

MODERNIZATION AND COMMUNICATION:
CONTROLLING ENVIRONMENTAL CHANGE

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
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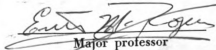
MODERNIZATION AND COMMUNICATION:
CONTROLLING ENVIRONMENTAL CHANGE

presented by

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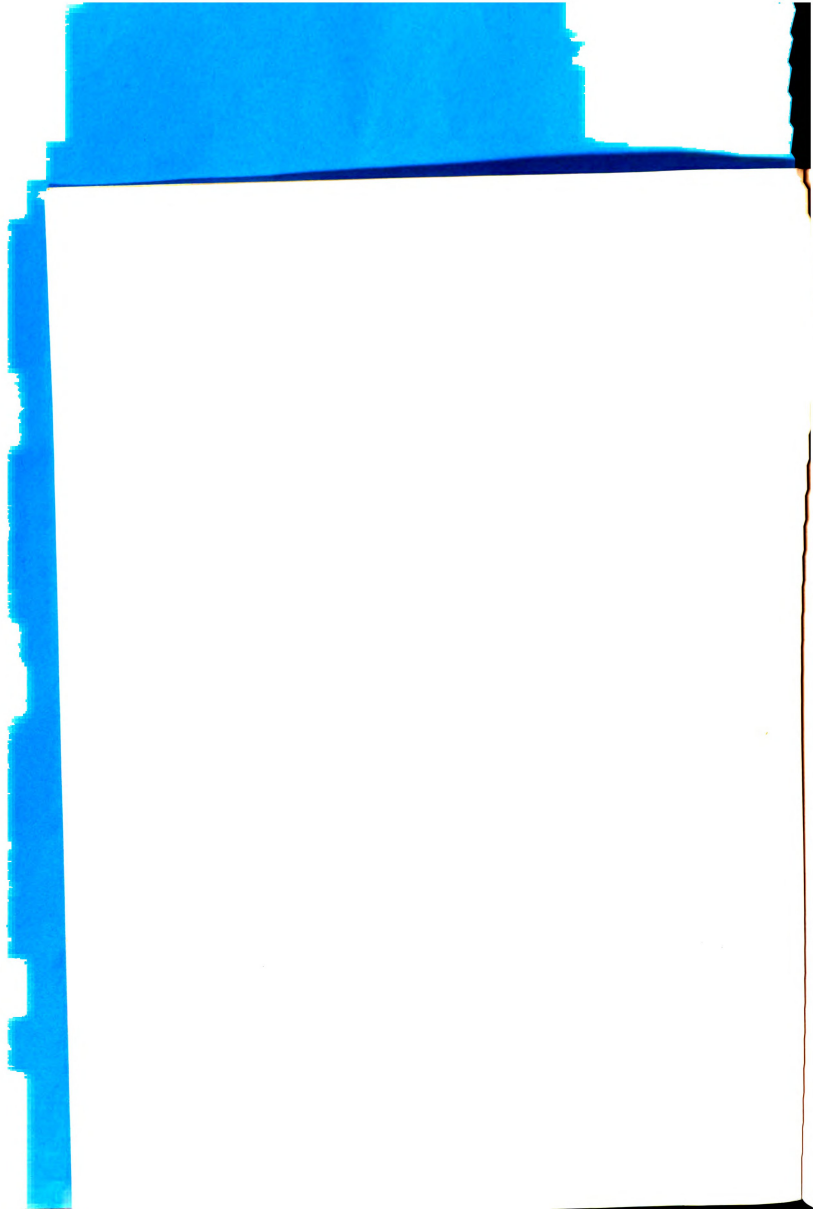
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ABSTRACT

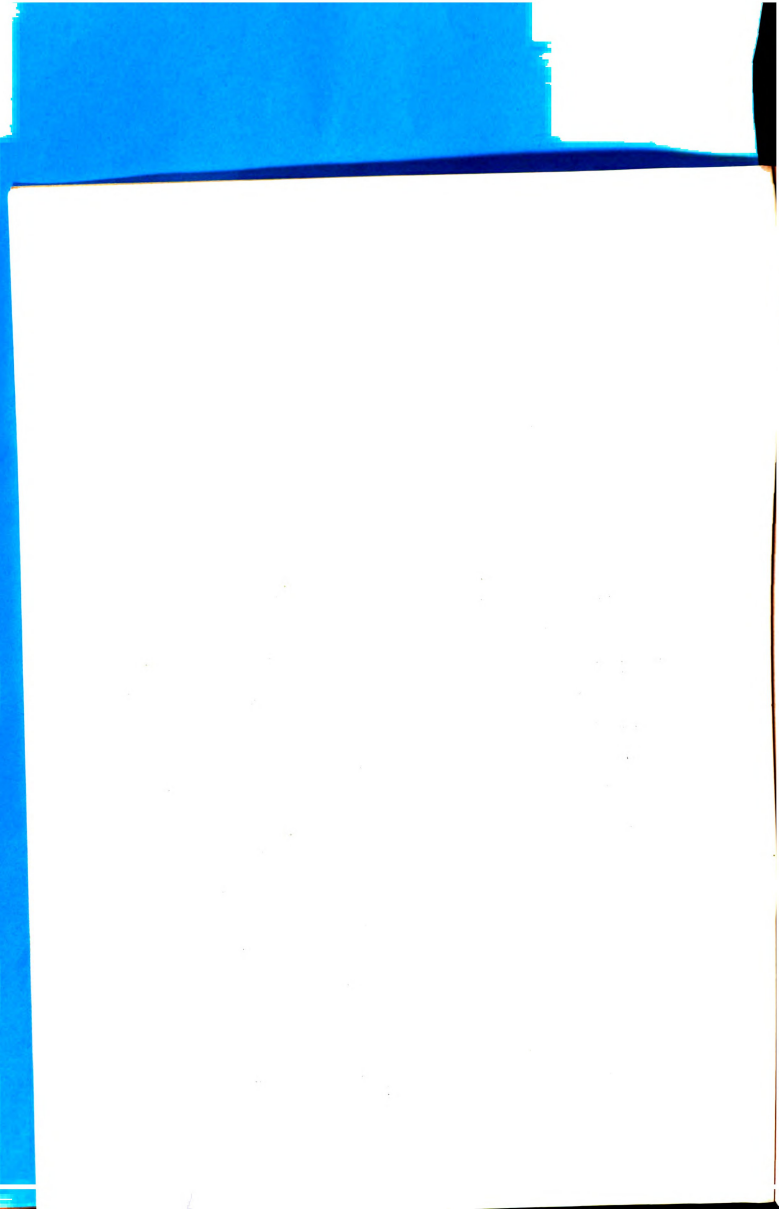
MODERNIZATION AND COMMUNICATION: CONTROLLING ENVIRONMENTAL CHANGE

By

Joseph R. Ascroft

The present study aimed to extend and generalize the Rogers with Svenning (1969, p. 14) postulate that "Modernization is the process by which individuals change from a traditional way of life to a more complex, technologically advanced, and rapidly changing style of life." The focus in the present undertaking has been less on determining specific antecedent conditions and ultimate consequents, and more on a theoretical investigation of the intervening processual events and underlying forces that "cause" man to change himself and others from one way of life to another. Two questions were asked in the present study: (1) What are the underlying forces impelling the process of modernization and governing its course? and (2) How does the process of individual and mass modernization occur?

It was postulated that modernization is the process



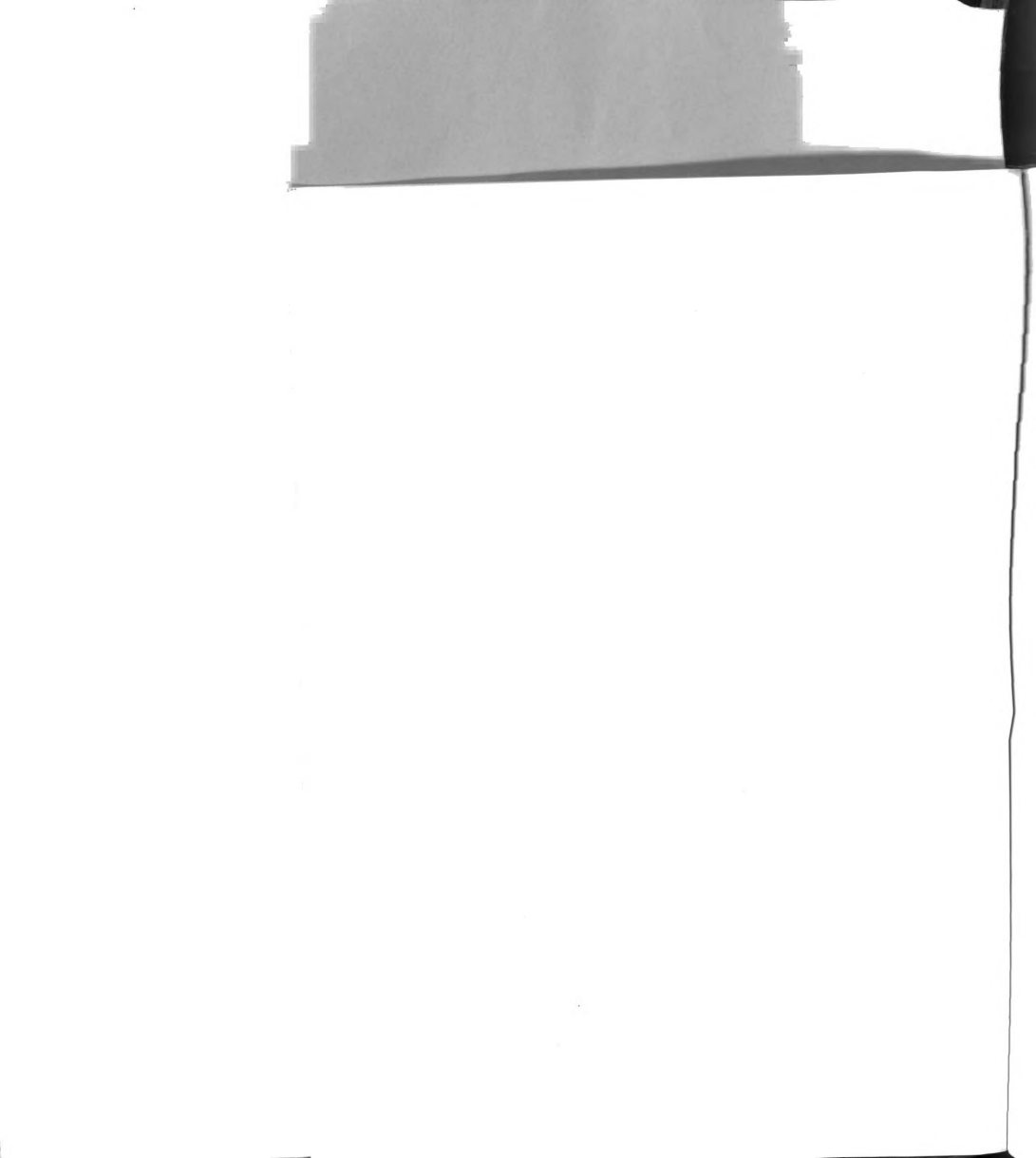
Joseph R. Ascroft

by which man purposively cumulates control over change in environmental phenomena essential to his welfare.

Communication is the main vehicle by which widespread modernization occurs.

The characteristic tendency in the universe is for entropy, i.e., chaos and confusion, to increase. There are, however, local and temporary islands of decreasing entropy, i.e., of increasing order and differentiation. Man is such an island, constituted by nature to oppose the tendency for entropy to increase. His environment, however, is not similarly constituted. In it entropy increases. Yet, to survive, man needs continuously to exchange essential energies and materials with his environment. To ensure regular and determinate exchanges, man must himself control changes in essential environmental variables by retaining them within safe and predictable limits. He is thus constantly seeking to enhance this control and avoid its curtailment--in short, to cumulate control over essential variables. Each degree of control cumulated is an act of modernization. It is this basic need to cumulate control over variables essential to man's welfare that impels the modernization process and governs its course.

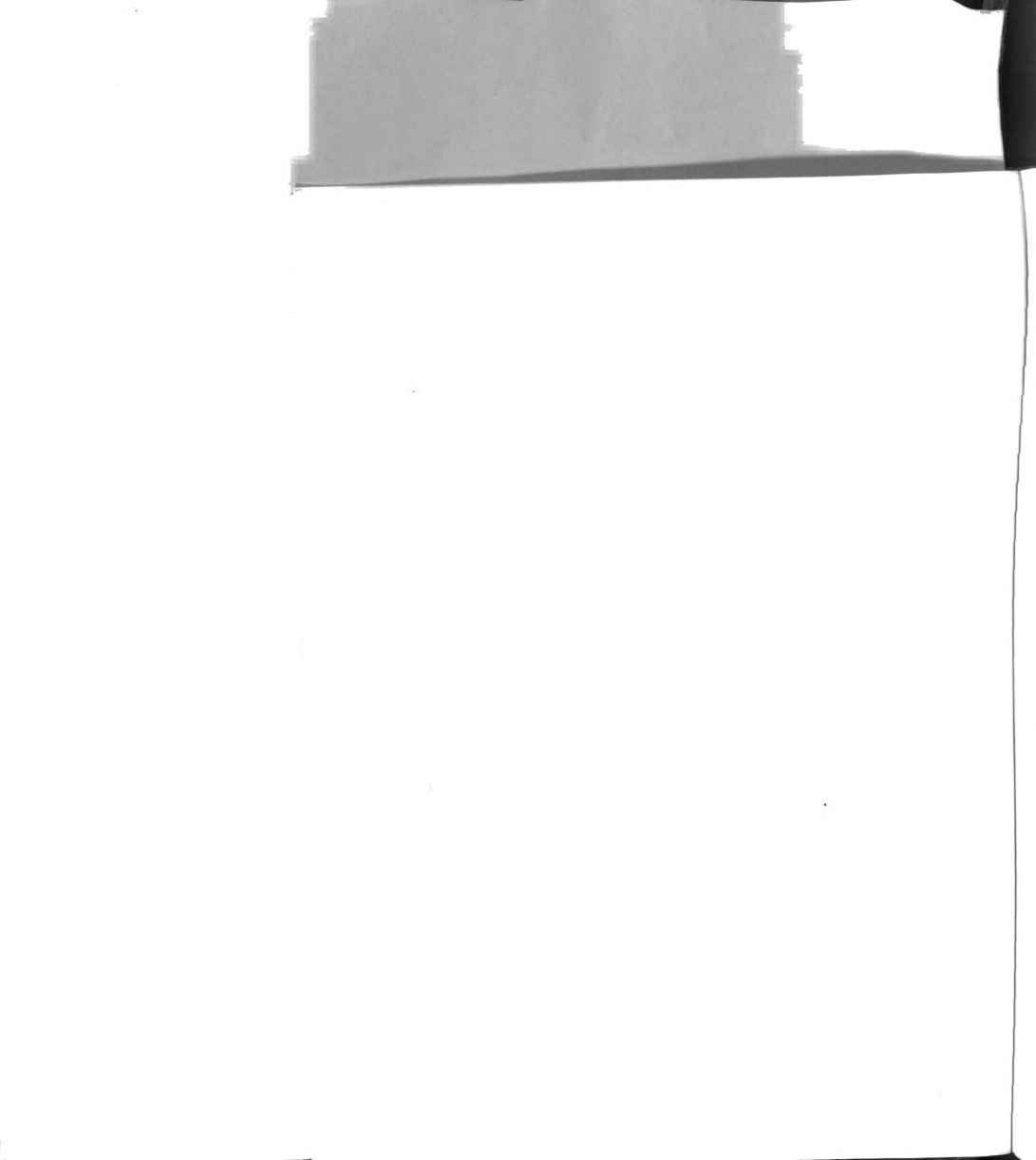
Two basic ways of cumulating change-control are (1) invention, and (2) discovery of inventions. Discovery may be self-initiated or other communicated. Invention and self-initiated discovery describe how individuals, regarded



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as isolated units, acquire new or improved methods of change-control. Other-communicated change-control describes how relatively few individuals induce others, regarded en masse, to cumulate control. Thus, purposive communication is the main vehicle by which widespread modernization occurs.

The Rogers with Svenning postulate is extended to read: Modernization is the process by which individuals change, as a function of an underlying need to cumulate control over change in environmental phenomena essential to their welfare, from a traditional way of life to a more complex, technologically advanced, and rapidly changing style of life. Their postulate is generalized in that the transition need not be deterministically unilateral in direction, from traditional to complex and rapidly changing lifeways. Indeed, the transition includes change from a state of infancy or poverty on the one hand, to a state of simplicity or slow change on the other. The approach offered in the present study argues for experimentation directed at the systematic manipulation of the content-bearing in conjunction with the relationship-defining aspects of messages emanating from agents of modernization.



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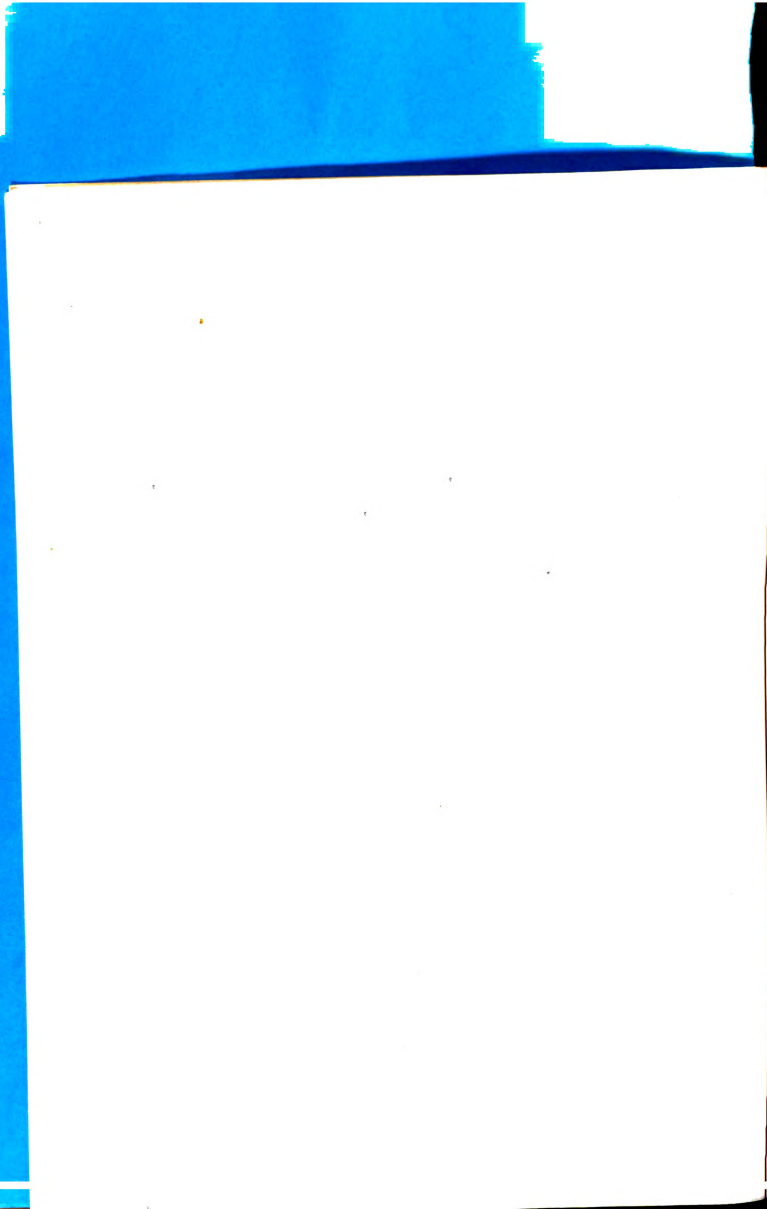
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A THESIS

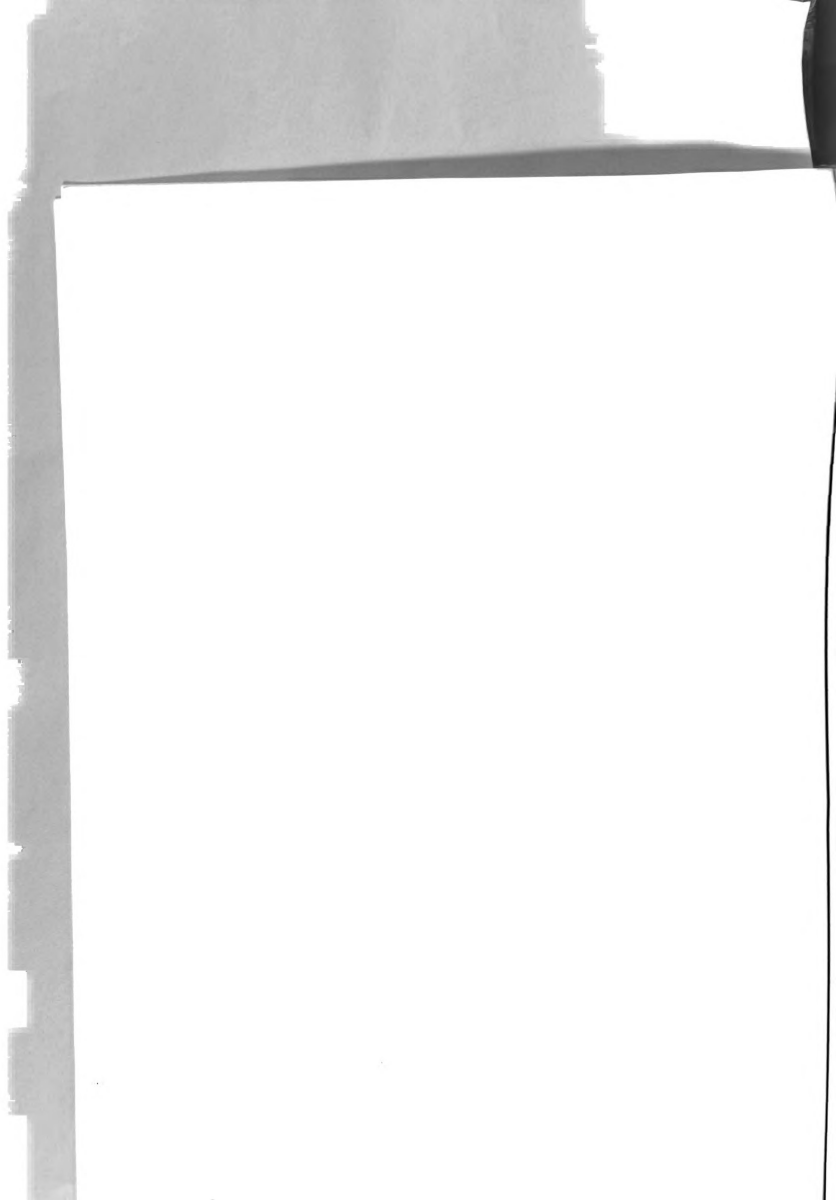
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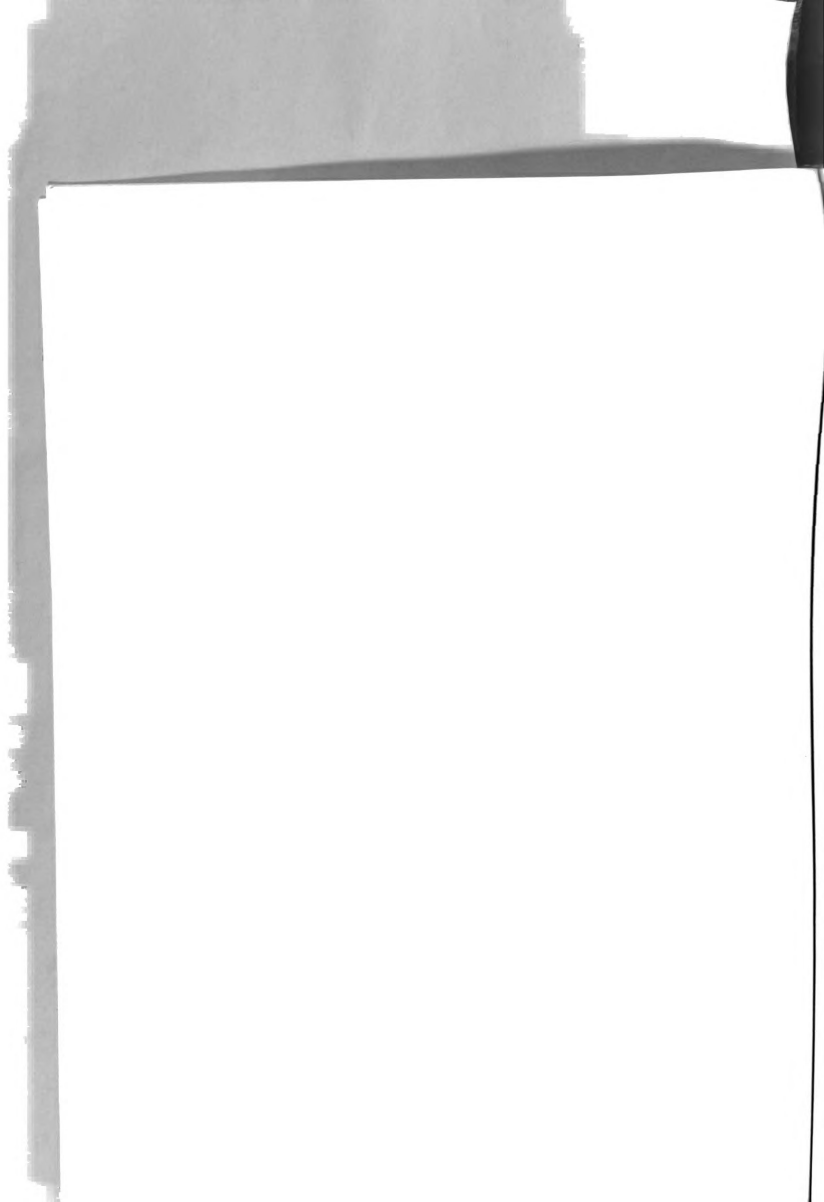
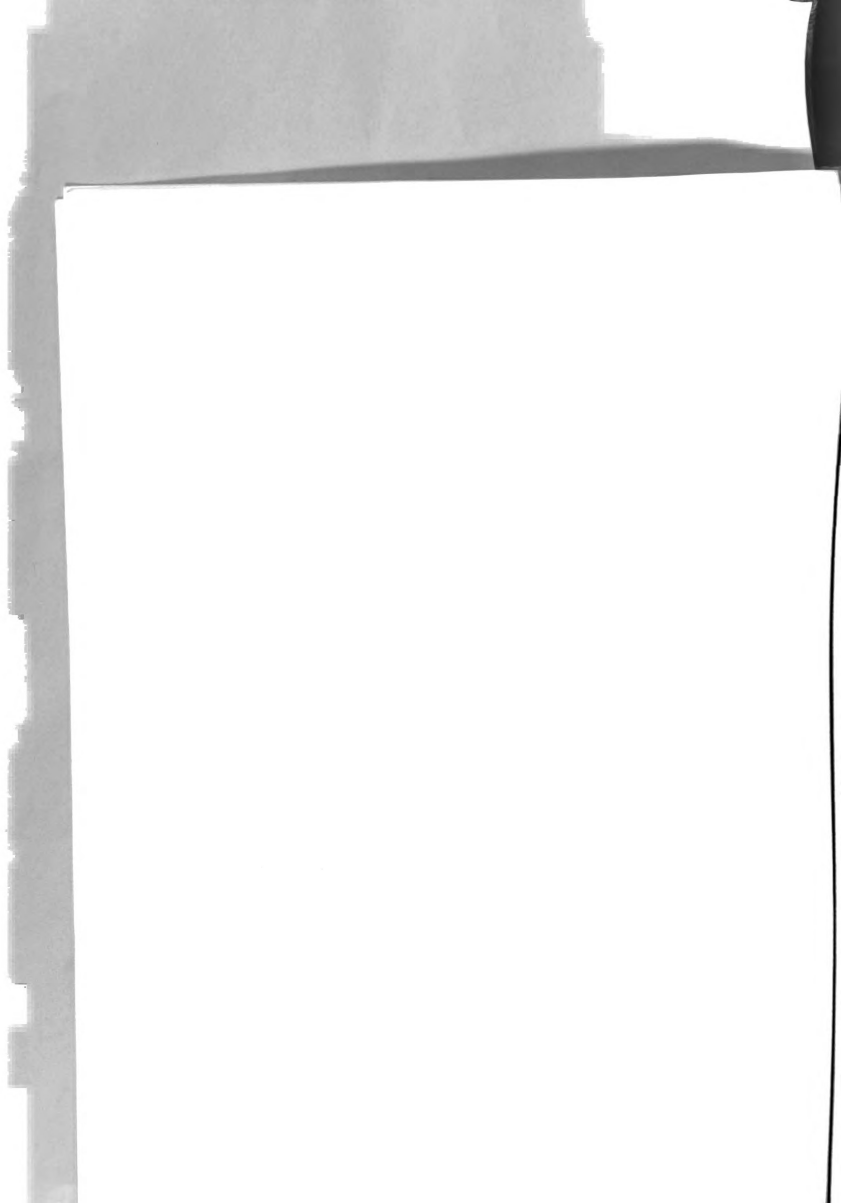


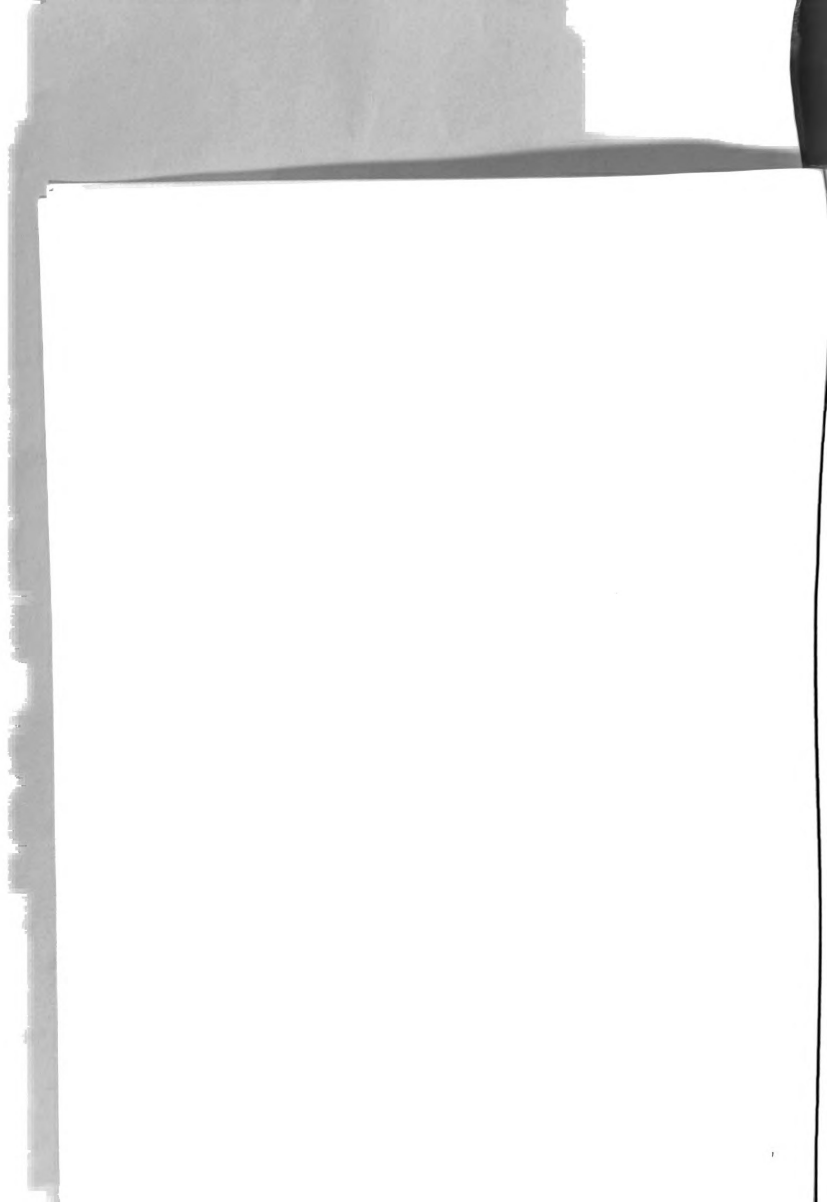
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CHAPTER I

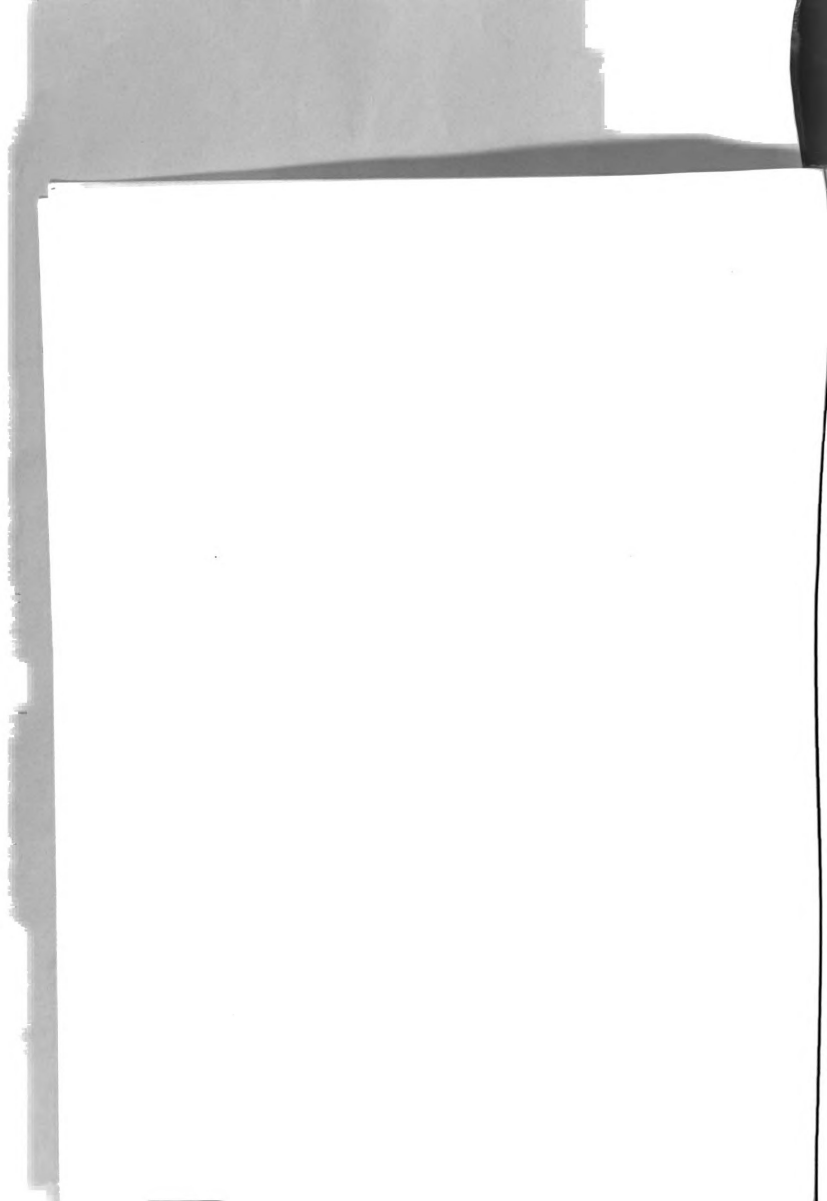
MODERNIZATION AND COMMUNICATION

The Problem Area

Modernization is the process by which man purposively cumulates control over change in environmental phenomena essential to his welfare. Communication is the main vehicle by which widespread modernization occurs.

The foregoing declarative statements represent the fundamental modernization postulate and basic communication corollary of the present study. They are specified so as to identify and organize those features which distinguish modernization from other processes. To avoid misunderstanding about the function of the postulate and its corollary, let us briefly examine what is meant by a fundamental postulate in a scientific inquiry.

"A postulate is an assumption that is an essential prerequisite to carrying out some operation or line of thinking" (Kerlinger, 1964, p. 420). It is "... an assumption so basic in nature that it antecedes everything which is said in the logical system which it supports" (Kelly, 1963, p. 46). Its value, therefore, is embedded in utility, not in truth. Thus, "... the moment we do question the truth of a statement proposed as a postulate, ... as well we may



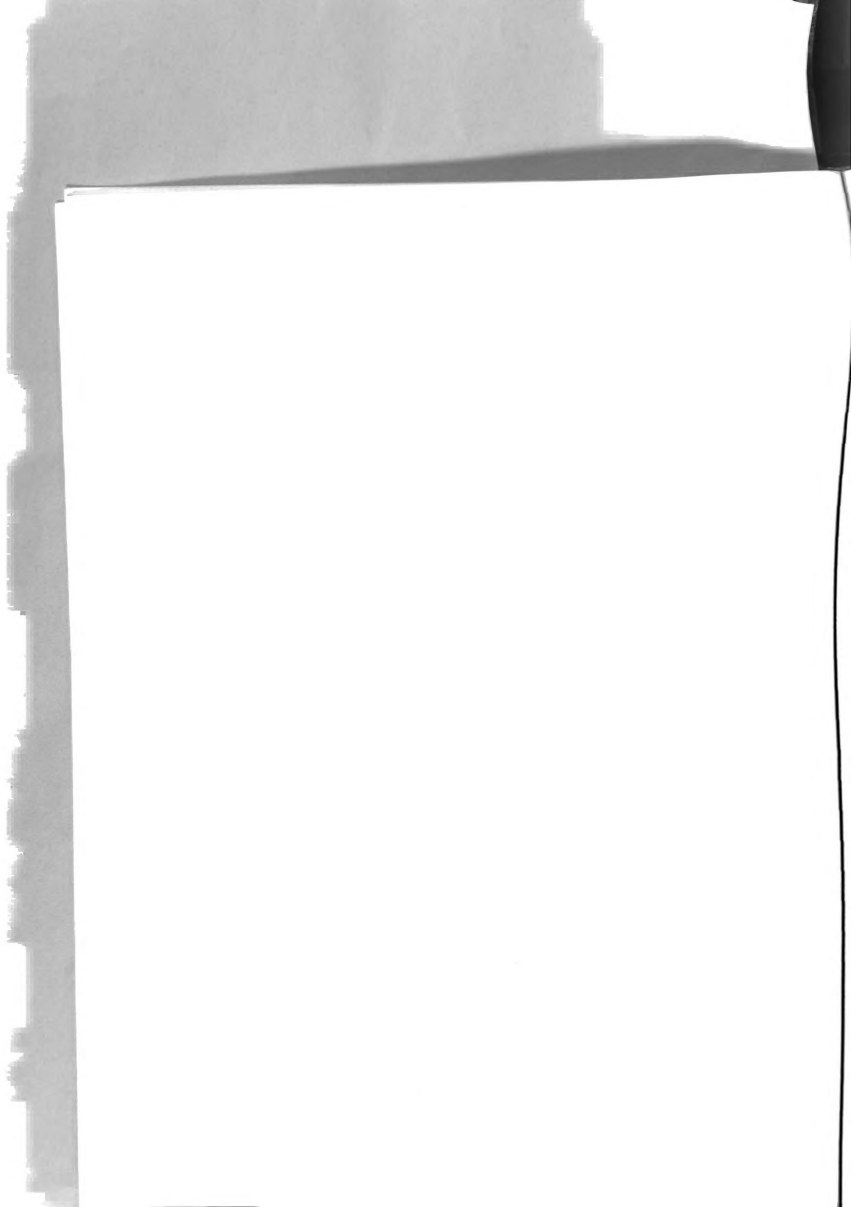
in some instances, we must recognize that we are arguing from other postulates either explicitly stated or, more likely, implicitly believed" (Kelly, 1963, p. 46).

In essence, the postulate and corollary of the present study are suppositions presenting an approach to modernization which hopefully will lead to a more fertile understanding of modernization and its facilitative process of communication than will analyses based on previous approaches.

General Objective of the Present Study

The present undertaking seeks to amplify and elaborate the fundamental modernization postulate and basic communication corollary stated earlier. Our aim is to provide a firm theoretical basis for the empirical investigation of the process of modernization at the level of the individual human organism.

Our area of interest is, however, circumscribed in certain specific ways. We are not concerned with constructing a system that purports to explain the totality of human behavior. Rather we are primarily interested in those frontiers of human activity characterized by the premeditated invention and discovery of innovative methods of controlling change in environmental phenomena. Therefore, reflexes, instincts and habits are important only insofar as they may have clear-cut utility in helping to explain intentional behavior.



The present chapter provides a critical review of a cross-disciplinary selection of previous approaches to the process of modernization, particular attention being given to the Rogers with Svenning (1969) approach from which our present formulations are derived.

Overview of Previous Modernization Approaches

The modern era of change, observes the historian Black (1966, p. 4), is "... the most dynamic of the great revolutionary transformations in the conduct of human affairs." Yet, in spite of, or probably because of, this rapid pace of social change, "... no one has arrived at a theory of social change that provides a workable instrument for its systematic investigation" (Rogers with Svenning, 1969, p. 3). Rogers with Svenning suggest that this failure probably stems from a gap between grand theory and raw empiricism.*

In addition, a knotty problem in the study of modernization is the fact that no single scientific discipline devotes exclusive interest to modernization as a systematic body of knowledge. Virtually every behavioral science discipline has found justifiable reason to take

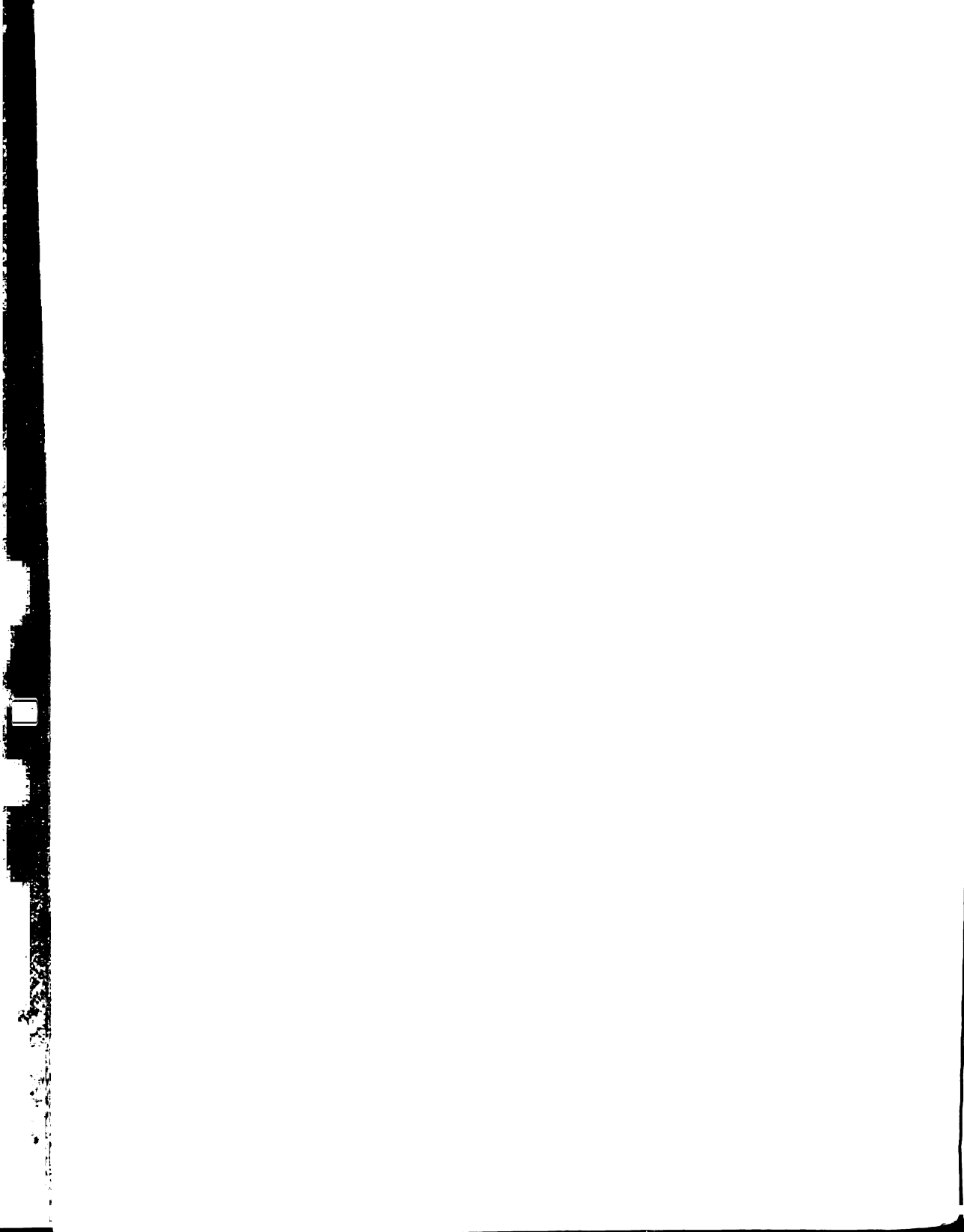
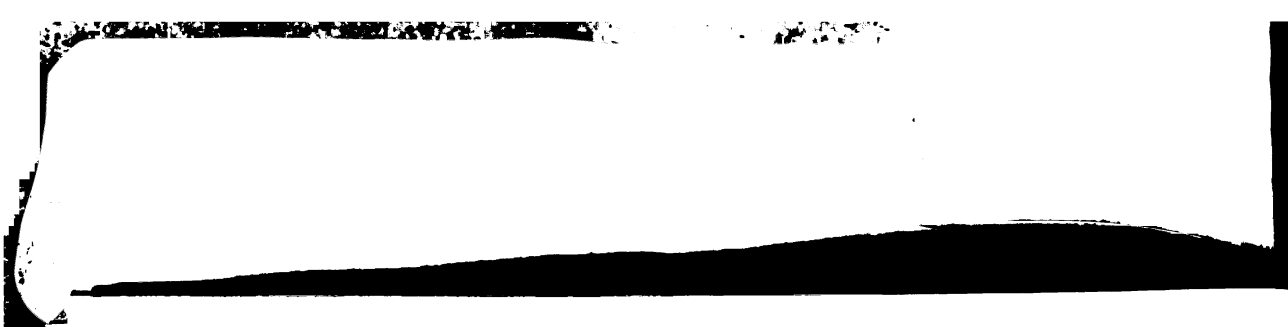
*Grand theory consists largely of "... general orientations towards data, suggesting types of variables which need somehow to be taken into account rather than clear verifiable statements of relationships between specified variables" (Merton, 1957, p. 9). Raw empiricism consists largely of descriptive abstractions of isolated events, but suffers a lack of theoretical basis: "Abstracted empiricism is not characterized by any substantive propositions or theories" (Mills, 1959, p. 55).



special interest in at least some aspect of the process. The specific aspect of the "total process" investigated by each discipline is likely to be consistent with the philosophical origins and theoretical orientations of that discipline. As a result, there exists a disconnected profusion of terms and approaches which neither easily relate to each other nor readily form themselves into a single core of knowledge.

Responding to Merton's (1957, p. 9) call for "theories of the middle range," Rogers with Svenning (1969, p. 44) attempted to bridge the gap between grand theory and raw empiricism by approaching modernization from the standpoint of a "... 'middle range' of analysis, at once in touch with both general concepts and empirical data." To this end, they proposed a modernization postulate and a communication corollary distilled from several schools of thought on modernization. The multidisciplinary diversity of the theoretic origins of the Rogers with Svenning formulations can best be illustrated by reviewing some prior approaches to modernization that contributed to their thinking.

Thus, for the economist, modernization involves man's application of technologies in the control of environmental resources with a view to increasing per capita incomes and, hence, levels of living. Transition to economic growth is seen as a "... process of social change in any society from technical advance so slow that it is hardly noticeable from generation to generation to continuing advance so rapid

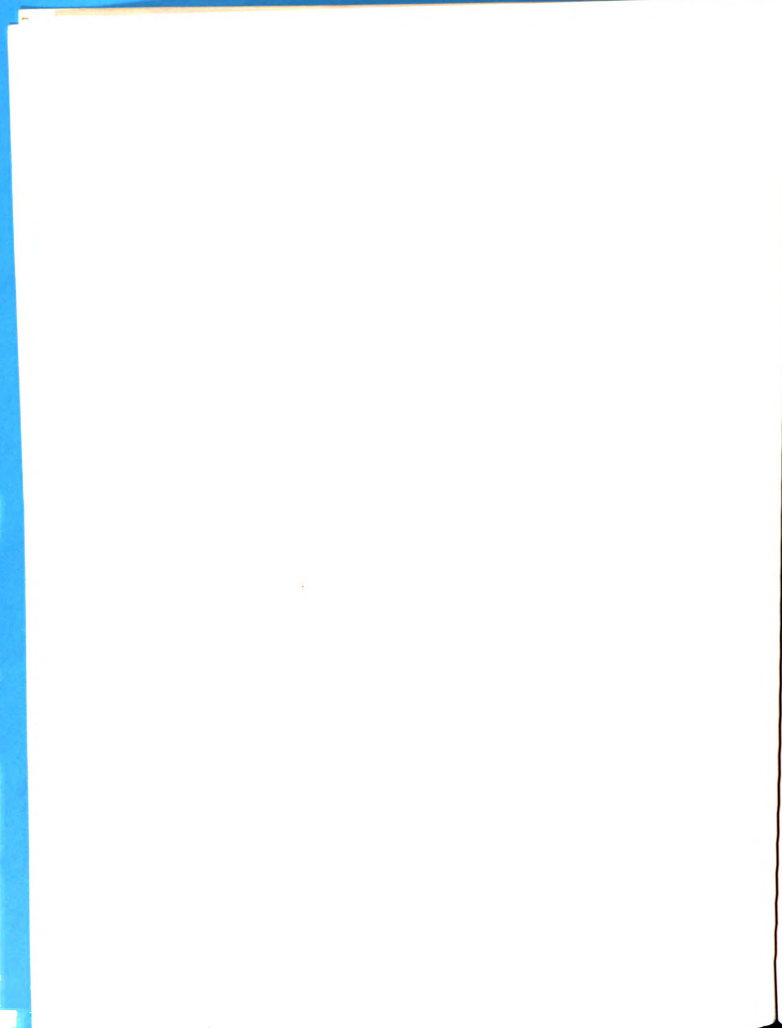


that it is conspicuous from decade to decade" (Hagen, 1962, p. 12).

For the sociologist, modernization focusses upon the increasing differentiation and specialization of individual activities and social structures. "With the growing social differentiation and the increasing wealth and rationality of social values, the complex of traditional schemes constituting the civilization of a group becomes subdivided into several more or less independent complexes. The individual can no longer be expected to make all these complexes his own: he must specialize" (Thomas and Znaniecki, 1961, p. 1293).

For the political scientist, modernization implies the intensification of social mobilization on the one hand, and the spread of potential power to all adult citizens on the other. Social mobilization is the "... process in which major clusters of old social, economic and psychological commitments are eroded and broken and people become available for new patterns of socialization and behavior" (Deutsch, 1961, p. 494). Lerner (1958) states that the spread of potential power commences with increasing urbanization which raises literacy levels and subsequently increases exposure to the mass media. Attending to the mass media leads to the development of psychic mobility (empathy) which "goes with" wider economic and political participation.

For the social psychologist, modernity, when applied

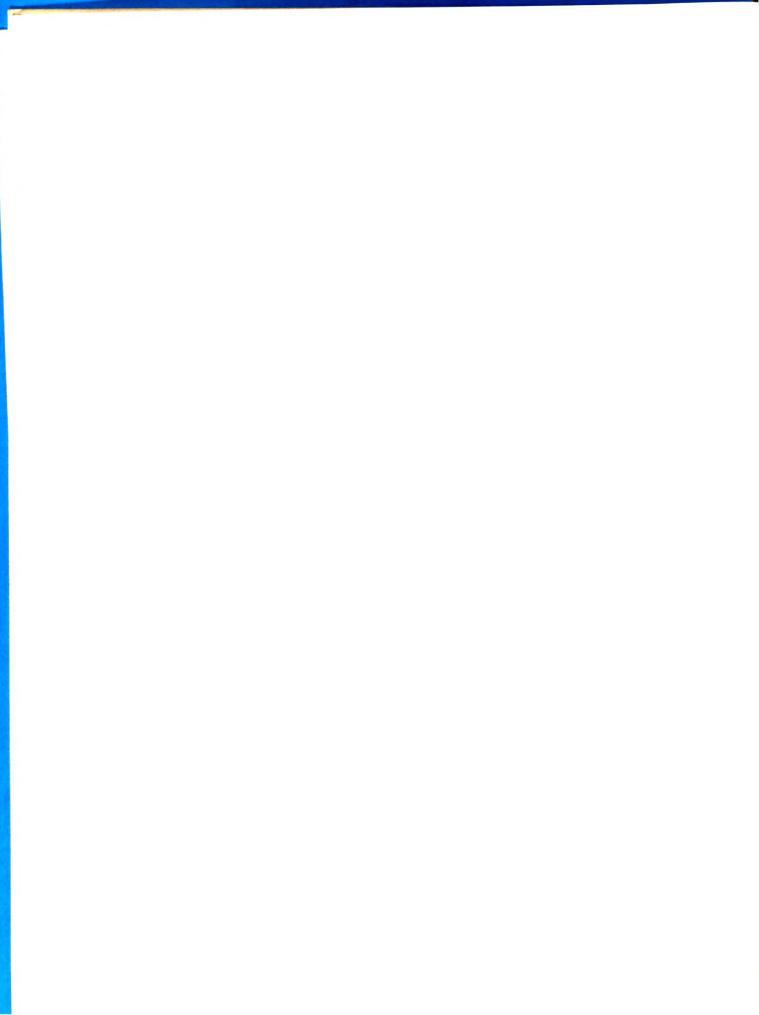


to individuals, involves a transition from ways of thinking and feeling that are centuries old, to a set of attitudes, beliefs, and behaviors characteristic of persons in highly urbanized, industrialized, and mobile social settings. Smith and Inkeles (1966) suggest that modernization, when applied to individuals, "... refers to a set of attitudes, values and ways of feeling and acting, presumably of the sort either generated by or required for effective participation in modern life."

The Rogers with Svenning (1969) approach is essentially a summary and synthesis of these diverse disciplinary approaches. Their fundamental modernization postulate reflects the economist's notion of rapid technological advance, the sociologist's view of increasingly complex differentiation and specialization, the political scientist's view of intensified social participation, and the social psychologist's notion of transition from traditional ways of living and thinking to life styles characteristic of highly urbanized, industrialized and literate social settings. Thus, for Rogers with Svenning (1969, p. 14), "Modernization is a process by which individuals change from a traditional way of life to a more complex, technologically advanced, and rapidly changing style of life."

Appended to this fundamental postulate is a corollary based upon Lerner's conviction that empathy,* necessitated

*"Empathy is the ability of an individual to project himself into the role of another person" (Rogers with Svenning, 1969, p. 38).



by increasing communicational diversity and exposure to the mass media, "... is the mechanism by which men transform themselves in sufficient breadth and depth and make social change self-sustaining" (Lerner, 1958, pp. 89 and 332). The corollary proposes that modernization "... is largely a communicational process in which receivers are generally people of less developed countries" (Rogers with Svenning, 1969, p. 49).

A paradigm of modernization (Figure I) which derives from the foregoing postulate and corollary is designed to present a "... general classification of the central concepts ... into antecedent, intervening, and consequent groups" (Rogers with Svenning, 1969, p. 50).

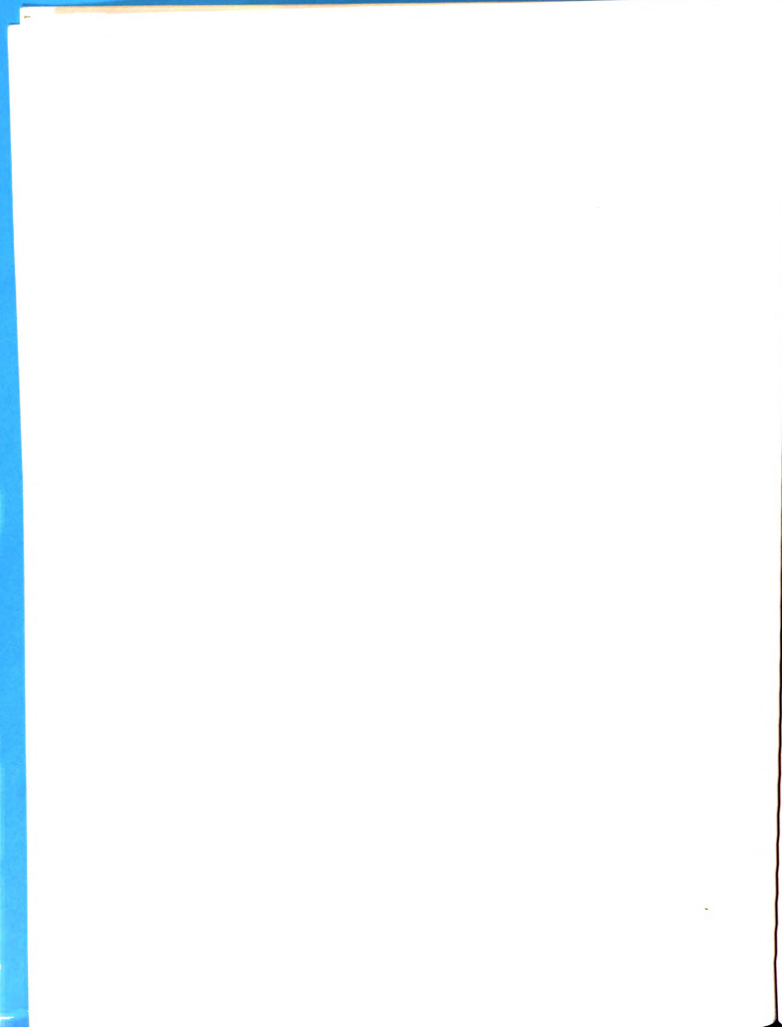
Main Antecedents → Intervening Variables → Main Consequents

1. Literacy	1. Empathy	1. Innovativeness
2. Mass Media Exposure	2. Achievement Motivation	2. Political Knowledge
3. Cosmopolitaness	3. Fatalism	3. Aspirations

Expected Time Order of Variables

Figure I. The Rogers with Svenning (1969) Paradigm of Antecedent, Intervening, and Consequent Variables of Modernization.

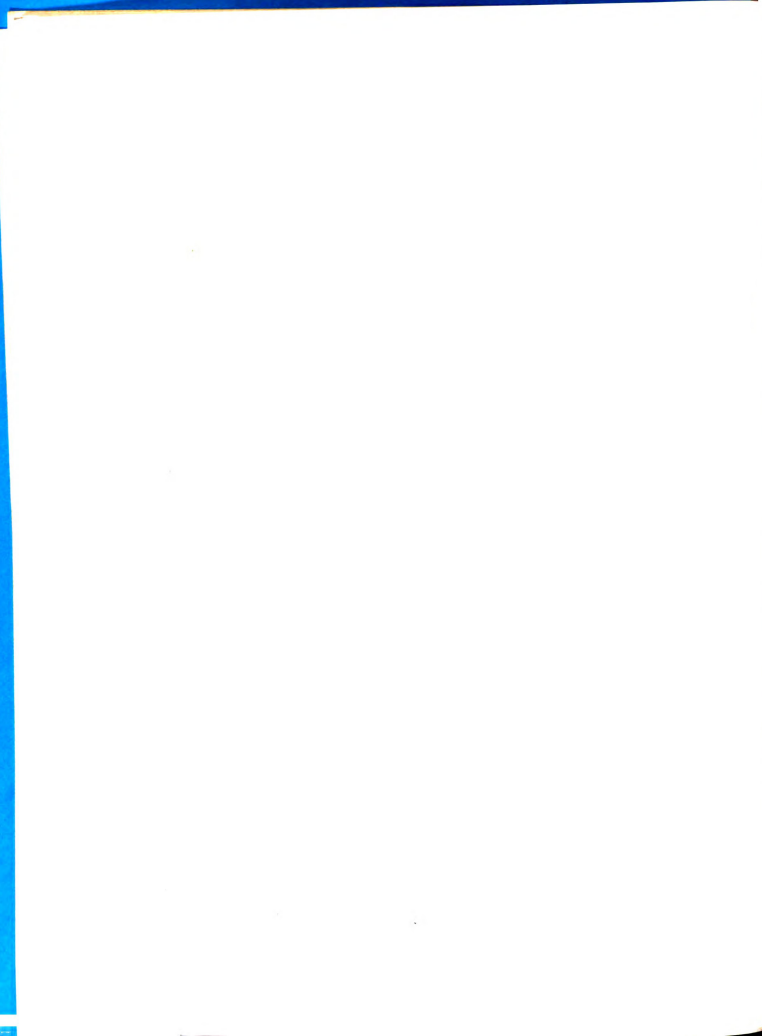
A basic notion which the paradigm seeks to convey is that modernization is directed or brought about by factors external to a social system. Hence, each of the antecedent variables are concerned essentially with external channels



of communication. The intervening variables deal with internal affective and motivational states of the organism, and the consequent variables are concerned with manifestations of modernization.

Rationale of the Present Study

Two problems, one concerning the basic modernization postulate and the other the modernization paradigm offered by Rogers with Svenning, represent the main issues with which the present undertaking is concerned. The modernization postulate places too much emphasis on the manifestations or end-products of modernization and too little emphasis on the underlying forces and processual events which impel man to attain these end-products and govern the course of their attainment. In other words, what makes man want to change himself and others from traditional to modern life ways and how does he set about affecting this change are questions which have not been treated in the postulate or the corollary. The modernization paradigm is limited to a one-sided consideration of only the receiver of modernizing influences. It does not take explicit account of the other participants (i.e., the source) in the receiver's communicational nexus, or of the messages transacted between the source and the receiver. Yet the Rogers with Svenning (1969) communication corollary suggests that source-receiver interaction is a central and vital part of the modernization process.

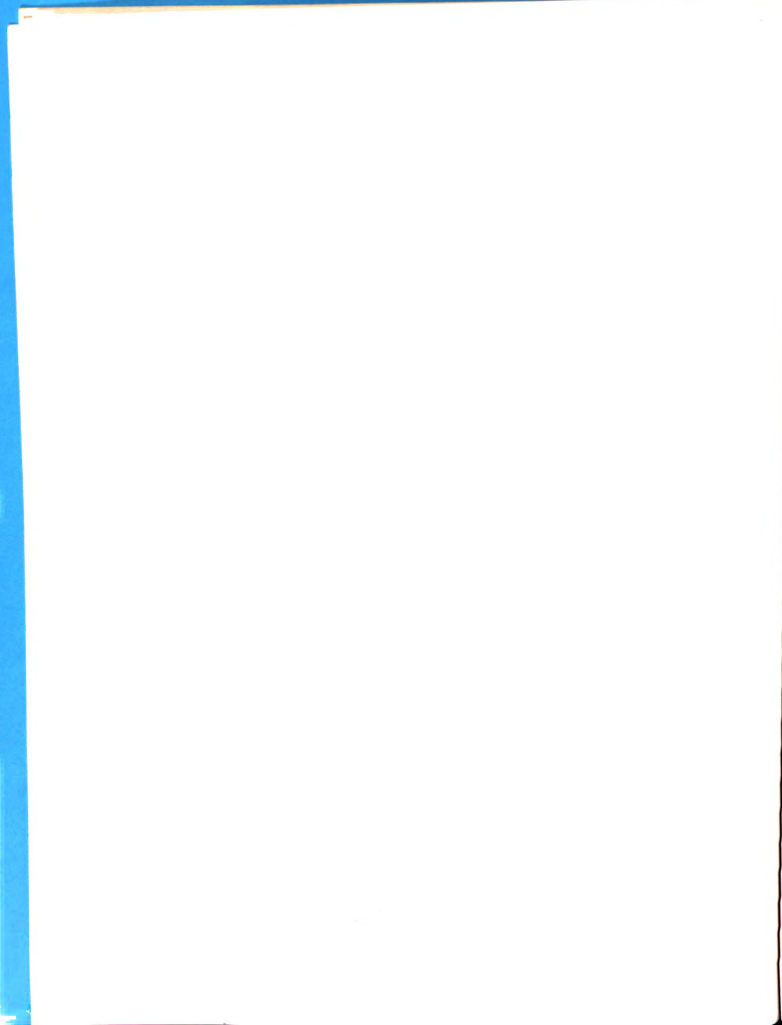


Focus on Underlying Patterns and Directions

The Rogers with Svenning modernization postulate implies a process occurring over a finite period of time in which the beginning state is a "traditional way of life" and the end state is a "more complex, technologically oriented, rapidly changing style of living." The present study takes a process view of modernization, meaning that events and relationships are viewed as dynamic, on-going, ever-changing, and continuous. That is, a process does not have "... a beginning, an end, a fixed sequence of events" (Berlo, 1960, p. 24). Such a view, therefore, is not compatible with the specification of beginning and end states in the process of modernization. It is more allied to a search for underlying forces which pattern and direct the behaviors of man in certain predictable ways.

Such an approach recognizes that similar consequences may result from dissimilar antecedent events as well as dissimilar consequences having resulted from similar antecedent events.* A traditional way of life may indeed be a likely antecedent, and a more complex, technologically advanced, and rapidly changing style of life a highly probable consequent in the process of modernization. However, neither of them are necessarily regarded as fixed

*This notion illustrates the principle of equifinality, meaning "... that the same results may spring from different origins because it is the nature of the organization which is determinate" (Watzlawick et al., 1967, p. 127). That is, "results" are not determined so much by initial conditions as by the nature of the process itself.

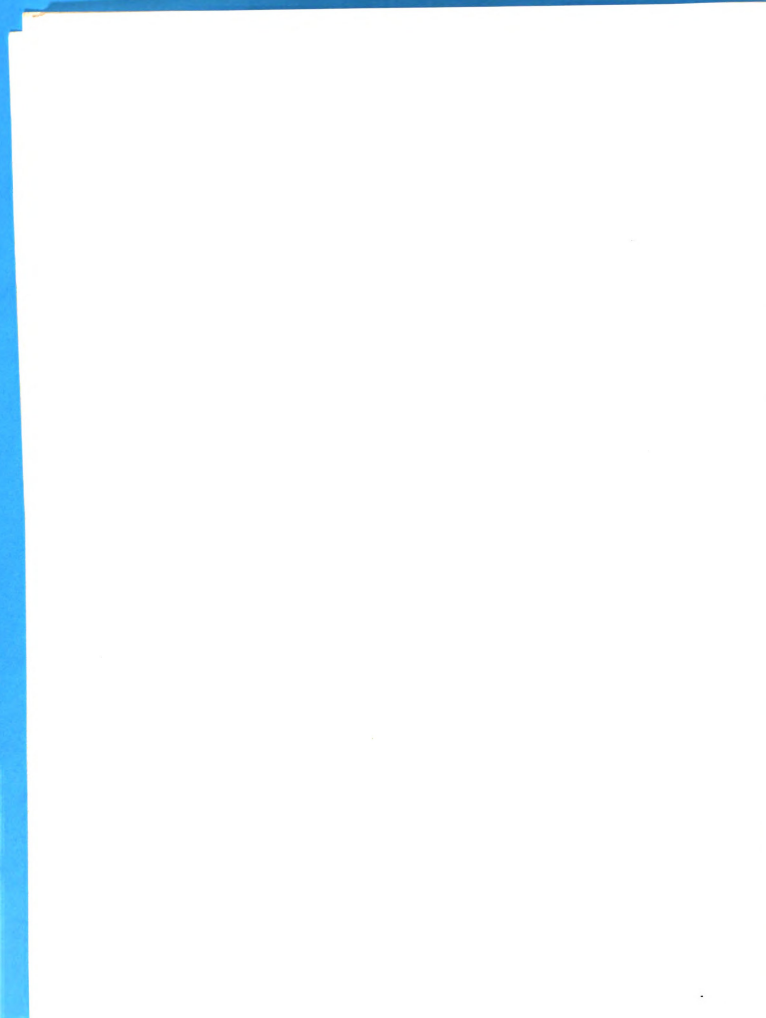


states between which, and only which, the process of modernization occurs. The modernization postulate of the present dissertation, therefore, makes no mention of specific end states but rather suggests a general pattern and direction of behavior as underlying modernization, impelling the process and governing its course.

Focus on Dyadic Interaction

The Rogers with Svenning modernization paradigm represents a channel-receiver-effects approach which does not clearly specify the source-receiver relationship nor the message content and treatment aspects of the information exchanged between them.* Indeed, the paradigm suggests a mass media approach to communication in which the messages are essentially unidirectional from a somewhat impersonal, generalized source to a more clearly described and differentiated receiver, and in which feedback represents the means by which the source determines ultimate success or failure. When the feedback indicates failure, probable "cause" of the failure is generally held by modernization researchers to be a function of receiver recalcitrance in accepting

*Rogers with Svenning (1969, p. 49) define communication (based on Berlo's (1960) S-M-C-R model) as the process by which "... a source (S) sends a message (M) via certain channels (C) to the receiving individuals (R) who respond or react to this stimulus with an effect (E).



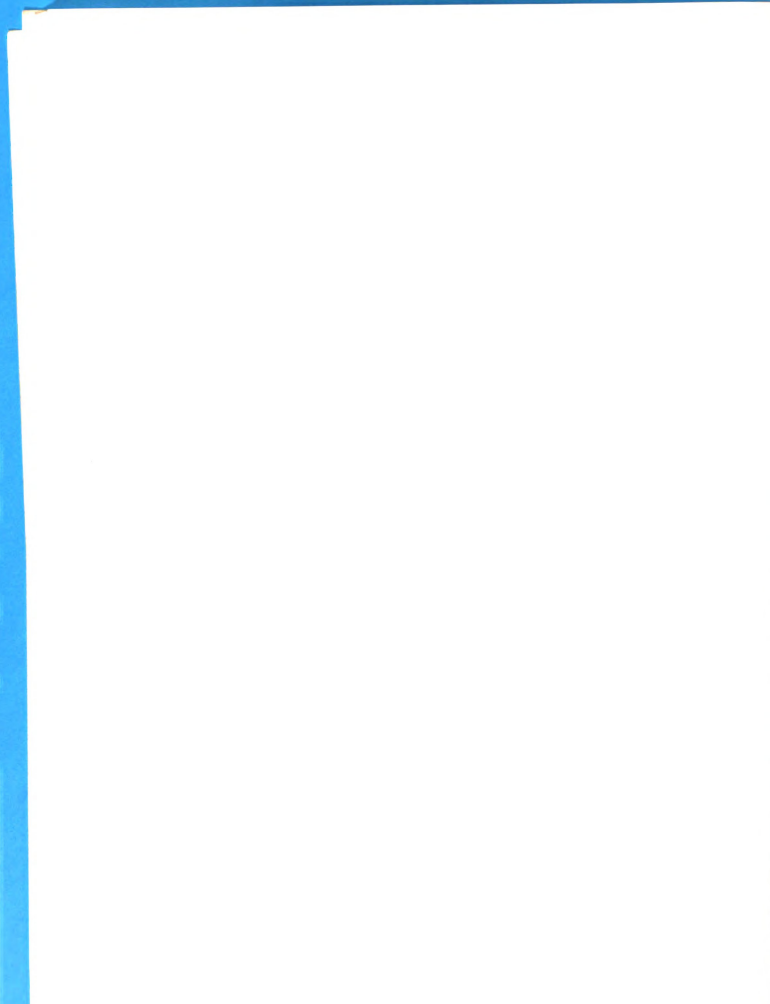
new ideas.* When it indicates success, the source is usually accredited with having somehow designed an effective communicational strategy.**

The present approach takes an interactional view of the process of communication in which source and receiver are temporarily bound in mutual dependence, and in which messages convey information about new ideas as well as providing cues, at a usually subliminal level, which allow source and receiver to define relationships vis-a-vis each other. The approach is less tied to a view of the receiver as a monad (an ultimate unit of one, considered in isolation of the source) and more concerned with a view of the source and the receiver as a dyadic communicational system.

By a dyad, we mean a pair of individuals (the source and the receiver) interacting in a communicational nexus rather than a pair of individuals considered as a single unit of analysis. That is, we continue to view the receiver as the unit of analysis. In addition, we also regard the source as an active, eminently manipulable

*Rogers (1965) summarizes and synthesizes what is presently known about traditional man, creating a composite picture which he labels the "subculture of peasantry." Central elements in this subculture of peasantry are: (1) mutual distrust in interpersonal relations; (2) perceived limited good; (3) dependence on and hostility toward government authority; (4) fatalism; (5) lack of innovativeness; (6) familism; (7) limited aspirations; (8) lack of deferred gratification; (9) limited view of the world; (10) low empathy.

**A frequently cited example of impersonal sources effectively transmitting technical details via the mass media to villagers in less developed countries is the radio farm forums in India (Neurath, 1960, 1962).



participant in a fundamentally communicational interactive system.* To say it another way, our focus is upon the source variables as antecedents, message variables as intervening, and receiver variables as consequent events. The intervening event ceases to be entirely a covert within-the-receiver occurrence as implied by the Rogers with Svenning (1969) antecedent-intervening-consequent variable paradigm, and becomes an overt between-the-source-and-the-receiver occurrence in which the intervening variables are messages exchanged between source and receiver. The dyadic approach, therefore, recognizes that while communication may be the main vehicle for gaining acceptance of new ideas among receivers, it may, paradoxically, also be one of the main ways of fostering rejection and resistance to change brought about by unintentionally alienating message-cues emanating from the source.**

*Lerner (1963, p. 329) states that: "Modernity is an interactive behavioral system. It is a 'style of life' whose components are interactive in the sense that the efficient functioning of any one of them requires the efficient functioning of all the others."

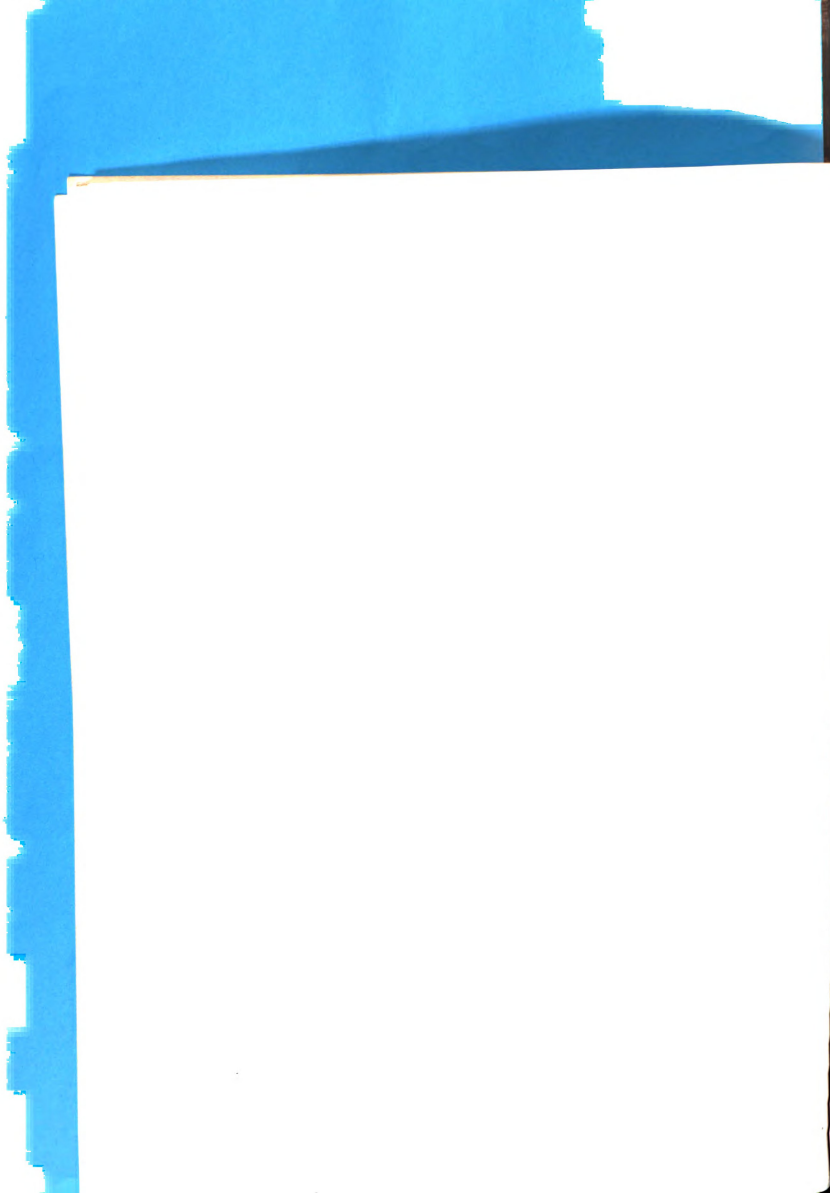
**The notion of unintentionally transmitted cues which may have adverse effects on receivers is summarized by Inkeles (1966) who states that "... the qualities that make a man modern often do not appear to be neutral characteristics that any man might have, but instead represent the distinctive traits of the European, the American, or the Westerner that he is bent on imposing on other people, so as to make them over in his own image... many of the characteristics that are described as modern, and therefore automatically desirable, in fact are not very useful or suitable to the life and conditions of those on whom they are urged or even imposed."



Specific Objectives of the Present Undertaking

The present study aims to extend the Rogers with Svenning (1969) formulations about the process of modernization and, by implication, aims also to extend those earlier modernization approaches from which the Rogers with Svenning approach is derived. The specific objectives in this regard are:

1. To extend and generalize the Rogers with Svenning fundamental modernization postulate by shifting the emphasis from ultimate manifestations or end-products of the process of modernization to the intervening processual events and underlying forces that impel man to change himself from a "traditional way of life" to a "more complex, technologically advanced, rapidly changing style of life." To this end, we shall postulate that the process of modernization is governed by man's need to cumulate control over change occurring in environmental variables essential to his welfare.
2. To extend and generalize the Rogers with Svenning (1969) paradigm of modernization so that it incorporates a consideration of source and message variables, particularly to the extent that such variables may be crucial determinants of intended and unintended receiver behavior. To this end, we shall propose that communication is the main vehicle by which widespread modernization occurs. However, this proposition paradoxically recognizes that certain relationship-defining aspects of a source's messages may be

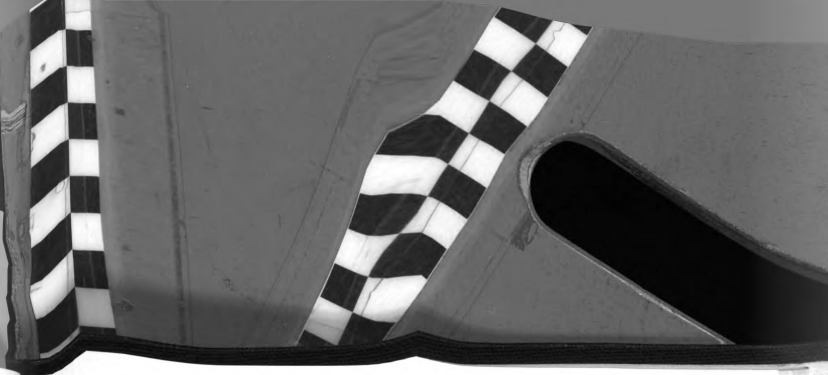




a major, although unintended determinant of receiver-resistance to modernizing influences.

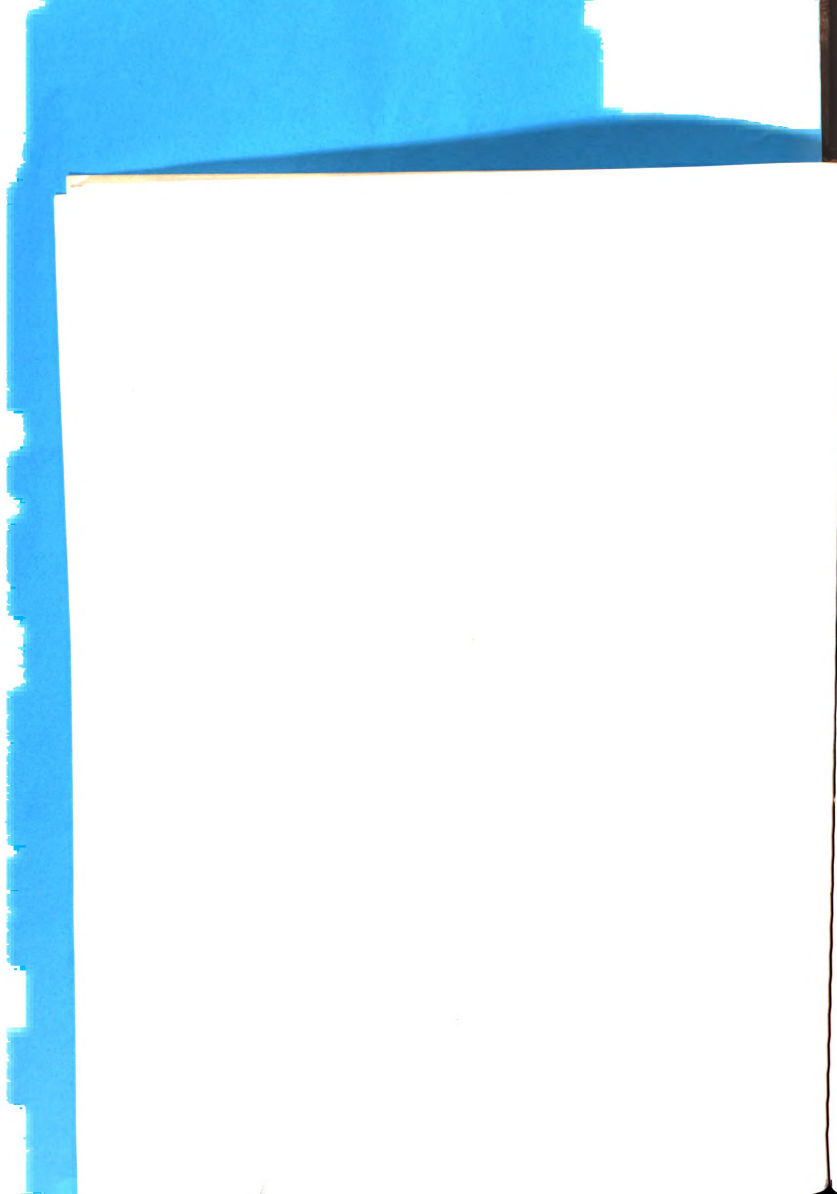
Chapter II of the present undertaking deals with the former of these two specific objectives, and Chapter III treats of the latter. The final chapter of the present dissertation is devoted to an examination of the implications of our formulations, especially in the realm of re-interpreting current approaches to the process of modernization.





a major, although unintended determinant of receiver-resistance to modernizing influences.

Chapter II of the present undertaking deals with the former of these two specific objectives, and Chapter III treats of the latter. The final chapter of the present dissertation is devoted to an examination of the implications of our formulations, especially in the realm of re-interpreting current approaches to the process of modernization.



CHAPTER II

MODERNIZATION AND CONTROL

Modernization is the process by which man purposively cumulates control over change in environmental phenomena essential to his welfare.

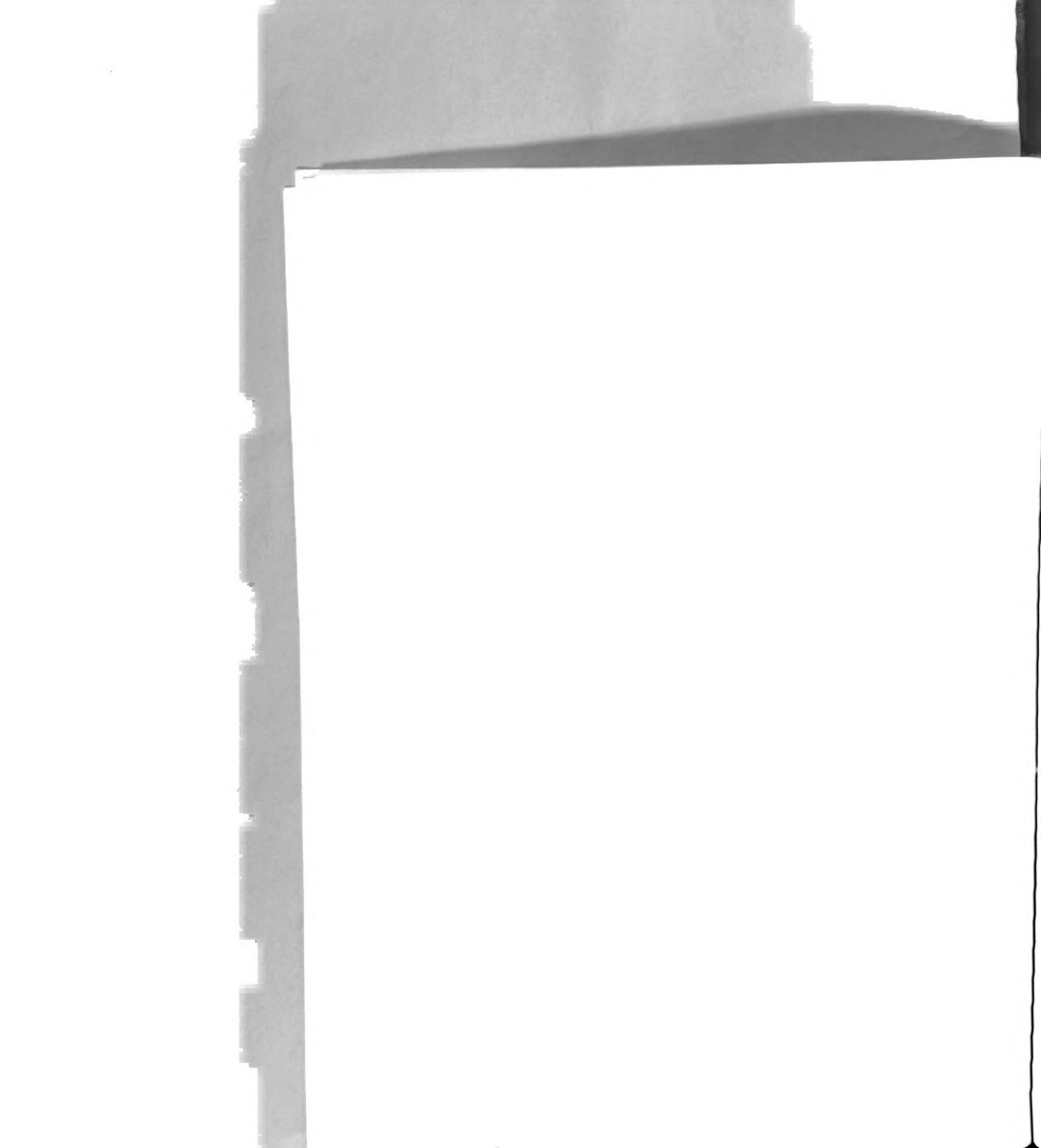
The present chapter amplifies and elaborates the foregoing statement. It investigates the question: What are the underlying forces impelling the process of modernization and governing its course?

The Nature of Change in Environmental Phenomena

A process view of reality, states Berlo (1960, p. 24), resulted from the work of such scholars as Einstein, Russell, and Whitehead:

First, the concept of relativity suggested that any given object or event could only be analyzed or described in the light of other events that were related to it.... Second, ... something as static or stable as a table, a chair, could be looked on as a constantly changing phenomenon, acting upon and being acted upon by all other objects in its environment, changing as the person who observed it changes.

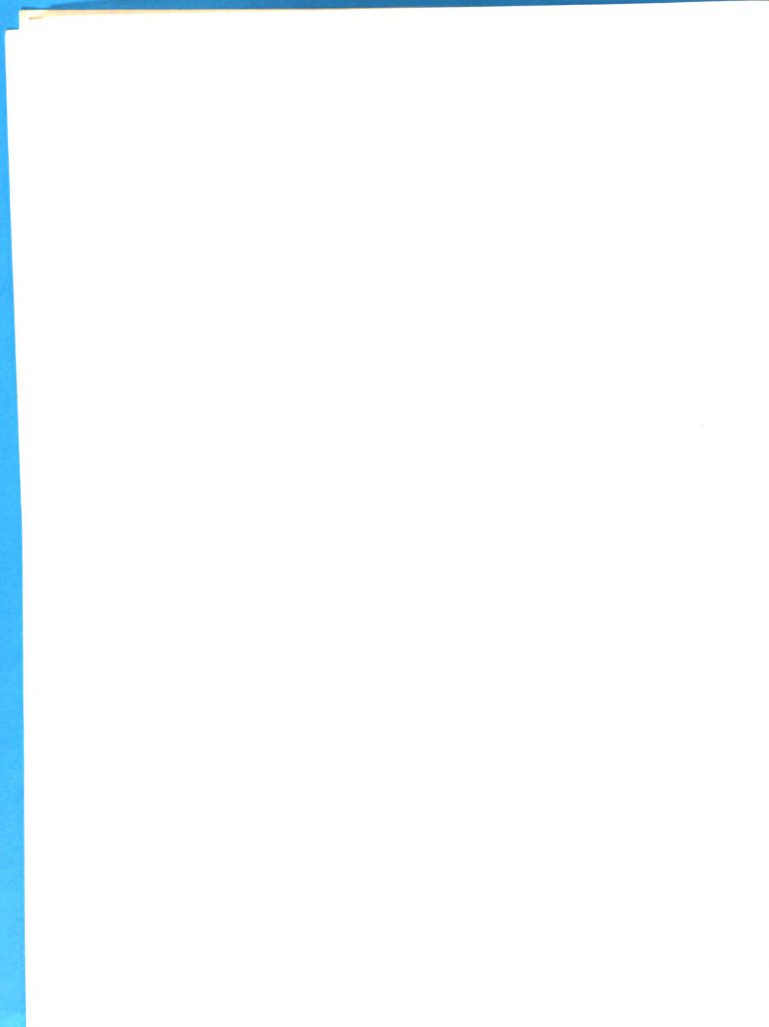
Accepting a process view of modernization, therefore, "... implies a continuous interaction of an indefinitely large number of variables with a concomitant continuous change in the values taken by these variables" (Miller, 1966, p. 33). It is, however, extremely difficult to study



a process in motion without somehow arresting its dynamic and reducing its multivariability to intellectually manageable units. Man achieves these ends by (1) abstracting distinguishing features to form relatively unchanging categories of otherwise continually changing phenomena; and (2) by specifying arbitrary time periods and problem statements in the context of which to observe specific changes.

Physical phenomena with constituent parts structured in some discernable form and pattern of organization may be classified as systems. That is, a system consists of a "set of objects together with relationships between the objects and between their attributes (Hall and Fagen, 1956, p. 18); where objects are constituent parts of the system; attributes are properties of the constituent parts; and relationships are the interactions which bind the parts together to form the system.

Thus, man defines, or in Kelly's (1963) terms, "construes" the reality of systems by classifying similar phenomena on the basis of abstracting the essence of the form and pattern of organization of their constituent parts--that is, by specifying essential properties of, and relationships among constituent parts common to certain phenomena. For example, man may define an organism to be a biological entity constituted to carry on the activities of life by means of organs separate in function but mutually dependent on each other. The "organisms" are the corresponding phenomena being defined; "organs" are abstracted as the



organism's essential constituent parts; "function" refers to the activities attributed to the organs; and "mutual dependence" describes the relationships between the organism's constituent parts.

Constituent parts may themselves be regarded as systems, or rather sub-systems, with a definable form and pattern of organization of their constituent parts.

Koestler (1964, p. 287) summarizes the situation when he states that a human system

... is an integrated hierarchy of semi-autonomous sub-wholes, consisting of sub-sub-wholes, and so on. Thus, the functional units on every level of the hierarchy are double-faced as it were: they act as a whole when facing downwards, as parts when facing upwards.

By this construction, we can place the individual human system in a dyad, the dyadic system in a family, the family system in a social system and so on.

All systems, no matter how seemingly static or stable, are constantly changing. On the one hand, systems are ever-changing because their constituent parts are in continual interaction with each other--constantly acting upon and being acted upon by each other. On the other hand, systems are ever-changing because they themselves are continually interacting with other phenomena--constantly affecting and being affected by other phenomena in their environments. Change in a system consists of any alteration of form and pattern of organization of its constituent parts resulting from internal interaction among constituent parts as well as from external interaction between the system and other



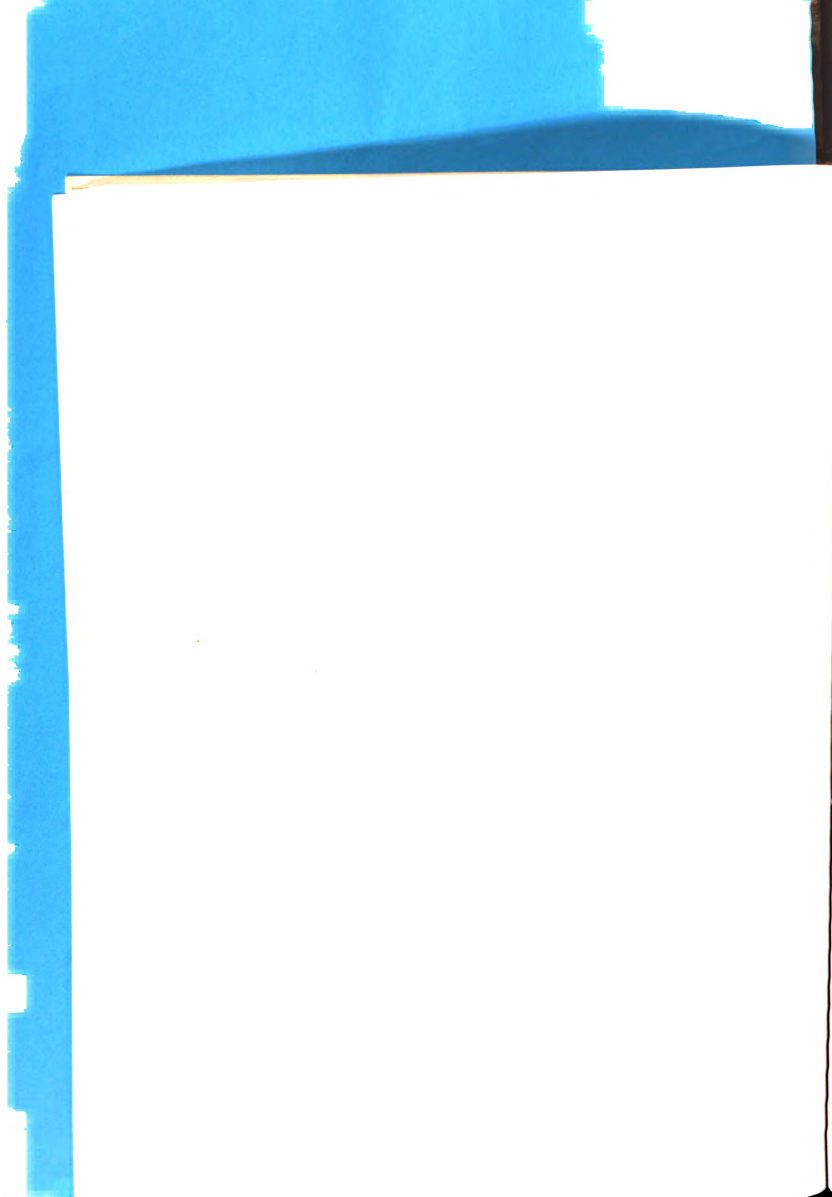
phenomena in its environment.*

However, there are an indefinitely large number of determinants, both internal and external to the system, acting continuously to produce change in the system. Hall and Fagen (1956, p. 20) state that: "For any given system, the environment is the set of all objects a change in whose attributes affect the system and also whose attributes are changed by the behavior of the system." To study any state of a system, or any change in state of a system, it becomes necessary, for purposes of intellectual manageability, to restrict the system's environment (1) by placing a limit upon the multivariability of internal and external determinants to be observed; and (2) by specifying some point or some span of time at or during which to describe the system or to observe change occurring in the system.

To restrict the universe of observable phenomena to manageable proportions, a specific issue or problem** is stated. Determinants, whether internal or external, become important only insofar as they are relevant to that issue or problem. As Hall and Fagen (1956, p. 18) observe, "... the relationships to be considered in the context of a given set of objects depend on the problem at hand, important or interesting relationships being included, trivial or

*This definition is adapted from Rogers with Svenning (1969, p. 3) who state that "Social change is the process by which alteration occurs in the structure and function of a social system."

**"A problem ... is an interrogative sentence or statement that asks: What relation exists between two or more variables?" (Kerlinger, 1965, p. 19).



unessential relationships excluded." Thus, if the issue is adopting a new seed variety, the matter of left-handedness in the organism, or the presence of a dog-trainer in the environment may not be as relevant as the question of physical disability in the organism or the presence of an agricultural expert in the environment.

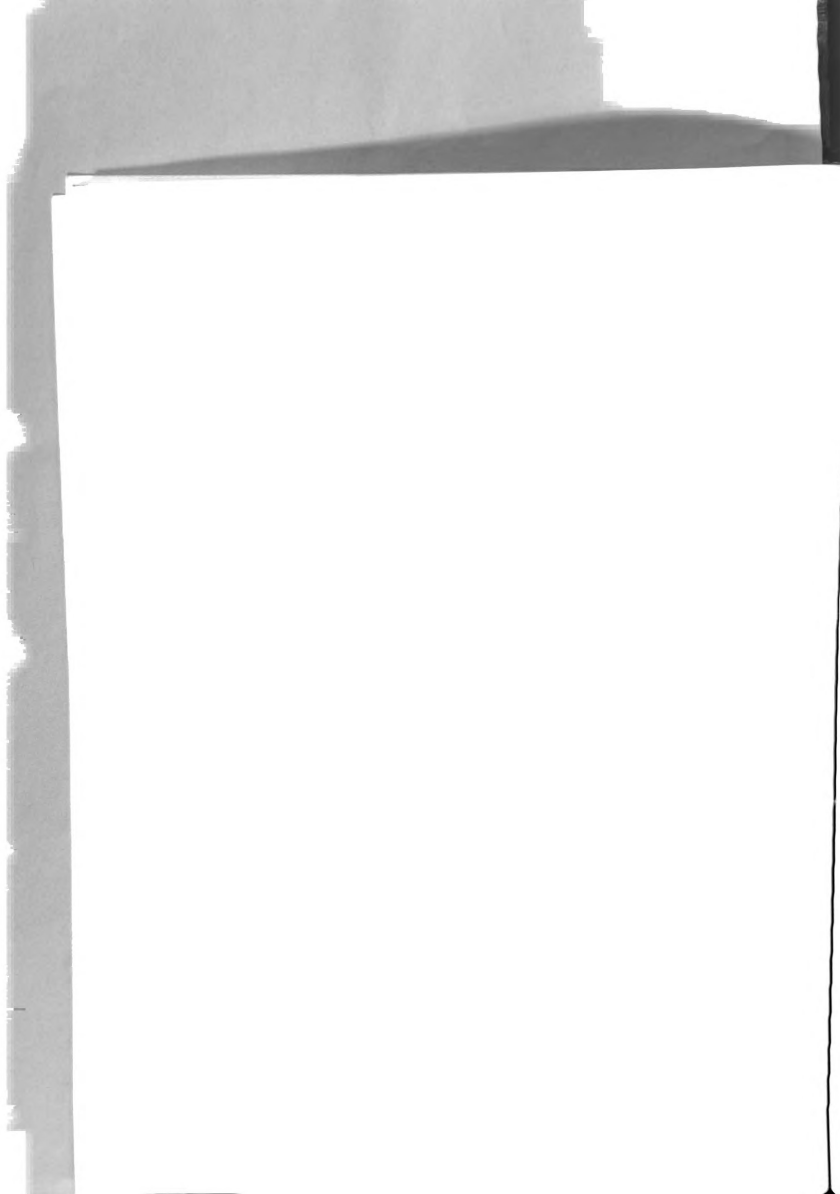
To restrict the period of observation to some finite span of time, we may "freeze" the dynamic of the change process at some point in time, or specify an arbitrary beginning and end to the process under observation. As Lennard and Bernstein (1960, pp. 13-14) state:

Implicit to a system is a span of time. By its very nature a system consists of an interaction, and this means that a sequential process of action and reaction has to take place before we are able to describe any state of the system or any change of state.

To summarize, then, the study of change in environmental phenomena consists of specifying (1) the particular phenomena under study defined by abstracting the essence of the form and pattern of organization of their constituent parts; (2) an issue or problem in the context of which to sort important from trivial interactions within and between phenomena; and (3) a point or span of time at or during which to observe any state or change in state of phenomena.

The Nature of Open and Closed Systems

There are two basic categories of systems, the closed system and the open system. Distinguishing between these categories is important mainly because open systems have

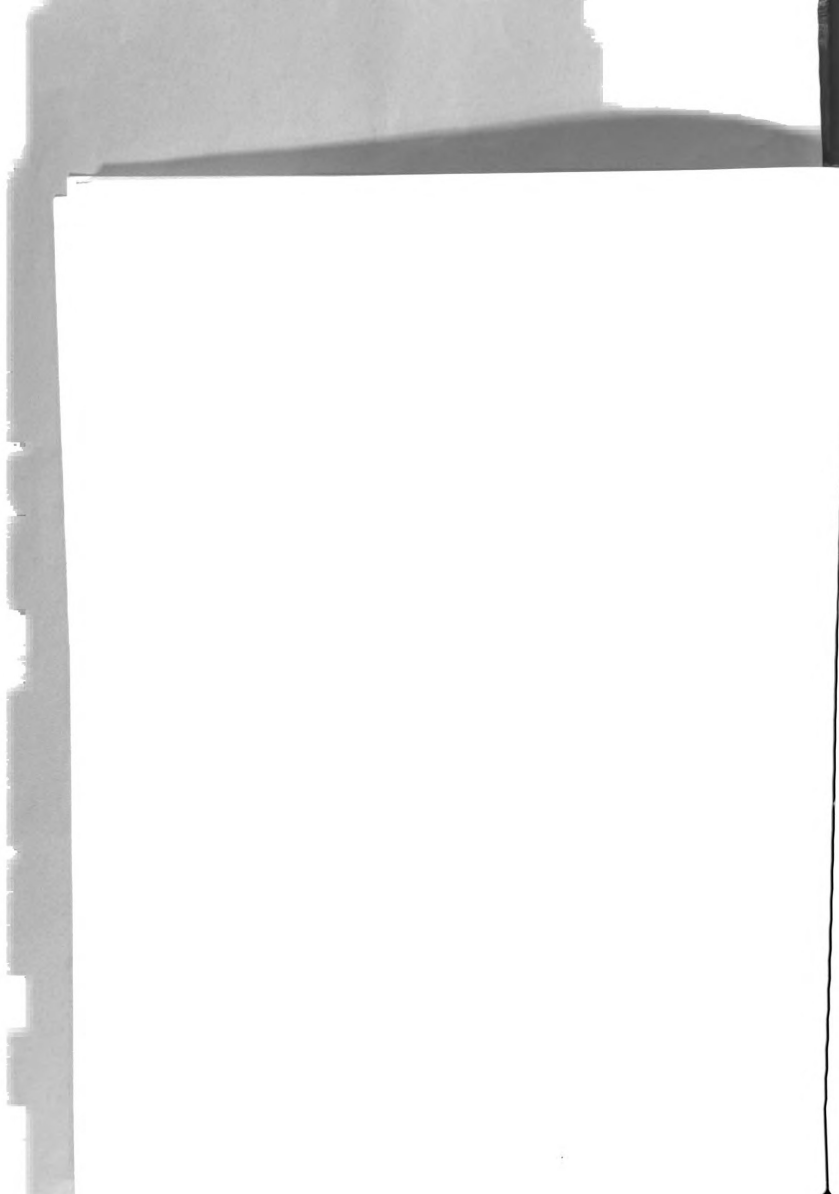


crucial dealings with their environments that closed systems do not have.

"A system is closed if there is no import or export of energies in any of its forms such as information, heat, physical materials, etc., and therefore no change of components, an example being a chemical reaction taking place in a sealed insulated container" (Hall and Fagen, 1956, p. 23). Organic (living) systems are open systems, "... meaning they exchange materials, energies, or information with their environments" (Hall and Fagen, 1956, p. 23). Open systems are characterized by wholeness, self-regulation, and equifinality.

1. Wholeness. The form and pattern of organization of an open system's constituent parts is characterized by mutual interdependence among the parts. Every part is so related to its fellow parts that a change in any one part will cause change in all of them and in the total system. That is, "... a system behaves not as a simple composite of independent elements, but coherently and as an inseparable whole" (Watzlawick et al., 1967, p. 123).

2. Self-Regulation. An open system is self-regulating because it monitors its own behaviors and, hence, the behaviors of environmental phenomena. That is, it adjusts to environmental phenomena as well as making its adjustments felt upon its environment. A thermostat is a self-regulating device. The metal elements of the thermostat are sensitive to temperature changes such that they automatically turn a



heat-generator off and on whenever environmental temperature reaches certain specified upper and lower limits.

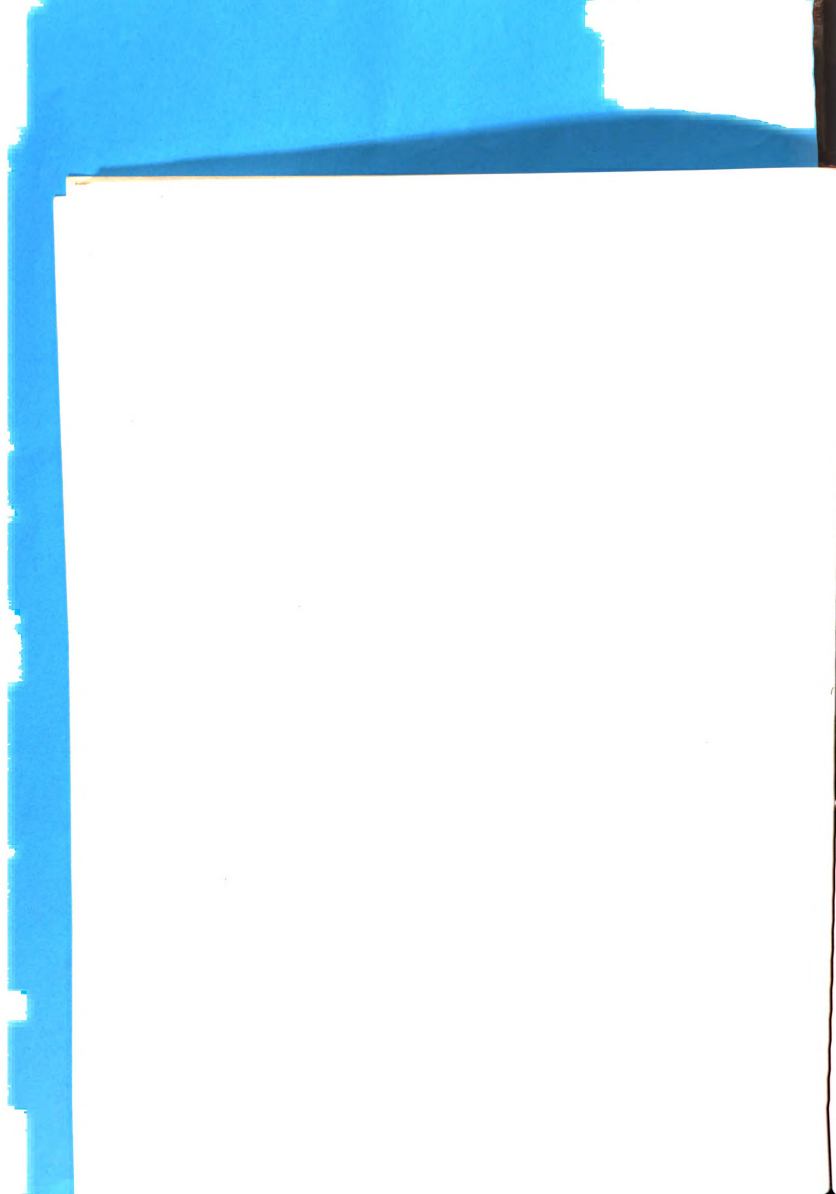
Self-regulation operates on the basis of information feedback. Cofer and Appley (1964, p. 346) summarize the operation of feedback in relation to behavior as follows:

Reacting to disturbance (i.e., stimulation), the system (or any subsystem) responds. Its response affects the environment in some particular way, at the same time 'reporting back' what has been done. The central regulatory apparatus then computes the discrepancy between performed and intended action and the succeeding response 'is corrected for error'. Such a sequence is repeated until the residual error is so small as to lie within the range of the target.

This adjustment of behavior on the basis of actual performance rather than intended performance is known as feedback which "... may be as simple as that of the common reflex, or it may be a higher order feedback, in which past experience is used not only to regulate specific movements, but also whole policies of behavior" (Weiner, 1954, p. 33).

3. Equifinality. Because open systems are self-regulating, outcomes of change over a span of time are not so much determined by initial conditions before the span of time, as they are by the self-regulating processes of the system during the course of the span of time. "If the equifinal behavior of open systems is based on their independence of initial conditions, then not only may different initial conditions yield the same final result, but different results may be produced by the same 'cause'" (Watzlawick et al., 1967, p. 127).

A fourth and particularly important property of open



systems regards the tendency for them to oppose the forces of internal as well as environmental disorganization and uncertainty. Because of the centrality of this property to our present view of the process of modernization, we shall discuss it in greater detail than we have the foregoing three characteristics.

Entropy versus Organization

Physical (thermodynamic) theory states that systems can only proceed to a state of increased disorder as time passes. The measure of this disorder is called entropy, and the "characteristic tendency for entropy is to increase" (Weiner, 1954, p. 12). Physical entropy operates mainly in closed systems. "As entropy increases, ... all closed systems in the universe ... tend naturally to deteriorate..., to move from the least to the most probable state, from a state of organization and differentiation ... to a state of chaos and sameness" (Weiner, 1954, p. 12).*

However, in a universe where order is least probable and chaos most probable, "... there are local enclaves whose direction seems opposed to that of the universe at large and in which there is a limited and temporary tendency for

*Nature's statistical tendency to disorder, the tendency for entropy to increase in closed systems, is expressed by Newton's second law of thermodynamics. "In a descriptive sense, entropy is often referred to as a 'measure of disorder' and the Second Law of thermodynamics as stating that 'systems can only proceed to a state of increased disorder': as time passes, 'entropy can never decrease'... randomness always increases Physical (thermodynamic) entropy is defined for a closed system, a system which is considered utterly isolated and incapable of exchanging energy in any way with its surroundings" (Cherry, 1957, pp. 214-215).

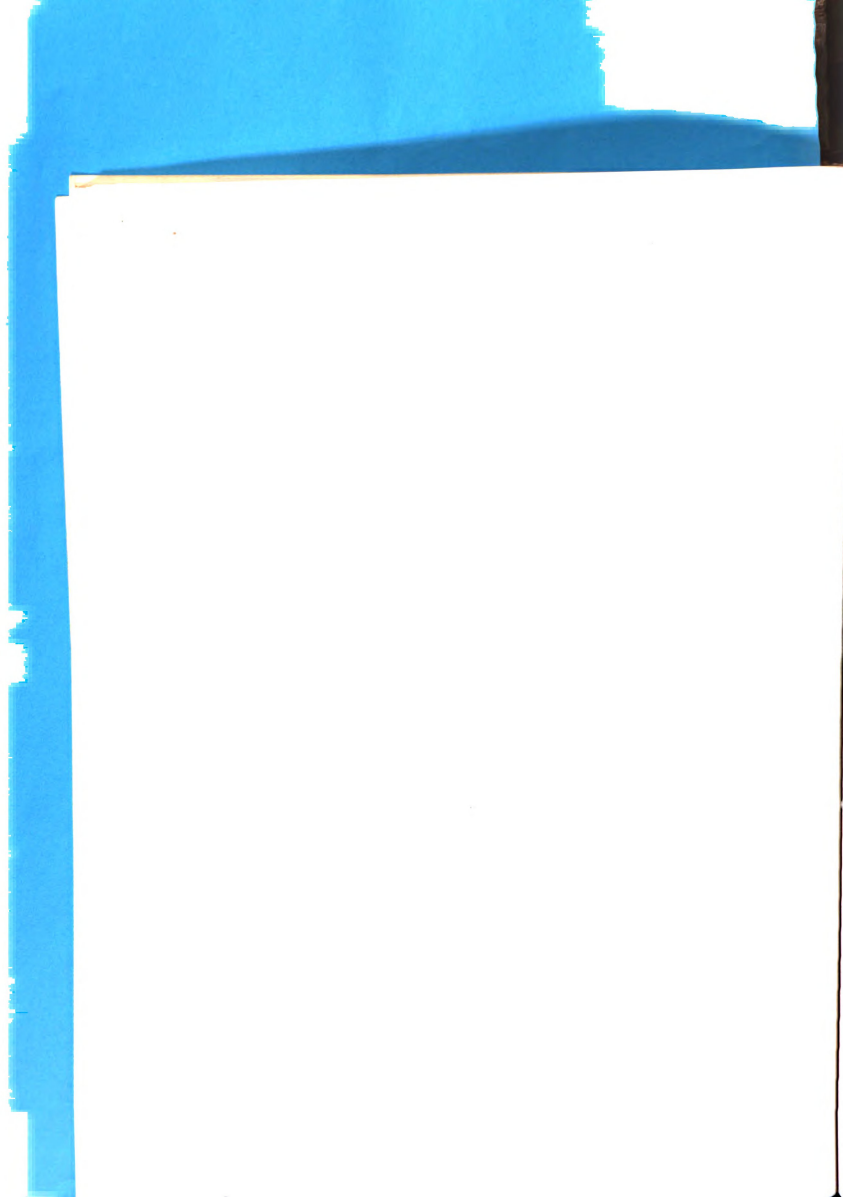
organization to increase" (Weiner, 1954, p. 12). Organization is the negative of entropy, a measure of the opposition to the natural tendency for entropy in the universe to increase. The characteristic tendency for organization is to increase locally and temporarily. Physical organization operates mainly in open systems.*

Man is an open system, a local enclave with a limited and temporary capacity to oppose the natural tendency for entropy in the universe to increase. We must, however, distinguish between two basic kinds of opposition: (1) within-system organization; and (2) between-system (environmental) organization.

Within-System Organization

Man is an open system characterized by wholeness. That is, the form and pattern of organization of his physical constituent parts is characterized by continuous interaction based on mutual dependence upon each other, particularly insofar as his vital organs are concerned. These interactions occur mainly in an orderly and predictable

*"We are immersed in a life in which the world as a whole obeys the second law of thermodynamics: confusion increases and order decreases. Yet, ... the second law ..., while it may be a valid statement about the whole of a closed system, is definitely not valid concerning a non-isolated part of it (Weiner, 1954, p. 36). Scientists are always working to discover the order and organization of the universe, and are thus playing a game against the arch enemy, disorganization. It is not a contrary enemy "... who is determined on victory and will use any trick of craftiness or dissimulation to obtain ... victory Nature offers resistance to decoding, but it does not show ingenuity in finding new and undecipherable methods of jamming our communication with the outside world" (Weiner, 1954, pp. 35-36).

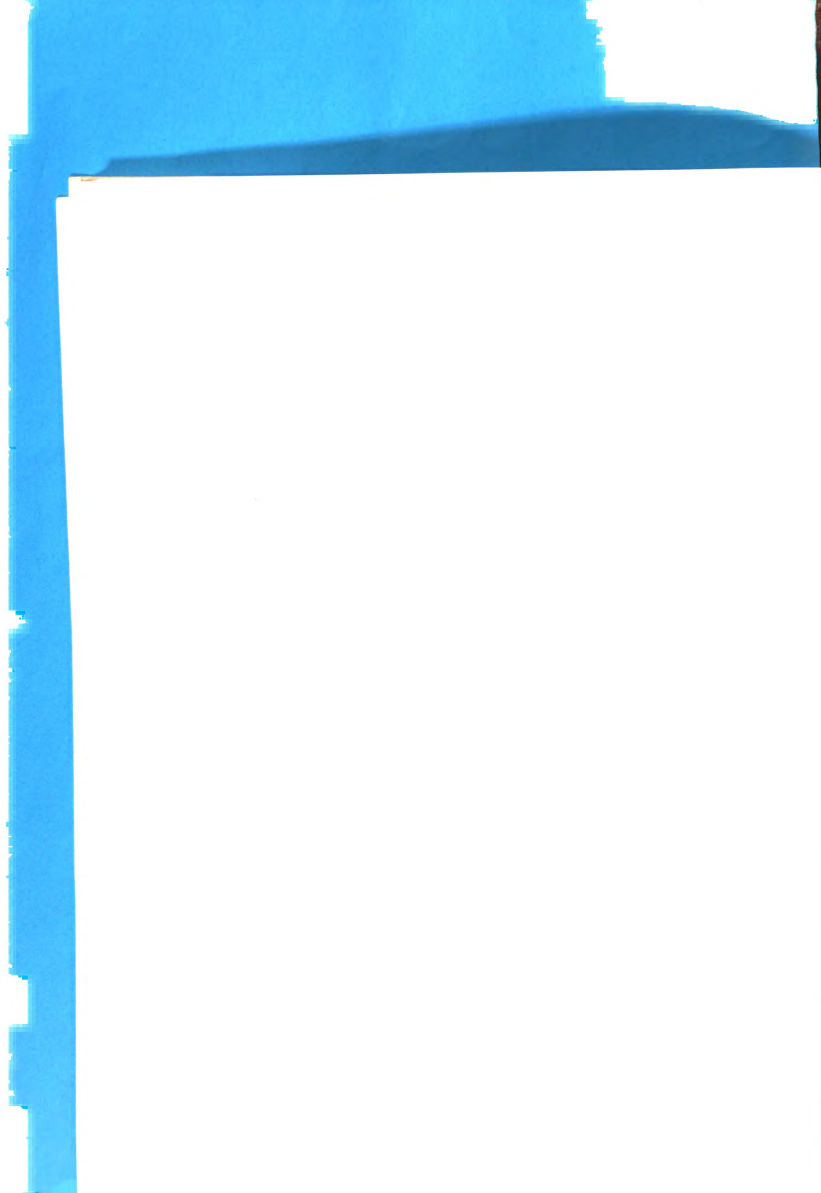


fashion such that change in one part affects change in its fellow parts in order to maintain the system in a state of stable equilibrium.* "Stability characterizes a system ... when its parts are arranged in such a manner as to counteract or resist disturbance" (Cofer and Appley, 1964, p. 346). That is, stability in a system characterizes organization or opposition to the forces of entropy.

Man, however, did not construct himself. He is, therefore, largely not responsible for the manner in which his constituent parts operate in mutual dependence with each other to counteract or resist entropic change. We may state, then, that man is constituted by nature (at least temporarily) to oppose entropy. The measure of this opposition is organization and the natural tendency for organization, as is evident by observing the progression from infancy to adulthood, is to increase in the short run.

*Cofer and Appley (1964, pp. 344-345) state that "... physiochemical laws governing energy conservation, particularly the second law of thermodynamics (entropy), would require that any closed system eventually reduces to a static equilibrium--a state of minimum energy exchange." Biological systems seem (at least temporarily) to "disobey" this natural law. "Open systems, by definition, draw upon the free energy of their environments ... and ... may attain steady states (i.e., remain constant or stable) while at the same time maintaining a continuous flow and interchange of energy and component materials." That is, open systems, such as biological systems, maintain stable equilibria, meaning that "... when displaced from a 'neutral' position, they tend to remain active until the disturbed equilibrium is restored, or, in combination with other part-systems, a new equilibrium is reached."

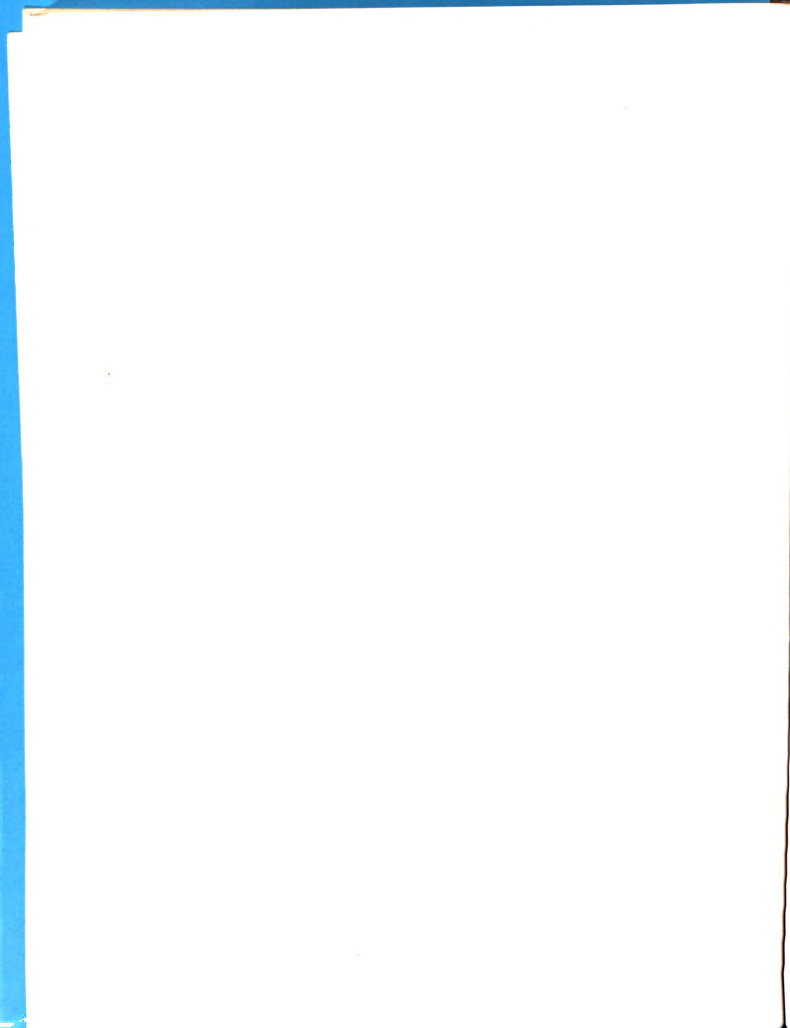
Krech (1950) has shown that a dynamic system may even move toward states of greater heterogeneity and complexity rather than simplicity in the pursuit of maintaining stable equilibria.



Between-System (Environmental) Organization

A system, however, can operate stably only within a given range, and deviations beyond the limits of this range would, when the limits are reached or surpassed, either temporarily or permanently destroy the system (e.g., when freezing or melting temperatures intrude upon human organisms, coma or death quickly follows). That is, changes occurring within an open system, as a function of the continuous interaction of its constituent parts, are orderly and differentiated only to the extent that the system's environment does not exceed any of the limits necessary for the system's stable operation. But the system's environment, in the largest sense, is the universe and the natural tendency in the universe, as time passes, is for entropy to increase.

It may be stated, therefore, that the system's environment is not constituted by nature to oppose the forces of entropy. It is not inherently characterized by a tendency for organization to increase. Therefore, any change occurring in any open system's environment as a function of interaction between that system and other phenomena can only be orderly and differentiated to the extent that the system itself, or other open systems in the environment, make it so. That is, the environments of human organisms are constituted by those human organisms living in them to oppose the forces of entropy.

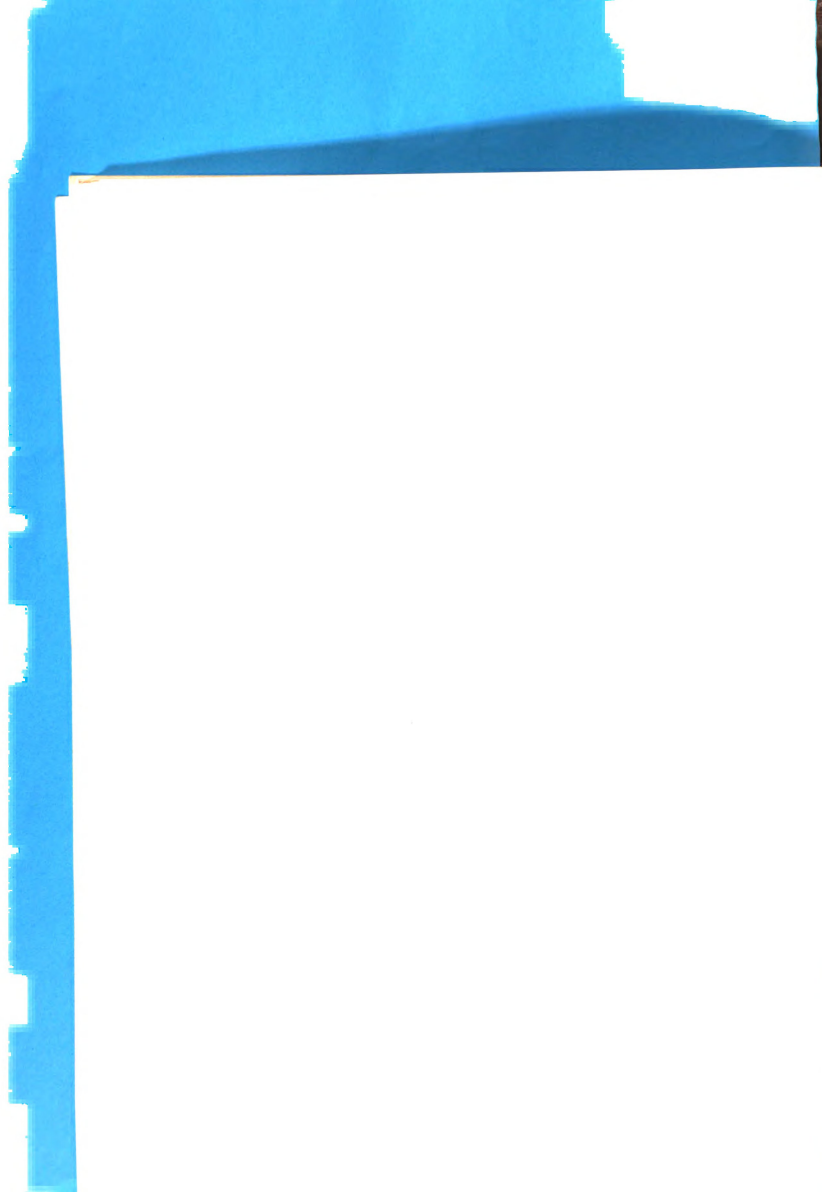


Essential Variables and Safe Limits

It can be said that the goal of all stable systems, living or not, is survival--that is, survival is synonymous with the maintenance or achievement of stability. A system can operate stably only when changes within the system occur within certain limits. To maintain these internal changes within safe limits, it is necessary for the system to ensure that changes in environmental phenomena likewise do not exceed any of the limits necessary for the system's welfare. That is, the system's welfare depends upon changes occurring as a function of internal interaction of its constituent parts as well as of external interaction with other phenomena, being of an orderly and differentiated nature. But a system's environment, given a process view of events and relationships, consists of a "... continuous interaction of an indefinitely large number of variables with a concomitant continuous change in the values taken by these variables" (Miller, 1966, p. 33). It would seem, therefore, to be an insurmountable problem for any open system to attempt to organize all environmental change, if only because "indefinitely" is not an operationalizable term.

Not all changes, however, occurring in an open system or in its environment are necessary to the welfare of the system. Ashby (1952) designates essential variables* as

*It is worth noting, however, that there is no strict dichotomy implied between essential and nonessential variables. Depending upon the issue or problem at hand, non-essential variables may become essential variables and vice versa (at least temporarily). At any rate, essential variables may themselves be hierarchically arranged such that "... oxygen deficit has priority over water deficit, which in turn has priority over food deficit" (Cofer and Appley, p. 349).

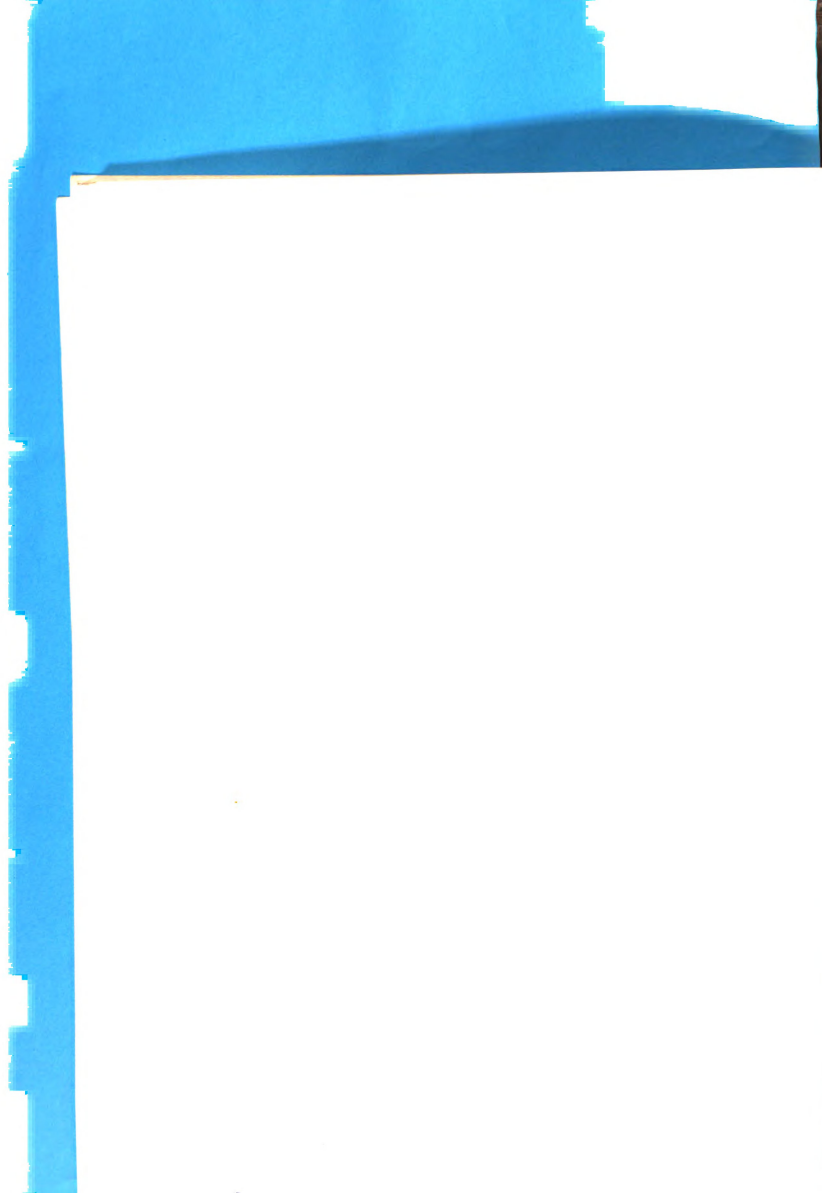


being only those in which excessive change would not be compatible with the system's survival. Adaptive behavior, then, may be viewed as any behavior which serves to retain essential variables within "safe limits." In the human organism, as in all open systems, adaptive behavior operates through self-regulation based upon information feedback.

For Ashby, nonessential variables have importance only to the extent that they maintain the constancy of essential variables and, hence, the stability of the system. What these safe limits are, and which variables are essential to the welfare of the system, may be empirically determined for particular systems. For example, the tolerable range of variation of bodily and environmental temperature, systolic blood pressure, oxygen content in the air and so on are empirically determinable.

The Basis for Purposiveness

Man, in order to maintain himself as an open system (i.e., to survive), must have certain crucial dealings in the form of regular and determinate energy exchanges with an environment which, as a whole, exhibits a tendency for confusion to increase and order to decrease. Therefore, man must himself continuously oppose the tendency for entropy in his environment to increase, particularly with regard to those essential variables in which excessive change would be incompatible with his continuing survival. That is, he must retain change essential to his welfare

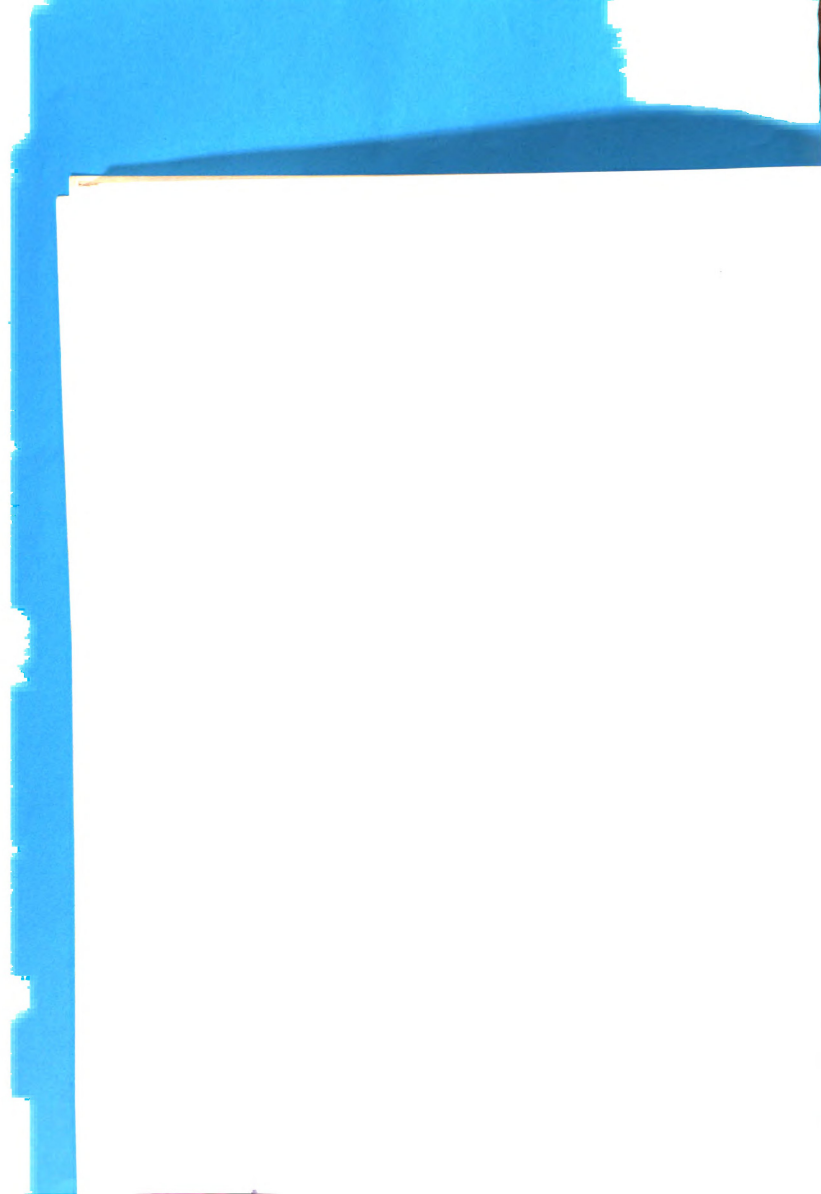


within safe limits.

It can be deduced from these observations, then, that man's actions are governed by an underlying purposiveness. Berlo (1960, p. 11) suggests that "... our basic purpose is to reduce the probability that we are solely a target of external forces, and increase the probability that we exert force ourselves." That is, our basic purpose is to enhance the probability of increasing organization in our environments. Inkeles' (1966) view of efficacious man is addressed to the same point. He states that man "... can learn, in substantial degree, to dominate his environment in order to advance his own purposes and goals, rather than be dominated entirely by his environment" (Inkeles, 1966). It can be stated, then, that man's basic purpose is to maximize the chances of perpetuating his survival by inducing and sustaining a locally limited tendency for organization in his environment to increase and, thereby, reduce the characteristic tendency for entropy in his environment to increase.

The Nature of Control

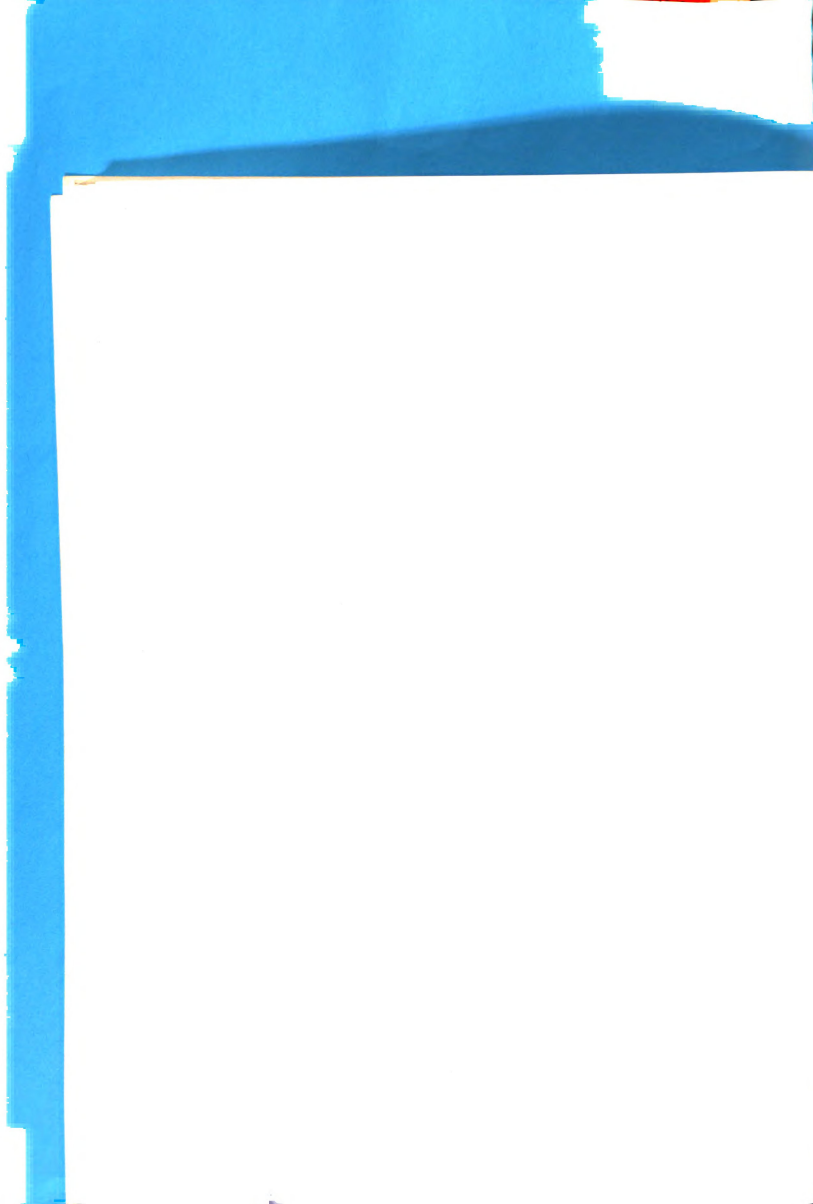
In order to survive, man needs to retain certain essential variables operating in his organism within safe limits. However, such retention depends upon maintaining a regular intake of such essential materials external to his organism as oxygen, water and food. Therefore, man needs to control the supply of these life-sustaining materials by retaining that supply within safe limits. That is, maintaining a



regular and determinate supply of these essential environmental materials enables man to retain essential variables in his organism within safe limits which, in turn, enables man to maintain himself as an open system. Therefore, control is the means by which man purposively retains change in environmental phenomena essential to his welfare within safe limits.

The goal of control is anticipation. Human systems cannot "... long survive if efforts to maintain their stability are activated only after essential variables had reached the limits of their ranges" (Cofer and Appley, 1964, p. 349). Therefore, we strive to render change in environmental phenomena "... sufficiently law-abiding or repetitive for us to be able to make some prediction about what it will do" (Ashby, 1952, p. 225).

Kelly (1963, p. 50) asserts that "A person anticipates events by construing their replications." By "construing" Kelly means that a person places an interpretation upon events. He erects a structure which is essentially abstractive of "... features in a series of elements which characterize some of the elements and are particularly uncharacteristic of others" (1963, p. 50). By "replications" Kelly means that man anticipates events by construing their re-occurrence. "Only when man attunes his ear to recurrent themes in the monotonous flow does his universe begin to make sense to him" (1963, p. 52). Thus, the year is divided by seasons, and winter is characterized by snow which is



particularly uncharacteristic of summer. A person is able to construe the replication of these events, to predict the advent of summer and winter because they occur regularly.

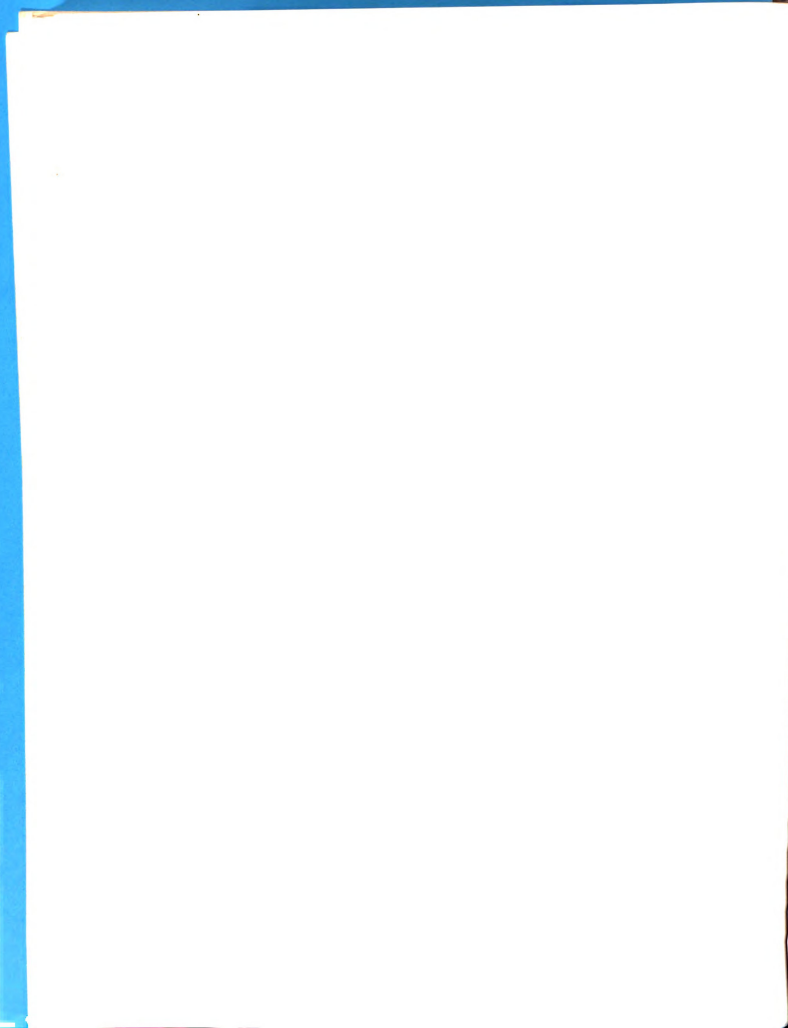
Of course, people are different, therefore they have different ways of anticipating events. In terms of Kelly's (1963, p. 46) fundamental postulate of his psychology of personal constructs, "A person's processes are psychologically channelized by the ways in which he anticipates events." By "channelized," Kelly means that "We conceive of a person's processes as operating through a network of pathways ... [which] ... is flexible and is frequently modified, but ... is structured and ... both facilitates and restricts a person's range of action" (1963, p. 49). Kelly (1963, p. 49) elaborates:

The channels are established as means to ends. They are laid down devices which a person invents in order to achieve a purpose. A person's processes, psychologically speaking, slip into the grooves which are cut out by the mechanisms he adopts for realizing his objectives Each person may erect and utilize different ways, and it is the way which he chooses which channelizes his processes

The different ways in which each person's processes are psychologically channelized to anticipate events underscores the equifinal behavior of human organisms.

Need to Cumulate Control

Control is not a dichotomy: one does not either have or not have control over change occurring in a particular

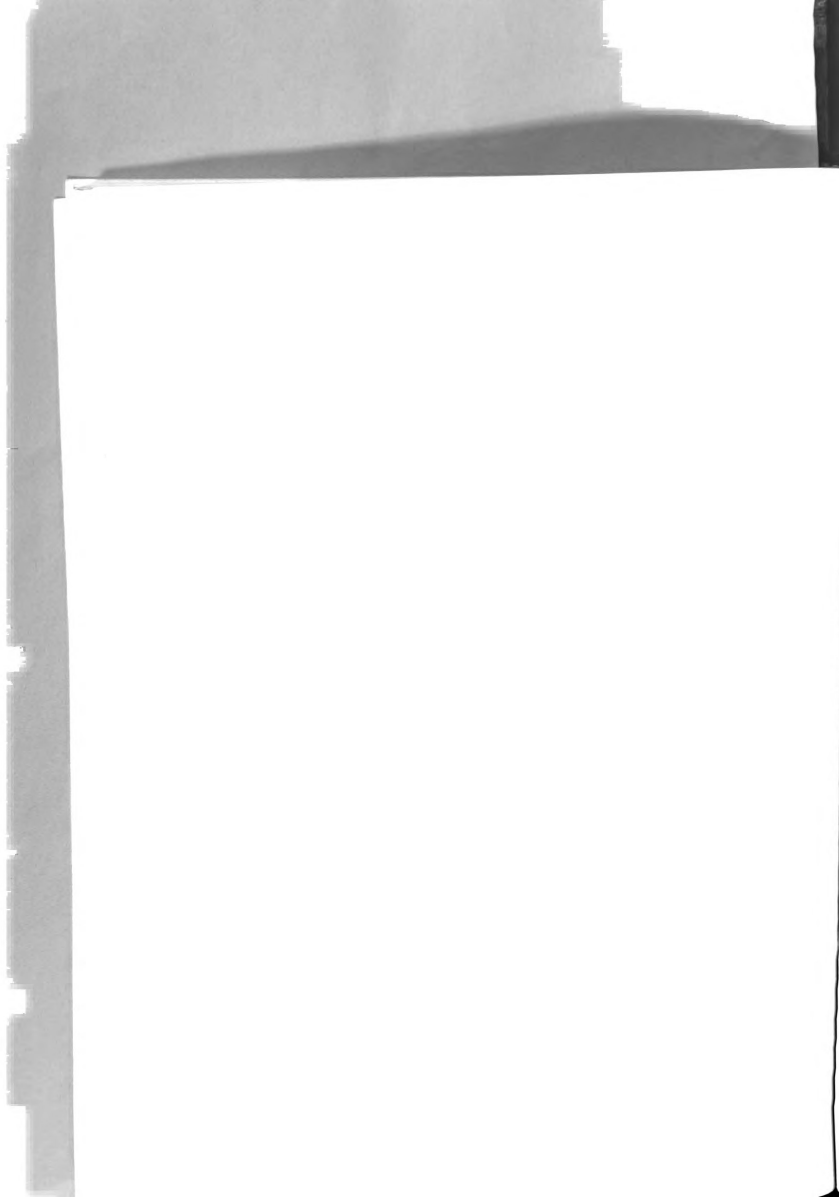


phenomenon. Control is a continuous variable. By way of intuitive example, a man who maintains room temperature within safe limits by building a fire has less control than one whose room temperature is thermostatically controlled. Indeed, the only dichotomy worthy of note concerns the relevance of acquiring particular controls. If environmental temperature naturally remains within safe limits, then the question of controlling environmental temperature is irrelevant.

Since control is a matter of degree, it follows that the possibility always exists for man to increase the degree of control he has already acquired over change occurring in any phenomenon. The man who builds a fire may increase his degree of acquired control over changes in room temperature by adopting a thermostatically-controlled furnace-motor.

More importantly, acquiring more degrees of control over change in one phenomenon may pave the way to acquiring more degrees of control over a variety of other phenomena. For instance, the principle underlying the small pox inoculation may be abstracted and generalized to an infinite variety of infectious diseases. In a sense, therefore, acquiring additional degrees of control with regard to change occurring in one phenomenon may well open a pandora's box of change-control possibilities with regard to many other phenomena.

Thus, control may be cumulated by gaining additional

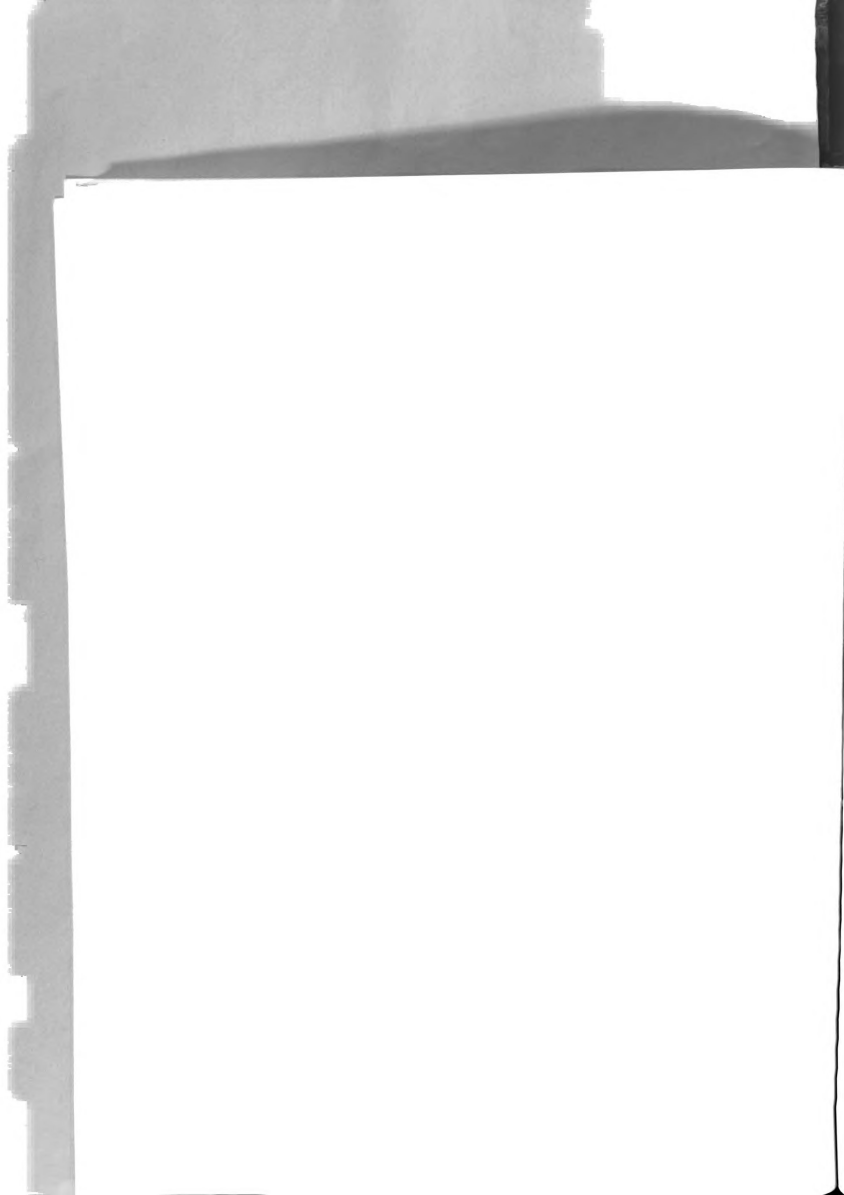


degrees of control over change occurring in any given phenomenon and by abstracting and generalizing principles underlying control in one phenomenon to a wide variety of other phenomena.

It may be expected that man's characteristic tendency is toward cumulation rather than attrition of control over environmental change, particularly over change in phenomena essential to his welfare. Stated another way, man in whom there is a limited and temporary tendency for organization to increase, constantly seeks to render this tendency less limited and less temporary. That is to say, man's basic underlying need is to cumulate control over change occurring in environmental phenomena essential to the welfare of his organism.

Predicting Human Behavior

If man's basic underlying need is to cumulate change-control, then it may be expected that man reacts positively to propositions which promise to enhance, and negatively to those which threaten to curtail his already acquired degree of change-control. That is to say, it may be predicted that if an individual is confronted with a promise of enhancement of his control over change, particularly in phenomena essential to his welfare, then that individual will tend to engage in behavior calculated to take advantage of the possibility to acquire the additional control. To be effective, the promise must satisfy, in the individual's

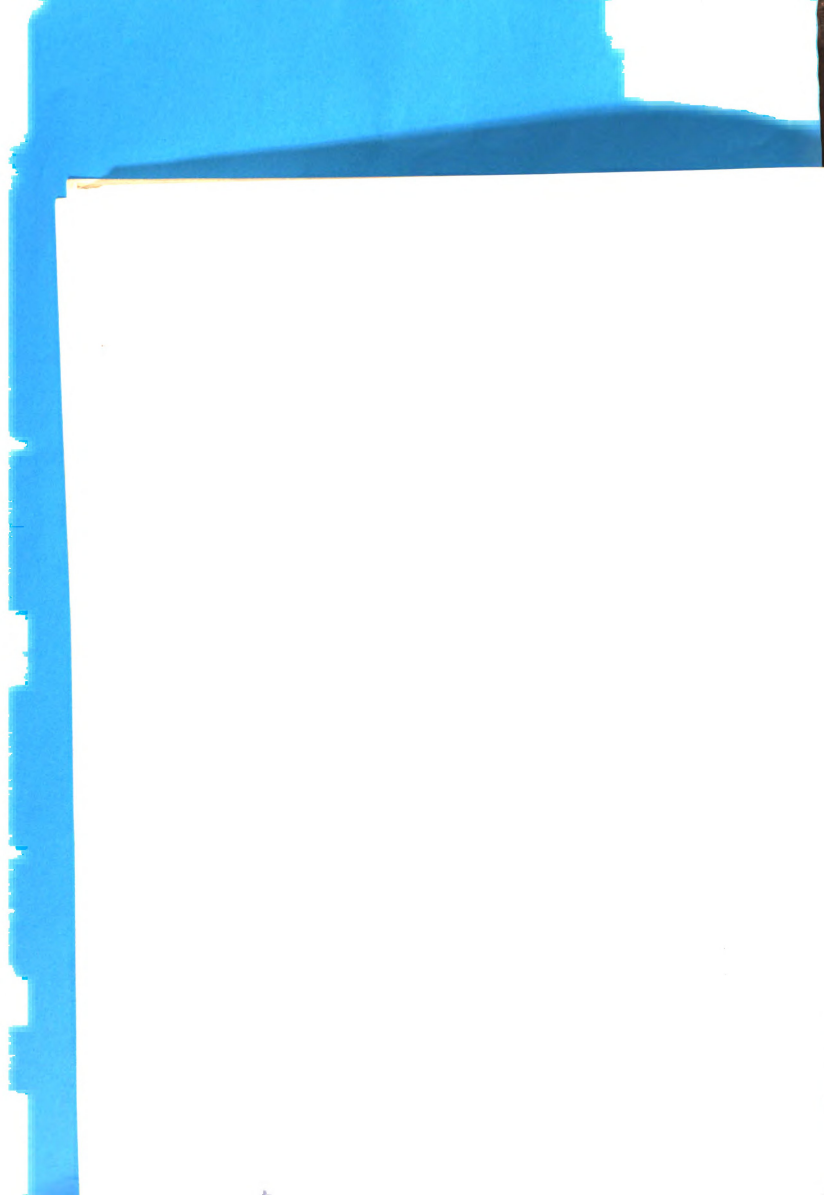


perception, an initial criterion of feasibility, either at the moment, or in the foreseeable future.

Conversely, it can be predicted that if an individual is confronted with a threat of curtailment of his control over change, particularly in phenomena essential to his welfare, then that individual will tend to engage in behavior calculated to curtail or eliminate the threat of curtailment with which he is faced.* To be effective, the threat must satisfy, in the perception of the individual, an initial criterion of feasibility, either at the moment or at some time in the future. Thus, cumulating control is a function of purposive enhancement on the one hand, and purposive curtailment of threats of curtailment on the other.

These two predictive statements are clearly of a motivational nature. A motivational theory, states Brown (1961), is one containing, in a role of central importance, a unique construct to which a specific label, such as drive, may be attached. For instance, Festinger (1957) postulates that cognitive dissonance is unpleasant and, therefore, motivates people to alter their cognitive system in such

*The conceptual origin of this line of thinking is based in Brehm's (1966) theory of psychological reactance, which states that for any given individual, at any given point in time, there are a set of free behaviors available to him. The behaviors are "free" in the sense that the individual perceives himself to be free to engage in any one of these free behaviors either at the moment or at some future time. For the behaviors to be free, however, they must be acts which are feasible, that is, realistically practicable. Reactance theory predicts that when any of these free behaviors are curtailed or threatened with curtailment or elimination, the individual will be aroused and motivated to recover or prevent the loss of those freedoms.



a way as to become consonant again.

Just as hunger is motivating, cognitive dissonance is motivating. Cognitive dissonance will give rise to activity oriented to reducing or eliminating the dissonance. Successful reduction of the dissonance is rewarding in the same sense that eating when one is hungry is rewarding (Festinger, 1958, p. 70).

The notion of a motivational construct involving the arousal of drive is succinctly summarized in Young's (1961, p. 24) definition of motivation as "... the process of arousing action, sustaining the activity in progress, and regulating the pattern of activity." Exception to a view of motivation focussing almost entirely upon its drive-like properties has been taken on at least two main issues.

On the one hand, it has been observed that changes in behavior following manipulation of a motivational variable can sometimes be explained by other non-motivational concepts such as habit strength, degree of learning, attitude, or the physiological condition of the organism. Brown (1961, p. 97) suggests that "Whenever variations in factors such as these provide acceptable explanations for the observed behavior, the concept of drive may become expendable."

On the other hand, it has been argued that the motivational construct misleadingly assumes that man is inert by nature, to be pushed into activity by drives, motives, and similar stimuli, or to be pulled into activity by purposes, values or goals. Kelly, (1958, p. 59), for instance, objects to a "... need for a closet full of motives to explain the fact that man was active rather than inert."

Because the drive or arousal aspects of motivation could be shown in some cases to add either nothing or only confusion to the clarity of our explanations of human behavior, it is felt in some circles that this argues for the complete elimination of the drive-like concept. Thus, Kelly (1958, p. 60) for example, created a psychological theory of 'personal constructs' which he claimed to employ "no catalogue of motives to clutter up ... a much more coherent psychological theory about living man."

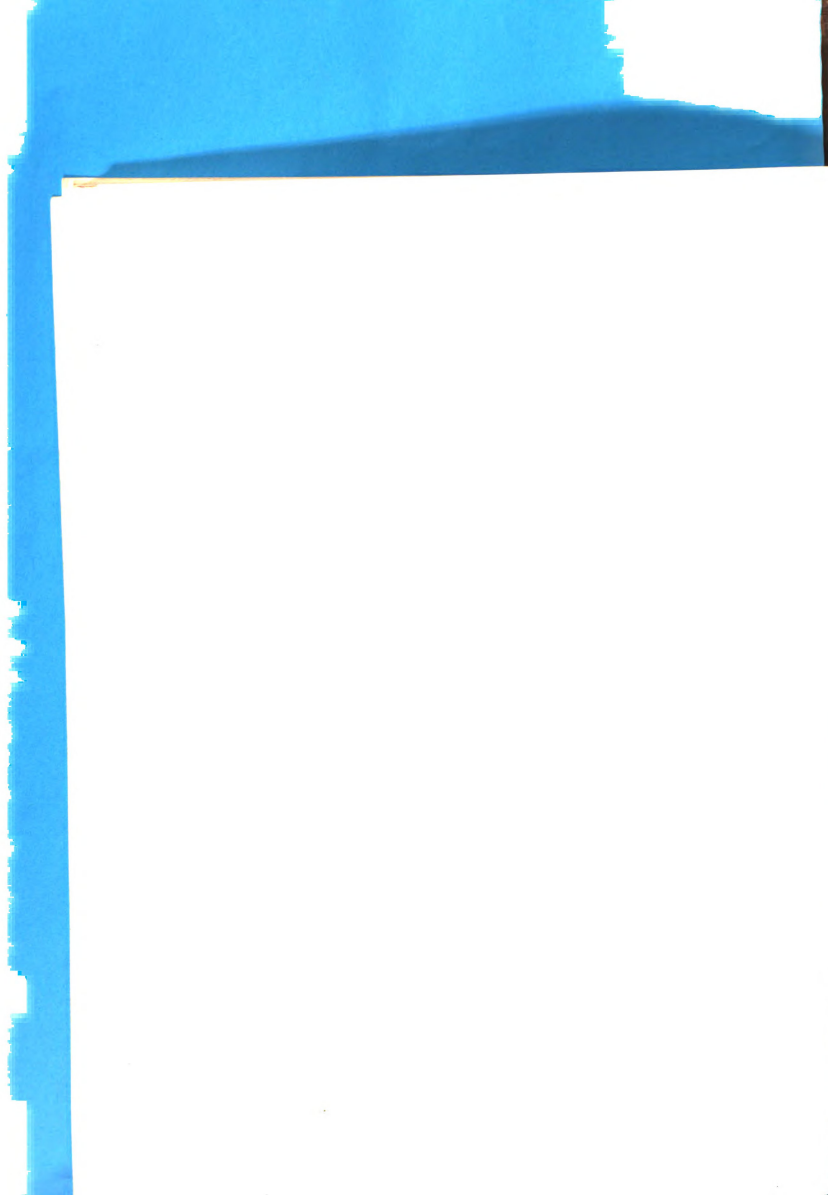
The problem, however, is not resolved by simple dint of dispensing with the question of motives because, as Brown (1961, p. 137) concludes, "... the construct of drive is ... supported by a wide variety of findings." Perhaps a more useful answer lies in de-emphasizing the centrality of the arousal aspects of motivational constructs which forces us into a view of man as being inert until pushed or pulled into activity.

To this end, we prefer to follow Hebb's (1949, p. 172) suggestion that "... the chief problem that the psychologist is concerned with, when he speaks of motivation, is not arousal of activity but its patterning and direction." Thus, the statement of our fundamental modernization postulate as well as the two predictive statements derived from it, are less concerned with presenting a legalistically logic-tight formulation based upon the arousal and reduction of drive, and more concerned with providing a heuristically provocative theoretical framework dealing with the

patterning and direction of human behavior in the process of modernization. Our formulations imply an ever-present drive-state in man. If the tendency for entropy in the environment to increase is ever-present, then man's opposition to that tendency is likewise also ever-present. That is, man is an ever-active individual, thereby eschewing the notion of inert man aroused to activity only by the intrusion of nigglesome external forces upon his quiescence.

Modernization and Control

We do not conceive of modernization (or perhaps more appropriately, modernism) as a state of being, as descriptive of a typology of people. Rather, modernization is conceptually a variable. That is, one does not become modern: one modernizes by continuously, never-endingly cumulating control over environmental change. Cumulated controls are the individually specific inputs to the collectively general storehouse of modernization. That is, each degree of control acquired over change in a particular environmental phenomenon is in itself a tiny act of modernization which augments the hoard of already acquired control in the storehouse of modernization. Indeed, the storehouse is never empty; it is considerably well-stocked with a rich heritage of controls already acquired to some degree over change in a wide variety of environmental phenomena. Each human system, whether monadic or polyadic, draws upon its storehouse of modernization which has elements common to and



different from each other human system's storehouse. The storehouses of some human systems are relatively better stocked than those of thers. These human systems are more modern than the others. These storehouses of modernization represent the reserves drawn upon in the processes of socialization and maturation.*

Control is a unidimensional concept, whereas modernization may likely be multidimensional. Because we take a process view of modernization, we concede that modernization is a bewilderingly multivariate phenomenon.** This being the case, it is conceivable that the general domain of modernization may likely consist of several relatively independent dimensions. That is, the degree of modernity achieved by a human system in one area of modernization (e.g., agricultural technology) may be unrelated to the degree of modernity acquired in another area of modernization (e.g., medical technology).*** Control on the other hand, is unidimensional to the extent that it treats of

*Generally speaking, socialization and maturation are processes by which new members to society (e.g., immigrants and infants) adopt prevailing societal norms.

**"Indeed, so many variables appear to be important parts of the modernization process that it is a formidable task to put them in some kind of order. In the process of probing the nature of the process of modernization, we now find ourselves unable to see the forest for the trees" (Ascroft, 1969, p. 317).

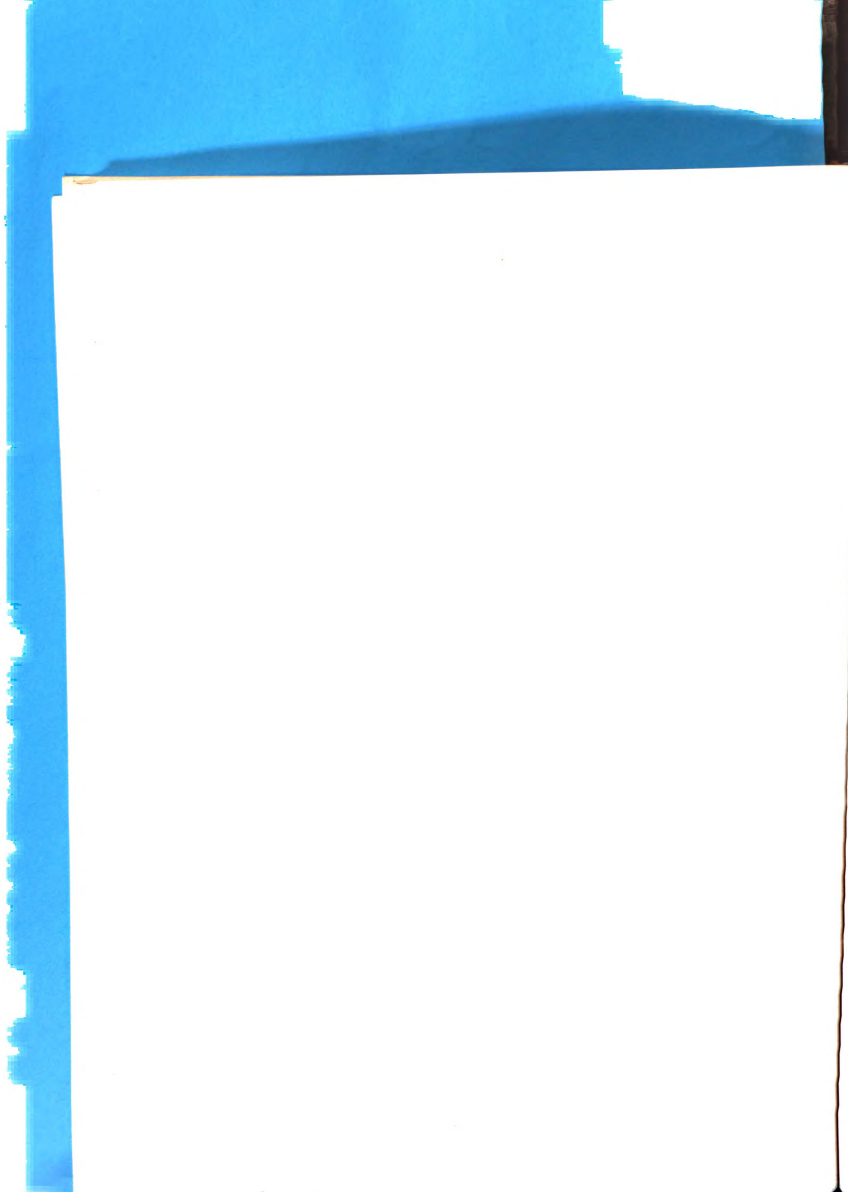
***Research investigations tend generally to support the notion that modernization, at the individual level, is multidimensional. Ascroft (1969, p. 340) synthesized the results of factor analytic studies using data gathered in several countries, and concluded that "Micro-level factor analyses of individual modernization ... show that modernization is multidimensional."

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gaining specific degrees of control over change in phenomena taken one at a time.

Summary

There are local and temporary islands of decreasing entropy in a world in which the entropy as a whole tends to increase. Man's organism is constituted by nature as such an island, but the environment in which he lives must be constituted by himself as an island of decreasing entropy. Man needs to organize his environment in this way since his survival, his continuing state as an island of decreasing entropy, requires a regular and determinate supply of certain essential materials external to his organism. Therefore, man needs to control this supply by retaining it within safe and predictable limits. Thus, man constantly seeks to enhance control, while at the same time seeking to avoid curtailment of control over change occurring in phenomena essential to the welfare of his organism. The pursuit of enhancement and the avoidance of curtailment, results in the cumulation of control--that is, in ever-increasing degrees of control being acquired over any given external phenomenon. Thus, man's basic underlying need is to cumulate control over change occurring in environmental phenomena essential to the welfare of his organism. It is this basic pattern and direction of behavior which underlies the process of modernization, which impels it and governs its course.



CHAPTER III

COMMUNICATION AND CONTROL

Communication is the main vehicle by which widespread modernization is achieved.

The present chapter undertakes the elaboration and amplification of this basic corollary to our fundamental modernization postulate. It seeks to answer the question: How does the process of individual and mass modernization occur?

Purposiveness in Communication

Much present-day communication research focusses on the effects of messages emanating from a purposive source upon change in knowledge, attitude, and overt behavior of receivers. For example, Hovland, Janis and Kelly (1953) look upon communication as having the purpose of persuading individuals to modify their opinions and beliefs. "When a communicator attempts to persuade people to adopt his conclusions he usually employs arguments and appeals which function as incentives" (Hovland, Janis and Kelly, 1953, p. 270). Festinger (1954) suggests that in order to explain the occurrence of communication among people, uncertainty about features in the environment is one reason that people talk to each other. There is a general need to know the



environment and when direct testing of the environment is not feasible, "... the person 'tests himself' against, or more specifically, compares himself with other persons" (Festinger, 1954, p. 195). Berlo (1960, pp. 11-12) suggests that:

Our basic purpose in communication is to become an affecting agent, to affect others, our physical environment, and ourselves, to become a determining agent. In short, we communicate to influence--to affect with intent.

Thus, man communicates purposively. Man is also purposively directed toward gaining change-control. Let us, therefore, examine the manner in which purposive communication and purposive change-control are related to each other.

Communicative Change-Control

Modernization, as we have suggested in the previous chapter, occurs because man has the basic underlying purpose of cumulating control over change in essential environmental variables as a necessary condition for maximizing his chances of survival. We now posit two basic ways by which control may be cumulated: (1) Invention, which is the process by which new or improved ways of controlling change in environmental phenomena are created and developed*; and (2) Discovery, which is the process by which others become aware of an invention.

An invention originates within the inventor; it is endogenous or immanent to the individual. Therefore, the

*Rogers with Svenning (1969, p. 3) define invention as "... the process by which new ideas are created and developed."



form of control acquired through invention may be described as immanent change-control. Discovery implies a source external to the individual; it is exogenous to the individual who becomes aware of a particular invention when he comes into contact with that source. Therefore, the form of control acquired through discovery may be described as contact change-control.* However, to avoid the implication that contact change-control is affected by direct contact between each discovering person and the original inventor, we shall consider an invention which is generalizable to, and reproducible by, others as being an innovation. Thus, whereas only the inventor can be the contact source of an invention, anybody who has reproduced the invention (i.e., construed its replication either mentally or in actual practice) may be regarded as the contact source of an innovation. Thus, "An innovation is an idea of controlling change in environmental phenomena perceived as new by the individual" (Rogers, 1962, p. 13). For purposes of simplicity, we shall hereinafter regard the term "innovations" to be inclusive of inventions and restrict ourselves to talking about innovations rather than inventions.

*"Immanent change occurs when invention takes place within a given social system with little or no external influence being exerted Contact change is introduced from sources external to the social system under analysis" (Rogers with Svenning, 1969, p. 5). Sorokin (1961, p. 1311) speaks of the "Principle of Immanent Change" upon which the foregoing definition is based. Parsons (1961) uses the terms "endogenous" and "exogenous" to correspond to the notions of "immanent" and "contact" change-control.



Contact change-control may be (1) self-discovered, meaning that an individual discovers an innovation on his own initiative and in the absence of purposiveness on the part of another individual; or (2) other-communicated, meaning that others expressly intended an individual's discovery of a particular innovation to occur. In the case of self-discovered change-control, as is the case with immanent change-control, purposiveness is located within the person making the discovery. Since the self-discoverer or inventor is concerned primarily with affecting his own behaviors, with cumulating personal change-control, self-discovered and immanent change-control describe how relatively isolated individuals, or groups of individuals, acquire new or improved ways of controlling change in a given phenomenon.

In the case of other-communicated change-control, purposiveness is located in the source of an innovation. That is, the source communicates an innovation to affect with intent, to influence others to adopt the innovation. Since the communicator can address himself to any number of people, other-communicated change control, therefore, describes how masses of people acquire new or more efficient ways of controlling change in essential variables. For purposes of simplicity, we shall refer to other-communicated change-control as communicative change-control.

Why would a source of an innovation seek to pass on new ways of change-control to others? Basically, he does



so in order to ensure that others in his environment apply compatible and cooperative methods of controlling change in environmental phenomena which are communally essential to the welfare of everybody in that environment. Thus, communicative change-control has the basic, underlying purpose of securing the cooperation of others in applying compatible controls over change in communal environmental phenomena essential to their collective welfare.

In communicative change-control, the burden is upon the source to engender purposiveness in those others whose cooperation he is seeking. The others are in essence making a discovery similar to self-discovered change-control, except that the source of the innovation has to make the others realize that they have indeed made a useful discovery. Disregarding the location of purposiveness, the generalization may be stated that immanent (inventive) change-control and contact (discovery) change-control are the main ways by which individuals (considered as isolated units of one) cumulate control over change in essential environmental variables. When purposiveness is taken into account, however, then communicative change-control is the main way by which individuals, considered en masse, cumulate control over change in phenomena essential to their welfare. Thus, purposive communication of new or more effective methods of change-control is the main way by which widespread modernization occurs.

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A Paradigm* of Modernization

The various notions we have been discussing relating communication to change-control and, thereby, to modernization become clearer when rendered in paradigmatic form as in Figure II. Paradigms represent useful vehicles for talking about a process. They do not capture the full dynamic, multivariate richness of the process. Rather, they provide a useful organizational framework for isolating certain especially relevant dimensions so that we may communicate with each other about them.

The paradigm presented in Figure II is essentially a communication paradigm which derives from Berlo's (1960) model of communication.** It is a more specific rendition of Berlo's general model in that it isolates and specifies a particular source (the agent system), a particular receiver (the client system), and a particular purpose (communicative change-control). The agent and client together represent the most essential ingredients of a basic

*A paradigm is a model, "... a classificatory system that enables one to abstract and categorize potentially relevant parts of the process" (Miller, 1966, p. 53). "The word 'model' is a synonym for paradigm, but 'paradigm' evades the value connotation of 'model'" (Kerlinger, 1965, p. 275). The value connotation which Kerlinger refers to concerns definitions of the term "model" as an exemplar or an ideal archetype.

**According to the model, all human communication has some source, some person or group of persons with a purpose which is expressed in the representational (symbolic) form of a message. This message is carried in some channel to the target of communication, the person or persons regarded as the communication receiver. These four elements, source, message, channel, and receiver (SMCR) together constitute the most essential ingredients of Berlo's (1960, p. 72) model of communication.



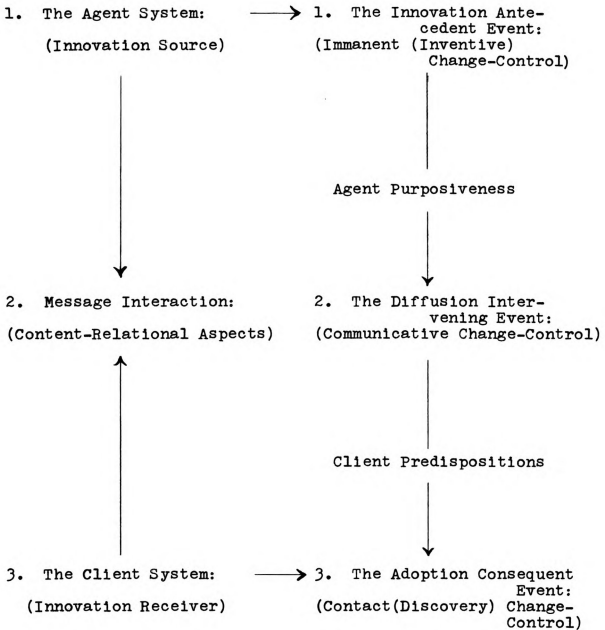
THE INTERACTIONAL SYSTEMTHE SEQUENTIAL EVENTS

Figure II: A Communication Paradigm of Change-Control Showing the Basic Dyadic Interactional System and the Three Sequential Events in the Process of Modernization.



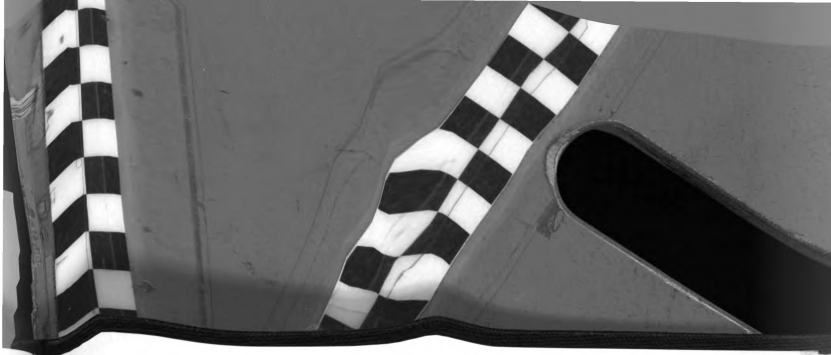
dyadic interactional system, and message interactions between the agent and the client constitute the relationships which bind the dyadic system into a dyadic whole.

Three sequential events in the process of modernization are also shown. The first is the innovation antecedent event (in which immanent (inventive) change-control occurs); the second is the diffusion intervening event (in which communicative change-control occurs); and the third is the adoption consequent event (in which contact (discovery) change-control occurs). The paradigm implies the bias of the present dissertation, which is to discuss the nature of purposive communicative change-control in greater detail than either immanent or self-discovered change-control. This bias derives from the assumption that communicative change-control is the main way by which widespread modernization occurs. Thus, the paradigm is slanted to a purposive agent system bent on communicative change-control and, therefore, needing to take account of certain receiver pre-dispositions to be effective as a communicator.

The Basic Interactional System

Throughout the world, nations and individuals within them are forever striving to enhance their control over change in environmental phenomena essential to their welfare. Nowhere is this activity more evident than in the less developed nations where attempts are being made, in a relatively short period of time, to narrow the gap between





themselves and those nations with greater technological control and, hence, with higher levels of living. To achieve this end, the governments of less developed countries frequently launch nation-wide programs designed to pass on new or improved ways of controlling change in essential environmental variables. Therefore, the predominant form of change-control acquisition in the less developed nations is communicative change-control whereby a relatively few individuals are seeking to affect mass modernization.

The Agent System

The key figure of these nationwide programs is the change agent, who Rogers (1962, p. 254) defines as "... a professional person who attempts to influence adoption decisions in a direction that he feels is desirable." Examples of various types of change agents are: "technical assistance workers in less developed countries; county extension agents; detail men who promote medical drugs with physicians; salesmen and dealers of new products; public health officials, nurses and medical doctors; and school administrators and teachers" (Rogers, 1962, p. 255). The professional change agent functions essentially as a communication middleman between two systems. He passes information about new ways of controlling change in environmental phenomena from such source systems as scientists and government planners, to such receiver systems as developing nations and peasant farmers. His messages may be technological, political, economical, or social but all are

concerned with new ways of change-control. He utilizes a variety of communication channels, ranging from nationwide radio broadcasts to personal discussion with individuals. He is, in effect, the single most important source of modernizing influences.

Because the term "agent" is widely used and understood in the context of planned change (i.e., purposive change-control), we have elected to retain it as a label which identifies the source of new and improved ways of change-control. We have generalized it, however, to include not only the professional change agent, but also any individual, or group of individuals, whose purpose is communicative change-control. That is, the change agent may be a single human organism (e.g., an extension agent) or a human organization (e.g., an extension agency). The change agent has information concerning new ways of change-control initially accessible to him, but which he now intends to make available to others. We have chosen to use the term "agent system" to distinguish such a generalized change agent from the more exclusive concept of a professional person. Thus, for our purposes, the agent system is any source of an innovation with the special purpose of influencing others to adopt the innovation.

The Client System

Shanin (1966) declares that "Peasants are the majority of mankind." Who are peasants? "The common threads woven

into most descriptions of mankind's majority include: subsistence agricultural producers and traditionally oriented rural villagers who are seldom completely self-sufficient" (Rogers with Svenning, 1969, p. 20). By most constructions, the term "peasant" is held to be interchangeable with the term "subsistence farmer." The mainstream of modernization research considers the peasant farmer to be the primary receiver of modernizing influences and, therefore, is concerned with modifying peasant attitudes and behaviors. However, a problem of perhaps too great exclusivity attaches to this view of the receivers of modernizing influences.

If only subsistence farmers are peasants, how then are we to classify the rest of mankind? Clearly, mankind's "minority"--if indeed it is a minority--cannot be entirely construed as the polar opposite of "subsistence farmer." For, what are subsistence fishermen, subsistence herdsman, subsistence businessmen, subsistence migrant workers, subsistence laborers, subsistence ghetto dwellers, subsistence welfare cases and subsistence miscellaneous persons, if not peasants?*

While conceding that one category of receivers of modernizing influences of immediate concern to us is indeed the peasant farmer, our view of modernization as a

*Wharton (1963) attempts a part-answer to this question by distinguishing between (1) subsistence production, as characterized by a low degree of commercialization and monetization (i.e., peasantry); and (2) subsistence living, which refers to a level of living that is a minimum for survival (i.e., poverty). But then, does not a production which is at a subsistence level automatically define a level of living that is a minimum for survival?



continuous variable behooves us to consider all manner of people, including the president of the United States, as potential receivers of modernizing influences. Thus, to avoid the dangers of over-specificity while at the same time suggesting a particular pattern and direction of relations between the agent system and the receiver he seeks to influence, we have elected to label the receiver of modernizing influences as the "client system." That is, any individual, or group of individuals, who an agent system seeks to influence to adopt new or improved ways of change-control constitutes that agent system's clientele. Thus, a client system may be a single human organism (such as the peasant farmer) or a human organization (such as a village community).

The Interaction

The agent system's purposes are expressed in the form of information carried in messages transacted between the agent system and the client system. That is, the agent system makes his purposes or intentions known to his clientele by confronting them with propositions rendered in the form of messages. The client system, in turn, evaluates a proposition and its source primarily on the basis of the messages emanating from the agent system. Messages and the information they carry constitute a linking or coupling device bringing the agent system and the client system into functional relations with each other, thereby forming the basic dyadic interactional system.



In human communication, a message "... is behavior available in physical form--the translation of ideas, purposes, and intentions into a code, a systematic set of symbols" (Berlo, 1960, p. 30). Let us follow Watzlawick et al. (1967, p. 50) who stipulate the various units of communication to be as follows:

A single communicational unit will be called a message... a series of messages exchanged between persons will be called an interaction. Finally, ... we will add patterns of interaction, which is still a higher-level unit of human communication.

For the purposes of illustrating these various units of communication, let us suppose that we have a specific issue which concerns the diffusion of a new high-yielding seed variety named NS-1 maize.*

1. The Message. An agent posts a bulletin declaring: Use NS-1 maize! This is a message--a single communicational unit sent by the agent to his clientele.**

2. The Interaction. The client, upon reading the message (Use NS-1 maize) may be moved to approach the agent for more information, setting off a series of message exchanges: Why? ... Because! ... How? ... Like this! ... and so on. This series of message exchanges constitutes a communicational interaction involving the active participation of both the agent and the client.

*NS-1 maize is an improved corn-seed variety which is being urged for adoption in Nigeria (see Ascroft et al., 1969).

**It is important to note that if we accept all human behavior during the time that an interactional system is viable to be communication, then the problem of specifying a simple message unit becomes extremely complex. That is, in addition to the verbal aspect of the message, we need also to take account of its tonal, postural, gestural, contextual, and such other aspects.

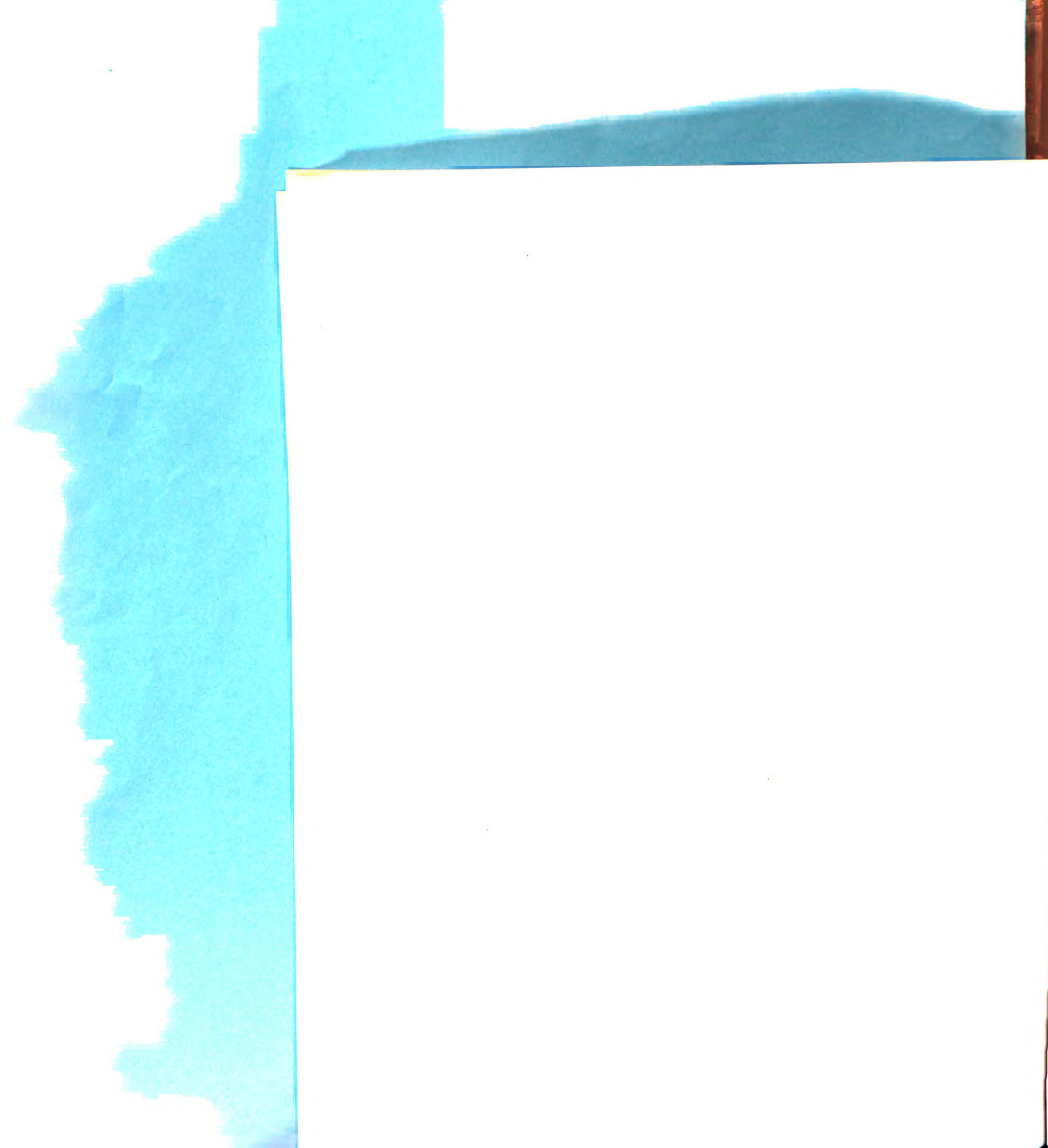


3. Patterns of Interaction. The agent, an authority on NS-1 maize, addresses the client assertively from a position of superior knowledge. The client, who is ignorant about NS-1 maize, responds submissively from a position of inferior knowledge. This establishes one of two basic patterns of interaction,* namely, complementary interaction. "One partner occupies what has been variously described as the superior, primary, or 'one-up' position and the other the corresponding, inferior, secondary or 'one-down' position" (Watzlawick et al., p. 69).

A second pattern of interaction is symmetrical interaction which is based mainly on equality, such as between friends. For example, the boasting of one friend may lead to boasting by the other, which may lead to more boasting by the former and so on. Within the context of the issue at hand, a similar situation could have arisen if the client was just as authoritatively knowledgeable about NS-1 maize as was the agent. Watzlawick et al. (1967, p. 70) contend that "... all communicational interchanges are either symmetrical or complementary."

It may be asserted that, since the main property of generalized agent systems is that they have a particular kind of information initially accessible to them and not to

*The notion of two basic patterns of interaction derive from Bateson's (1958) observation of a phenomenon which he called "schismogenesis", defined as the process of differentiation in the norms of individual behavior resulting from cumulative interaction between individuals. He identified two basic patterns which he termed "complementary" and "symmetrical" schismogeneses, and which are now usually referred to simply as complementary and symmetrical interaction.



the client, the pattern of interaction which is likely to obtain between the agent and client is one which typifies complementary interaction rather than symmetrical interaction.

Content-Relational Aspects in Messages

Any message has two major components: (1) it conveys information about a proposition; and (2) it defines the relationship between the source and the receiver of the proposition. These two components, following Reusch and Bateson (1951, pp. 179-191), are known respectively as the "report" and "command" aspects of any message.

The report aspect conveys information about the issue at hand, and is, therefore, synonymous with the content of the message (i.e., a simple declarative statement advising one and all to "Use NS-1 maize!"). The command aspect "... refers to what sort of message it is to be taken as, and therefore, ultimately to the relationship between the communicants. All such relationship statements are about one or several of the following assertions" 'This is how I see myself ... this is how I see you ... this is how I see you seeing me ...' and so forth in theoretically infinite regress" (Watzlawick et al., 1967, p. 52). That is, the command aspects of messages prescribe roles, and relationships between role players, in a communicational situation. For example, the agent system plays a role of informed source, the client system the role of naive receiver.

To illustrate the difference between content and relational aspects of messages, let us refer to Kelman's



(1958) three processes of social influence which he posits to be (1) compliance, (2) identification, and (3) internalization. Each process has certain antecedent and consequent conditions connected with it. Let us examine these conditions in the context of the issue of diffusing NS-1 maize.

The agent may issue an order "You will use NS-1 maize, otherwise ...". The message clearly implies a relationship of dominant agent with the power to force compliance, and a submissive client who must comply, "otherwise" The agent, on the other hand, may issue an appeal based on his attractiveness as a personality: "Use NS-1 maize because I use it." The message now implies a relationship of an agent believing himself to be attractive in the perception of his client system and a sufficiently impressed client system who identifies with him. Finally, the agent may issue an advisory based on the credibility of experts: "Use NS-1 maize because scientists recommend it." In this case, the message suggests a relationship of an agent providing a reasoning client with issue-related information for purposes of internalization. In all three cases, the messages have approximately the same report aspect or informational content--Use NS-1 maize. Yet each of the three messages define a source-receiver relationship as different from each other as chalk is from cheese.

However, relationships in messages are only rarely defined deliberately or with full awareness on the part of the participants in a communicational interactional system.



That is, while each member of an interactional system is constantly attending to relationship-defining cues of others and constantly transmitting similar cues in his messages, this attention and this transmission is seldom carried on with full manipulative awareness. Indeed, "... it seems that the more spontaneous and 'healthy' a relationship, the more the relationship aspect of communication recedes into the background" (Watzlawick et al., 1967, p. 52).

The agent-client relationship, particularly in the context of developing countries, is unlikely to be typified by closeness and spontaneity. In such circumstances, concern with interpreting the relationship aspects of messages may loom so pervasively large as to relegate the content-bearing aspects of messages far into the background. This kind of problem frequently becomes painfully obvious when the agent-system is culturally alien to the client system.

The Interactional System

An interactional system, then, is "... two or more communicants in the process of, or at the level of, defining the nature of their relationship" (Watzlawick et al., 1967, p. 121).

In the context of communicative change-control, the agent system may expect his clientele to depend largely upon using the content aspects in conjunction with the relational aspects of his messages in order to determine whether the agent system's propositions promise to enhance or threaten to curtail his existing control over



environmental phenomena. Of course, the client system brings certain of his own predispositional (attitudinal) factors to bear on the problem. On the one hand, the client is likely to evaluate the agent system's messages in the light of prior perceptions that the client system has of the agent system. "These perceptions relate to such attributes of the source as his competence, or expertise; his trustworthiness, or honesty; and his dynamism, or vigor" (Miller, 1966, pp. 34-35). In short, does the client system perceive the agent system as being credible?

On the other hand, the client system evaluates the agent system's messages in the light of prior perceptions that the client system has of the innovation being proposed. These perceptions relate to such attributes of the innovation as (1) its relative advantage, or degree to which it is superior to the ideas it supercedes; (2) its compatibility, or degree to which it is consistent with existing values and past experiences of the client system; (3) its complexity, or degree to which it is relatively difficult to understand and use; and (4) its divisibility, or degree to which it may be tried on a limited basis (Rogers, 1962, p. 146). In short, the client system assesses the feasibility of the innovation in his situation by attending primarily to the content-bearing aspects of the client system's messages. Therefore, the attitudinal predispositions of the client system toward the agent system or the innovation he proposes may be crucial determinants of whether or not the agent

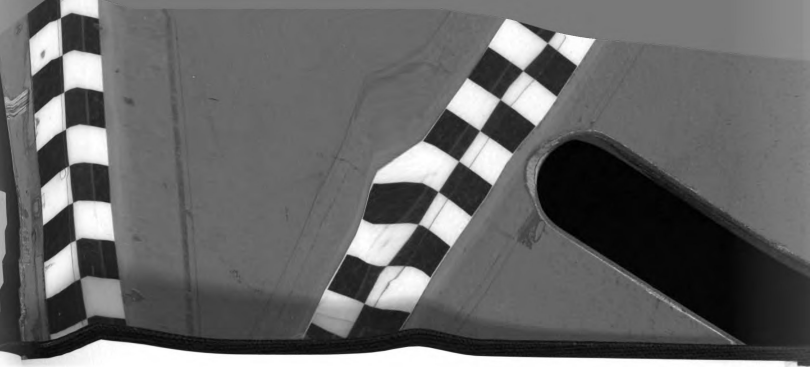
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system will accomplish his purposes. If the agent system has gained prior knowledge of these predispositions, he is able to plan a more effective communication strategy which takes account of them.

It may be concluded then that the primary way available to the agent system to induce the client system to adopt innovations consists of manipulating the content-bearing and relationship-defining aspects of his messages. That is, communication is the vital link between immanent change-control involving individuals considered in isolation, and contact change-control, involving individuals considered en masse. The constituent parts of an interactional system are persons exchanging information with other persons about a proposition, and the command aspects of human communication specify the relationships existing between the constituent parts for the duration that the interactional system is viable. By this conceptual model, we are able to locate the dyadic interactional system into the family, the community, the social system. It becomes a subsystem of these larger systems. Moreover, such a subsystem may overlap other subsystems, since each participant of a dyadic interactional system may be involved in a dyadic interaction with other persons.

In an interactional system, messages, particularly the relationship-defining aspects of messages, allow individuals to construe the intentions of others. Kelly (1963, p. 95) suggests that "To the extent that one person





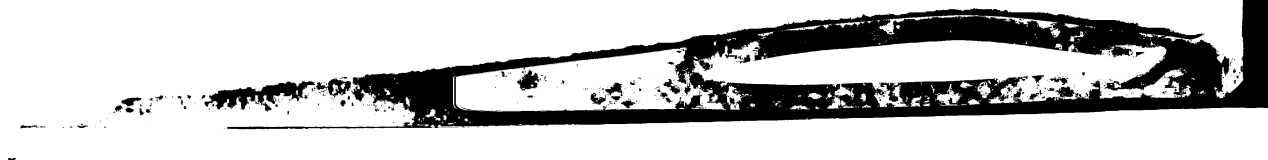
construes the construction process of another, he may play a role in a social process involving the other person." The person who is to play a constructive role in a social process with another person need not so much construe events precisely as the other person does as he must effectively construe the other person's outlook. This notion, of course, allows for the possibility of one person misconstruing another person's outlook. In such cases, communication may break down, i.e., the interactional system may cease to be viable.

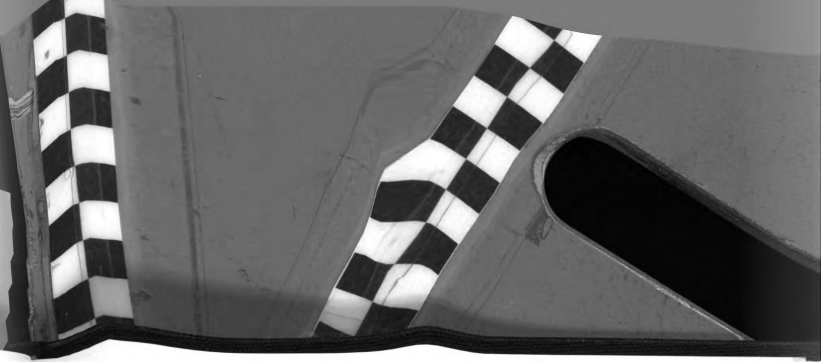
The Sequential Events

A process view of modernization implies that we look upon the modernization process as not having a beginning, or an end, or a fixed sequence of events. For purposes of discussion, however, we have isolated a single hypothetical act of modernization, and arbitrarily supplied it with a beginning, and end, and three sequential events in order to describe the major phases involved in the process of spreading an individual's invention to the population at large.

The Innovation Antecedent Event

The process of acquiring immanent change-control may have been heuristically triggered by a self- or other-conceived prospect of enhancing control, or by a threat of curtailment of control. In the latter case, the triggering mechanism may be called heuristic problem-solving, with the emphasis on "imaginative" rather than on "routine"





problem-solving. After intellectualizing the problem, after constructing its replication, as it were, by turning back on experience for possible solutions, by observing interactions among relevant phenomena, the individual formulates a resolution of intent. A resolution of intent expresses purposiveness on the part of an individual to affect his environment in such a way as to achieve a particular goal. Planning is the process by which resolutions of intent are translated into blueprints for behavior by spelling out the activities or operations necessary to accomplish intended controls over change occurring in a given phenomenon.

A plan's essential characteristic is feasibility. It represents a sort of manual of instructions for operationalizing resolutions of intent. Operationalization is the process by which the feasibility of a plan is empirically tested. It is the process of putting the plan into action, of carrying it out. During the process, the plan is checked, modified, possibly reformulated, or even rejected. A successful operationalization yields an invention which, when it is generalizable to, and reproducible by others, becomes an innovation.

Any individual who has physically or mentally replicated the invention with the purpose of passing it on to others may be regarded as being a potential agent system. The innovation antecedent event treats essentially of the activities of the inventor, but may also be extended to the



purposive replicator, in the process of gaining immanent change-control. Thus, the innovation antecedent event is the event during which immanent (inventive) control over change in environmental phenomena is acquired with a view to diffusing the resultant innovation to others.

The Diffusion Intervening Event

"The diffusion process is the spread of a new idea from its source of invention or creation to its ultimate users" (Rogers, 1962, p. 13). Diffusion occurs as a function of self-discovered and communicative change-control. Our primary focus is upon communicative change-control. That is, we are essentially concerned with the purposive, rather than the accidental, diffusion of an innovation by the agent system. In the diffusion intervening event, therefore, the agent system is regarded as the individual who initiates communicative interaction with his client system. Thus, the diffusion intervening event is the event during which individuals considered en masse come to be aware of an innovation largely, but not necessarily, as a function of agent-initiated communicative change-control. It is the event which links the innovation antecedent event with the adoption consequent event.

The Adoption Consequent Event

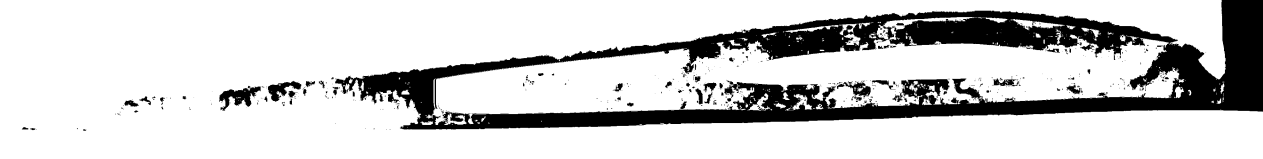
The agent system's primary goal in communicative change-control is to influence his client system to adopt an innovation. "Adoption is a decision to continue full use of an

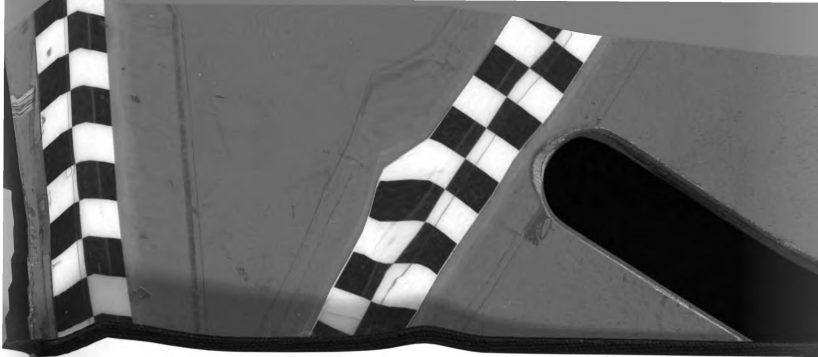
innovation" (Rogers, 1962, p. 17). In essence, the agent system attempts to induce his clients to undergo an abbreviated replication of the process of immanent change control, involving the procedures of formulating resolutions of intent, developing plans, and operationalizing the plans.* That is, the burden is upon the agent system to instill purposiveness in the client system. From the client's point of view, however, he is making a discovery as a result of contact with a source of an innovation. Thus, the adoption consequent event is the event during which contact (discovery) change-control is acquired by the client as a function of the diffusion of innovations by others.

Summary

Two basic ways of cumulating change-control, of acquiring new or improved methods of retaining essential variables within safe limits, are by (1) invention; and (2) discovery of inventions. Communicative change-control, i.e., the purposive communication of new or improved methods of change-control to others, describes the main way in which individuals considered en masse (regarded as the client system) acquire new or improved methods of change-control from contact sources of immanent change-control considered in isolation (regarded as agent systems). Thus, communication is the main vehicle by which widespread modernization occurs. To extend our earlier analogy, communication is the means by which individually specific units of controlled change in the collectively general storehouse of modernization become available to mankind in general.

*Rogers (1962, p. 81) stipulates five stages of the adoption process: (1) awareness, (2) interest, (3) evaluation, (4) trial, and (5) adoption.





CHAPTER IV

SUMMARY, CONCLUSIONS AND IMPLICATIONS

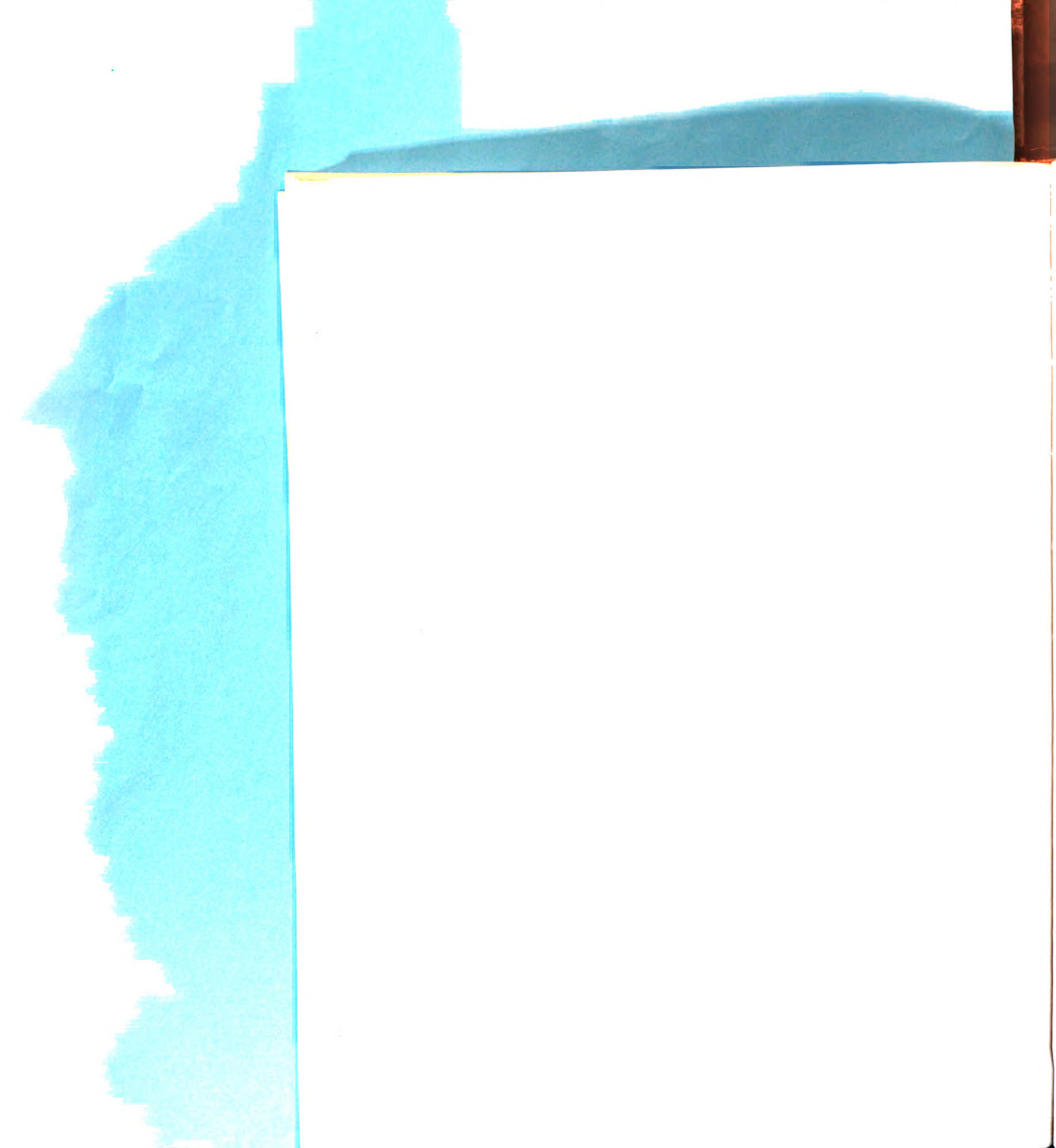
The present study aimed to extend the Rogers with Svenning (1969, p. 14) postulate that "Modernization is the process by which individuals change from a traditional way of life to a more complex, technologically advanced, and rapidly changing style of life." Rather than asking what the beginning and end states of modernization are (i.e., what is a "traditional way of life" and what is a "modern way of life?"), the present undertaking focussed upon the processual nature of modernization by asking: What are the underlying forces impelling the process of modernization and governing its course? How does the process of individual and mass modernization occur?

Summary of Main Propositions

The Modernization Postulate

It is postulated that modernization is the process by which man purposively cumulates control over change in environmental phenomena essential to the welfare of his organism.

Change in a system consists of any alteration of form and pattern of organization of its constituent parts resulting from internal interaction among constituent parts

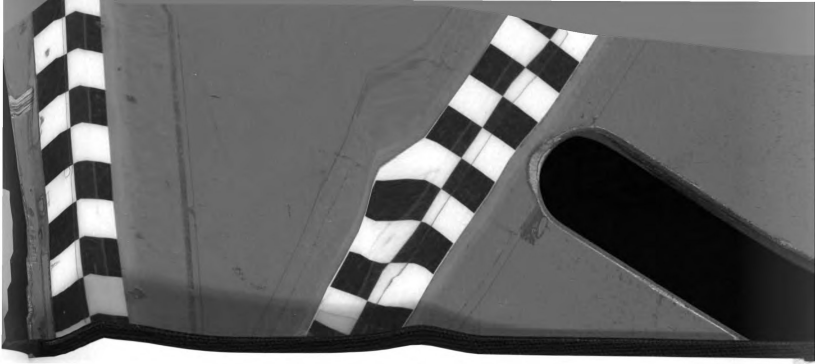


as well as from external interaction with other phenomena in its environment. The study of change in environmental phenomena consists of specifying (1) the particular phenomena under study defined by abstracting the essence of the form and pattern of organization of their constituent parts; (2) an issue or problem in the context of which to sort important from trivial relationships within and between phenomena; and (3) a point or span of time at or during which to observe any state, or change in state, in phenomena.

Physical phenomena may be classified as closed or open systems. Closed systems are static, incapable of exchanging energy with their environments, and characterized by a tendency in them for entropy to increase. Open systems are dynamic, maintain a continuous interchange of energy and component materials with their environments, and are characterized by a limited and temporary tendency for organization, the negative of entropy, within them to increase. Open systems have the properties of wholeness, self-regulation and equifinality.

Entropy is a measure of disorder in the universe, and its characteristic tendency is to increase. Organization is a measure of the opposition to entropy, and it has a locally limited and temporary tendency to increase. Man is an open system in which there is such a tendency for organization to increase; that is man is constituted by nature temporarily to oppose the natural tendency for entropy in the universe to increase. Man's environment,





being in the largest sense the universe in which the tendency is for entropy to increase, must be constituted by man himself, rather than by nature, to oppose the forces of entropy in order that man may survive.

Man's survival depends upon the regular and determinate exchange of energy and materials with his environment. Therefore, man continuously opposes the tendency for entropy in his environment to increase by constantly striving to retain within safe limits those essential environmental variables in which excessive change is incompatible with the welfare of his organism. That is, man's basic underlying purpose is to maximize his chances of survival by inducing and sustaining a limited tendency for organization in his environment to increase.

Control is the process by which man seeks to retain change in environmental phenomena essential to his welfare within safe limits. The goal of control is anticipation because man cannot long survive if efforts to maintain himself as an open system are activated only after essential variables have reached critical limits. Man needs to control essential environmental variables since his welfare depends upon the regular and determinate supply of certain essential materials external to his organism. Thus, man constantly seeks to enhance control, while at the same time seeking to avoid curtailment of control over change in phenomena essential to his welfare. The pursuit of enhancement and avoidance of curtailment results in the cumulation

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Control may be cumulated by gaining additional degrees of control over change in any given phenomenon, and by abstracting and generalizing the principle underlying control in one phenomenon to a wide variety of other phenomena. Control-cumulation is the means by which individually specific inputs are made to the collectively general storehouse of modernization. Control is a unidimensional concept, whereas modernization is likely multidimensional. Man's characteristic tendency is to cumulate control in order to more effectively oppose the tendency for environmental entropy to increase. That is, man's basic underlying need is to cumulate control over change in essential variables. It is this basic underlying need which impels the process of modernization and governs its course.

The Communication Corollary

Communication is the main vehicle by which widespread modernization is achieved.

Invention and discovery of inventions are the basic ways by which change-control may be cumulated. Immanent (inventive) change-control is the process by which new or improved ways of controlling change in environmental phenomena are created and developed. Contact (discovery) change-control is the process by which others become aware of and adopt innovations. Innovations are inventions which have been rendered generalizable to, and reproducible by, others. Contact change control may be (1) self-discovered, meaning

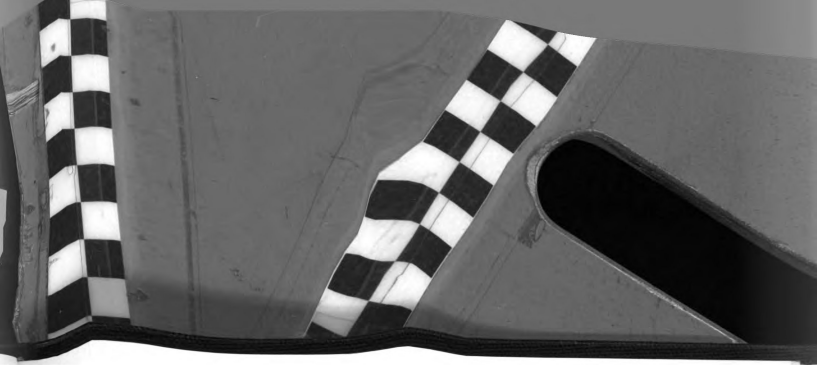
that an individual discovers an innovation on his own initiative and in the absence of purposiveness on the part of another individual; or (2) other-communicated, meaning that others deliberately intended an individual's discovery of a particular innovation to occur. Communicative change-control (i.e., other-communicated change-control) has the basic underlying purpose of securing the cooperation of others in applying compatible controls over change in communal environmental phenomena essential to their collective welfare. Generally speaking, immanent and self-discovered change-control describe the main ways by which individuals, considered as isolated units of one, cumulate control over essential variables. Communicative change-control describes the main way by which individuals, considered en masse, cumulate control over change in phenomena essential to their welfare. Thus, communicative change-control is the means by which widespread modernization occurs.

The agent-client interactional system is the basic communicational dyad in the modernization process. An agent system is any source of an innovation with the special purpose of influencing others to adopt that innovation. The agent system's innovation antecedent event is the event during which immanent change-control is acquired with a view to diffusing the resultant innovation to others. A client system is any individual, or group of individuals, who an agent system seeks to influence to adopt new or improved ways of change-control. The client system's

adoption consequent event is the event during which contact change control is acquired as a function of purposive diffusion of innovations by others. The diffusion intervening event is the event during which individuals considered en masse gain awareness of an innovation largely, but not necessarily, as a function of agent-initiated change-control. It is the event linking the innovation antecedent and adoption consequent events together.

Messages and the information they carry are the coupling devices linking the agent and the client system in the basic dyadic interactional system during the diffusion event. The units of communication are messages, message interactions, and patterns of interaction. Messages are the translations of ideas, purposes, and intentions into a systematic set of symbols. Any message has two major components: (1) it conveys information about a proposition; and (2) it defines a relationship between source and receiver of the proposition. Relationships in messages are seldom defined deliberately or with full manipulative awareness by participants in an interactional system. Concern with relationship aspects of messages may loom so pervasively large as to relegate the content aspects far into the background.

The primary way available to the agent system to induce (and to overcome prior negative attitudes) the client system to adopt innovations consists of the manipulation of the content-bearing, as well as the relationship-defining,



aspects of messages. Thus, communication is the means by which individually specific units of controlled change in the collectively general storehouse of modernization become available to mankind in general.

Main Conclusions

Let us, for a moment, consider the life style of the Kalahari Bushman vis-a-vis that of industrialized Europe. We may, as has been done in the past, abstract the essence of the form and pattern of organization of the constituent parts in the Bushman social system, and conclude that relationships among the constituent parts are characterized by set patterns of interaction which are relatively unchanging in rate and degree over time. We may likewise abstract the essence of the form and pattern of organization of the constituent parts in the European social system, and conclude that the relationships among these constituent parts are characterized by increasingly complex and rapidly changing patterns of interaction as a function of technological advancement.

We may furthermore regard the Bushman social system as typifying a "traditional" way of life and the European system as typifying a "modern" style of living. Because the European life style may once have been "like" the Bushman's, we tend to deduce directionality of change, a seemingly

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alchemic* transition, unilateral in direction, from a traditional way of life to a modern style of living. This tendency is exemplified in the Rogers with Svenning (1969, p. 14) postulate that "Modernization is the process by which individuals change from a traditional way of life to a more complex, technologically advanced, and rapidly changing style of life." Yet, in the end, "... it must be confessed that we know very little about the forces that cause the process of change and govern its course" (Hagen, 1962, p.3).

Extending Theory

We have attempted, in the present dissertation, to focus more on the processual nature of modernization by suggesting probable underlying forces which "cause" the process and govern its course. We have, therefore, proposed that modernization occurs as a function of man's ever-present need to oppose the tendency for entropy in his environment to increase by purposively cumulating control over change in environmental phenomena essential to the welfare of his organism. To show how the Rogers with Svenning postulate has been extended, we have taken their original formulation and combined it with our notion of cumulating change-control, yielding the following product: modernization is the process by which individuals change,

*One dictionary defines alchemy as the "medieval chemical science, the great objects of which were to transmute base metals into gold and to discover the universal cure for diseases and means of indefinitely prolonging life ... the process of transforming ... something common into something precious."

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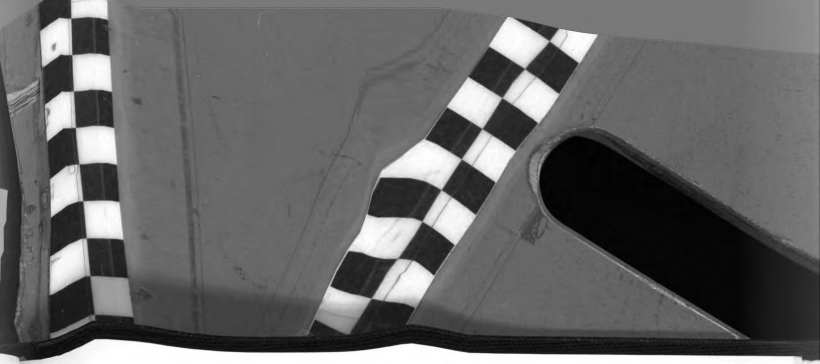
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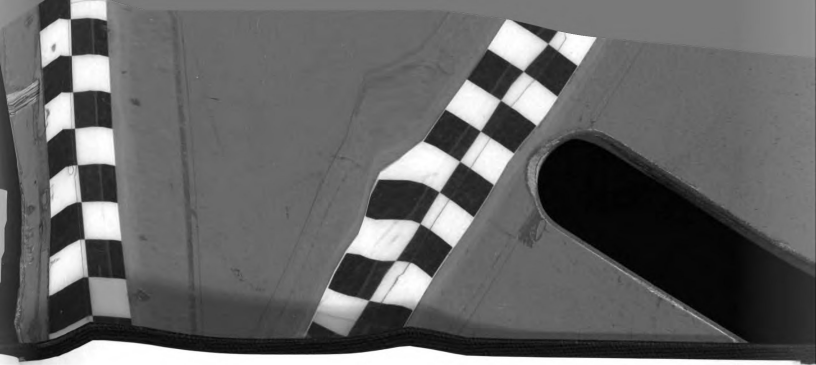


as a function of an underlying need to cumulate control over change in environmental phenomena essential to their welfare, from a traditional way of life to a more complex, technologically advanced, and rapidly changing style of living.

We are very careful, however, to point out that the postulate we have offered is not solely a means of deterministically linking traditionalism with modernism. Indeed, we view the manifestation of greater complexity, technological advancement, and rapid change as sufficient, rather than necessary, consequents of the need to cumulate control over change. Man is an open system capable of self-regulation and equifinal behavior. Outcomes of change over a span of time are not so much determined by the initial conditions existing prior to the period of time, as they are by the self-regulating processes of the system during the course of the span of time. If the equifinal behavior of man is based on the independence of outcomes from initial conditions, then not only may different initial conditions, such as urban poverty rather than rural peasantry, yield the same final outcome, but different outcomes, such as socialism rather than capitalism, may be yielded by the same initial conditions.

Therefore, the modernization postulate we have suggested neither presupposes traditional peasantry as the only antecedent condition, nor necessarily determines increasing complexity, technological advancement, and rapid change as





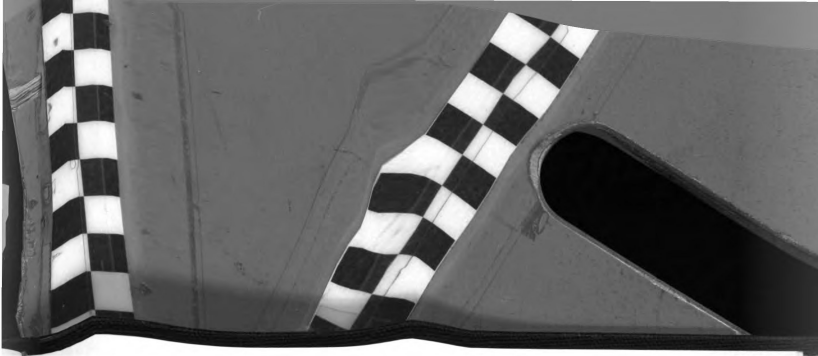
the only possible consequents. Indeed, our postulate does not preclude the possibility that at another time, or in another place, the outcomes of modernization may well be a simpler, slowly changing life-style if it turns out, in the long run, that a more complex, rapidly changing way of living actually constitutes a threat of curtailment to man's control over change in environmental phenomena essential to his welfare.*

By implication, our present formulations also extend the earlier modernization approaches upon which the Rogers with Svenning modernization postulate is based. Thus, the economist's view of modernization involving man's application of technologies in the control of environmental resources with a view to increasing per capita incomes and, hence, levels of living, is consistent with an hypothesis of need to cumulate change-control. Technology represents new or more effective ways of controlling change in such environmental phenomena as food, sanitation, medicine and so on, all of which are conducive to the welfare of our organisms, i.e., to increasing levels of living.

*It may be pointed out in this regard that air and water-pollution, deforestation of oxygen-producing plants, are manifestations of technological advancement which represent increasing loss of control over change in essential environmental phenomena. DeVore and Lee (1969) state that: "It is still an open question whether man will be able to survive the exceedingly complex and unstable ecological conditions he has created for himself. If he fails in this task, interplanetary archaeologists of the future will classify our planet as one in which a very long and stable period of small-scale hunting and gathering was followed by an apparently instantaneous efflorescence of technology and society leading rapidly to extinction."

The sociologist's view of modernization as focussing upon increasing differentiation and specialization of individual activities and social structures also fits well with our present formulations. First, modernization occurs because man opposes the tendency for entropy in his environment to increase. Entropy is characterized by disorder and sameness. The negative of entropy is organization which is characterized by order and differentiation. Therefore, when the sociologist observes a tendency for differentiation to increase as a function of modernization, he is observing the manifestations of man's need to induce a tendency for organization in his environment to increase.

Secondly, modernization is cumulative in nature since it is a function of man's need to cumulate change-control. As modernization cumulates, specialization follows, such that "remote" control, as it were, begins to gain increasing importance. Some individuals specialize in controlling agricultural variables, others in controlling sanitation variables, such that the agriculturalist and the sanitary engineer live together in mutual dependence. Macro-specialists develop to control the activities of the agriculturalists and the sanitary engineers, while micro-specialists come about to control further differentiated areas within the agricultural and sanitation domains. Thus, social systems with increasingly differentiated social structures and individual specialization are likely consequences of cumulating change-control across a wide variety



of environmental phenomena.

When the political scientists observe an increasing tendency for major clusters of old social, economic and psychological commitments to become eroded and broken, making people available for new patterns and directions of socialization and behavior, he is observing the effects of new and improved methods of change-control supplanting old, archaic ones. Similarly, when the social scientist observes the effects of urban industrialization upon the attitudes, values, and ways of feeling and behaving among individuals, he is observing a new style of living and thinking that comes with new and improved methods of change-control. For, as control over environmental change cumulates, it is not unlikely that individuals undergo more or less traumatic rearrangements of what they perceive to constitute promises of enhancement or threats of curtailment to their existing control over change in phenomena essential to their welfare.

The Rogers with Svenning modernization postulate, however, is primarily concerned with present-time peasant farmers who (1) may very likely constitute the majority of mankind; and (2) are evincing increasing evidence of failure to control essential environmental variables efficiently. It is to such persons that certain new and more effective means of controlling change must be rapidly diffused. We turn, therefore, to suggesting ways by which the diffusion of innovations may be made more efficient.



Implications for Practice and Research

The paradigm presented in Figure II implies an approach to research in which messages are the independent variables, and receiver variables of attitude toward the agent system (e.g., perceived credibility) and attitude toward the innovation (e.g., perceived feasibility) become the dependent variables. For the practitioner as well as for the researcher prior information about the receiver's attitudinal predisposition toward (1) sources of innovations, and (2) innovations themselves, increases the probability of designing effective communication strategies, of providing a context in which to manipulate messages based on anticipated client system behavior. The propositions offered in the present dissertation provide a useful basis for devising a general design by which to anticipate those factors most likely to influence the client system's behavior vis-a-vis the acceptance of modernizing influences.

In Chapter II, we derived two predictive statements from our fundamental modernization postulate. These statements represent a general framework for expecting certain patterns and directions of behavior to ensue under certain conditions. The first of these statements hypothesized that if an individual is confronted with a proposition which promises to enhance his control over change in essential variables, then it may be predicted that he will tend to accept the proposition. The second statement hypothesized that if an individual is confronted with a



proposition which threatens to curtail his control over change in essential variables, it may be expected that he will tend to reject the proposition. To be effective as a promise or a threat, the proposition must be feasible. These two statements are addressed primarily to making predictions about probable client behavior based mainly on prior information about the client system's attitudinal predispositions toward the innovations being proposed.

In Chapter III, we suggested that messages have two major components: (1) a content-bearing aspect; and (2) a relationship-defining aspect. We further suggested that the pattern of interaction most likely to obtain in the agent-client relationship is complementary interaction in which the relationship-defining aspects may loom so pervasively large as to overshadow the content-bearing aspects of messages. These suggestions are addressed primarily to making prediction about probable client system behavior based mainly on prior information about the client system's attitudinal predispositions toward the source of the innovations being proposed.

To provide a general design for gathering data on prior information about the client system's predisposition toward both the innovations and their probable sources, let us turn to Sherif and Hovland (1961) and their notion of the social judgment scale.

Sherif and Hovland suggest that individuals confronted with a series of related stimuli tend to form psychological

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scales of judgment by which they rate these stimuli in relation to each other, even when the stimulus series is not well graded, and even when explicit standards of judgment are lacking. The reference scale is composed of (1) a latitude of acceptance; (2) a latitude of indifference; and (3) a latitude of rejection.* Let us now apply the principle of the social judgment scale to gathering receiver pre-dispositional information in order to construct the following scales: (1) A span of optimal control; (2) A span of "actual control"; (3) latitudes of source-associated acceptance and rejection; and (4) latitudes of receiver-perceived enhancement and curtailment (Figure III).

The Span of Optimal Control

Berlo (1960, p. 12) suggests that "... in trying to improve our own communication ability, the first question we need to ask is, what did the communicator intend to have happen as a result of his message?" In the context of change-control, the agent system must clearly specify the complete set of behaviors to be adopted in order for a particular new way of change-control to be effective.

*Sherif and Hovland (1961) hypothesize that given a salient or ego-involving issue, such as birth control, an individual, if he is, for example, a staunch Catholic, would be expected to take an extreme stand against birth control. The latitude of acceptance of such an individual on birth control would include his own stand on the issue plus other related cognitions such as coitus interruptus, the Pope, and church dogma. That individual's latitude of rejection, then, could be expected to include all those other cognitions farthest from his own stand - the pill, advocates of birth control, and free love. Finally, the individual's latitude of indifference would likely include all those cognitions neutral to or not immediately relevant to the issue--cross-pollination, a school bond, and celibacy.



CLIENT SYSTEM PREDISPOSITIONSINTENDED CONSEQUENCESToward
Proposition:Toward
Source:1. Latitude of
Enhancement1. Latitude of
Acceptance2. Span of Actual
Control

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1. Span of Optimal
Control3. Latitude of
Curtailment2. Latitude of
Rejection

Figure III: General Design for Determining Attitudinal Predispositions toward Sources and Proposed Innovations.

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Let us suppose that the agent system's purpose is to diffuse NS-1 maize. Adopting NS-1 maize may mean the concomitant adoption of a complete set of practices essential to the successful cultivation of NS-1 maize (e.g., contouring, ridging, timing, row-cropping, fertilizing, spacing, weeding, spraying, and so on), as well as implying the abandonment of older, less efficient practices currently in use by the client system. Let us consider this complete set of behaviors which the agent system regards as essential to the successful cultivation of NS-1 maize as constituting the span of optimal control that the agent system is seeking to induce the client system to adopt.

The Span of Actual Control

The notion of NS-1 maize may represent a completely new food variety or it may represent an improvement over a variety currently in use by the client system. Whichever it is, a second step is to generate a complete set of the client system's current cultivation practices. The questions being answered here are: To what extent is the client system currently employing practices which are (1) included in the span of optimal control; or (2) inconsistent with the successful cultivation of NS-1 maize? Let us consider this complete set of current cultivation practices (i.e., the client system's existing degree of change-control over the phenomenon in question) to represent the client system's span of actual control.

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the span of actual control and the span of optimal control and this discrepancy will differ from individual to individual. By aggregating across individuals, it becomes possible to determine the model or normative discrepancy for the total membership of a particular social system. This modal discrepancy is what the agent system seeks to reduce in successive stages, the span of optimal control representing intended behavior, the span of actual control, performed behavior.

Source-Related Acceptance-Rejection Latitudes

The perceptions that the client system has of the agent system as a communication source of a particular innovation may affect the client system's decision. These perceptions relate to such attributes of the source as his competence, his trustworthiness, and his dynamism--in short, they refer to the credibility of the source. It would be helpful to the agent system, therefore, to generate a list of people, or people types, which the client system perceives to be (1) acceptable, and (2) unacceptable as potential sources of influence regarding a specific proposition. The list of acceptable sources, which might include opinion leaders, formal leaders, friends and relatives as well as the agent system himself, may be rank-ordered by the client system to range from mildly to strongly acceptable, thereby creating the latitude of acceptance. The latitude of rejection may be generated in a similar way and might include foreigners, youth, salesmen, government officials, and so on.

Proposition-Related Enhancement-Curtailment Latitudes

Individuals tend to react positively to propositions which promise to enhance, and negatively to propositions which threaten to curtail their spans of actual control over change in those phenomena to which the propositions are addressed. It would be helpful to the agent system, therefore, to generate a list of propositions which the client system perceives to be (1) promising of enhancement; and (2) threatening of curtailment to his span of actual control over change in a particular, essential variable. The list of potential, albeit not immediately feasible, enhancements might include the acquisition of a farming loan, more land, a harrow, laborers, more knowledge, a co-op and so on. Such a list may be rank-ordered by the client system from mildly to strongly desirable. By doing slight violence to the Sherif and Hovland notion of latitude of acceptance, such a ranking may represent the client system's latitude of enhancement. The latitude of curtailment may be constructed in a similar way. It might include such potential threats of curtailment as crop-taxation, drought, crop-failure, risk-taking or even forcible abandonment of traditional ways of cultivation.

It seems feasible to aggregate latitudes across individuals such that modal latitudes of acceptance, rejection, enhancement, and curtailment are established for any given social system. Armed with such information, an agent system is enabled to predict with increased precision

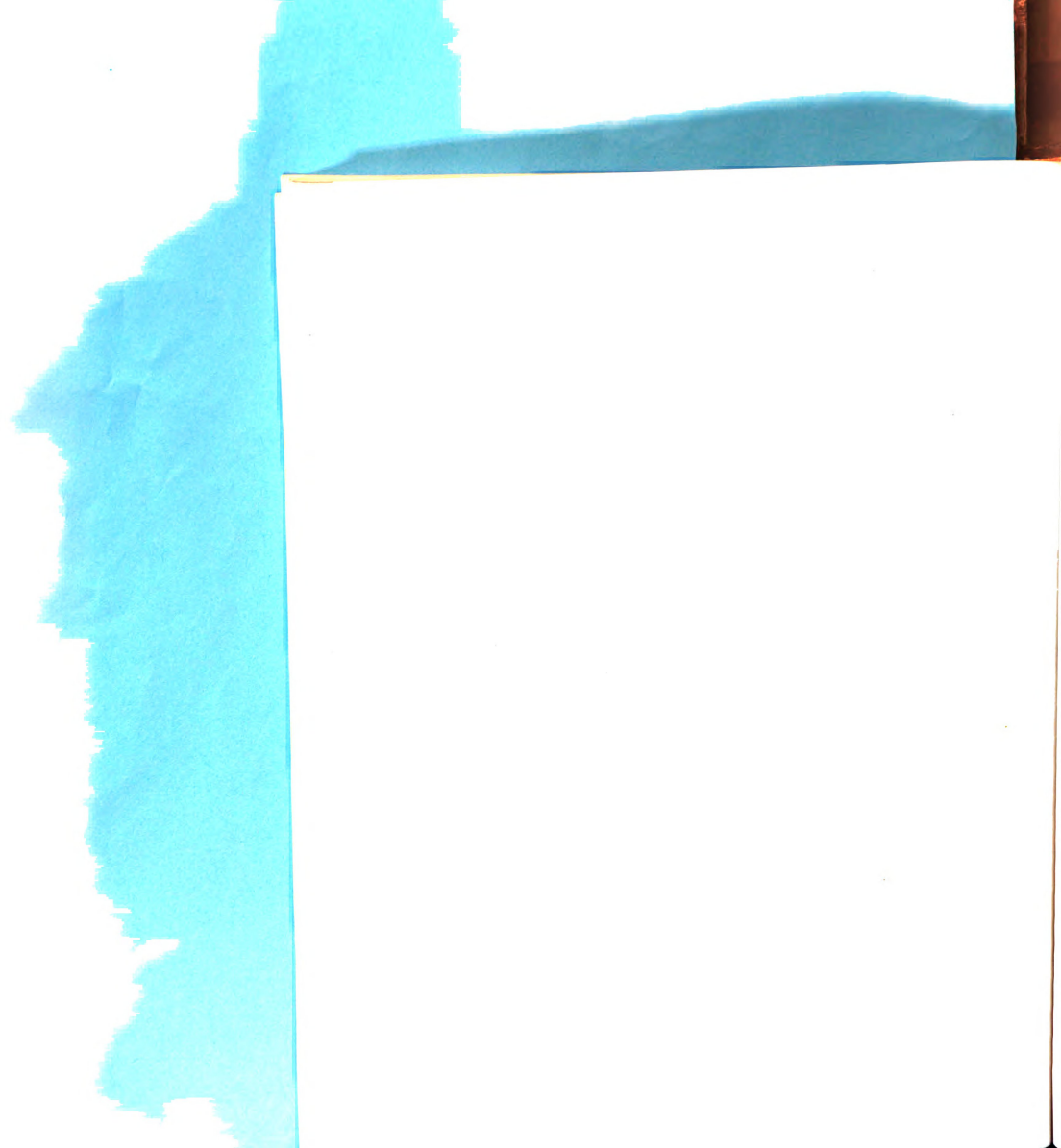
Probable client system reaction to the innovations he proposes. He himself may not have rated as an acceptable source, in which event he might seek to channel his messages through a source revealed in the latitude of acceptance as being highly acceptable. The innovation he proposes may likely imply the abandonment of traditional ways of change-control which, as Inkeles (1966) suggests, "... often seems to be abandoning principle itself." In this event, the threat of curtailment may well overshadow the promise of enhancement. He may seek to overcome this problem by attempting to create dissatisfaction with traditional ways (possibly under the aegis of a highly acceptable source) before unveiling his own proposition.

The researcher may be interested in investigating such questions as: What is the effect of a highly unacceptable source declaring himself to be strongly opposed to a particular innovation? It might be reasoned that the source is initially unacceptable because he represents a potential threat of curtailment. His opposition to the innovation may thus be interpreted as a design to prevent enhancement on the part of others. Therefore, it seems reasonable to hypothesize a tendency for individuals to accept innovations which are opposed by highly unacceptable sources. Another question which indicates a fruitful avenue of research is: What is the effect of an individual being repeatedly confronted with propositions which are promising of enhancement, yet are patently not feasible in the

perception of the individual? It may be hypothesized that the individual will tend to grow increasingly alienated from the source even to the point of becoming fatalistic. Such an individual may become so inattentive to further messages from the source that even propositions which are clearly feasible may be ignored.

These are but a few indications of the utility for practice and research-generation deriving from the theoretic framework developed during the course of the present dissertation. Our formulations suggest a preventive rather than a curative approach to modernization in that the emphasis is upon devising strategies of communication directed not at overcoming inherently recalcitrant receiver attitudes, but at avoiding their development. It is in this regard that we believe the theoretic approach suggested in the present dissertation has its greatest utility.

It cannot be too strongly emphasized, however, that the present dissertation, in essence, represents no more than a seemingly feasible plan which still awaits operationalization. It is an expression of purposiveness, a resolution of intent to gain control over the procedures of inducing rapid and effective modernization. It is a manual of instructions for practice, a blueprint for research, the feasibility of which has yet to be submitted "... to the court of empirical inquiry and test" (Kerlinger, 1965, p. 13).



Needed Research

Previous research on modernization tended to be concerned almost exclusively with endogenous determinants of receiver behavior, with determining inherent characteristics of receivers of modernizing influences.* This focus arose from a need to explain the apparent tardiness of such receivers in accepting new ideas. As a result, the notion has taken root that "traditional" people are afflicted by certain inherent attributes, such as a lack of innovativeness and a propensity toward fatalism, which effectively inoculate them against the incursion of modernizing influences.

Because research focussing on certain exogenous determinants such as those associated with perceived characteristics of sources of, and of messages about, new ideas have not been as extensively undertaken, it is still questionable whether all of the refractory characteristics attributed to "traditional" people are indeed inherent, or whether some of them may not be merely symptomatic of poorly-established source-receiver relationships. Modernization researchers, by focussing more on such channel variables as mass media exposure and cosmopolitaness, usually tend to treat the content aspects of messages as given while largely ignoring their relationship-defining aspects. As a result, we find

*Witness Rogers' (1965) "subculture of peasantry" which presents a synthesis and summary of peasant farmer characteristics drawn from available theoretical, speculative, and empirical literature.



ourselves blaming, as we frequently do, the failure of a campaign to persuade peasant farmers to adopt new agricultural ideas upon possibly extraneous and perhaps irrelevant receiver characteristics rather than on a possible shortcoming of the campaign strategy itself. In the circumstances, we cannot be certain that a campaign failed because of inherently change-resistant receiver characteristics, or whether it failed as a result of receivers construing, or perhaps misconstruing, the campaign objectives as threats of curtailment rather than as promises of enhancement. Certainly, if the latter is the case, then the error is correctable in the agent system's communication. Since there are generally considerably fewer agent systems than clients, the problem is relatively easier to handle. In any case, even if there are inherent receiver characteristics acting as barriers to accepting new or improved ways of change-control, it is still the agent system upon whom the burden rests to devise a sufficiently effective communication strategy to overcome them.

To this end, we have made the diffusion intervening event, rather than certain intervening variables internal to the organism, the central issue of our paradigm of the process of modernization. Our rationale for doing so is based on the conviction that it is more helpful to advise an agent that his failure in diffusing a particular new idea may have arisen from an inappropriate but self-correctable message treatment, than it is to tell him that

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his problem rested in a nexus of inherent change-resistant characterological elements within the client. The approach offered in the present dissertation invites research directed to the systematic manipulation of both the content-bearing and the relationship-defining aspects of modernization messages, under the assumption that the process of modernization is impelled by a human need to cumulate control over change in environmental variables essential to the welfare of man.



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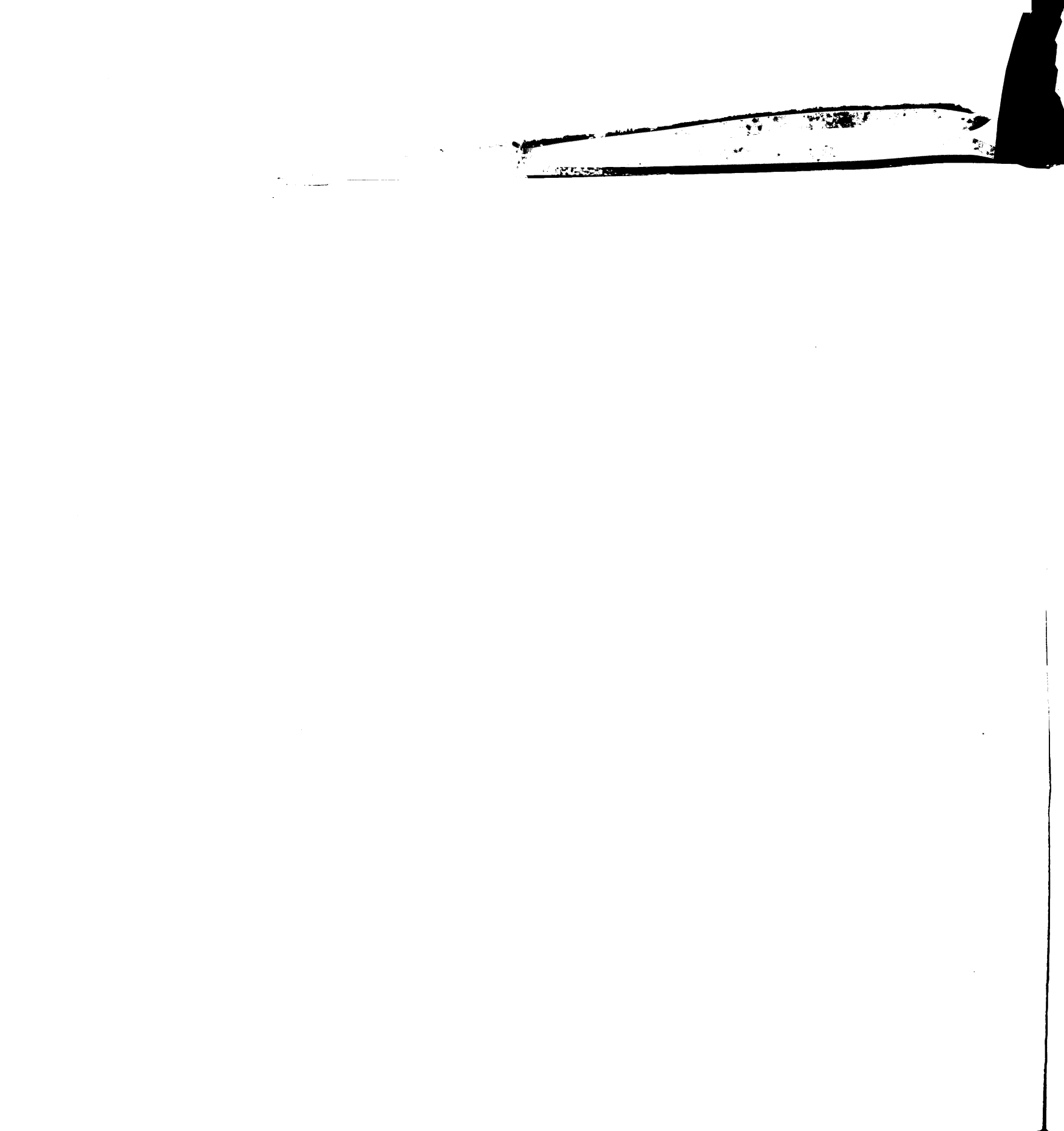
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