechanism operating by virtue of the specific sounds heard; in any event, BABBLE continues (or terminates, in which case the program is left) until a response happens to be emitted which approximates the phonetic shape of STIMULUS (V); there must then follow a STIMULUS (Y) which has been programmed in an external source to be emitted only when the machine utters, within a reasonable period of time after (V), a verbal response of a form which the external source considers sufficiently close in phonetic shape to (V). So:)
STIMULUS (Y) (must have high reward value)
CALL PERCEIVE
CALL REINFORCE (because STIMULUS (Y) has high reward value, it tends to reinforce the verbal response made in routine BABBLE)
RETURN((at option of external source, otherwise the program terminates)

Model Presented: A theory of administration as a social process, derived from Talcott Parsons, is presented and includes:

Definition of administration as a dyadic relationship, superordinate-subordinate

Analysis of relationship in terms of three dimensions, with specifications of alternatives within each:

Authority:

Traditional

Charismatic

Rational

Role:

Functionally diffuse

Functionally specific

Affectivity:

Universalistic

Particularistic

Concept of effectiveness as measure of good administration

Proposition that effectiveness of administration is maximized when:

Role expectations of superordinate and subordinate are congruous

Authority is rational

Roles are functionally specific

Affectivity is predominantly universalistic

Conception of Model: Since the theory is taken to be a model and it is used to represent administrative phenomena including those of education, the conception of model is representational and of the empirical characterization type.

8. Creegan, Robert F., "A Modelistic Educational Theory," in School and Society, 1959, Vol. 87, pp. 511-512.

Purpose of the Paper: The purpose is to present a theory of education

based upon the proposition that human learning takes place through the construction and modification of models of life and the world.

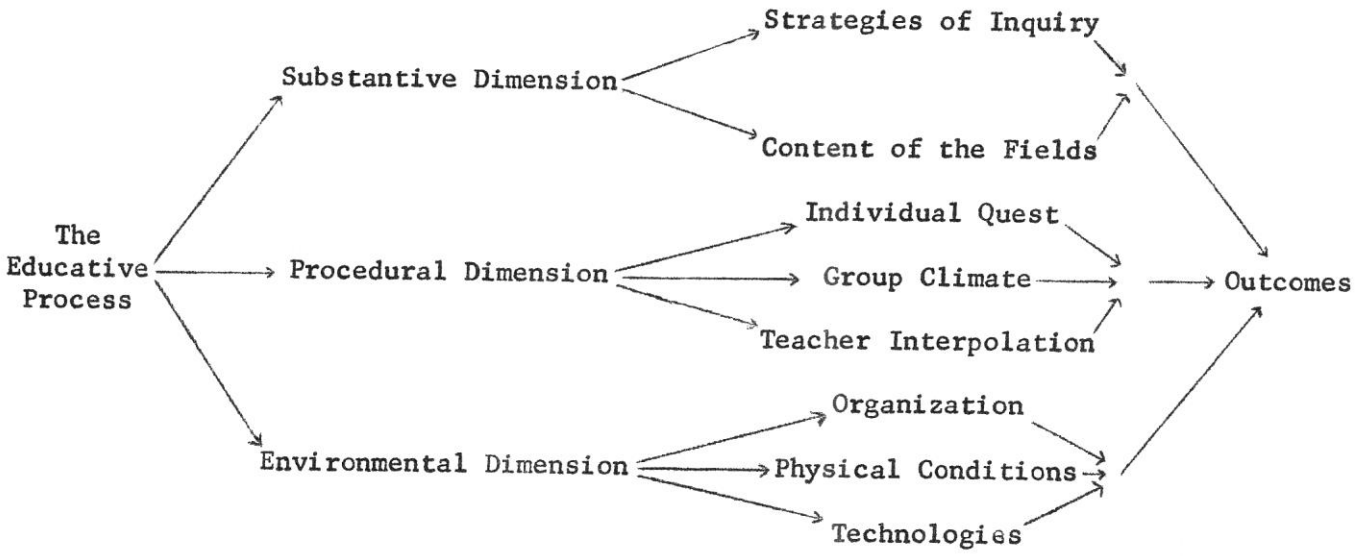
Model Presented: Listed as examples of models are super-partriotism, passive neutralism, Buddhism, Christianity, Hinduism, Judaism, New World education or Progressivism, Old World or formal education, Communism, and capitalism.

Conception of Model: Models are taken to be characterizations which represent life and the world; so the conception of model is representational and of the characterization type. However, all characterizations are not empirical or solely formal. Some represent objects which ought to exist, e.g. Christianity which characterizes what life ought to be, not what it actually is.

9. Downey, Lawrence W., "Secondary Education: A Model for Improvement," in School Review, 1960, Vol. 68, pp. 251-265.

Purpose of the Paper: The purpose is to show the value and need for theory in secondary education and to propose one.

Model Presented: A theory of secondary education is presented. Its main outlines are presented in the following diagram:



(p. 259)

Conception of Model: The theory is used to represent the phenomena of the educative process, and so the conception of model is representational and of the empirical characterization type.

10. Gerbner, George, "Toward a General Model of Communication," Audio-Visual Communication Review, 1956, Vol. 4, No. 3, pp. 171-199.

Purpose of the Paper: The purpose is to present a general conception, which the author calls 'a model,' of communication for the purpose of stimulating the development of a technique and value-oriented theoretical structure.

Model Presented: A conception of communication involving ten basic aspects is set forth. The conception is presented in two forms; one is a sentence broken into ten parts and is called 'the verbal model,' while the other is presented in a series of diagrams and is called the 'graphic model.' About these Gerbner says:

> . . . a graphic model can be cluttered up in the attempt to schematize concepts more clearly explained in words. So we shall use the two models jointly, and consider them two representations of the same basic model, each expressing certain things not easily described by the other. (p. 174)

The verbal model is used to classify areas of communication research as follows:

	Verbal Model	Areas of Study
1.	Someone	Communicator and audience research
2.	perceives an event	Perception research and theory
3.	and reacts	Effectiveness measurement
4.	in a situation	Study of physical, social settings
5.	through some means	Investigation of channels media, controls over facilities
6.	to make available materials	Administration; distribution; freedom of access to materials
7.	in some form	Structure, organization, style, pattern
8.	and context	Study of communicative settings, sequence
9.	conveying content	Content analysis; study of meaning
10.	of some consequence.	Study of over-all changes

(p. 173)

The graphic model is expressed in the diagram on the following page.

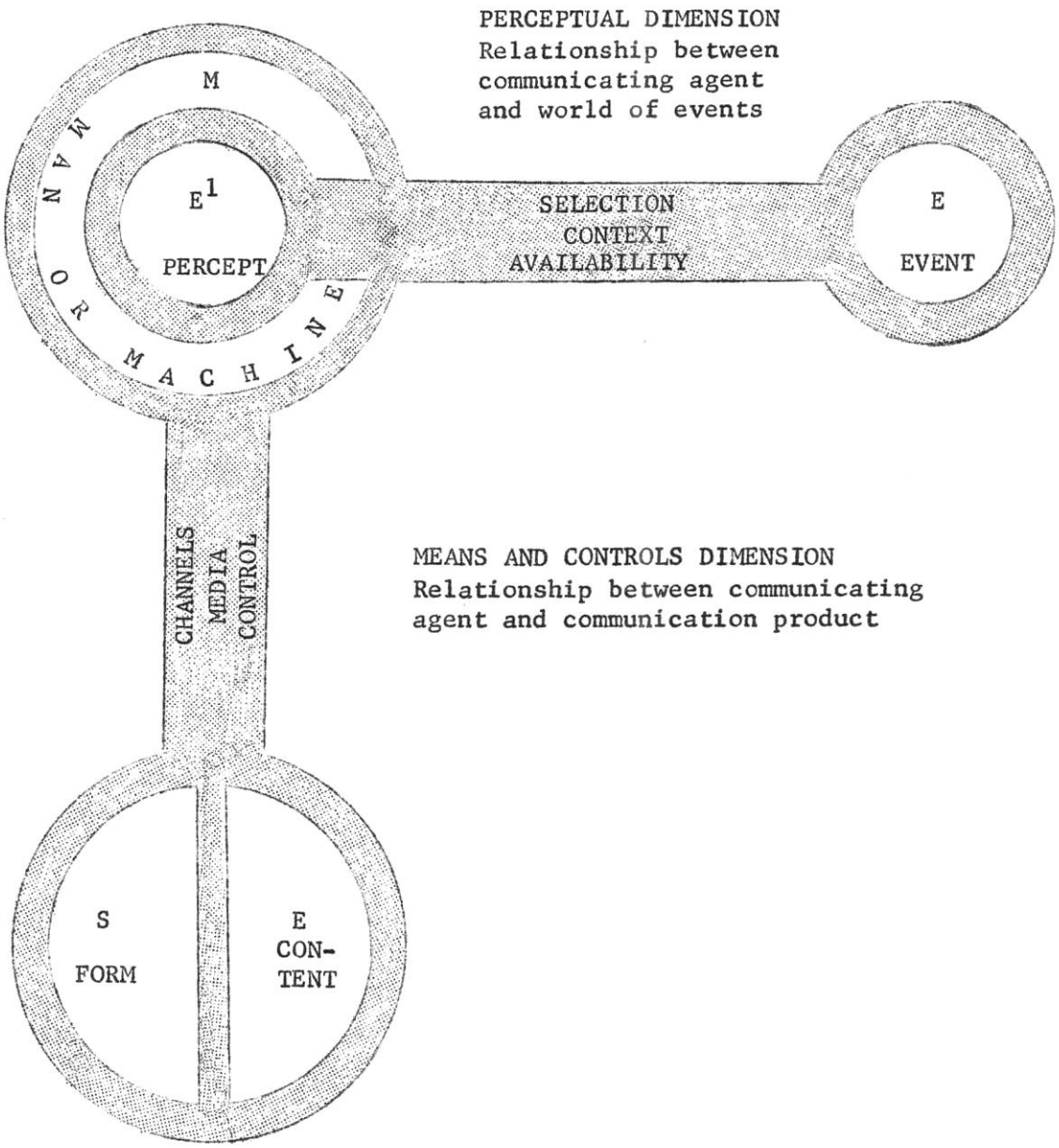


Figure 2

The basic generalized graphic model (p. 177)

/In this diagram, M represents (1) of the verbal model; E^1 - E represents (2), (6), (8); M - SE represents (3) and (5); S represents (7); E represents (9); and (4) and (10) are not represnted./

Conception of Model: Even though the characterization which is called 'a model' is limited to that which is general and from which more specific characterizations or theory can be derived, nevertheless it is used to represent the main phenomena of communication. The conception of model, therefore, is representational and of the empirical characterization type.

11. Getzels, Jacob W., "Administration as a Social Process," in Administrative Theory in Education, ed. by A. W. Halpin, Chicago: University of Chicago Press, 1958, pp. 150-165.

Purpose of the Paper: The purpose is to present a theory of educational administration as a social process.

Model Presented: The theory includes:

Definitions:

Administration:

Structurally conceived as hierarchy of subordinate-superordinate relationships within a social system

Functionally conceived as locus for allocating and integrating roles and facilities in order to achieve the goals of the social system

Social system:

Involves two conceptually independent but phenomenally interactive dimensions or classes of phenomena:

nomothetic dimension: institutions with roles and expectations which will fulfill the goals of the social system

idiographic dimension: individuals with personalities and need-dispositions, whose observed interactions make up social behavior

Institutions:

Agencies established to carry out routinized imperative functions of social systems

Roles:

Most important analytic subunits of institution

Dynamic aspects of positions, offices and statuses within institutions, defining behavior of role incumbents or actors

Defined in terms of role expectations--normative obligations and responsibilities

Within an institution are interdependent or complementary; each deriving its meaning from other related roles in the same institution

Those prescribed within the existential social system are perceived by their role incumbents, and by other persons who interact with those incumbents, each in terms of his own needs, dispositions, and goals (When such private perceptions of two or more individuals are congruent, they may be said to understand each other; when the perceptions are incongruent, to misunderstand each other.)

Individuals:

Specific persons occupying roles, and behaving--fulfilling or failing to fulfill role expectations--in specific ways

Personality:

The dynamic organization within the individual of those need-dispositions that govern his unique reactions to the environment

Need-dispositions:

Individual tendencies to orient and act with respect to objects in certain manners and to expect certain consequences from these actions

The following diagrammatic presentation of relationships:

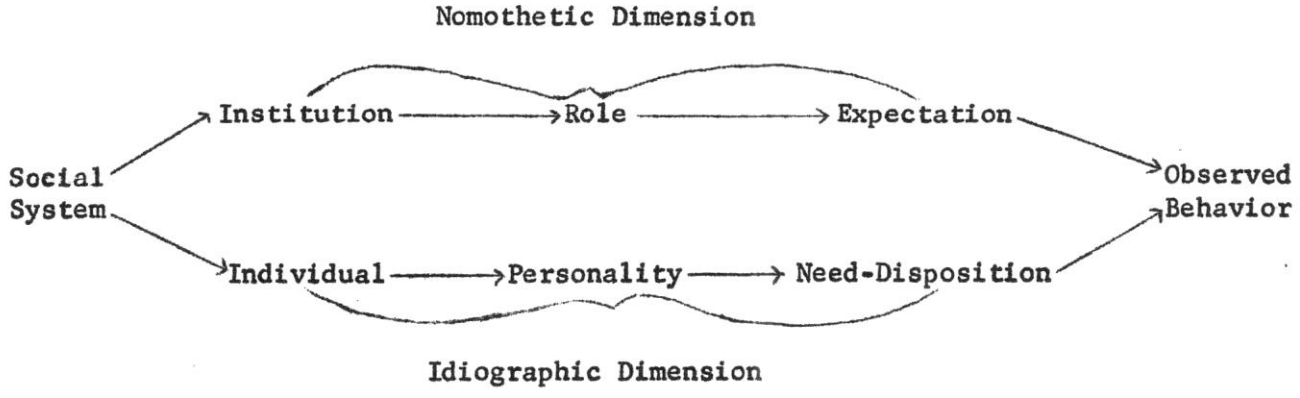


FIG. 5. General model showing the nomothetic and idiographic dimensions of social behavior. (p. 156)

In each dimension, each term is the analytic unit for the term preceding it. A given act is conceived as deriving simultaneously from both dimensions.

Conception of Model: As in the Coladarci-Getzels paper (7), the conception of model is representational and of the empirical characterization type, since the model is a theory which is used to represent phenomena of administration.

12. Gregg, Russell T., "Administration," in Encyclopedia of Educational Research, ed. by Chester Harris, New York: MacMillan, 1960 (3rd edition), pp. 19-24.

Purpose of the Paper: The purpose is to present a general survey of research in educational administration.

Model Presented: Reference is made to Halpin's paradigm.[10]

Conception of Model: The term 'model' is used only in reference to the paradigm outlined by Halpin in Administrative Behavior in Education. Hence, the term would seem to mean here what Halpin meant by it--a representational empirical characterization.

13. Griffiths, Daniel E., "Some Assumptions Underlying the Use of Models in Research," in Research in Educational Administration, ed. by Stephen P. Hencley, Cooperative Research Project F2, 1962, pp. 43-59.

Purpose of the Paper The purpose is to discuss the nature of models and the assumptions underlying their use, and to propose a model for theory in educational administration.

Models Presented: Griffiths discusses two models: a machine model deriving from Locke, Montesquieu, Newton, and others, applied by Frederick W. Taylor to organization theory and by Strayer, Cubberley, Spaulding, and others to educational administration; and a system-theory model, deriving from Von Bertalanffy, Goldstein, and others which he suggests may be fruitful for administrative theory. The latter model may be summarized as follows:

Definitions:

System: A system is a complex of elements in mutual interaction. Systems may be open or closed.

Open system: An open system is related to and exchanges matter with its environment.

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[10]See abstract 16.

Closed systems: A closed system is not related to and does not exchange matter with its environment. A closed system tends toward entropy.

Properties of organismic, open systems:

Open systems exchange energy and information with their environment. They have inputs and outputs.

Open systems tend to maintain themselves in steady states.

Open systems are self-regulating.

Open systems display equifinality.

Open systems maintain their steady states, in part, through the dynamic interplay of subsystems operating as functional processes.

Open systems can maintain their steady states through feedback processes.

Open systems display progressive segregation.

The question whether the administrative performance of school principals is isomorphic to systems theory is raised. A study of school principals is cited as indicating that the properties ascribed to open systems do seem to characterize administrative performance.

The system-theory model is used to develop propositions about administration:

"The steady state of an administrative performance system is maintained by a decision process in which satisfactory alternatives are selected rather than optimal alternatives." (p. 57)

"Administrative systems respond to continuously increasing stress first by a lag in response, and finally by a catastrophic collapse of the system." (p. 58)

Conception of Model: The system-theory model is a characterization which is used to devise another characterization, administrative theory; hence, the conception of model is non-representational and of the empirical characterization type.

14. Griffiths, Daniel E., "Toward a Theory of Administrative Behavior," in Administrative Behavior in Education, ed. by Roald F. Campbell and Russell T. Gregg, New York: Harper, 1957, pp. 354-390.

Purpose of the Paper The purpose is to investigate the nature of theory, the manner in which it is constructed, and its use; to review some

attempts to construct a theory of administrative behavior; and to propose a procedure for the construction of administrative theory, using the paradigm presented by Halpin.[11]

Model Presented: Halpin's paradigm is cited. In addition, Griffiths designates as models an earlier formulation of his own which he calls the tridimensional concept, and Herbert Simon's mathematical formulation of Homan's theory of interaction within a group.

The following table taken from Griffiths' paper summarizes his concept:

TABLE 1

THE TRIDIMENSIONAL CONCEPT OF EDUCATIONAL ADMINISTRATION
A FRAME OF REFERENCE

The Job	The Man	The Social Setting
CONTENT	CAPACITY	CONTENT
1. maintaining effective interrelationships with the community	1. physical	1. physical, technological, human resources
2. improving educational opportunity	2. intellectual	2. relational systems
3. obtaining and developing personnel	3. emotional	3. network of organization
4. providing and maintaining funds and facilities	4. spiritual	4. patterns: thought, belief, values
PROCESS	BEHAVIOR	PROCESS
1. sensing problems	1. sensing problems	1. continuity and stability
2. relating the problem	2. making inferences	2. new and different
3. making decisions	3. relating to people	3. stresses and strains
4. implementing	4. predicting and deciding	4. resolution and readjustment
	5. implementing	
SEQUENCE	SEQUENCE	SEQUENCE
1. past	1. past	1. deeply rooted traditions
2. present	2. present	2. recent past
3. future	3. future	3. present and near future
		4. long-range future

(p. 369)

[11] See abstract 16.

The following quotation states the interrelation of man to job to social setting.

> The Man brings to the Job certain capacities of body, mind, emotions, and spirit. He has beliefs, values, expectations, behavior patterns, energy reserves, and skills. While the Job shapes him, he is also shaping the Job. The Social Setting encompasses the pressures and compulsions of society. These not only establish and set limits for the Job, but also influence the thinking of the Man and set values by which he adjusts himself and is judged. (pp. 368-369)

Griffiths summarizes Simon's formulation as follows:

Definition of variables (each variable stated as function of time, t):

$T(t)$ = intensity of interaction (communication)

$I(t)$ = amount of friendliness (group identification) among members

$W(t)$ = total amount of activity of a member of a group

$F(t)$ = activity of a group required for survival

Postulates:

If the scheme of activities is changed, the scheme of interaction will, in general, change also, and vice versa.

Persons who interact frequently with one another tend to like one another.

If the interactions between the members of a group are frequent in the external system, sentiments of liking will grow up between them, and these sentiments will lead in turn to further interaction over and above the interactions of the external system.

Persons who feel sentiments of liking for one another will express those sentiments in activities over and above the activities of the external system, and these activities may further strengthen the sentiments of liking.

The more frequently persons interact with one another the more alike in some respects both their activities and their sentiments tend to become.

In terms of those postulates and the symbols, the following equations are formulated:

$$T = a_1 I + a_2 W$$

This means that interaction is produced by friendliness and/or group activity. If both are present there will be more interaction than if only one is present.

$$\frac{dI}{dt} = b(t - \beta I)$$

This means that friendliness will tend to increase if the amount of interaction is disproportionately large in relation to existing friendliness, or will tend to decrease if the amount of interaction is disproportionately small in relation to existing friendliness. When interaction is equal to friendliness the right-hand side of the equation would be zero, the factors being in adjustment, and so there would be no tendency toward change.

Conception of Model: Griffiths' description of Simon's formulation suggests that he means by 'model' the characterization or theory stated in mathematical form which is used to represent group behavior. The conception of model, thus, is representational and of the empirical characterization type. On the other hand, he explicitly asserts that his tridimensional concept, like Halpin's paradigm, is not a theory but a framework for discussing administrative behavior. However, the conception of model is the same, if one realizes that by 'framework' is actually meant the broad outlines of a theory.

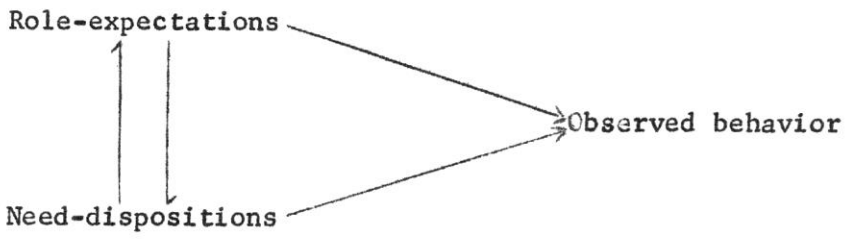
15. Guba, Egon G., Role, Personality, and Social Behavior, Bureau of Educational Research and Service, The Ohio State University, 1958.

Purpose of the Paper: The purpose is to present a theory of social behavior and to examine it in terms of its consequences in various social areas.

Model Presented: The model is basically the theory presented by Getzels in the article reviewed above. Guba's version differs from Getzels' chiefly in the areas into which the theory is extended.

An example is the following analysis of the educative process:

Diagram of relevant portion of theory:



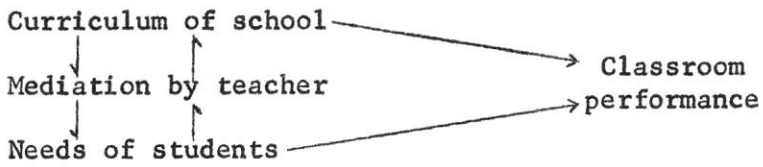
Definition of educative process:

> Guiding the pupil in integrating the demands of the school as a social institution with his own individual demands in ways at once institutionally productive and individually fulfilling

Use of the model to determine three problematic factors in the educative process:

> Curriculum: the expectations set by the school for the student
>
> Self-consistency: the nature and operation of the needs-systems students bring to the classroom
>
> Method: the manner in which the teacher mediates between the curriculum and the needs-systems of the pupils to bring about acceptable classroom performance

The relation between these factors may be diagrammed thus:



Conception of Model: Since the model is the theory used to represent phenomena of social behavior including that of education, the conception of model is representational and of the empirical characterization type.

16. Halpin, Andrew W., "A Paradigm for Research on Administrative Behavior," in Administrative Behavior in Education, ed. by Roald F. Campbell and Russell T. Gregg, New York: Harper, 1957, pp. 155-199.

Purpose of the Paper: The purpose is to present a framework which will serve as "the basis for a systematic classification and critique of existent and ongoing research on administrator behavior, and . . . suggest fruitful lines of inquiry for new research" (p. 155).

Model Presented: The model presented is predicated upon the following assumptions:

Methodological:

> It is desirable to confine inquiry to concepts having definable referents in behavior or in products of behavior.

It is important to discriminate between descriptions of behavior and evaluations of behavior.

Strategic:

That apart from educational administration, hospital administration, etc., administration qua administration is a domain worthy of study.

That it is more profitable to focus upon behavior of administrators than upon administration or administrative behavior.

Concerning educational administration:

That public school organization has a purpose stateable operationally in terms of desirable behaviors or products of behavior. This is the Organization Task.

That individuals constituting an organization are engaged in continuous problem-solving behavior in effort to accomplish the Task.

That an administrator has a key role in this behavior, especially in

a. his perception of the Organization Task,
b. his behavior as a Decision Maker,
c. his behavior as a Group Leader.

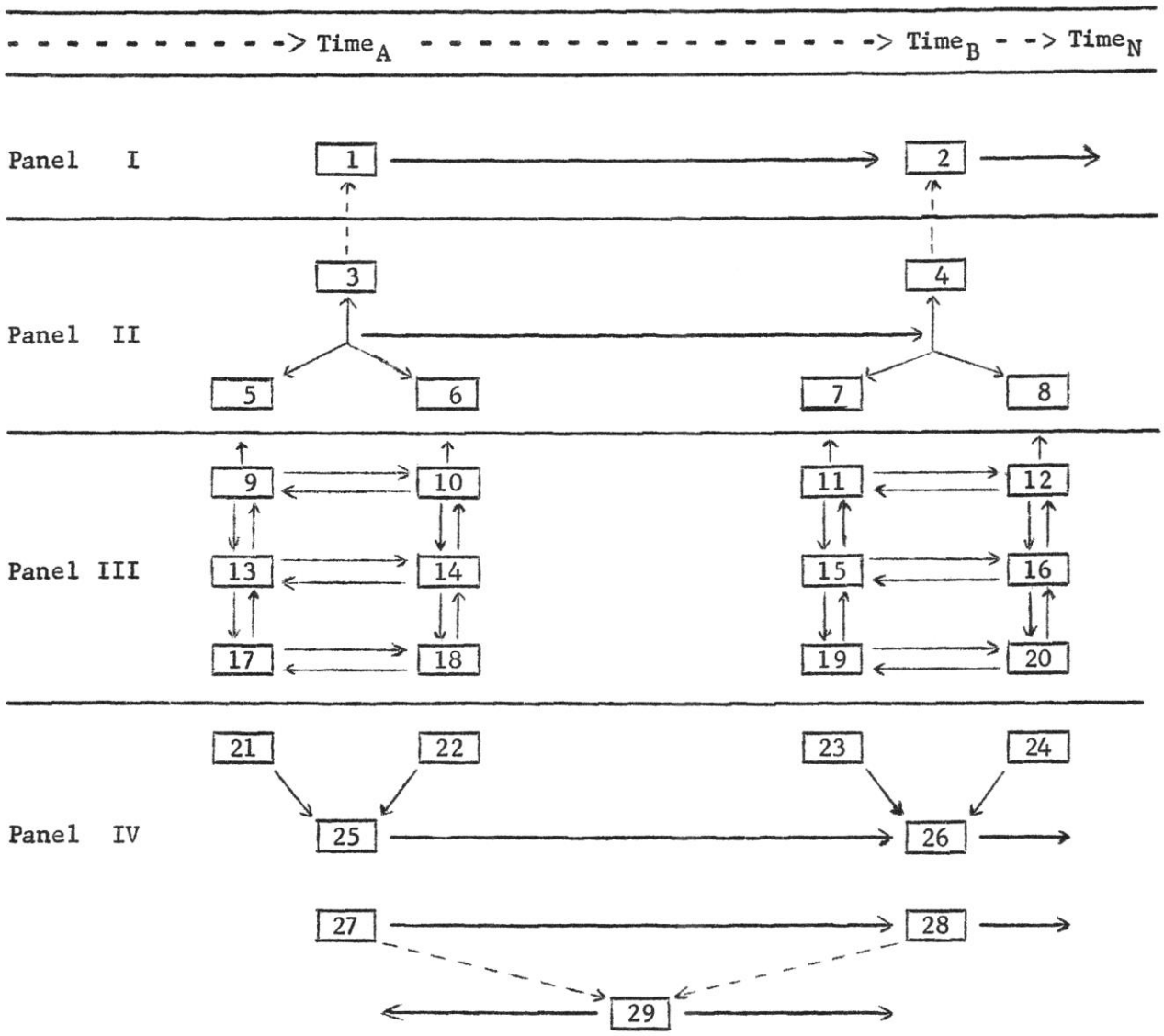
That administration is a human activity involving four components: the Task, the Formal Organization, the Work Group or Groups, and the Leader or Leaders.

The model is presented in the paradigm on the following page which is set forth in terms of four panels:

I. The Organizational Task: defined in terms of desirable behavior or behavior products.

II. Administrative Behavior: the behavior of the officially designated leader in his administrative role.

III. Variables Associated with Administrative Behavior: these include behavior on the part of group members other than the leader, products of the behavior of group members, specified conditions under which the administrator and other group members are required to operate, patterns of administrative organization, and community factors that bear upon the formal organization. These variables are to be reported objectively and measured reliably.



1. The Task$_A$
2. The Task$_B$
3. Administrator's Perception of Organization's Task
4. Administrator's Perception of Organization's Task
5. Behavior as a Decision Maker
6. Behavior as a Group Leader
7. Behavior as a Decision Maker
8. Behavior as a Group Leader
9. Administrator Variables
10. Administrator Variables
11. Administrator Variables
12. Administrator Variables
13. Intraorganization Variables
14. Intraorganization Variables
15. Intraorganization Variables
16. Intraorganization Variables
17. Extraorganization Variables
18. Extraorganization Variables
19. Extraorganization Variables
20. Extraorganization Variables
21. Evaluation as a Decision Maker$_A$
22. Evaluation as a Group Leader$_A$
23. Evaluation as a Decision Maker$_B$
24. Evaluation as a Group Leader$_B$
25. Organization Maintenance
26. Organization Maintenance
27. Organization Achievement$_A$
28. Organization Achievement$_B$
29. Change (Box 28 - Box 27)

Modified from Figure 6, Paradigm for Research on Administrator Behavior, p. 190.

IV. Criteria of Administrator Effectiveness: two levels of criteria are postulated.
   (1) Intermediate criteria such as evaluations or ratings of the leader's behavior.
   (2) Outcomes of behavior measured in terms of organization products and changes in these products.

Conception of Model: Halpin's paradigm constitutes the main outlines of a theory used to represent administrative phenomena. The conception of model, therefore, is representational and of the empirical characterization type.

Exception may be taken to the former statement on the grounds of Parsons' assertion that a paradigm is not a theory, but is "a set of canons for the statement of problems, in such terms as to ensure that the answers to the questions asked will prove to be of generalized significance, because they will state or imply definite relations between the fundamental variables of a system."[12] However, it is important to note that Parsons restricts the term 'theory' to adequate theory, i.e. a body of knowledge of laws. Theory is theory, whether it has been proven adequate or forms only the tentative outlines.

17. Harcleroad, Fred, "Theoretical Formulations in Audiovisual Communications," in Review of Educational Research: Instructional Materials: Educational Media and Technology, 1962, Vol. 32, No. 2, pp. 119-126.

Purpose of the Paper: The purpose is to review the development of theory since 1956 relating to the use of instructional materials and instruments.

Model Presented: Reference is made to George Gerbner's and William A. King's theories of communication as models.

Conception of Model: A "model of the communication process" (pp. 120, 123) indicates the conception of model as representational and of the empirical characterization type.

18. Jackson, Jay, Normative Structure in Educational Systems, Paper read at Washington University Conference on the Classroom as a Social System, January 15-17, 1962, St. Louis, Missouri.

Purpose of the Paper: The purpose is to propose a theory of normative structure as the essential regulating core of a social system, and to suggest that this theory is relevant to educational social systems.

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[12]Talcott Parsons, The Social System, Illinois: The Free Press, 1951, pp. 485-486.

Model Presented: An analysis of the normative situation as including the possibility of a given type of behavior, which type could be exhibited in varying degrees, and a potential social return for that behavior, which can also be exhibited in varying degrees of approval or disapproval. This analysis is shown in the diagram on the following page.

Conception of Model: The theory which is used to represent phenomena of a social system, including an educational social system, is called 'a model.' Hence, the conception of model is representational and of the empirical characterization type.

19. Johns, Roe L. and McLure, William P., "Economics and Finance of Education," in Review of Educational Research: Educational Organization, Administration, and Finance, 1961, Vol. 31, No. 4, pp. 417-427.

Purpose of the Paper: The purpose is to review recent literature relating to the economics of education.

Model Presented: Economic theories, Strayer's and Haig's proposals in 1923 of equalized foundation programs of support, and a theory proposed by Mort and Furno to explain the forces that shape school quality are referred to and called 'models.'

Conception of Model: Since models are taken to be theories which are used to represent economic phenomena, the conception of model is representational and of the empirical characterization type.

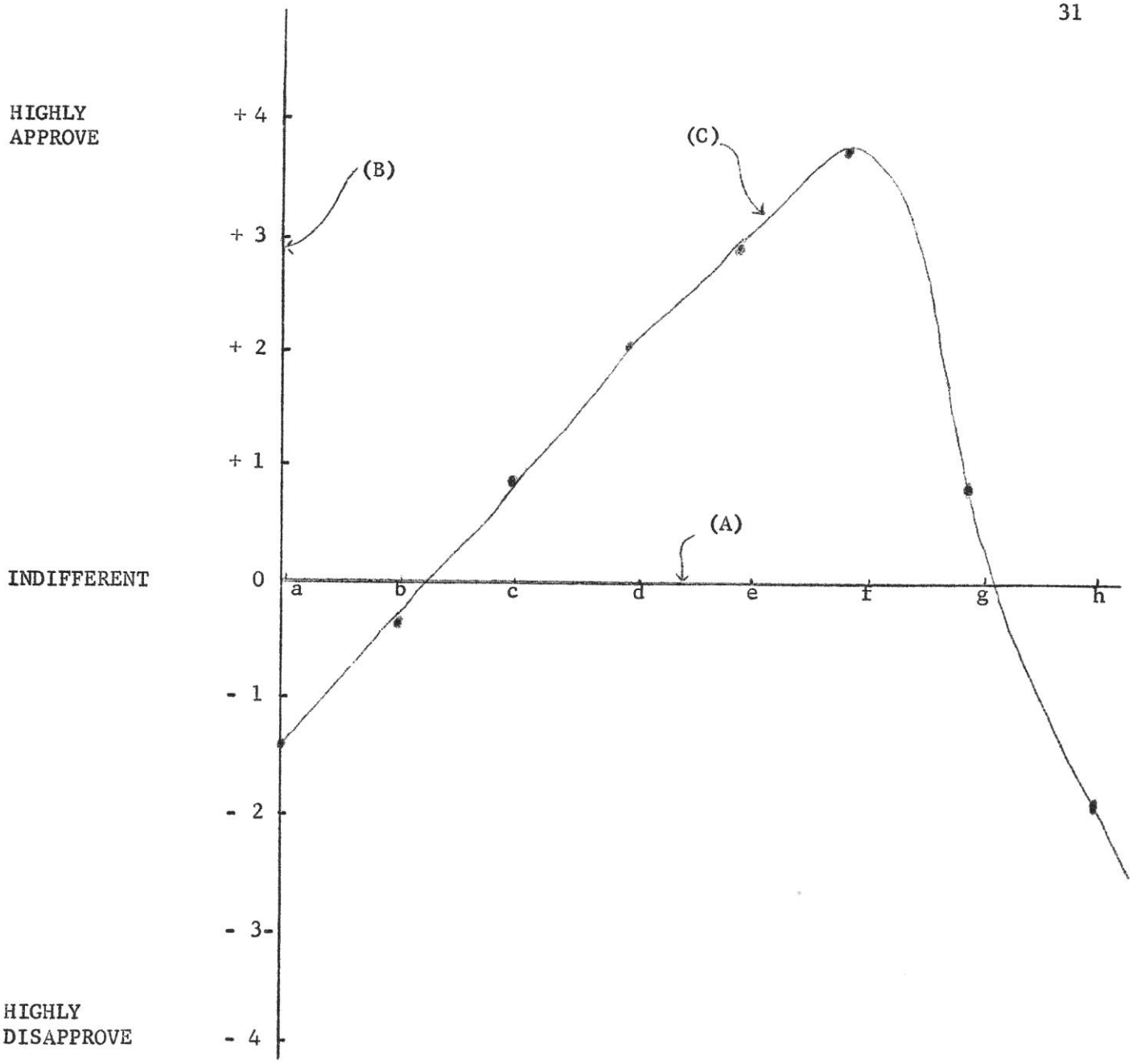
20. King, William A., "Communication Theory and the Allport Concept of Structure," Audio-Visual Communication Review, 1961, Vol. 9, No. 2, pp. 119-128.

Purpose of the Paper: The purpose is to relate Floyd H. Allport's event-structure theory to George Gerbner's theory of communication in such a way that the latter is provided with "an objective ontology of physical and physiological systems, enabling theory to develop some firm criteria to guide its methodology and its dealings with processes" (p. 119).

Model Presented: Reference is made to "Gerbner's verbal model for communication" (p. 119). Key concepts and postulates from Allport's event-structure theory are set forth, and then Gerbner's communication theory is described in these terms. This discussion may be summarized as follows:

Key concepts and postulates from Allport's theory:

Event: A point of contact between ongoing processes. Events do not partake of time and space; a single event is a dichotomizing, non-quantifiable happening and nothing more.



Schematic diagram showing the Return Potential Model for representing norms. (A) A behavior dimension; (B) an evaluation or return dimension; (C) a return potential curve, showing the distribution of approval-disapproval among the members of a social system over the whole range of an Actor's behavior. (Taken from Figure 1 of text.)

Ongoing: A continuous process which closes on itself through a cycle of operation.

Ongoing-event cycle: The fundamental structure of any phenomenon; a series of ongoings and events which tends to close on itself to form a cycle.

Tangency of cycles: Contact or interaction of ongoing-event cycles in a common event.

Compounded cycle: A series of tangent ongoing-event cycles which itself tends to close to form a new cycle.

Autonomy: The energy-level of a cycle at which it maintains itself as a structure. This tends to coincide with that level at which the cycle is in equilibrium with the environment.

Energic closure: The coming to equilibrium of a cycle's energy level with those of adjacent cycles with which it is in contact.

Kinematic closure: The closing of a cycle.

Description of Gerbner's model in Allportian terms:

Someone: Any human being can be thought of as a very high order ongoing-event system or structure.

Perceives an event: The pattern of light disturbance in the atmosphere, caused by the fire, contacts the eye and transmits energy to the latent ongoing-event cycles in someone that had been formed by previous experience with fire, and brings their energy levels up to autonomy where they can operate as a structure in transmitting energy to the reaction cycle that follows.

And reacts: Reaching for the phone is composed of a series of ongoings and events that comes to closure in bringing the phone up to someone's ear and mouth.

In a situation: The community in which the incident occurs is a structure of cycles of ongoings and events.

Through some means: The telephone system is a structure of cycles of ongoings and events.

To make available materials: The administration of the telephone system is a structure that determines whether someone and his neighbor can afford phones and whether they are kept in working order.

In some form: The pattern of the words that someone says to his neighbor on the phone is a series of ongoings and events that we

can assume, for the present, close in on themselves to form a cycle. It operates as a structure in transmitting energy to the latent house on fire structure within the neighbor.

And context: The context in which this behavior occurs is the structure of the friendship of someone and his neighbor.

Conveying content: The content conveyed is the latent house on fire structure within the neighbor that is re-energized or brought up to its autonomous level.

Of some consequences: The structure of the action taken by the neighbor in putting the fire out is the consequence of someone having called him. (Modified from p. 126.)

This description is illustrated on the following page.

Conception of Model: Since Gerbner's theory is taken to be a model and is used to represent communication phenomena, the conception of model is representational and of the empirical characterization type.

21. Kjeldergaard, Paul M., "The Psychology of Language," in Review of Educational Research: Language Arts and Fine Arts, 1961, Vol. 31, No. 2, pp. 119-129.

Purpose of the Paper: The purpose is to survey recent theoretical developments in the psychology of language.

Model Presented: A theory of mediated generalization is presented and may be summarized as follows:

Definition:

Mediated generalization is what takes place when learning in one situation has a facilitation effect on the learning in a second situation, even though there is no direct connection between the elements of the two learning experiences. (pp. 119-120)

Schematic Representation:

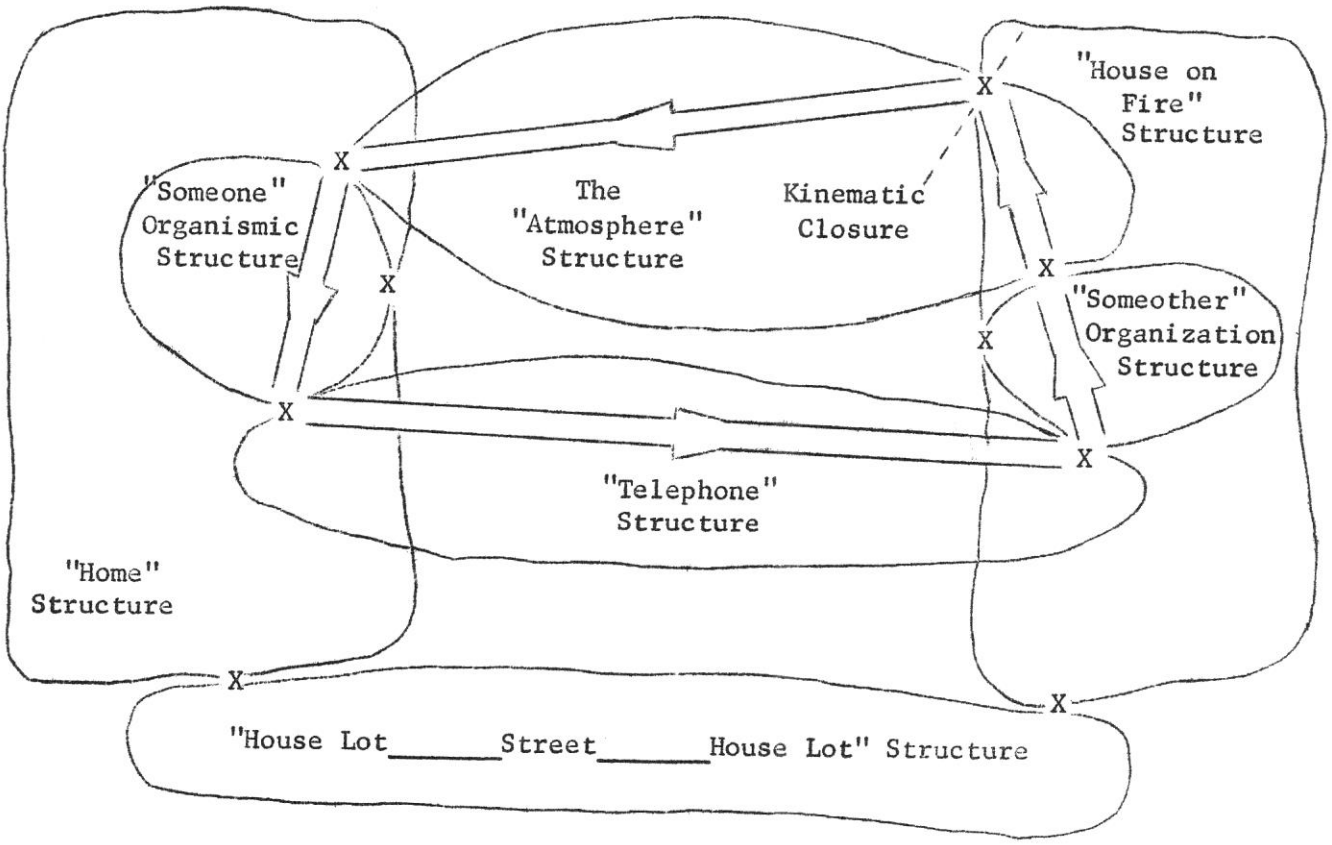
Prior Learning:

Stimulus A ⟶ Response C ⟶ (Stimulus consequences of C)
Stimulus B ⟶ Response C ⟶ (Stimulus consequences of C)

New Learning:

Stimulus A ⟶ (Implicit C) ⟶ (Stim. conseq. of C) —— Response D
Stimulus B ⟶ (Implicit C) ⟶ (Stim. conseq. of C) —— Response D

(p. 120)



Legend:

X X an event

an ongoing

path taken by the message being communicated

X X an ongoing-event cycle

(Modified from p. 127.)

Proposition:

> The connection between stimulus B and response D is accomplished, in part, during the A to D learning when the implicit response, C, and its stimulus consequences are connected to responses D. (p. 120)

In addition, reference is made to "theories or models of verbal behavior" and to the "Brown and Dulaney model" of language. (p. 119) On the other hand, the statement is made that "Carroll used the computer program as a model for describing the acquisition of language." (p. 119)

Conception of Model: The theories used to represent phenomena of language behavior, as well as a characterization--computer program--used to devise a theory of the acquisition of language are taken as models. Consequently, two conceptions of model are involved: representational and non-representational; the former being the empirical and the latter, the formal characterization type.

22. Mathewson, Robert H., "School Guidance: A Four-Dimensional Model," in Personnel and Guidance Journal, 1961, Vol. 39, pp. 645-649.

Purpose of the Paper: The purpose is to present a four-dimensional frame of reference for the assessment of strategies of guidance practice, to illustrate its use by applying it to three strategies of guidance, and to propose a strategy.

Model Presented: The model presented is a system of four bi-polar axes upon which the profile of a given guidance strategy may be plotted.

The Axes:

Classroom-centered--Specialized:
The classroom-centered view sees guidance as occurring almost wholly within the classroom; the specialized view sees guidance as almost exclusively the province of the trained professional specialist.

Personal--Social:
The personal view holds that the function of guidance will be "the satisfaction of unique individual needs and purposes through provision of special means for individual expression and experience, for understanding the individual in his unique terms, for evaluating and interpreting a unique personal pattern, and for aiding each individual to relate his characteristics knowingly to appropriate opportunities and social demands" (p. 646). The social view is chiefly concerned with meeting the needs of society.

Subjective--Objective:
The subjective pole emphasizes the self-defining and self-conceptualizing processes occurring within the pupil, while the

objective pole centers on the evaluation and interpretation of objective data obtained through the use of tested instruments.

Self-integrative--Prescriptive:
Self-integrative guidance assumes that the formation of percepts and concepts relating to adjustment, and their effective use in self-identity, is primarily the task of the individual himself. Prescriptive guidance emphasizes prescriptions or recommendations made by professionals at decision-points in the career of the individual.

These dimensions are acknowledged as all interrelated. Furthermore, it is recognized that there are other dimensions in guidance besides these, though these are seen as central.

Conception of Model: The four-dimensional system is a rudimentary theory of guidance behavior and as such would be used to represent educative phenomena related to guidance. The conception of model, therefore, is representational and of the empirical characterization type.

23. Mathieu, Gustave, "Language Laboratories," in Review of Educational Research: Instructional Materials: Educational Media and Technology, 1962, Vol. 32, No. 2, pp. 168-178.

Purpose of the Paper: The purpose is to review literature discussing the development and use of language laboratories.

Model Presented: The term 'model' is used in reference to the recorded voices of native speakers of languages, after which the learners are to pattern their own pronunciation of the language.

Conception of Model: This conception of model is non-representational and of the object type, since the recorded voices are objects to be represented in the other objects, the voices of the learners.

24. Mauch, James, "A Systems Analysis Approach to Education," in Phi Delta Kappan, 1962, Vol. 43, No. 4, pp. 158-162.

Purpose of the Paper: The purpose is to logically establish that use of the methods of systems analysis for comparison of alternative means of reaching educational goals can lead to discovery of ways to use more efficiently resources devoted to education.

Model Presented: Mention is made of "models of math programs" (p. 160), proposed ways of teaching mathematics. For each such proposed program, if one predicted both the cost per pupil and the amount of mathematics each pupil would learn, then it should be possible to select the program which would meet the mathematical objectives of the school at the lowest

cost per pupil or to make the resources alloted to mathematics achieve the most learning per pupil. The result would be a model incorporating both educational and economic goals.

Conception of Model: Since the program is taken to be the model and it is used to represent ways of achieving goals, the conception of model is representational and of the empirical characterization type.

25. McClellan, James E., "Theory in Educational Administration," in School Review, 1960, Vol. 68, pp. 210-227.

Purpose of the Paper: The purpose is to offer an explanation of recent advances in theorizing in educational administration, to propose a theory of educational administration, and to discuss the probable outcomes for education of recent and current theoretical developments in educational administration.

Model Presented: The model presented is a theory of administration as decision-making in situations "analogous to those faced while playing poker in a group composed of friends and enemies . . . Since there are many agents in this situation, the decision of any one agent becomes a datum to which the others must adjust if the system as a whole--that is, the game--is to be maintained intact . . . The administrative unit in education is defined as in a state of cooperative competition with a finite number of competitors. The purpose of the administrative unit is to maintain or improve its position relative to its competitors, and this purpose implies maintaining the integrity of the larger systems within which the competition occurs . . .

To use theory of games requires that for any administrative unit, one can state a rank order of preference for alternative outcomes of the next move in the system, the next after that, and so on . . . Technically, a preference order ranks alternative states of the total system and not solely positions of one unit in the system.

If we consider the school as an administrative unit in this sense, we still must make empirical predictions that are not deducible from the theories of decision-making. But . . . our model of decision-making gives us a theoretical reason for saying that . . . /these predictions are/ . . . relevant to administration of schools. Thus predictions from other laws in the social sciences also acquire their administrative relevance from what they enable us to say about the probable outcomes of other moves for the preference orders of the school . . . " (pp. 221-224)

Conception of Model: Since the theory of games as it is developed into a theory of administration as decision-making is taken to be the model and is used to represent phenomena relating to the administration of schools, the conception of model is representational and of the empirical characterization type.

26. Millar, Michael, "Some Roles of Subject Matter in Curriculum Inquiry," School Review, 1960, Vol. 68, pp. 329-345.

Purpose of the Paper: The purpose is to state the need for a conceptual framwork which would indicate the requirements for theory and guide research in curriculum and instruction, and to illustrate through a discussion of mathematics education some roles which subject matter might play in developing such a framework.

Model Presented: Millar criticizes as a model a formulation drawn from Ralph W. Tyler's Basic Principles of Curriculum and Instruction, Chicago: University of Chicago Press, 1950. This includes three categories conceived as fundamental in developing curricula or plans of instruction:

> student-directed objectives (formulated with reference to both content and behavior),
>
> the selection and organization of learning activities (designed to help the student attain the objectives), and
>
> the evaluation of the learning activities (to determine whether the objectives are being attained).

Tyler views these categories as operative in a temporally consecutive, or linear, order.

Millar criticizes the ad hoc introduction of objectives and also the idea of linearity. He suggests that subject matter itself could function both in a regulative and formative role. The result would be considerations leading to a conceptual non-linear system of objectives and learning activities.

Conception of Model: Millar emphasizes that the kind of framework he discusses is not itself a theory, but a guide for the development of theory. Thus, it would appear that his conception of model is non-representational rather than representational. However, it is representational and of the empirical characterization type, for what he is proposing is the outlines or framework and so the beginnings of a theory which when completed would represent educative phenomena related to curriculum.

27. Mooney, Ross, A Conceptual Model for Integrating Four Approaches to the Identification of Creative Talent, A Report to the 1957 Research Conference on The Identification of Creative Scientific Talent, Salt Lake City, August 17-20, 1957, The Bureau of Educational Research and Service, The Ohio State University.

Purpose of the Paper: The purpose is to present "a perspective which is large enough to encompass all four . . . /approaches to the problem

of creativity7 . . . within one system and deep enough to establish the interlocking function of all four" (p. 4). The four approaches arise from the following emphases: (1) environment, (2) the person, (3) the process, and (4) the product.

Model Presented: The perspective centers about the essential conditions for the existence of men which are stated in the language of dimensions and illustrated in the diagrams on the following page.

Dimensions:

(1) out, denoted by the outgoing arrows, to declare man's extension into his universe, his belonging to the whole;

(2) in, denoted by the incoming arrows, to declare man's centrality in his universe, his being integrative to the whole;

(3) out-and-in-and-out-and-in-again-and-again, denoted by the infinity sign, to declare man's sequential ordering of his universe, his continual coming to be (becoming) through give-and-take, incoming and outgoing;

(4) fit, denoted by the three lines at each end of the infinity sign, to declare man's selective ordering of his universe, his continual fitting of specific incomings and outgoings, his rendering potentialities actual in concrete sequential instances. (pp. 8-9)

Conception of Model: Since the model is a unifying idea used to represent all phenomena of life, not only that of man but that of a protozoan, it is representational and of the empirical characterization type. Furthermore, the qualification of model as conceptual, leads one to believe that there is a recognition of the other category of models according to what they are, i.e. object models.

28. Mort, Paul R. and Furno, Orlando F., Theory and Synthesis of a Sequential Simplex: A Model for Assessing the Effectiveness of Administrative Policies, Institute of Administrative Research, Teachers College, Columbia University, 1960.

Purpose of the Paper: The purpose is to make generally available the idea of the Sequential Simplex, certain specific formulations of the Sequential Simplex which have been developed and the use of these formulations, and ways of developing a Sequential Simplex.

Model Presented: The model presented is a specific formulation,'Sequential Simplex Model B, 1955,' as an illustration of the use of the Sequential Simplex concept as an instrument of research. The concept

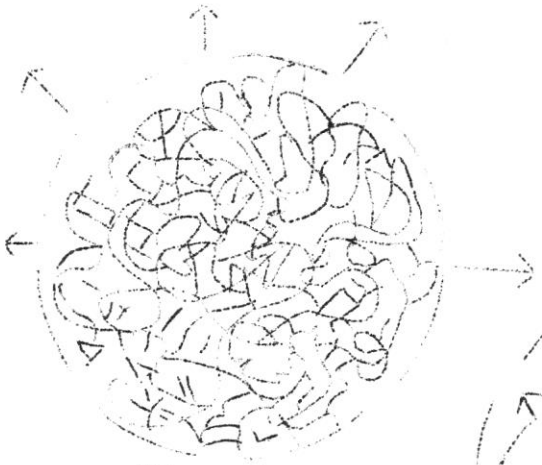


Figure A.
Composition within Universe: Energy Forms in Action

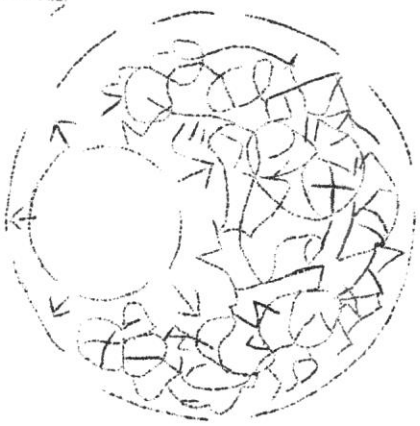


Figure B.
A Man's Outward Relation to Other Energy Forms

Figure C.
A Man's Inward Relation from Other Energy Forms

Figure D.
Composition within Man: Energy Forms in Action

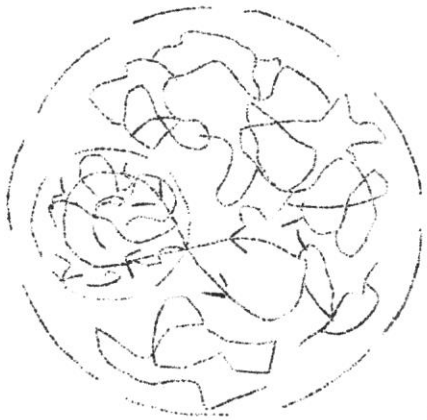


Figure E.
A Man's Sequential Transaction with Other Forms

Figure F.
A Man's Selective Fitting during Transaction

Figures in re
Discussion of

ESSENTIAL CONDITIONS
FOR THE EXISTENCE OF MAN
June 20, 1956

itself, which is not presented as a model, is a statistical technique for grouping and comparing various factors pertaining to a group of school systems, as these factors correlate with, and presumably influence, school quality in those systems. A Sequential Simplex model is conceived to be a description in terms of this technique of the relation of a specific group of factors to school quality in a specific group of school systems. The essential elements of such a model are the Sequential Simplex technique, a group of school systems, a criterion of school quality, and a set of relevant factors measured with appropriate instruments. These may be outlined with reference to Sequential Simplex Model B, 1955, as follows:

The Sequential Simplex technique:

> The technique has two basic features: the treatment of a group of school systems being studied as a statistical universe in and of itself, and the clustering of the traits under examination into panels which are considered to act in sequence as they affect school quality.
>
> The treatment of a group of school systems as an independent universe avoids the difficulties of establishing either random or structured samples for the assessment of factors relating to school quality. The factors in question are measured in <u>all</u> the schools in the group, and the relationships found to exist are asserted to hold <u>only</u> for that specific group.
>
> The assigning of individual factors under examination to a series of panels acting in sequence is done to circumvent the fact that no single factor by itself has been found to correlate very highly with school quality. It is possible to so construct such panels that each panel will correlate highly with school quality and with every other panel in the series. Individual factors may then be assessed, not only in terms of their correlations by themselves with the criterion of school quality which is used, but also in terms of their correlation with each panel and their contribution to the power of each panel to predict school quality.

Sequential Simplex Model B, 1955:

> School systems:
> About 70 high expenditure school systems in the Metropolitan New York City area, comprising the Metropolitan School Study Council.
>
> Criterion of school quality:
> Adaptability, as measured by the instrument presented in <u>The Growing Edge</u>, by Mort, Vincent, and Newell, New York: Metropolitan School Study Council, 1947.

Panels and factors under examination:
These are indicated in the diagram on the following page.

Use of the Model:

This model is designed particularly for the evaluation of the influence of various legal and administrative policies on school quality in the specific group of school systems studied. Eleven steps are prescribed for the evaluation of a given factor, as follows:

Step 1: Light From Related Studies
Comparison of the relationship found between the measure of the factor under study and school quality with similar relationships found in earlier studies.

Step 2: Light From Comparison With Critical Elements in the School Environment
Comparison of the measure of the factor under study with critical elements in the school environment represented by the measures in the model.

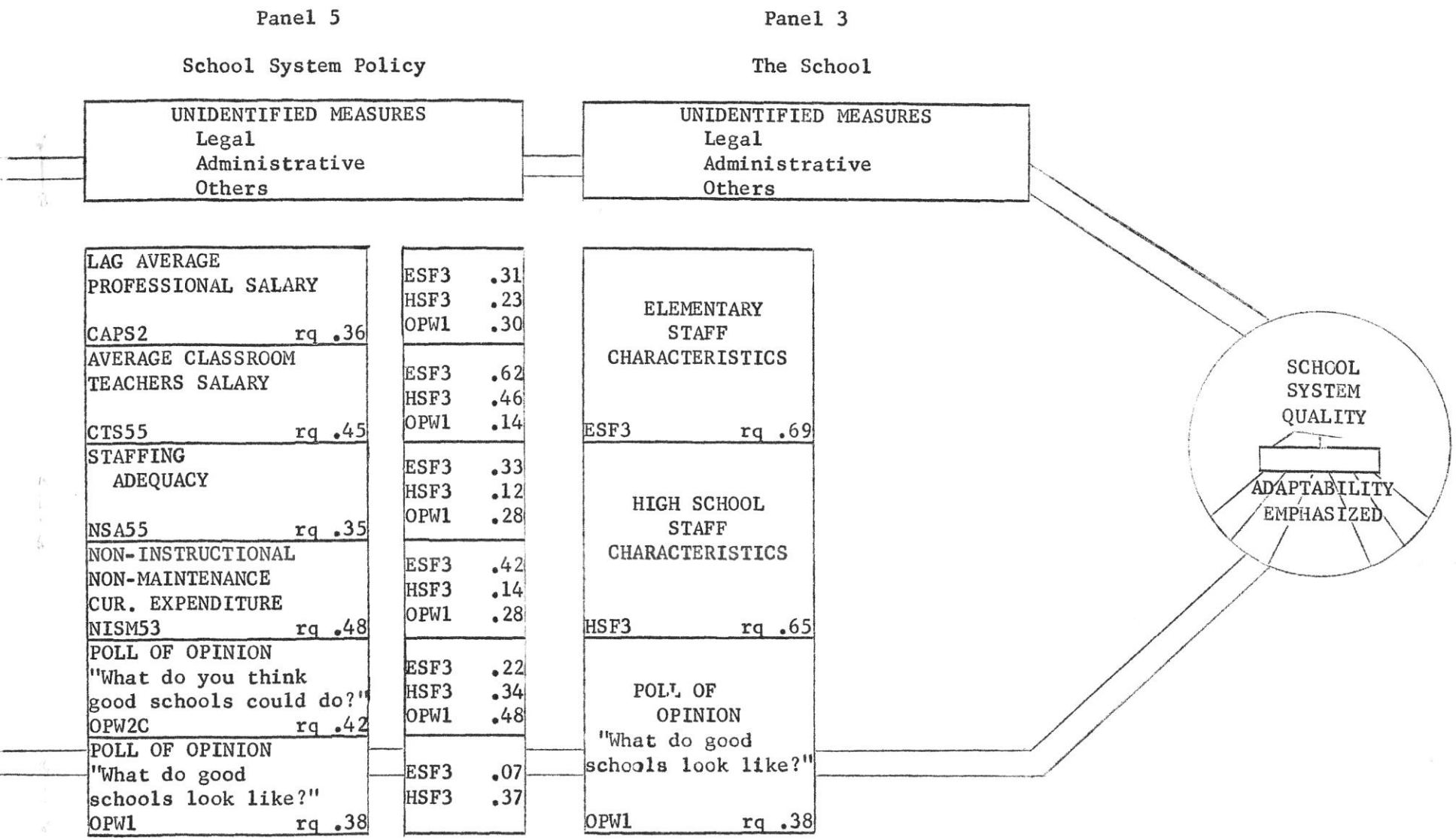
Step 3: Possible Sources of Disturbance in the Zero-Order Relationships
Identification of school-community environmental factors that run with or counter to the factor under study. This calls for a reclassification and examination of data collected in connection with Steps 1 and 2.

Step 4: Inferences as to Causation
Estimation from the data array of the possible way or ways in which the factor operates with the maze of other facts in the community and school environment.

Step 5: The Continuing Search For Possible Causes and Effects
Identification of the factors that may conceivably serve as intermediaries in bringing the force of the factor to bear on school quality.

Step 6: Summation of the Findings
Reassessment of the evolving theory as to how the factor operates (similar to Step 4).

Step 7: Determining the Unique Predictive Power of the Measure
Determination of the unique predictive power of the measure of the factor under study. In the preceding steps, the considerations were qualitative. Step 7 and the three steps immediately following (Steps 8, 9, and 10) apply quantitative measurement to the same considerations in order to refine the thinking in the evaluation of the theory of how the factor operates.



the staffing adequacy measure. For example, the correlation between Staffing Adequacy and Elementary Staff Characteristics, ESF3, is .62. (From text of paper.)

SEQUENTIAL SIMPLEX MODEL B-1955

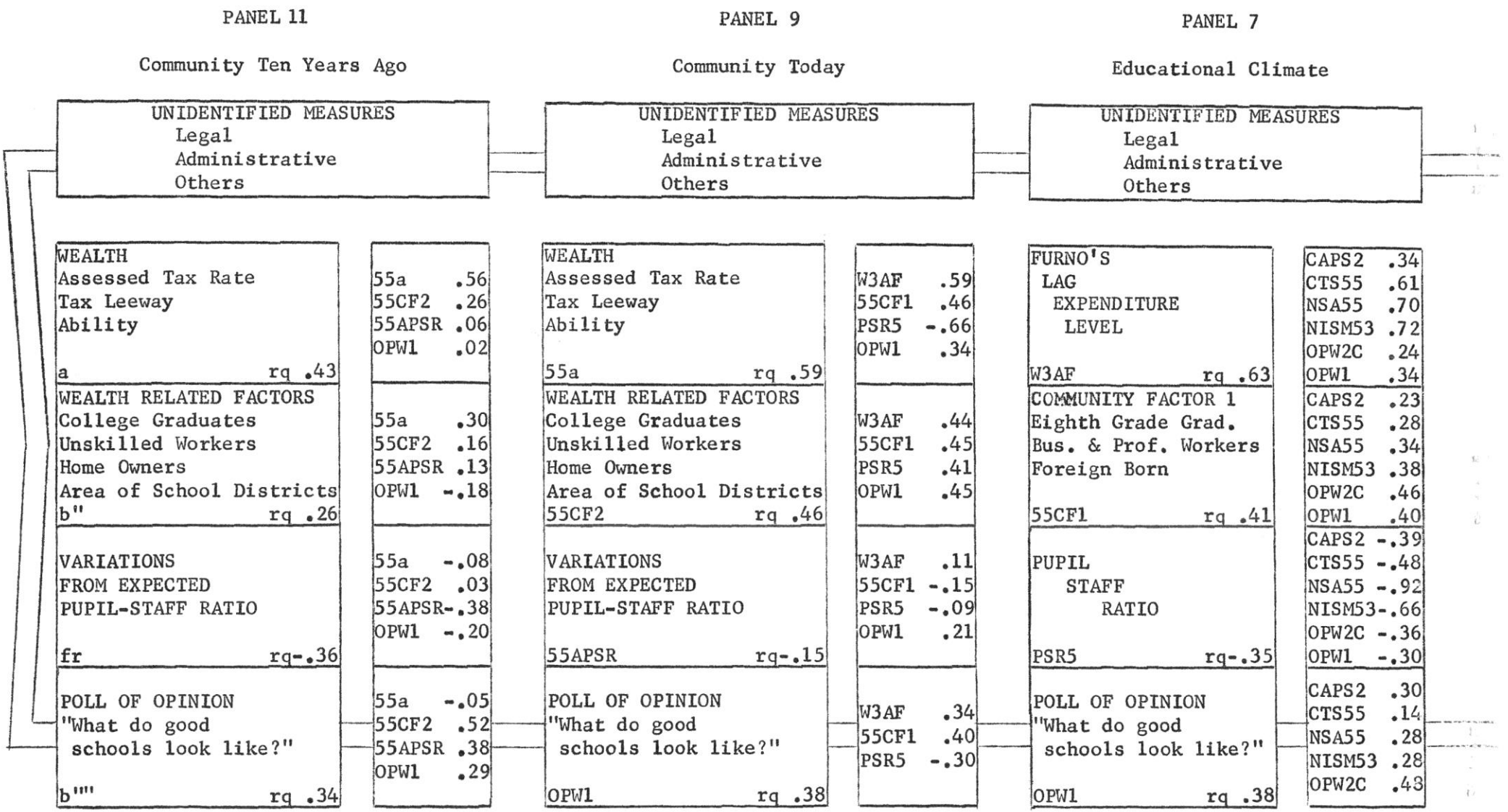


Figure 3. The schema for the control model idea of the Sequential Simplex Theory. It should be read as follows: The correlation between Staffing Adequacy, NSA55, and school quality is represented by the symbol rq -.35. The correlation between Staffing Adequacy and the separate measures in Panel 3 is shown in the block to the right of

Step 8: The Team-Mates Test

Quantitative measure of the strength of the relationship between the measure of the factor under study and the measures representing the facts of the community and school represented by the model.

Step 9: The Search For Inferences From a Study of the First Residuals

Reprocessing of the measure of the factor under study to bring into the open the characteristics of the measure that account for its relationships with quality.

Step 10: The Second-Derivative Test

Reprocessing of the data to identify the characteristics of the measure of the factor under study that have no predictive power for school quality (similar to Step 9).

Step 11: Final Evaluation of the Findings

Reexamination of the theory formulated in Steps 4, 5, and 6, bringing to bear on the operation of the factor any further light revealed by the quantitative Steps 7, 8, 9, and 10.

(pp. 22-23)

Conception of Model: Since the model is taken to be the characterization of the relation of a specific group of factors to school quality and is used to represent phenomena in a specific group of school systems, the conception of model is representational and of the empirical characterization type.

29. Newell, John M., Lewis, W. W., and Withall, John, "Use of a Communication Model to Study Classroom Behavior," Mimeographed paper presented at meeting of American Educational Research Association, 1961.

Purpose of the Paper: The purpose is to report the development of a set of categories for the classification of acts of communication, and their effectiveness in distinguishing between the communication behavior of teachers utilizing the concept of problem-oriented approach, the case study approach, and the learner-centered approach.

Model Presented: A set of categories for the classification of acts of communication is presented which is based upon a definition and analysis of communication, as follows:

Definition of 'communication': "An interpersonal (or intrapersonal) process by which a person reduces the uncertainty of some state of affairs with another (or in some aspect of himself) by the detection of cues which seem to him to be relevant to that state of affairs." (p. 2)

Communication behaviors may be classified as sending-oriented or receiving oriented.

Sending-oriented behaviors are associated with attempting to put an idea across to another. These may be subdivided into: output behavior--telling something to another, and feedback behavior--seeking to discover whether what has been told has been understood.

Receiving-oriented behaviors are associated with attempting to understand what another is saying. These may be classified as: input behavior--listening, and confirmation behavior asking questions to determine if one has understood what has been said.

The categories:

Receiving-oriented behaviors:
- Asks for information
- Seeks or accepts direction
- Asks for opinion or analysis
- Listens

Sending-oriented behaviors:
- Information-centered behaviors
  - Gives information
  - Gives suggestion
  - Gives direction
  - Gives opinion
  - Gives analysis
- Attitude-centered behaviors
  - Shows positive feeling
  - Inhibits communication
  - Shows negative feeling
  - No communication
- Awareness-indicating behavior
  - Perfunctory agreement or disagreement

Conception of Model: The set of categories used to represent acts of communication is taken to be a model; consequently, the conception of model is representational and of the empirical characterization type.

30. Page, Ellis B., "Behavioral Theory, Verbal Magic, and Education," in Educational Theory, 1962, Vol. 12, pp. 73-78.

Purpose of the Paper: The purpose is to show through the explication of the concept of experimental models the difficulties of deriving answers to educational problems concerning curriculum, methods, or guidance, from experimentation with mechanical models, or with animals, or with humans under contrived conditions.

Model Presented: Reference is made to the kinds of experimental models: sampling, substitutive, and illustrative. Page discusses the limitation of the substitutive model, and points out that the illustrative model is not an experiment (test) but a demonstration.

Conception of Model: Since the experimental model is used to represent the objects of interest and so to permit checking of a theory, the conception of model is representational and of the object type.

31. Rapacz, Richard V. and Kahn, Albert S., "Comparative Education," in Review of Educational Research: The Philosophical and Social Framework of Education, 1961, Vol. 31, No. 1, pp. 57-69.

Purpose of the Paper: The purpose is to review recent literature in comparative education.

Model Presented: Reference is made to Kandel's New Era in Education, which treats educational theories and practices of various nations in terms of their social, political, and economic systems as these operate within the cultural matrices of those nations. This work is said to be a model upon which later students, with more fully developed theories of culture, can build.

Conception of Model: It would appear that Kandel's theory is to be used to be represented in other theories yet to emerge. Thus the conception of model would be non-representational and of the empirical characterization type. However, if Kandel's theory is taken to set the framework within which other theorizing is to be done, then the conception of model as stated would not hold.

32. Shafer, Robert E., "Mass Communication," in Review of Educational Research: Language Arts and Fine Arts, 1961, Vol. 31, No. 2, pp. 197-207.

Purpose of the Paper: The purpose is to review research literature dealing with mass communication which has implications for education.

Model Presented: Reference is made to a need for "new conceptual and methodological models," (p. 199) and to "a classroom model projected as a social system" by Riley and Riley (p. 199). Sondel also is said to have projected a model of the classroom as a social system. Papers by Tannenbaum, Cunninghis, and others dealing with the development of survey techniques are cited in such a way as to indicate that Shafer considers such techniques methodological models.

Conception of Model: By 'conceptual model' Shafer would seem to mean a characterization used to represent educative phenomena related to mass communication. Reference to Sondel's and Riley and Riley's work indicates so. By 'methodological model' he would seem to mean a characterization

used to represent the population of educative phenomena. Reference to survey techniques indicates so. Thus, the conception of model is representational and of the empirical characterization type.

33. Smith, B. Othanel, "A Concept of Teaching," in Language and Concepts in Education, ed. by B. Othanel Smith and Robert H. Ennis, Chicago: Rand McNally and Company, 1961, pp. 86-101.

Purpose of the Paper: The purpose is to criticize several current definitions of 'teaching,' and to present another definition of the term.

Model Presented: A pedagogical model based upon Tolman's "A Psychological Model," in Toward a General Theory of Action, ed. by Parsons and Shils, is presented. It is sketched as follows:

A Pedagogical Model

I Independent Variables (Teacher)		III Intervening Variables (Pupils)		II Dependent Variables (Pupils)
(1) Linguistic behavior (2) Performance behavior (3) Expressive behavior	⟶	These variables consist of postulated explanatory entities and processes such as memories, beliefs, needs, inferences, and associative mechanisms.	⟶	(1) Linguistic behavior (2) Performance behavior (3) Expressive behavior

(p. 91)

The arrows indicate the direction of causal influence. The action of teaching is an independent variable. Learning is an intervening variable which indicates its presence through pupil behavior, which is a dependent variable.

This model is not considered to be a complete theory of teaching, both because the three sets of variables are not completely set forth, and because, since pupil behavior also influences teacher behavior, the teaching process is a cycle of which the model portrays only half. The complete cycle may be symbolized as follows:

$$\left|\left|P_t \longrightarrow D_t \longrightarrow R_t\right| \longrightarrow P_p \longrightarrow D_p \longrightarrow R_p\right|\left| \longrightarrow P_t \longrightarrow D_t \longrightarrow R_t\right| \longrightarrow P_p \longrightarrow D_p \longrightarrow R_p$$
$$\left|\left| \longrightarrow P_t \longrightarrow D_t \longrightarrow R_t\right| \longrightarrow P_p \longrightarrow D_p \longrightarrow R_p\right| \left| \ldots\ldots \longrightarrow \text{achievement}\right.$$

(p. 92)

Where P_t is the teacher's perception of the pupil's behavior; D_t is the teacher's diagnosis of the pupil's educational condition; R_t is

the action taken by the teacher; P_p is the pupil's perception of the teacher's behavior; D_p is the pupil's diagnosis of the teacher's state of mind; and R_p is the reaction of the pupil to the actions of the teacher. Double vertical lines mark off instances of the complete cycle; single vertical lines divide the cycle into the act of teaching, $\|P_t \longrightarrow D_t \longrightarrow R_t\|$, and the act of taking instruction, $\|P_p \longrightarrow D_p \longrightarrow R_p\|$.

Conception of Model: The theory constructed to represent the teaching process is termed 'a model.' Therefore, the conception of model is representational and of the empirical characterization type.

34. Suchman, J. Richard and Aschner, Mary Jane McCue, in Review of Educational Research: Growth, Development, and Learning, 1961, Vol. 31, No. 5, pp. 451-462.

Purpose of the Paper: The purpose is to review studies in the development of perception and cognitive processes.

Model Presented: The paper contains a single reference to "the construction of theories and models of perceptual mediation" (p. 451).

Conception of Model: The evidence is inadequate to enable a judgment as to what is meant by 'model,' but the phrase quoted above suggests a representational meaning of the empirical characterization type.

35. Sweitzer, Robert E., "An Assessment of Selected Theories of Administration," in Research in Educational Administration, ed. by S. P. Hencley, Cooperative Research Project No. F-2, 1962, pp. 68-99.

Purpose of the Paper: The purpose is to discuss problems and methods of assessing administrative theory, to propose a method, and to illustrate that method by applying it to two theories current in educational administration. The method proposed seeks areas of complementarity between two or more theories by spotting the directional properties of the theories, using these directional properties to determine the relationships of the theories to the interests of the investigator, and attempting to detect points of agreement between the theories. The theories used to illustrate this method of assessment are the Getzels-Guba nomothetic-idiographic model and Stogdill's input-output framework.

Model Presented: The term 'model' is used only in reference to the Getzels-Guba theory which is essentially the same as that presented in the papers by Coladarci and Getzels, Getzels, and G ba which are reviewed above--7, 10, and 15 respectively.

Conception of Model: On the basis of the way in which the term 'model' is used, the conception expressed here is identical to that elsewhere associated with the Getzels-Guba model: representational and of the

empirical characterization type. However, in his discussion of the assessment of theories, Sweitzer suggests that two or more theories dealing with the same domain of data may be used to explicate and perhaps to evaluate each other, and to devise further propositions not contained in the original theories. This seems to be a non-representational conception of model.

36. Thompson, James D., "Modern Approaches to Theory in Administration," in Administrative Theory in Education, ed. by A. W. Halpin, Chicago: University of Chicago Press, 1958, pp. 20-39.

Purpose of the Paper: Thompson states his purpose to be the discussion of the following questions:

> "(1) What do we hope to achieve through the use of theory?
> (2) What are the sources of traditional theory?
> (3) What are the criteria for administrative theory?
> (4) Are we approaching an adequate theory?" (pp. 21-22)

Model Presented: Parsons' approach to administrative theory via social systems concepts, and applications of game theory to administration are mentioned as examples of models.

Conception of Model: It is probably the case that 'model' is used both in reference to theory used to represent administrative phenomena and to a pattern drawn from a related field for the building of administrative theory. At one point Thomspon distinguishes between theorizing as the result of deductive approaches based on a priori postulations and theorizing based upon models derived from a variety of sources, but at another point he refers also to the former as models. Whether he means to refer to representational models or to non-representational models or both, it is clear that there are empirical elements in the formulations he mentions.

37. van Egmond, Elmer, "Socialization Processes and Education," in Review of Educational Research: The Philosophical and Social Framework of Education, 1961, Vol. 31, No. 1, pp. 80-90.

Purpose of the Paper: The purpose is to review literature dealing with the nature of the socialization process, delinquency as a breakdown in the socialization process, and the school and mass media as agencies of socialization.

Model Presented: The term 'model' is used in the phrases 'identification model' and 'role model of the parents,' which refer to the function of parents in setting behavioral patterns which children adopt in the learning of social roles.

Conception of Model: Since the behavior of the parents is used as an object to be represented in the behavior of the children, the conception of model is non-representational and of the object type.

Conceptions and Evaluation

Table 1 on the following page summarizes the conceptions of model in the surveyed and abstracted literature dealing with educational theory. From the frequencies, the generalization that the prevailing conception of model is representational and of the empirical characterization type is patent.

Since the representational model of the empirical characterization type can have significance for educational theorizing in evaluating the results of such theorizing, one might be tempted to conclude that the prevailing conception of model has that significance. However, Table 2 on page 51 indicates that in only three abstracts was a conception of model related to the evaluating process, and of these three Table 3 on page 52 indicates that in only one was the conception of model representational and of the empirical characterization type. What one must conclude is that the prevailing conception of model has nothing whatever to do with the process constituting or related to educational theorizing. Rather the conception of model is such that educational theory itself is seen as a model. In thirty-two instances, educational theory was viewed as a model of educational events. It was considered a characterization used to represent educational phenomena.

One can hardly quarrel with the prevailing conception of model on the grounds that it is not a logically legitimate conception. It is. Yet from the standpoint of doing educational theory, the prevailing conception

TABLE 1: CONCEPTIONS OF MODEL IN ABSTRACTS

Abstract Number	Conception of Model					
	Representational			Non-representational		
	Object	Characterization		Object	Characterization	
		Empirical	Formal		Empirical	Formal
1	0	1	0	0	0	0
2	0	1	0	0	1	1
3	0	1	0	0	0	0
4	0	1	0	0	0	0
5	1	1	0	0	0	1
6	0	1	0	0	0	0
7	0	1	0	0	0	0
8*	0	0	0	0	0	0
9	0	1	0	0	0	0
10	0	1	0	0	0	0
11	0	1	0	0	0	0
12	0	1	0	0	0	0
13	0	0	0	0	1	0
14	0	1	0	0	0	0
15	0	1	0	0	0	0
16	0	1	0	0	0	0
17	0	1	0	0	0	0
18	0	1	0	0	0	0
19	0	1	0	0	0	0
20	0	1	0	0	0	0
21	0	1	0	0	0	1
22	0	1	0	0	0	0
23	0	0	0	1	0	0
24	0	1	0	0	0	0
25	0	1	0	0	0	0
26	0	1	0	0	0	0
27	1	1	0	0	0	0
28	0	1	0	0	0	0
29	0	1	0	0	0	0
30	1	0	0	0	0	0
31	0	1	0	0	1	0
32	0	1	0	0	0	0
33	0	1	0	0	0	0
34	0	1	0	0	0	0
35	0	1	0	0	1	0
36	0	1	0	0	1	0
37	0	0	0	1	0	0
TOTAL	3	32	0	2	5	3

*The conception of model is representational, but not of the empirical or solely formal characterization type.

TABLE 2: ABSTRACTS IN WHICH CONCEPTION OF MODEL IS RELATED TO PROCESSES OF EDUCATIONAL THEORIZING

Abstract Number	Conception of Model Related in Abstract to		
	Doing Educational Theory		Evaluating Educational Theory
	Devising	Explicating	
2	1	1	0
5	0	1	1
13	1	0	0
21	1	0	0
30	0	0	1
31	1	1	0
32	0	0	1
35	1	1	0
36	1	1	0
SUBTOTAL	6	5	3
TOTAL	11		3

TABLE 3: CONCEPTIONS OF MODEL RELATED TO PROCESSES OF EDUCATIONAL THEORIZING

Conceptions of Model			Significance to Educational Theorizing Found in Abstracts		
			Devising	Explicating	Evaluating
Representational Model	Object				2
	Characterization	Empirical			1
		Formal			0
Non-Representational Model	Object				
	Characterization	Empirical	5	4	
		Formal	1	1	
	TOTAL		6	5	3

' ▨ ' denotes logical impossibility, and so there are no instances.

is sterile. To do educational theory, what is required is a conception of model that is non-representational and of the empirical or formal characterization type. What are needed are points of view to be represented in, and thus allow the devising and explicating of educational theory. Those concerned with developing educational theory must come to such a conception of model; as Ausubel, Carroll, Griffiths, Kjeldergaard, Rapacz, Sweitzer, and Thompson seem to be doing. Furthermore, the non-representational conception must be given precedence over the representational conception. At least in this stage of development of educational theory, it is not the case that the representational conception has greater theoretical significance; as Griffiths has asserted:

> Although model is used in various ways, the fourth meaning above /a description of a set of data in terms of a system of symbols, and the manipulation of the symbols according to the rules of the system/ is probably the most precise and theoretically significant meaning of the word. It should be noted that this meaning is comparable to the definition . . . for theory.[13]

After more adequate educational theory has been devised and explicated is time enough to use the representational conception of model. Only then can we truly say that our theory represents educative phenomena.

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[13] Administrative Theory, New York: Appleton-Century-Crofts, Inc., 1959, p. 44.