

APPROACHES TO SEMIOTICS

edited by

THOMAS A. SEBEOK

assisted by

DONNA JEAN UMIKER

SEMIOTIC
APPROACHES
TO
HUMAN RELATIONS

by

JURGEN RUESCH, M. D.

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INTRODUCTION

If in the past man's environment was made up of people, animals, vegetables, and minerals, the rise of the technological civilization has added another significant element — the machine. Although made up of inert materials and referred to in slang as “hardware”, modern machines no longer are simple extensions of man's sensory or motor systems, as was characteristic of the earlier industrial age. We now are in the post-industrial period in which machines are capable of receiving signals, of making decisions, and of emitting signals. Similar to organisms, machines can achieve a certain degree of autonomy; and they therefore have a “behavior” of their own. The theories and scientific models that underlie the construction of computers, automata, and robots have greatly enhanced our knowledge of human behavior; and now, for the first time in the history of mankind, we are able to construct external models of behavior — a feat that enables scientists to test some of the theories derived from empirical observation of individuals and groups.

Perhaps it is well to remember that there exists no single theory of communication. Instead, the science of “steersmanship” or cybernetics comprises a number of theories. Information theory is essentially concerned with the probability of occurrence of signs and related phenomena. A second theory is concerned with smoothing, filtering, detection, and prediction of the value of signals in the presence of noise; and finally, there is a theory of feedback and servomechanisms. These theories of communication have been successfully tested and operationalized in the fields of automata, genetics, neurophysiology, and economics. However, these mathematical aspects of communication do not suffice to encompass satisfactorily face-to-face encounters. To apply the notion of cybernetics to the human situation, we have to draw from theories that derive from social anthropology, sociology, philology, linguistics, and related disciplines. All of these fields are concerned with

semiotics — that is, the phenomenology of signs and their relationships to one another and to their human users.

One of the major obstacles in applying principles derived from cybernetics to the human situation was the traditional separation of the sciences into the natural sciences on the one hand and the social and psychological sciences on the other. For over 2500 years, the mind-body dichotomy has been with us, with the result that the communication machinery of the human organism was considered in the light of biological and physical laws while the semiotic processes were evaluated in the light of theological, psychological, and social conventions. But man is a complex creature, and his behavior can be understood only if both the bio-physical and the symbolic processes are encompassed in one over-all system. With the advent of cybernetics and the concept of feedback, the theoretical basis for a unification of behavioral theories was established, resting essentially upon the following circumstances: Information processing — both by the human mind and in the computer — is based on scanning, encoding, decoding, storage of information, decision-making, and similar procedures. The output of an organism or a machine is judged in terms of the effect it produces. The output of the body is made up of a variety of movements summarized under the term “action”. All actions have a physical impact upon people and upon the material surroundings, and when this impact is perceived by an individual, it is fed back and incorporated into his body of information where it leads to corrections of his knowledge. Feedback links the impact of action in the physical world with information about action in the symbolic world. Information thus controls action, and action changes information. With this linkage, the mind-body dichotomy became obsolete.

In the modern world, the symbolic, linguistic, and semiotic processes have been unified under the heading of “information sciences”. Communication is recognized as that process that links discontinuous parts of the living world to one another. It is made possible by three basic properties of organisms found at all levels of organization from the single cell to complex societies. In living organisms we refer to perception, evaluation, and expression, and in machines we call these properties input, central function, and output. These functions, of course, constitute the foundation upon which human relations and man-machine interaction rest.

The papers reproduced in this volume reflect the approaches to human behavior that developed when communication became one of

the central concerns of behavioral scientists. In the first section, "The Theory of Social Communication", the reader will find a recapitulation of the notions of cybernetics as they apply to face-to-face communication in two-person situations and in small groups. Naturally, the principles of communication derived from message exchanges between machines cannot be applied in the human situation without some alterations. For one, the concept of noise that refers to the presence of random or undesired signals in systems with discrete channels cannot be used because in discussing human communication it is impossible to define which signals were intended to reach the other persons and which were added from other sources in the environment and hence constitute noise. For another, the connection between information and action is more complex and often delayed in the human situation, so that it is uncertain which information should be attached to which action and vice versa. Notwithstanding these difficulties, the notion of feedback has proven to be the single most productive concept introduced into the behavioral sciences in the twentieth century.

In the section entitled "Communication, Social System, and Culture", the reader will find a description of the social field, or the context, in which a message exchange takes place. The social field determines the parameters of the system that are significant for both the scientific observer and the participants. For the scientist, the social setting provides the more time-enduring structure in which an exchange takes place; for the participant, it provides the instructions necessary for coding and decoding the messages. This has been described as meta-communication.

In the third section, entitled "Communication and Interaction", the papers are concerned with the relationships of information to action and of the action of one person to the reaction of another. Emphasis is laid upon the two principal modes of evaluating meaning. The first, or the traditional evaluation of the referential property of signals and signs, is concerned with the agreed upon meaning, reflecting the normative property of universal signs and symbols. The second, or personal evaluation, is concerned with the impact signals, signs, or actions have upon self and others. The nominal evaluation can be carried out by any observer who has a dictionary; the experiential evaluation can be carried out only by the participant who has experienced the impact of the exchange. Both modes are necessary to build up a cumulative body of knowledge and to understand the usage of universals in specific situations.

In the fourth section, communication theory is treated as a general systems theory, or a theory of theories. As any person familiar with interdisciplinary research knows, an attempt to bring together data concerning human behavior derived from different disciplines has to focus upon elements or aspects that are shared. By neglecting the individual and focusing upon the message, scientists are able to trace it from its place of origin to its destination. In the process, the message travels through diversified networks and usually gets transformed as it passes from one organization to another. At each station of transformation it loses some information because of the recoding process, and at its destination it may have a totally different meaning and impact than the intended one. But in the meantime, anthropologists, sociologists, psychologists, linguists, biologists, and other scientists can study the identical events and report their findings in one and the same conceptual framework.

In Section V, the application of communication theory to clinical science has been discussed. In this context, then, clinical science includes not only medicine and psychiatry but all those fields that deal with the assessment of people regardless of purpose. To put it even more broadly, communication is the tool of all social procedures; and failure in communication usually spells doom for human relations and social enterprises. Therefore, the assessment of a person's ways of communication is central to all types of human evaluations; and knowledge of the particular slants and emphases that communication may take is paramount for prediction of behavior in individuals or groups.

Psychiatrists, psychoanalysts, psychologists, and related professionals are experts at dealing with disordered behavior. Unfortunately, however, psychiatric theories rarely are phrased in operational terms — that is, in the ways in which information is gathered or action is undertaken. Instead, psychiatric theories are built either around the notion of personality or around the notion of part functions such as thinking, emotion, stress, and the like. Psychotic and neurotic patients suffer from disorders of communication, as do those persons who have not mastered social communication, who cannot coordinate information with action, who have difficulties engaging in action, or who possess a conflictual body of information. In Section VI, then, a number of papers have been assembled which describe not implicitly but directly the ways of communication of a variety of psychiatric patients. Illustrative examples, focusing upon the transmission of anxiety and the com-

municative difficulties of psychosomatic and schizophrenic patients, have been presented.

In Section VII a more detailed discussion of the therapeutic process is presented. Unfortunately, most psychotherapeutic theories of psychiatry are again not phrased in operational terms but are appended to a variety of personality theories. The detailed procedure usually is left implicit, and improvement is reported in terms of personality changes. Here, then, an attempt has been made to cover a variety of psychotherapeutic procedures in terms of communication. The discussion ranges from action-oriented to verbal communication, from psychotherapy with the very ill to psychotherapy with those who function relatively well, and from treatment undertaken by professionals to interviews conducted by machines. The examples given illustrate the fact that therapeutic communication reflects an attitude of the therapist which can be characterized as follows : He will use any means, verbal or nonverbal, to understand what the patient wishes to express; and in turn he will use any device to get his own messages through to the patient. He will try to acquaint the patient with the pleasure of communication, and once this pleasure has been experienced the patient can be relied upon to master the more complex forms of communication in order to enjoy the satisfactions that successful communication can bring to every person.

I

THE THEORY OF SOCIAL COMMUNICATION

INTRODUCTION

- 1. SOCIAL PROCESS**
- 2. SYNOPSIS OF THE THEORY OF HUMAN COMMUNICATION**
- 3. PSYCHIATRY AND THE CHALLENGE OF COMMUNICATION**
- 4. PRINCIPLES OF HUMAN COMMUNICATION**

INTRODUCTION

The theory of social communication I first described, together with Gregory Bateson, in a volume entitled *Communication, the Social Matrix of Psychiatry* (Norton, 1951). This work was the result of the emergence of the information sciences in the 1940's — marked in print by Wiener's book on *Cybernetics* (Wiley, 1948), the Transactions of the Macy Foundation Conferences on Cybernetics (1949-1953), and Shannon and Weaver's *The Mathematical Theory of Communication* (University of Illinois Press, 1949). The scientific theories of the communication engineers had to be somewhat modified to be of use in the study of face-to-face situations. Therefore the term "social communication" refers to these modifications, indicating that the theory is concerned with the exchange of messages mediated by vocal sounds, written signs, or gestures and other movements without the intermediary of machines. In social situations, the channels that connect sender and receiver are not discrete, and the intended message often cannot be separated from accessory messages originating in the environment. Therefore, the interpretation of messages exchanged in a social setting is dependent upon a knowledge of situational factors which are conceptualized best with the help of theories borrowed from the social sciences.

The interrelationships between the converging fields of communication, social engineering, sociology, social psychology, and the management sciences have been discussed in the first paper entitled "Social Process", while in "Synopsis of the Theory of Human Communication" the modification of the engineering notions to suit social interaction and face-to-face communication have been presented in greater detail. "Psychiatry and the Challenge of Communication" examines the ways in which the professionals in the health sciences use communication in their daily operations. A summary of the postulates of the social theory of communication, formulated in simple and concise language, can be found in the last paper of this section.

The central idea of these presentations contains two notions. The first is that communication always has to be conceived of in dualistic terms. The scientist and theoretician has to think of information and action, content and instructions, intended effect and that actually achieved verbal and nonverbal codification. The two sets of data complement each other, and the relationship is more stable than either set alone. For example, if the metacommunicative instructions are elaborate, the content can be brief; or, if the content is conveyed by gesture, the vocal sounds can be treated as instructions. The second notion refers to the fact that we have always four elements to consider : the sender, the receiver, the observer, and the total system. Sometimes the position of the observer is fused with that of sender or receiver and one position is eliminated; on other occasions, the system is neglected and remains implicit because the participants share assumptions and these need not be spelled out.

SOCIAL PROCESS

(1966)

Every human being is equipped to relate to others, and this feature is as basic as locomotion, metabolism, respiration, or circulation. This human faculty, which for want of a better term shall be called "social process", can be studied through the observation of four sets of phenomena.

The *actual events* — that is, those that stand for themselves — can be divided into : (1) *behavior*, or the functioning of whole organisms or machines and (2) *field*, or the environmental or situational structure in which this behavior takes place.

The *symbolic events* — those that stand for other events — can be divided into : (3) *communication*, or the symbolic functioning of whole organisms or machines and (4) *organization*, or the social order (context) in which communication takes place.

Unfortunately, the experts who study these processes and fields have little contact with one another, and in the course of time they have developed different theories and methodologies. Professionals who work in these related areas therefore are confronted with multiple and overlapping concepts and vocabularies. In this paper, a comparison is undertaken of the theories of the behavioral and social scientists with the notions of the communication engineers and organization experts, in the hope that such juxtaposition may prove helpful to the psychiatrist in developing a more comprehensive theory of his therapeutic and managerial procedures.

Four Approaches to Human Behavior

Both behavioral and social scientists study people, but those who study individuals use somewhat different concepts than those who study groups or social structures. Theoretically speaking, the relation of the individual to the group and of the group to the larger social system has

always presented a major conceptual obstacle. Part of this difficulty is related to sheer numbers. Theoretical generalizations are dependent upon the magnitude of the social system in that the reliability and validity of observations and measurements increase as the number of factors increases. Although behavioral and social scientists never deal with mass effects of the order of the gas laws (10^{23}), they nonetheless can make rather accurate predictions with the help of techniques utilizing a smaller number of factors (Table 1).

At the level of magnitude of 10^0 , the individual person, functions are conceptualized in terms such as identity, motivation, cognition, learning, adaptation, or action. The multiplicity of factors here is related not to the number of persons but to the number of observations made about the same person. The method may be reliable, but because of the limited number of cases the conclusions may not be generally valid. At the level of magnitude of 10^1 , or the small group, functions are expressed in concepts such as family, interaction, rivalry, competition, cooperation, rejection or leadership. The same reservations that apply to the individual apply to the small group, except that the variability of group phenomena is somewhat less than the variability of individual phenomena; therefore abstractions tend to be more valid generally. At the level of magnitude of 10^3 to 10^6 , or society, concepts are expressed in terms of value orientations, laws, economics, language, institutions, religion, or politics. At this level we are dealing with generalizations about mass effects. The methods may not be reliable, but the conclusions often are generally valid. At the level of magnitude of the gas laws, finally, the methods are reliable and the conclusions are valid.

Social and Behavioral Science

Among the concepts supplied by the behavioral and social disciplines which may be of use to the psychiatrist we find : the notion of identity, which refers to the way an individual views himself vis-à-vis others (13); the notion of position, which defines the tasks, rights, and obligations of a given station or office in a social system (62); the notion of role, which refers to what a person makes of a position through his ways of thinking, feeling, and acting (110, 119); power, which results from the ability of a person (or group) to make other people do what he wants them to (68); status, an attribution of power that leads to preferential treatment by others (9); and respect or esteem, which is a public reaction expressing emotional approval of a person or action (4). Social

TABLE 1

The Order of Abstractions

Field	Type of Abstraction	No. of Individual Entities Upon Which Abstraction Is Based	Order of Magnitude
Psychoanalysis	Personality typologies	One person or the average of several persons (eg, the oral character)	10^0
Clinical Psychiatry	Disease typologies	Between 10 and several hundred cases (eg, the acute brain syndrome)	10^1 - 10^2
Social Psychiatry	Situation and group typologies	Between 10 and several hundred transactions (eg, marital conflict scenes)	10^1 - 10^3
Cultural Anthropology	Value or role typologies	Between 100 and 1,000 observations (eg, the medicine man)	10^2 - 10^3
Sociology	Institutional or mass typologies	Several thousand individual responses (eg, public opinion polls)	10^3 - 10^4
Economics	Economic typologies	10,000 to millions of transactions (eg, the stock market averages)	10^4 - 10^7
Government	Political science typologies	100,000 to hundreds of millions of people (eg, the voters' response)	10^5 - 10^8
Physics, Chemistry, Biology	Laws of physical science	Molecules in large numbers	10^{23} and up

TABLE 2

Concerns of Social and Behavioral Scientists

The Individual (The Field of the Behavioral Scientist)	Group and Society (The Field of the Social Scientist)	Social Operations (The Field of the Manager and Social Planner)
Physical characteristics (113)	Race and ethnic background (15, 22)	Integration and acculturation (117, 125)
Personality structure (45, 114)	Social structure and institutions (83)	Organization and reorganization (75)
Ideals, principles (11)	Rules, laws, and games (49, 131)	Law enforcement (64)
Knowledge and skills (42)	Collective know-how (24)	Education and Supervision (97)
Individual values (73)	Cultural value orientations (94)	Opinion molding (95)

TABLE 2 (*Continued*)

The Individual (The Field of the Behavioral Scientist)	Group and Society (The Field of the Social Scientist)	Social Operations (The Field of the Manager and Social Planner)
Energy and initiative (5)	Power (9, 68)	Manipulation of appeal and popularity (25)
Action (52)	Group action (21)	Social planning (27)
Perception and expression (55)	Group communication (48, 70)	Change in styles (76)
Speech (109)	Language (86)	Operant conditioning (118)
Role (136)	Position (96)	Definition and redefinition of tasks (2)

rewards (honors, titles, memberships) are given for purposes of group manipulation (52). It follows that position, role, and power are the terms used by insiders, while social status, popularity, esteem, and honor are the notions used by outsiders who are less familiar with the people and the situations involved (Table 2).

The Motivating Force : Social Needs

The human being is structured in such a way that he needs (60) for his well-being the fulfillment of a number of conditions (20). These Cantril (16) has described as follows : Man requires the satisfaction of his survival needs and seeks security in a physical and psychological sense; he craves sufficient order and certainty in his life to enable him to judge with fair accuracy what will or will not occur; he seeks to enlarge the range and to enrich the quality of his satisfactions; and being a creature of hope he is not inclined to resign himself easily. Since he has the capacity to make choices, he desires freedom to exercise this capacity. He wants to experience a sense of his own worthwhileness, and he wants to share a system of values or beliefs to which he can commit himself. Also, he needs to live in a society which holds out a fair degree of hope that his aspirations will be fulfilled.

The fewer of these conditions that are met, or the more the conditions deviate from the optimum, the more frustration the individual experiences. This frustration, which is inwardly characterized by a variety of feeling states (anxiety, anger, fear, shame, guilt, and depression), is outwardly visible as tension (58). Because tension is subjectively disagreeable, the human being attempts to seek those goals

and conditions that he believes will reduce his tension (goal-seeking behavior). If he is unsuccessful, he may attempt to alter his goals and seek satisfaction in a different manner (goal-changing behavior). Behavior thus can be viewed as a series of tension-producing states (111) which induce people to communicate or to act in order to reduce tension. In the process new tensions are created, and so it goes.

The Clash With Others : Conflict

Today we have to presume that social conflict and crises always will exist and will become intensified as available rewards and opportunities become scarcer. Social conflict increases with gross inequalities, high population density, excessive restrictions, and inadequate standards of living (59, 85). In daily life some situations are conducive to social conflict, which may arise if : the paths of people's actions collide (traffic accidents); the number of obtainables (seats in the theater, elective offices) is smaller than the number of people seeking them; somebody or some group infringes upon the territory, the rights, or the privileges of others (libel, personal injury, trespassing on property); the positions of individuals are ill-defined (two positions responsible for the same task); the roles are mutually exclusive (two leaders in the same small group); the laws, regulations, and informal rules governing a social situation are ambiguous (smear tactics or libel in a political campaign); the goals of a situation are ill-defined (committee without a specific charge); or the actions or communications of two or more people are non sequitur (delayed response, which when it arrives is no longer pertinent because in the meantime the situation has changed).

The Prevention of Conflict : Social Organization

Social organization is designed to achieve a designated purpose and to prevent conflict. It may function at the international, national, state, county, community, association, small-group, family, and individual levels. It essentially facilitates the achievement of certain tasks that are too big for the individual, and it assures the survival of the group. Large organizations are described in terms of constitutions and formal organizational charts. Small groups and families usually have informal, unwritten, but nonetheless clear-cut ways of organizing their social pursuits (2).

The purpose of social organization (127) is to : define group tasks;

delineate boundaries in time and space (to each his own); establish priority systems (value systems); provide for emergencies (protective services); make new rules (legislature); interpret the rules (judiciary); reinforce the rules (law enforcement); allot positions within the organization (civil service); make decisions (executive); initiate and implement group action (exploration of outer space); and regulate exchange with other groups (competition, cooperation).

The Individual in the Organization : Position, Status, and Power

Inside a social organization the position that an individual holds defines his tasks, his rights, and his obligations (96). With it goes power, or the ability to make other people act in certain ways (68). Acceptance and fulfilment of a position and the exercise of power bring personal rewards, while mismanagement of the position usually leads to diminishing rewards or to exclusion from the organization altogether (75).

Citizens who stand outside an organization attribute social status to an individual because of his position and membership in the organization or social group. Status refers to an individual's rank in the human pecking order (9). These attributed, but rarely tested, features can to some extent be manipulated by means of advertising (95). High status gives an individual advantages in that he may receive preferential treatment by others. Inside an organization a person usually operates with the power given to him through his position. Outside of the formal organization — for example, at a cocktail party — he operates with the status given him voluntarily by the other participants.

The Individual in the Social Situation : Roles, Rules, and Games

The role that a person assumes is determined by what he thinks, feels, and does (74). Role is independent of position and does not wield power. A role is nothing but a typology expressing the mutual relationship of people : father-son, leader-follower (110). Role is self-chosen, and the public may show respect for certain roles (hero) and, conversely, contempt for others (traitor).

Rules (49) are made by people to govern interaction. The formal organization rules are principle-oriented and refer to the stations in the organizational scheme, prescribing the tasks, the privileges, and the responsibilities of their occupants. When interactions become repetitive, the rules that govern them can be compared to games (12). Informal

rules are those which modify the organizational rules and are adapted to the roles of the participants. Informal rules therefore make it possible for an organization to operate without violating the organizational scheme or the written rules upon which the organization is built.

Communication Engineering

Communication experts are message oriented rather than people oriented. This emphasis enables the observer to trace a message from its source to its destination, regardless of how many times it may be transformed or recoded and regardless of how many machines or people are traversed. Each unit engaged in communication is characterized by input, output, and decision-making. Units (cells, people, machines) may be organized into larger aggregates in various combinations.

Computers and similar devices for some time now have been used as external models of social, psychological, and physical functioning (31, 65, 84). The theories used in the communication field are on the whole more accessible to testing and experimental verification than the theories used in the social field. We are rapidly approaching the stage where the computer program that reenacts a process will be just as acceptable as the equation describing it. An extreme position even claims that a theory that cannot be translated into a computer program no longer can be considered a theory (100). The various communication theories have achieved their present positions of eminence because they have the characteristics of general systems theories. Properties or functions described are no longer bound to a structure of a given magnitude, as is the case with the abstractions of the behavioral and social scientists, inasmuch as input, output, and central processes are characteristic of cell, organ, organism, group, society, or automaton.

There exists no single theory of communication. Instead the science of cybernetics, or steersmanship, comprises a number of theories: information theory (mathematical) (112); smoothing, filtering, detection and prediction theory (value of signals in the presence of noise) (99); and feedback and servomechanism theory (99, 133). The application of these theories has been successfully tested in the areas of automata (65), genetic control (6), nervous system functioning (24), humoral functioning (55), interpersonal communication (107), mass communication (67), and economics (63). In order to communicate, the individual entities must share a code or language (109). The path that signals take is referred to as a network (107). When effects achieved through

communication or action are taken into consideration at the source, we talk of feedback (133). Whatever referential property is attributed to a language or code is commonly known as content (11).

Matters get more complicated when one considers actions as messages. Animal biologists, ethologists, and ecologists, unable to talk to their animal subjects, have to rely upon the observation of behavior (action) to study communication (37). The distinction as to when an action is intended as a message and when it is used for need satisfaction has always remained a puzzle for the communication experts. The simplest way to handle this perplexing problem is to assign a dual function to any action. In the first instance, the action serves need satisfaction; in the second instance, it may be perceived by self or by others, and at that moment it becomes a message. Intention, therefore, which plays such a role in legal procedures, cannot be used in communication, because unintentional messages may have as much impact as intentional messages (108).

The Managerial Disciplines

If the behavioral and social scientists are structure oriented and the communication engineers message oriented, members of the newly emerging managerial disciplines are task oriented. Less interested in what exists and more interested in reaching a stated goal, these people are at present developing a science of operations. Although professionals such as the lawyer, the clergyman, the teacher, the military man, the business manager, the personnel officer, and the government agent all are concerned with interaction and communication, there does not exist as yet a mother discipline that encompasses a theory or a body of knowledge concerned with the methods people use to influence one another.

This historical accident is related to the ways various disciplines study behavior (10, 56). Sociologists, psychologists, and anthropologists are searching for facts that have universal validity and will hold for longer periods of time. Invariably, therefore, their attention turns to structure. The communication engineers are interested in information; therefore they build machines that can receive, scan, retain, compute, select, and transmit information. Thus the behavioral scientists, the social scientists, and the engineers all deal with generalities (93). But the surgeon, the therapist, and the lawyer, who must operate within a given physical or social context at a given time, deal with specifics.

They deal with one organ, one person, or one group. The knowledge they are seeking, therefore, is place-, time-, person-, and situation-bound. Whenever a scientist studies a communicative exchange, it matters whether this occurs in England or in China, whether it takes place early in the morning or late in the evening. It is relevant whether a statement is made by the American ambassador or by a tourist, and whether it is made in a hospital or at a cocktail party. Inasmuch as each message or action is preceded and followed by other messages or actions, it matters whether a statement is made at the beginning or at the end of an ongoing procedure, a meeting, or a campaign. The coexisting and sequential order of statement or actions thus influences the interpretation of messages or actions (106) and the effects they produce.

In contrast to the reductive sciences, which attempt to isolate component factors or processes, the operational disciplines specify the step functions that produce a definite impact at a given moment. This effect usually is stated a priori as an operational goal: in warfare, as a designated objective; in trade, as a sales volume; in medicine, as a state of physical health; in economics, as a level of profits; in education, as an average grade or scholastic achievement. A well-defined cause and effect sequence at step 1 simply becomes the cause for another cause and effect sequence at step 2, and so it goes. Stated task, effect achieved, and feedback to the source are the concerns of the operational disciplines. With this emphasis the sequential order becomes the unit of study. In a chain of events one cause and effect unit may be substituted for another one and still lead to the same end result. The constituent, or pure, factors therefore are not of relevance, but the total effect produced is a principle that is familiarly expressed in the saying, "All roads lead to Rome" (18).

In the anticipation of end results, not all procedures are equally economical, technically feasible, or elegant. Before initiating any kind of action people working in the operational disciplines attempt to evaluate the risks involved (43). A precise knowledge of probability or chance, therefore, is indispensable, as every politician knows who, before beginning his campaign, studies the results of polls that are supposed to predict his chances of being elected. Military men, aviation maintenance men, and physicians consider empirically established probabilities before engaging in action. Decision-makers weigh the risks, make a decision, choose a procedure, and then initiate action (19). At this point the educated guesses as to the future cease. As soon as

the operations are under way, observed facts in a given situation replace general probabilities as guideposts of action. Because the time interval between action and reaction, or between observed effect and the next operational step, is short, the probabilities of correctly anticipating the next step reach the level of near certainty.

Both treatment and management are examples of procedures that are guided first by general probabilities (91) based on data collected in different situations at different times, and later, when the action is under way, by specific step-by-step probabilities. In medicine two kinds of procedures have to be distinguished. Treatment in the form of surgical operations, drug therapy, or hypnosis aims to alter the state inside a person. Such interference with the communicating unit — the person — requires a licence (physician, veterinarian). Management, on the other hand, aims at steering the processes connecting the various units (Table 3). This procedure usually does not require a license. Remedial measures may be introduced through reorganization (2), government intervention (27), morale and leadership manipulation (51, 120), altering the group processes (52), changing the decision-making process of the group (21), and many other means. Management thus is the prerogative of executives, policemen, welfare workers, clergymen, government agents, and group therapists, whose remedial measures may consist of reorganization of the network, recombination of units to form different coalitions, the introduction of new rules and procedures, or the reformulation of goals (104).

The operational disciplines thus are distinguished from the basic sciences in that they are more familiar with the specifics than with the general, more apt to seize on the exception than on the rule, more likely to be confronted with breakdowns than with smooth procedures. Concerned with the discontinuities of the orderly process, with change, and with heterogeneity, the operations expert is called in when long-term predictability fails. At that point he has to analyze and remedy the step-by-step procedure until smooth operation is restored.

The Health Sciences

In the course of the 19th and 20th centuries we have witnessed a change from local economy to global economy, from individual independence to human interdependence, and from a reliance upon family and kinship groups to a reliance upon occupational and task-oriented groups. We have made the transition from an underpopulated

to an overpopulated earth, from an underorganized to an overorganized existence, and from a world where people were surrounded by nature to a world where people are surrounded by machines (29).

The ever-improving standard of living (40) in the technological societies and the political trend towards the welfare state have led to the development of vast government and industrial bureaucracies (82). What formerly was the domain of the individual or small group — economic support, health, education — now is the responsibility of the government. With the passage of the Medicare Bill, for example, medical care became a human right, and with the transformation of a privilege into a right, the social view of health and disease becomes a dominant concern of our time (116).

Concomitant with this social revolution (66) has come a profound scientific change (115). In the past medicine was essentially concerned with emergencies. When war or famine, drought, pestilence, and other natural catastrophes threatened their existence, people were concerned with survival. Under these conditions physicians diagnosed existing illnesses and treated the patient, if possible. But fighting a forest fire with buckets of water is hardly effective, and as the government entered the health field, public health approaches became essential (98). The public health procedures are based upon the assessment of health risks of the total population and the introduction of preventive measures (17). The recent successful immunization of the population against polio may serve as an example. These changes in medical engineering demand a radical overhaul of medical practices. From a patient-oriented practice that consists of identified patients, identified doctors, and identified diseases, we are moving to a population-oriented practice that is characterized by its emphasis upon patient populations, health teams, and susceptibilities to disease (72). From emergency medicine we have moved to probabilistic medicine (36).

These modern trends brought professionals of different backgrounds into the health field, gradually displacing the physician from his monopolistic position. Writes Rosen :

Long before the social sciences identified medical sociology as a specialty, men concerned with affairs of state — economists, physicians, social reformers, historians, and administrators — were preoccupied with socio-medical problems and had made significant contributions to their solution. (102)

In psychiatry these trends were reflected in a shift from a concern with the psychopathology and the psychodynamics of the individual patient to the social behavior of people in groups—a change that had

been anticipated some 30 years ago by Sullivan (122), Fromm (38), and Horney (53). Where the psychiatrist formerly was concerned with individual patients, he now has to turn his attention to problem populations (135); and in this task he finds the sociologist rather helpful (28). The older concern of the psychotherapist with the psychological typologies of character and personality has given way to a preoccupation with problem situations — a field with which anthropologists, psychologists, and managers are quite familiar (105). From an exclusive concern with physical resources and somatic therapies, the physician has moved to a concern with institutional resources and the organizational framework (27); and as the conversion from treatment to prevention (134) continues, the psychiatrists begin to learn from the formerly often maligned “paramedical specialities”. The health team has replaced the older solo operator (8).

SOCIAL PROCESS

The social and behavioral scientist; the legal mind (lawyer and judge); the manager, executive, and government official; the communications expert and engineer; and the psychiatrist and therapist all share one goal: they wish to introduce some social order into a painfully complex world so that man can peacefully attend to the business of living. But order can only be understood, explained, and implemented through use

TABLE 3

Characteristics of Communicative Interaction

Characteristics of the Communicating Entity, Whether Cell, Organ, Organism, Organization, or Machine	Characteristics of the Processes Connecting the Entities	Characteristics of the Outside Observer or Manager
Input functions (14) (perception)	Combination of functions of several small entities to form larger entity (103)	Scientific observation or measurement of ongoing signal exchange (54)
Central processes (1, 124)	Networks (81, 107)	Evaluation of exchange in terms of a theory or model (92)

TABLE 3 (*Continued*)

Characteristics of the Communicating Entity, Whether Cell, Organ, Organism, Organization, or Machine	Characteristics of the Processes Connecting the Entities	Characteristics of the Outside Observer or Manager
Data scanning (recognition)	Languages & codes (99)	Assessment of effects produced (3, 69)
Data processing (thinking)		
Data storage (memory)	Content: referential property attributed to signals (86)	Management and organization: interference with connecting processes (43)
Output functions (55) (expression, action)	Metacommunicative processes: instructions & interpretative devices (107)	Treatment or repair: interference with the entities themselves (104)
	Feedback: reincorporation of information at the source (133)	

TABLE 4

Concerns of Social Psychiatrists

Individual	Group and Institution	Intervention: Somatic, Psychological, Social
Individual health (129)	Group health (123)	Prevention (17, 128)
Individual development (90)	Group development (family) (57)	Maintenance of social continuity (7)
Personal identity (30)	Group identity (11)	Changing identity (4)
Motivation (78)	Institutional rewards and honors (75, 121)	Reinforcement (34)
Psychopathology (61)	Group pathology (120)	Individual and group therapy (35, 39)
Personal conflict (33)	Social conflict (87)	Managing conflict (44, 62)
Disturbed communication (103)	Disturbed group communication (47)	Therapeutic communication (104)
Economic and emotional self support (114)	Interdependence of groups (26)	Management of economic & psychiatric aids (8)
Social change (88)	Culture and culture change (89)	Forced acculturation and relocation (71)
Aging (46, 130)	Bureaucracy (23)	Preventing institutional inefficiency (41)

of the symbolic process which enables a person or a group to represent events that have already occurred or will occur at another time or place. Unfortunately, symbolic representation is not without shortcomings. Information processing inside the organism, representation of events through external models — notably computers — and the transmission of messages from person to person may entail unavoidable distortions of the original events. If these distortions are perceived as such, people may apply corrections. But naive observers may fail to notice the distortions and therefore may gain an erroneous view of the original events (124). The availability of simple and verifiable models of social, psychological, and physical events, therefore, is a basic condition for the progress of behavioral science (79).

A Theory of Behavior Based on Communication

At present there does not exist a symbolic system for the representation of human behavior that is suitable for all purposes. One school of thought emphasizes part functions, such as feelings, thoughts, or associations; another concerns itself with individual behavior; a third deals with interaction; and so it goes. Most of the theories dealing with the individual have been developed by psychoanalysts, psychiatrists, and psychologists. Theories concerned with physical and social action or the impact people have upon one another and the world were developed by anthropologists, sociologists, managers, actors, and military men. But a general theory of human behavior has to encompass the psychological, the physical, and the social universes. Only with a general theory of behavior can we avoid the inside-outside, the mind-body, the thought-action dichotomies, and many others that are equally undesirable. With the influence of cybernetics and social and behavioral science, there seems to emerge at the present in the managerial disciplines (126) a general theory of social process suitable for a variety of purposes. It is based upon three verifiable assumptions: (1) that information controls action; (2) that feed-back of the effects of action changes the informational state of the cell, organ, organism, or group; and (3) that this new informational state becomes the base for the next action.

The first of these three simple concepts brings together under the heading of information all the psychological, physical, and social data on human beings. The second concept not only bridges the gap between the information and the action universes but also unifies structure and

process. The third concept does away with unverifiable ultimate causes and limits observations to verifiable step functions.

However, some difficulties remain in that the action counterpart of information and the information counterpart of action cannot as yet be expressed in completely certain or quantitative terms. This relationship has to be expressed in terms of probabilities. There exists a lag between changes in information leading to subsequent institution of action and the effects of action that subsequently change information. To explain this lag one might resort to a model characterized by a cumulative score. When information is sufficiently alarming, a critical range or threshold will be reached where the probability becomes almost certainty that action will follow; conversely, when action produces specific effects these effects are recorded, and when a critical range has been reached the image concerning the events will be changed. This type of model is borrowed from physiology, where it serves, for example, to explain the cerebral control of respiration and other autonomic functions (77).

In order to illustrate how psychological, social, and physical notions can be combined by means of these three concepts into a workable theory of individual or group behavior, a series of questions has been listed, the answers to which will yield information pertaining to almost any behavioral situation :

Who does or says ... ?	(group membership, position, identity, role, status)
What ... ?	(type of action or content of message)
For which reasons ... ?	(motivation, rewards)
With what intent ... ?	(anticipated response or effect)
Under what rules ... ?	(formal, informal, emergency, regular)
To whom ... ?	(group membership, position, identity, role, status)
How ... ?	(type of language, or code, form of speech)
By what means ... ?	(face-to-face, written, telegram, telephone, television, public address system)
Where ... ?	(context or situation)
When ... ?	(in the past, now, or later)

For how long and how often ... ?	(time duration, repetitiveness)
To what extent ... ?	(introducing reversible or irreversible changes)
With what effect ... ?	(changes, effectiveness)

The Regulation of Tension Through Communication : Adaptation

The human being has the capacity to compare the image he has gained of a certain event with the statements made by others about the same event. These statements elicit in his mind a second image. If the two images coincide, there is gratification; if they do not, tension ensues. The brain then has the ability to juxtapose or superimpose images and determine similarities and differences. This universal process is of particular significance in the evaluation of social events.

Birth is a social event which under all circumstances includes the mother and the baby, and optionally some other persons. Every individual, therefore, is born into a group at the same time that he begins his struggle to become a distinctly separate entity. The precarious balance between individual identity (image of self when considered alone) and group membership (image of self when with others) can be achieved through control of the perceived social differences that exist between the self and others. Perceived social differences can be increased or decreased through three fundamental processes of communication: understanding, acknowledging, and agreeing. Understanding is based upon the availability of satisfactory explanations that will justify the differences. To understand and to be understood are rather gratifying experiences. Acknowledgment refers to the response received to an initial message addressed to another person. To acknowledge and to be acknowledged are satisfactory to the individual, proving that he is connected with others in spite of his being separate or different from them. Agreeing implies the isolation of a certain aspect within the universe of discourse, and the establishment of corresponding views or opinions between two or more people with respect to that aspect. To reach an agreement is a most satisfying experience and a prerequisite for action. With these three processes, people regulate their social encounters and the tensions that these encounters produce (104).

If the psychiatrist is called upon to assess, advise, or intervene in social conflicts, he must inquire into their origin. Inequality of views between people may occur for a variety of reasons. Rules may be inadequate to define the differences; positions or roles may be incom-

patible; assessment of time, space, responsibility, or other features may differ (103). If the psychiatrist believes that opinions and views can be brought closer together, he may attempt to reduce the differences existing in the bodies of information held by the various participants. *Equalization of information* is achieved through : (a) exposure of people to similar things, persons, and situations, resulting in equivalent experiences (understanding achieved through similarity of exposure); (b) promotion of social interaction, which contributes to a leveling of information and behavior (communicative exchange); (c) sharing of explanations to justify existing differences (interpretation); and (d) introduction of coercive action or threat of coercive action, particularly in case of deviance (discharge, imprisonment, hospitalization).

On other occasions tensions may arise because of over-organization. The thinking of the members may be too homogeneous, the rewards not diversified, or the competition too great. In these situations the social psychiatrist attempts to *increase the differences between people* as follows : (a) through isolation of one or more individuals from the group and exposure to self (solitude); (b) through exposure of one or more individuals to knowledge or skills that are not possessed by the others (achievement); (c) through exposure of people to new groups (culture change); or (d) through promotion of unusual life experiences not shared by others (danger, adventure).

If these communicative procedures fail to reduce tension, or if the situation is beyond intervention, three possible consequences have to be considered. One or more members of the group may adapt pathologically in disregard of their own needs; one or more members of the group may rebel and attempt to change the goals or the rules by negotiation or by subversive means; or the group may be reorganized, either by changing the membership through resignation, separation, or divorce, or by planned reorganization on the part of management. Sometimes the psychiatrist will discover that some of the participants have not mastered the skills of communication. He then will introduce measures that will improve these skills, both verbal and nonverbal (32, 108), in the hope that mastery will enable the participants to reduce tension (80, 132).

The Regulation of Tension Through Programming and Organization : Control

If informal communication serves to equalize information and to induce people to make do with what already exists, programming and organi-

zation aim at controlling and sometimes changing existing behavior (101). In different words, informal communication serves adaptation, while programming and organization aim at better control. *Programming of an individual's life* or of a group's activities contains the following ingredients: allotment of proper space (living quarters, office space, play field); allotment of proper time (time duration; timing in terms of beginning and end; timing in terms of coinciding with, preceding, or following other events); regulation of energy household (physical strength, alternation between rest and exercise, play and work); allotment of proper funds (budgets, cash, credits, financial operations); allotment of proper technical resources (transportation, tools); and integration of space, time, energy, funds, and resources into a pattern of living.

Such programming first has to be worked out on paper, then tried out in action; then proper corrections have to be made, and finally the participants have to master the program until it becomes second nature. The procedures of master archers or swordsmen in the Zen Buddhist tradition is perhaps the best example of this kind of programming ever devised (50).

Unfortunately, programming of individuals or small groups may fail if not accompanied by a large-scale social organization (2). Such an organization is characterized by: an ongoing network consisting of input, central functions, output, and feedback devices (observers, decision-makers, production workers); definition of objectives (morale); rules, so that proper allocation of time, space, energy, money, and technical resources is insured (laws, regulations, traditions); provisions in case violation of rules, disorder, or breakdown should occur (law enforcement, sanctions); criteria of membership in the organization (citizenship, formal and informal memberships); provisions for and specification of positions, responsibilities, and tasks (definition of power, duties, and lines of communication); supervisors who check on what goes on in the organization (the corporation's board, government agencies); planners who every so often reorganize the existing structure (planning committee); and description of the organization as it ought to be (values and ideals).

The rules of the small group have in some ways to be coordinated with the laws of society at large, and the roles held in a small group must be familiar to members of other groups. The task of the psychiatrist and manager is to a large measure related to ironing out the differences between individual and small group and between small

group and society (47). The energy and force required to maintain deviance against societal opposition are so overwhelming that it rarely succeeds. In order to help the individuals or groups who are concerned about the conflicts they witness with the surroundings and with themselves, the psychiatrist must, of course, be thoroughly familiar with the values and social structure of the group he deals with, of his community, and of society at large.

SUMMARY

The convergence of biochemistry, biophysics, genetics, and biology — fields that study man's constituent processes — led to the emergence of a general systems theory of molecular biology.

The convergence of physiological and ecological sciences — fields that study man's transactions with his physical environment — led to the development of a general systems theory of biological sciences.

The convergence of psychiatry, psychology, sociology, and anthropology — fields that study man's behavior alone and in groups — hopefully will lead to the development of a general systems theory of behavioral science.

The convergence of business administration, social organization, communication engineering, and group management — fields that share in common the tendency to steer, organize, or change social behavior — seems to result in the emergence of a general systems theory of social operations.

Underlying all of the approaches to the study of man is his ability to interact and relate to others — a faculty which has been described as "social process".

The converging tendencies described above reflect the trend that the modern task orientation of science requires new theories that are neither bound to unique situations nor associated with particular professions.

The modern multivariate approach to complex phenomena of living, as opposed to the univariate approach of the physical sciences, requires new methodologies. These consist of pattern identification, pattern analysis, establishment of probabilities, and action based on incomplete and uncertain information. A multivariate approach to the understanding of human affairs must contain the following: the inside view — psychology and psychoanalysis; the outside view — anthro-

pology and sociology; and the component parts analysis — biological and medical science.

A multivariate approach to the betterment of human affairs must include: the remedial operations with the individual — treatment; the remedial operations in the group — management; and the remedial operations with the large organization — reorganization.

A multivariate approach for the average citizen must include: his own view of himself, others, and the physical world; other people's views of himself, themselves, and the physical world; and the ability to reconcile views of self with the views of others by means of communication.

While the technical aspects of communication have been superbly developed by the engineers for the machine, the social aspects of communication will have to be developed further by social and behavioral scientists and psychiatrists. In this paper, an attempt has been made to weave together a multivariate approach to the social process in which we all engage.

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SYNOPSIS OF THE THEORY OF HUMAN COMMUNICATION

(1953)

The psychiatrist, who in his therapeutic activities attempts to restore or develop anew the relationship of the patient to self and others, today has several systems to choose from. But inasmuch as he actually uses communication to improve the communication methods of the patient, the development of an appropriate scientific system suitable for the study of intrapersonal and interpersonal communication seems to be a necessary and logical step. The present paper constitutes an attempt to sketch a communication model suitable for the study of the psychiatrist's operations.

The human activity of communication links person to person, individual to group, and smaller social organizations to larger societal structures. Human behavior is obviously influenced by what people think and feel, and it is evident that their transactions and interactions are guided by information acquired in the course of social contact. The scientific model of communication is especially applicable to the study of human relations. Data pertaining to the ways and means by which people exchange messages, to the correction of information through social contact, and to action undertaken as an outgrowth of communication are handled successfully within the scientific model of communication. Conversely, scientists who are not interested in the relationships of human beings or of other biological entities and who are not desirous of studying social forms of organization — as, for example, the anatomist or the neuropathologist — will have little use for a scientific model of communication. The communication model is used with success whenever two or more biological or social entities have to be related to each other. Where the scientist has only one entity to contend with, the communication model is less suitable.

Although many scientists will have no opportunity to apply the theory of communication in their particular line of work, all scientists are by

necessity concerned, both practically and theoretically, with the fact that scientific observations must be reported to other scientists and perhaps to the public in communicable terms. A deeper understanding of the dual function of the theory of human communication can be gained by considering the assumptions upon which it is built; these assumptions can be divided into the premises generally accepted by modern scientific philosophers (21, 15, 55) concerning the characteristics of naturally occurring events and those which are specifically geared to the scientist's role as a human observer.

PREMISES UNDERLYING THE THEORY OF HUMAN COMMUNICATION

Delineation of the scientific universe

Though it is granted that all events in nature are somewhat related, it is the task of the scientific observer to limit his field of observation. Delineation of the field of observation is not only spatial, or topical, but also temporal, inasmuch as the human being has to express successively what in nature takes place simultaneously. Thus the delineation of the scientific universe is a dialectical device forced upon scientists because of the structural limitations of man's communication instruments. The scientist's observations and reports can only be mediated through the human observer's ways of communication (50).

Belief in the rational understanding of nature

Were a scientist to believe that he could not understand nature, he would cease to observe, to construct models, and to label himself a scientist. Implicitly, therefore, every scientist assumes that nature can be understood rationally and that from the observation of events some generalizations can be derived which can be stated in either formal or empirical terms. It follows that if the scientist's instruments of observation are not equipped to perceive certain events which occur in nature, no scientific information will be available. Furthermore, the assumption is made that the events observed in nature can be properly reproduced through some device of symbolic representation. When an observation is made which cannot properly be fitted into the scientific model, the scientist becomes aware of a gap in his body of information. In such

a case, either he acquires additional information in the hope of supplying the missing link or he changes the characteristics of his system.

Scientific distortions

In addition to the distortions introduced through the use of language systems, there exist the distortions introduced through the selective observations and operations of the observer. Not only does the scientist observe, but he also uses his information for a given purpose which often dictates the format and other characteristics of his model. The scientific distortions which scientists have to contend with are very much like the distortions encountered in map projections in which the three-dimensional globe is represented in Mercator or polyconic projection in two dimensions. Human beings who have observed some complex events in nature have to simplify and condense their data for purposes of recording, thinking, and communicating, in spite of the fact that such an operation introduces new distortions. Therefore, one must assume that all models constructed for the understanding of nature are somewhat simpler than the real events and that only a few functions will be appropriately represented in the system, while others will be highly distorted. However, through the use of multiple systems this error can be somewhat compensated for (50).

Uncertainty

Certainty in the human being is a function of the completeness of his information. One must assume that there are myriad events which have not been observed as yet and myriad more which never will be known. In present day theory construction, therefore, provision must be made for information which is not yet available or which never will be available. The area where the as yet unknown information is known to exist has to be bridged by assumptions in order to close the gap. All modern scientific systems have such areas of uncertainty, and the awareness of this uncertainty is the feature which distinguishes scientific systems from some political and religious systems which tend to negate the existence of uncertainty.

Open and closed systems

A system is closed if no material enters or leaves it; it is open if there is import and export and, therefore, change of the components. Living

organisms are open systems, remaining constant as a whole though there is a continuous flow of the component materials. This characteristic feature of most biological systems is called a steady state (70). In addition, vital systems can be distinguished from physical systems through the criterion of equifinality. In most physical systems the final state is determined by the initial conditions, while in biological systems the final state is reached from different initial conditions and in different ways. According to Bertalanffy (4, 5), open systems which attain a steady state can be said to behave in an equifinal way, and it seems safe to assume that the majority if not all of biological, psychological, and social systems fulfill the criteria of open systems and of equifinality — that is, growth.

Lineal and circular systems

In the nineteenth century, scientists used lineal systems to analyze their observations. Events were linked to events by spacing them in time or by patterning them in space, and in the prevailing theories of causality that which preceded was thought to determine completely that which followed. Though today scientists still have to maintain that cause and effect have to follow each other in time, they have become careful in making statements about causality (8). Present-day scientific systems used in biology and social science have in common the characteristics of being circular, of having self-corrective devices, of being able to establish vicious circles, of having purposive or seeking aspects, of maximizing or minimizing certain features — in brief, of reacting with adaptive and predictive responses bearing upon maintenance of a steady state at a fairly high level of orderliness (69). In such systems, part functions are always functions of the system as a whole, and the chains of causation are at least circular, and sometimes even more complex.

Class theory and field theory

In the traditional, class-theoretical, Aristotelian approach, an event was grouped with other events into classes dominated by similar characteristics. The establishment of a class of events was determined by the question of regularity in terms of frequency of recurrence, and therefore the individual case had no place in Aristotelian thinking.

In the present-day, field-theoretical, Galilean approach (30, 32),

events are studied with respect to the field in which they take place, and an attempt is made to specify the conditions under which an event might occur. Functions are conceived as forces; as a result value concepts, dichotomies, and other old-fashioned alternatives have gradually disappeared. Inasmuch as the laws in the field-theoretical approach are not based on class characteristics but upon the relationship between an object and its field, similar principles can be applied to a single case also. While in the traditional class-theoretical approach the characteristics of an object were completely determined in advance, in the field-theoretical approach the characteristics and dynamics of an object are determined by its relationship to the surroundings. In social science, the field-theoretical approach is more to the point than the class-theoretical approach because all human beings are surrounded by an environment and all scientific observations have to be made from some position located in the environment.

Representativeness of observation

Every scientist makes the silent assumption that his sense organs and evaluative functions are capable of encompassing that which he anticipates observing and that his instruments of observation really do observe or measure that which he purports to measure (10). A scientist usually assumes that his observational indices or measurements are as representative as possible of the functions he wishes to study. Erroneous conclusions are reached if his instruments and gadgets record incidental events which are not characteristic of the functions to be observed, or if his direct observational cues are indistinct.

Operational approach

Science, as Stevens (59) puts it, consists of a set of empirical propositions agreed upon by the members of society. Therefore only those propositions which are based upon public and repeatable operations lend themselves for discussion or agreement and disagreement, and only that type of operation can be admitted to the body of science. This approach, which has been labeled *operationism*, insists upon operational definitions of variables and of operations with data; it obviates meaningless concepts such as intuition and dispenses with demons and other devices which attribute unobservable properties to the events under observation. While operationism has long since found its place in phys-

ical science, it still is a subject of debate in the social sciences. The author believes, however, that the operational approach as set forth in a model of communication can be applied to the study of intrapersonal, interpersonal, and group phenomena and to large scale social events (50).

Variables and frames of reference

For obvious practical reasons, the scientist must limit his observations in time and in space and concentrate upon the observation of a few relevant functions. In so doing, he must assume that the functions he studies will vary (variables) (11), while other functions which serve as points of orientation will remain relatively stable and unchanged (frame of reference) (9). Though it must be granted that change is a universal aspect of life, nonetheless functions undergo transformations at different rates; this fact is made use of in science since those functions with a slower rate of change are taken as frames of reference for those with a faster rate of change. Thus the scientist has to assume that during the period of observation and measurement the function under observation does not change.

Within the system that a scientist uses to understand events in nature, the term "variable" can be defined as a symbol standing for a class of events which, under different conditions, have variable quantity and direction. The term "frame of reference" then refers to those symbols which stand for a class of events which, under these given conditions, do not have significant variation in quantity or direction.

Structure and process

An observer can arrange information in various ways. Use of spatial coordinates and disregard for temporal coordinates results in structural assessment, while maximization of temporal coordinates leads to the consideration of process (50). When data at Time I are compared to data at Time II and then are related in such a way that inferences can be made about the change which has occurred, one speaks of process. At any one moment, scientists have the choice of considering complex spatial patterns (structure) and ignoring time, or of considering complex changes in time (process) and ignoring spatial arrangements — both notions being complementary to each other (51). In any scientific system, distortions will come about from condensing either spatial or

temporal events — that is, from regarding events in space as though they occurred in one place or regarding events in time as though they were not subject to change. And the adequacy of a particular scientific system will depend essentially upon what distortions it introduces.

Part and whole

In present scientific systems it is assumed that change in a part involves a change in the whole and that a change in the whole involves a change in the parts. In any system, therefore, it is very important that the relationship between part components and whole be stated in terms of symbols and concepts which are characteristic of the system. It is awkward to mix concepts derived from chemistry with those that originate in evolutionary theory or to combine statements about an individual with statements about culture. In order to avoid these difficulties, a system has to be used which includes a variety of dimensions — for example, the system of communication (47).

Causality and determinism

In order to understand nature, scientists distinguish between cause and effect. One event occurring in a time-space continuum is labeled “cause” and another is labeled “effect” if the occurrence of the effect is dependent upon the occurrence of the cause (8). An event which has been defined in terms of one scientific universe cannot be the cause of another event which has been defined in terms of another scientific universe. Causes and effects, therefore, have to be formulated within the same frame of reference. When events are formulated in different frames of reference, the scientist can only speak about coexistence, correlation, and perhaps interdependence; on the basis of such relationships he can predict predetermined situations.

Assumed reality and perceived reality

In science a distinction is made between what is perceived in nature and what is believed to exist in reality. This distinction is useful in the field of physical sciences because subsequent experimentation may lead to a reproduction of natural events and hence to a check of the accuracy and completeness of the data and of the scientific model. However, difficulties arise when this distinction is applied to the field of social science.

By definition, social science is concerned with what human beings do. Man-induced action presumes perception, and social reality is a function of perception. In the field of human communication, therefore, it has become a necessity to part with traditions of physical science. Social transactions engaged in by people cannot be treated as such but have to be viewed through the eyes and ears of a human observer. Since it is impossible to determine what part of a given scientific report on social events is based on the bias of the observer and what part is traceable to the characteristics of the observed events, it is preferable to abandon the distinction between assumed and perceived reality and to deal exclusively with the perceived reality (50).

The social context of scientific observation

Every scientist lives in a social matrix (50), and the questions he raises reflect the social and scientific philosophies of his time. It is impossible for others to interpret an observer's report unless some statements are available about the matrix or the field in which the observations were made. Statements about the social situation or the context in which an investigation was undertaken usually are helpful in understanding the bias introduced by personal factors, by membership in a professional discipline, or by exposure to large-scale social events.

The social situation as a new entity of study

Though any human being or animal is, biologically speaking, a natural and practical entity, it does not follow that the human being or the animal is a useful scientific entity. To study one ant in a glass jar will tell little, if anything, about the ant's relation to other ants or about the social organization of ants as a whole. In communication theory, therefore, the unit of study is the social situation which is defined by the network of communication in which the individual is participating. Without an observer there is no scientific information. Therefore information as to social events can only be gathered in a social situation in which at least two people participate.

The relationship between observer and observed

If the characteristics of the observer are of the same magnitude as those of the phenomena studied, the observer must be supposed to influence

the processes under observation as well as to be affected himself by the ongoing events (69). In this case, the observer becomes a part of the system and his report will be subjectively colored. This characteristic dilemma of the social sciences is based upon the fact that the properties of human observers are almost identical with the properties of the objects of observation — namely, people. In the physical sciences, in contrast, the properties of the observer are usually very different from those of the observed; hence the observer is likely to remain relatively outside of the system that he is studying and his report will be more objective.

In communication theory, therefore, speculations as to the nature of the observed events are replaced by a consideration of the idiosyncratic picture which the human observer possesses. Any scientific system used for the study of social events must provide a place for data relating to the human observer so that his report can be evaluated by others who either observe the same events or observe the first observer and then re-evaluate his report. At times this observation by an alter-observer can be replaced by self observation (50).

Complementarity of information

Heisenberg (27) states in his principle of indeterminacy that the velocity and the position of a physical particle can never be completely ascertained at the same instant. Switching the universe of discourse from that of wave mechanics to that of communication, one finds that a similar principle applies. At any one moment, the observer can look at an event from one position only. By the time he alters his position, his focus of interest, or his attitude, or by the time he poses the question he wishes to ask, the event may already have changed. These circumstances force us to recognize a novel relationship, conveniently termed “complementarity” (7), between empirical findings obtained under differing conditions. In the field of communication, examples of such complementarity of information are : concern with others or concern with the self (intro- and extero-functions), the view from inside out or from outside in (participation and observation), concern with the present or with the past (diachronic and synchronic statements), and consideration of spatial or of temporal coordinates (structure and process).

The problem of complementarity of information owes its existence to the inability of the human observer to observe more than a few

things at a time. One must assume that conscious awareness is limited to a single pattern or cluster of events, and that if the observer wishes to focus simultaneously upon other features he cannot do so without blurring the previous pattern. The more successful the observer is in isolating an event and the more distinct the perceptual cues become, the more specific is the information he gains; but the more he concentrates upon details, the less he learns about the relatedness of this to other events. Conversely, the more inclusive the report is, the more information the observer gains about relationships, although he loses information about details. This peculiar problem bearing upon the nature of human observation probably is responsible for the problem of polarity. The scientist is aware that when he focuses upon one thing he must have at that very moment in his field of awareness a label for all those things he is not considering. This particular problem is considered best in terms of the theory of values, which subject has been expanded elsewhere (50).

The transactional point of view

Dewey and Bentley (18) have in masterful words summarized three positions encountered in psychological theory. They distinguish the following levels of organization on which scientific inquiry can proceed : (1) self-action, in which things are viewed as acting under their own powers; (2) inter-action, in which thing is balanced against thing in causal interconnection; (3) trans-action, in which systems of description and naming are employed to deal with aspects and phases of action without final attribution to "elements" or other presumptively detachable or independent "entities", "essences", or "realities", and without isolation of presumptively detachable "relations" from such detachable "elements". In present-day psychiatric and psychological theory — and this includes the outline of communication presented in this paper — the transactional point of view has been generally accepted.

The multiple meaning of the term "communication"

The term "communication" refers on the one hand to a ubiquitous activity engaged in by all human beings and on the other hand to a scientific procedure designed to gather data about the way people behave. In one instance, communication refers to that which is assumed to exist in reality quite independent of the actions of an identified human

observer, and in another instance it refers to the processes of communication which the observer must use when observing, experimenting, and eventually making his scientific reports.

While in the physical sciences the human observer uses communication to report scientific facts and theories pertaining to the material world, in the social sciences the processes of communication are used to investigate communication itself. How this difficulty can be managed will be discussed in the next section.

THE ELEMENTS OF COMMUNICATION THEORY

The terms social situation, status, roles, rules, and social techniques refer to theoretical constructs used in the understanding of social action (42, 43, 44). Underlying these constructs is the assumption that during the period of observation events will not change and roles or social situations will remain stable. The purpose of introducing into communication theory some of the sociological concepts is to create a bridge between the wider societal framework and the narrower interpersonal framework in which psychologists and psychiatrists operate. These concepts are, of course, not simply borrowed from these other systems; they are translated and specially fitted into the framework of communication.

Cultural and social institutions define the situations in which human beings operate. In the course of the centuries, cultural institutions have arisen pragmatically around the important and repetitious situations of daily life. In cultural terms, rules and laws represent the institutionalized aspects of social action, and roles the personalized aspects. In individual terms, conscience, ideals, and morals represent the institutionalized component, and the sensory-effector system represents the personal and practical aspects. Therefore, on the individual level as well as on the group and cultural levels we have to distinguish between the institutionalized — that is, the formalized and regulated — aspects of social action and the unique, individual, and often spontaneously arising aspects which are contained in the expressions of single persons or groups.

Social Situations, Status, Roles, Rules, and Techniques

In communication theory, the unit of consideration is the social situation. A social situation is established when people enter into inter-

personal communication. For practical purposes, a social situation is thus limited to people who either talk or write to each other, although they may be connected by some other device of communication. In a social situation, the behavior of the participants is organized around a common task which implies the existence of rules, of status assignment, and of role differentiation.

The social situation

The scientific concept of "social situation" is a structural assumption used in understanding a set of social processes which occupy a defined portion of the time-space continuum. Social and cultural institutions usually define the situations; once the individual has identified the label of the situation correctly, he can proceed with the previously established behavior patterns which were designed to cope with such situations.

Scientifically, a complete description of a social situation (54) includes the label and the identifying characteristics; a description of the relevant rules, of the status assignment of the participants, of available rewards, of emotions which are supposed to be displayed, and of the implementations which are possible; an identification of the goals and the points of departure of social action; and a description of the premises upon which such social action is based. These aspects, when perceived in their entirety by a participant, are closely related to what a psychiatrist calls social reality. With respect to time, it is obvious that any situation evolves from a previous situation and dissolves into a subsequent one.

In daily living, people may refer to a social situation by saying, "I have to attend a meeting", "I am expected for dinner", or "I have to go to a funeral". These words label the situation and delineate for a member of the same social system some aspects of the situation in space and in time and of the behavior which can be expected. To the foreigner, however, such statements mean less because he is unable to fill in from experience the relevant connotations which pertain to this particular social system.

The scientific observer is in a somewhat similar position. Observation alone is rarely satisfactory for the study of social situations. A participant who assumes an active role, with the desire and the ability to communicate, is undoubtedly in a better position to report about events in terms of rules and roles and with reference to those subtle cues which determine the label of the situation than is a rather passive observer who, by definition, remains relatively outside of the main events.

Social situations are frequently identified by signs and signals which originate in the material environment. Architecture, furniture, clothing, *décor*, trade symbols, verbal signs, and name plates can all be employed as cues for the identification of a situation — subject, of course, to modifications introduced through the action of people.

The institutionalized situations found in a modern technical civilization crystallize around a variety of foci: There are situations which bear upon the *interrelationship of family or household members* at home. Here, the labels of the situations are dependent upon activities such as eating, washing, cooking, sleeping, training of children, and relationship to pets and domestic animals.

Again, there are situations which are grouped around the *social and recreational activities* of people; these include entertainment, amusement outside of the home, sports, gang activities of children, membership in clubs and associations, approaches to one's own sex and to the opposite sex, travel, and, last but not least, ceremonials and festivities.

There are a number of situations which bear upon the *occupational life* of people. Some of these define the interrelationship in terms of status — that is, age, seniority, intelligence, skill, or property; others classify people in terms of skill alone. There are terms which differentiate various school grades, which delineate unskilled, semiskilled, and skilled work situations, and which label maintenance, trade, and administrative activities.

Sometimes situations are labeled according to the facilities which people have at their disposal to perform a service. Western Union can transmit telegrams; the Union Pacific can transport goods and people; and the stock exchange is geared to the trading of stocks. One finds standard situations in restaurants, which have space, equipment, and food available for serving their guests; there are situations which have to do with housing, clothing, repair of plumbing, shoe-shining, and the care of the sick in hospitals. Finally, some situations are labeled according to the relationship which characterizes the interaction between government officials and the population; these situations are highly institutionalized and formalized, as evidenced in court procedures, tax collection, or public health measures.

But regardless of how the situation is officially labeled, the individual, if he desires to communicate successfully, has to go beyond the gross identification of the label. The label is only an approximation making it possible for the person to scan his memory for a number of possible behavior patterns which might occur in the immediate future, to estab-

lish some general directives, and to set some limits for his expectations. Recognition of the subtleties of the situation is related to the identification of status and roles.

Status and roles

The term "status" has long been used to refer to the position of an individual in the prestige system of society, while the term "role" has been used to designate the sum total of action patterns associated with a particular status. Status is assigned by others, but roles are action patterns learned by an individual in the course of his development. Social scientists, therefore, have been interested in conceptualizing social events (43, 33, 68, 25) in terms of caste, class, and status and role systems, while psychiatrists, with their orientation towards the individual, have tried to conceptualize interpersonal events less in terms of systems than in terms of mutually developed and individualized roles (54, 60, 41, 1) frequently with a therapeutic purpose in mind (38).

Language is full of terms which describe status and roles. Terms such as king, slave, notable, and general refer to the position in the prestige scale of society, while terms such as husband, friend, son, lawyer, or physician refer to specialized behavior of individuals within a group. To be precise, the term "role" labels an individual as a participant in an intricate network of human relations. Roles are multipolar phenomena denoting the relationship of one person to one or more other people, or expressing the relatedness of many people to many other people. There is no husband without a wife, no father without a son or daughter, and no tax collector without taxpayers. People identify status and roles in many ways. Uniforms, lapel buttons, and styles of dressing are external marks of identification; manners, gestures, and ways of talking are more intimate marks of identification; personal introductions — "I am so-and-so" — may overtly clarify a role. But regardless of what the criteria are, in practice almost all people use the sum total of cues and clues present, including the sensations which arise inside their own organism.

In daily life, role and status are the keys to the interpretation of messages. One talks differently and about different things when one is questioned by a judge than when one buys a vacuum cleaner from a salesman. With the help of roles, people are able to address each other without being personally acquainted; a sick person may ask for a physician, and a person in need of protection may call for a policeman although in both cases the principals have probably not met before.

The role and the status of receivers and senders in a network of communication indicate to the participants how a message ought to be interpreted. For example, a person who enters a used car lot as a prospective buyer is treated differently and his words are weighted and interpreted differently than if he had identified himself as a seller who wished to get rid of his jalopy. In communication theory, therefore, roles have a double function: they identify the participants; and they represent silent messages about communication which constitute instructions of the receiver to the sender about the way he should be addressed and from the sender to the receiver about the way his message ought to be interpreted.

Once a participant has, consciously or unconsciously, identified the role which he is likely to assume, he will, in the course of communication, raise a number of questions which will give him further information about the details of the role he is about to engage in — questions pertaining to the initiation of activity and to active or passive participation, and questions of prestige, intimacy, and similarity. Furthermore, he will inquire whether these roles are of short- or long-term duration, whether they can be altered or whether, once engaged in, they remain stable over a period of time. He will be interested in whether his assuming a role will result in social contact with others, whether it will involve the execution of stereotyped functions, as in the work of a bookkeeper, or of varied functions, as in the job of the trouble-shooter. He will inquire into whether or not his role will force him to adapt to others, to control others, to mediate between others, or to complement the function of others. And finally, if he is searching for roles analogous to family situations, he may wonder whether a role is parental, filial, mate-like, or sibling-like. And he may explore whether the role deals with exchange of information, with trade, with cooperation, with competition, or with a variety of these functions.

Rules

Much has been written about the nature of laws and rules (14). The laws of natural science, if valid at all, cannot be violated. If anyone could in the least depart from such a law, it then would be proved false as a scientific or universal law. But it is of the very essence that legal rules, customs, and traditions are violable and that sanctions are provided for their violation. They do not state what always is, but attempt to decide what ought to be. In any society one often finds conflicting usages and customs, so that specific rules are enacted by the

legislatures; and these rules are elaborated upon by courts and enforced by the state. Rules are normative devices, established by people to create social order and to avoid conflict and chaos. Natural laws, on the other hand, reflect some inherent properties of nature, as conceived by scientists (16).

In daily life, each social situation is governed by written or unwritten rules; they instruct the participants about the procedure — that is, the “what”, the “when”, and the “where”. Rules contain directives for the participants and frequently are restrictive. In everyday communication, rules control the flow of messages; they indicate who may talk to whom, prescribe the form in which messages must be presented, and specify how long someone may talk and what not to say. The rules of communication have been laid down in written language for many institutionalized situations : for example, procedures in courts of law, civil service reports, military communications, and the etiquette of state receptions. Less formal, but nonetheless rather binding, are the rules of custom which prescribe the behavior at funerals, marriage ceremonies, initiations, and celebrations.

Perhaps the most precisely defined rules are those which apply to games such as bridge or poker, football or baseball. Such rules usually specify the following : a description of the game including its label and purpose; the time duration of the game; the place of the game and the facilities and equipment necessary; the distribution of status and roles during the game; the rewards for playing or winning the game; the sanctions for violation of rules; the provisions for ending the game prematurely, for dealing with outside interference, for change of rules, and finally for abolishing the game and disbanding the players.

This analysis can without difficulty be applied to daily life situations, if one substitutes the word “social situation” for “game”. Most of our social situations are little games with a variety of rules which the participants have to learn if they wish to survive. Von Neumann and Morgenstern (67) have successfully applied the game model to an analysis of economic behavior, and there is no doubt that such a model is most relevant to communicative behavior. All human relations and communication systems are governed by rules; these are either handed down from generation to generation or newly created by mutual consent or by forceful imposition. A great deal of time is spent at home or in school in teaching the rules governing communication in social situations; and those who openly defy these rules land either in jail or in mental institutions.

Social techniques

Constructs such as situation, rules, status, and roles do not suffice to encompass all the subtleties of communication. For example, there is no doubt that there are different kinds of fathers who have different effects upon their children, in spite of the fact that they have identical roles and observe similar rules. Thus a scientist can report in words about the social situation, rules, and roles that he has observed, but he is unable to do justice to the subtleties of social action, for words are not satisfactory to completely describe social events. In the past, different disciplines have suggested a variety of schemes to encompass these more subtle aspects of social action. In psychoanalytic theory, for instance, the attempt is made to explain nonverbal actions of people and interaction with the surroundings by focusing upon the bodily orifices. By adoption of the analogy of food intake and elimination, terms such as anal and oral are used to denote the varieties of social approaches employed by individuals. Specifically, Alexander in his vector theory, Erikson in his enunciation of modalities, and Fromm in his basic orientations (2, 19, 23) have elaborated on Freud's earlier theories bearing upon the erogenic zones of the body. Such formulations have some shortcomings, however, in that social approaches are never the function of only one person. An overly dependent, oral character, for example, must find someone to be dependent upon. The dependent and the dependee thus form one unit.

In modern communication theory, then, such social approaches are described as multipolar phenomena determined by at least two, if not more, people. I have labeled the network of these subtle, essentially nonverbal social actions between people as "social techniques" (45). Though the term "social technique" to my knowledge was coined only recently, by Tolman (63), the evolution of the concept of social technique dates back to ancient poets and philosophers. Machiavelli (35), for example, described the procedures of diplomacy, with emphasis upon ruling and domination, and the effects to be achieved from these. Novelists such as Cervantes, Goethe, and Zola describe exquisitely the social techniques and transactions of a Don Quixote, a Werther, or a Nana; but the social scientists of their time were still concerned with concepts which considered the person as a self-contained and isolated entity. Only in recent years, especially under the influence of Lewin, Parsons, and Sullivan (31, 43, 60), have the transactional approach (18) and the observation of effects been stressed.

The methods of manipulation, operation, social engineering, and social technique can only be reported by a person who is a participant. The manifest content of the messages contains few if any clues about the nature of such techniques so that only an actual participant can gauge, from the wear and tear which he experiences, the influences to which he has been subjected. Frequently a person may be unaware of his own manipulative tendencies, and only after another person calls attention to what is going on can the full extent of the operation be assessed. Social transactions frequently make use of nonverbal means of communication, and a variety of action signals are combined into intricate patterns of social action (54). Context, action sequence, timing, and intensity are skillfully used by the participants to influence each other. People who are manipulators are extremely sensitive to the responses achieved in the listener, and their procedure cannot be characterized by what they say or by how they say it, but primarily by their persistently adaptive mercurialness. To attempt to characterize these rapid changes is difficult, but a descriptive classification may conveniently start with their purpose — that is, the anticipated effects which manipulators want to achieve.

From a descriptive point of view, I would like to mention first those techniques which can be labeled *interpersonal tactics*; they are employed to establish new or to alter existing relationships. Designed to bring about a change in role distribution (for example, the techniques of social climbing (48) and decline), interpersonal tactics are used for the purpose of approach (for example, the “pick-up” technique of young men), detachment (for example, the techniques of detachment from the parents), or annihilation (for example, the technique of warfare). These techniques not only characterize individuals but often are typical for the activities of groups of people. The techniques of revolutionaries (Fascists, Nazis, Communists, and anarchists) as well as the techniques of propaganda (57), when successful bring about changes in role distribution, status, and the observation of rules.

Another type of technique is geared to the *maintenance of relationships* that already exist. On a group level the techniques of the government in power, and on a family level the techniques of domineering parents are designed to maintain the status quo. On an interpersonal level, these approaches can conveniently be grouped around the topics of intimacy, prestige, identity, and family role. In order to maintain distance, for example, an individual may remain aloof, may prevent people from gathering much information about him, and may al-

ways be choosy about friends and groups he comes in contact with. He may become aggressive, punitive, or rejecting, or he may freeze other people when they trespass his privately set boundaries. In contrast, there are the techniques which are designed to maintain a feeling of intimacy with others; sharing a common purpose or common information, doing the same things, and conforming in thought and belief serve the purpose of getting closer.

The methods for maintaining prestige and superiority (45) and those designed to insure self-abasement are well known. To maintain superiority, a person does not seek a common meeting ground with others but, on the contrary, surrounds himself with people who in every respect feel inferior to him.

Finally, there are the techniques related to the *maintenance or clarification of identity* (45). Actions which stress similarity involve copying and imitation — for example, the boy who acts like his father. Actions which stress the difference between people involve confrontation, negativism, and independence — for example the actions of boys and girls who, when dating, dress up and emphasize their difference to increase their attractiveness.

So far, I have pointed to some of the characteristics of social techniques. Now I should like to discuss the denotative devices that are used to describe actions and techniques in terms of verbal language. Language cannot do justice to the subtle differences in social techniques; although the English language is particularly rich in verbs and terms referring to action (36), it cannot encompass fully that which is actually experienced. But the study of verbs reflects somewhat the variety of social techniques which have been observed. Not all of these verbs denote interpersonal transactions; some terms denote the actions of single individuals irrespective of others, and other terms refer to the interaction of two or more people. It is well to remember that interaction verbs silently imply the presence of several people, even if grammatically the verb is related to one subject only. The peculiarities of language often necessitate a discrepancy between strict semantic meaning and pragmatic interpretation. But a review of the words suggesting the various modes of participation will give the reader an impression of the varieties of social transactions.

The term *approach* (45) denotes actions which are designed to bring people closer to each other; they are characterized by display of friendliness and absence of threat. The word approach refers to a truly interpersonal process: it presupposes initiative on the part of

one person and readiness to respond on the part of the other person.

Preservation of existing relationships is achieved through providing satisfaction of the other person's needs, threatening reprisals for eventual dissolution, or perhaps exaggerating the consequences of an eventual separation. Most existing verbs refer to a change of relationships. *Cooperation* is perhaps the only term which can be appropriately used to denote actions which keep things going and maintain relationships.

The term *detachment* refers to social situations and interpersonal relations in which a dissolution of an existing relationship becomes necessary. By this technique, a person may withdraw the inherent gratifications in a situation and increase the frustrations of others. The same purpose can be achieved by threat or by isolating oneself from others.

If approach, preservation, and detachment refer to the over-all effect which a person can achieve with a technique, there are also more specific terms which denote the way such a change has been brought about. *Intake* denotes an increase or gain, either in food and beverages or in information (24). *Annihilation* (54) refers to the reduction of interference. *Retention* (19) refers to exclusive possession and withholding of substances or information. *Elimination* (19), or riddance, refers to the treatment of people or things as if they were waste material. *Avoidance* (19) designates the diminution of contact with other persons or things. *Marketing* (23), or exchange, denotes the simultaneous intake and output — that is, exchange — of materials or information with other people. *Attracting* (54), *showing off*, or *displaying* reflects all those actions which imply a signaling for attention. *Play* (54) denotes the rehearsal of actions with the mutual understanding that whatever the outcome of the situation may be, the results are not going to have serious consequences. *Exploration* (54) is concerned with the penetration of the unknown; going into strange surroundings rather than bringing the strange surroundings to the self is characteristic of this approach. *Intrusion* (19) denotes the forceful thrust of a person upon another person or organization with the intent to penetrate. *Inception* (19) is the opposite of intrusion; it refers to the envelopment of that which intrudes. *Creation* (54) is concerned with the production of the new or not existing. *Raising* (54), *developing*, and *letting grow* are words which denote the process by which existing organizations or persons provide an opportunity for the newly created organization or person, and thus gradually give independence to that which is to be raised or developed.

In the theory of human communication, constructs such as social situations, rules, status, roles, and social techniques truly reflect the actions which people have to undertake if they wish to communicate. For both the participant and the theoretician, the social situation defines the matrix and outlines the field in which communication takes place. Rules determine what language is to be spoken, what messages have priority, and who can talk to whom. Status and role identify the human participants engaged in communication and serve as explanatory — that is, metacommunicative — messages; as in the denotation of music, they are the keys which instruct the participants in how to interpret the messages. Social techniques, finally, are a way to describe the intentions of people and the effects they have achieved with social action when action itself is the language in which the messages are coded.

Information, Language, and Codification

Information is probably the most important theoretical construct in communication theory. It refers to the fact that events going on in nature can be represented in other places and at other times. What is represented is obviously not the original event but a system of relationships which closely approximate the original event. Information may be coded outside of the human organism in terms of verbal symbols, objects, drawings and sketches, full- or small-scale models, and in many other forms. Inside the human organism, information is coded probably in terms of nervous and chemical signals. Information held by human beings is made accessible to self by feeling and thinking and to others by means of expressive movements — that is, action, including speech.

Information has a number of highly characteristic properties. It is always selective, much as sensory processes are always selective. The selectivity depends in part upon the structure of the end organs, and in part upon the observer who selects out of the potentially available information that which he is interested in. The observer's personal interest depends upon his purpose at that moment, which in turn is influenced by previous experiences. Focusing, therefore, is an operation which necessarily results in distortions. Simultaneous events have to be perceived successively, and one can only infer that things happen at the same time. Likewise, the evaluation of successive events is tel-

escaped into simultaneous considerations whenever messages are evaluated. That which is magnified stands out; the rest becomes background.

The perceptual-evaluative apparatus of the human being is, for practical purposes, limited to the observation of one aspect of events at any given time. In order to obtain more complete information, the observer has to focus in succession upon different aspects of events. For this purpose, he must assume that perceived events essentially do not change during the period of observation — an assumption which, in the case of human behavior, is highly improbable. At any one moment, the information received through perception of events is rather incomplete. Therefore, it has to be complemented with other pieces of incomplete information derived from additional observations at different times. These limitations of the perceptual-evaluative apparatus of the human being lead to a dialectic problem which one may refer to as the *complementarity of information*.

When an observer is concerned with observing himself, he cannot be concerned with others; if he specializes in transmission, he is less concerned with perception; and if he focuses upon interpersonal events, he cannot be equally concerned with group events. Though we must assume that individual, interpersonal, group, and cultural events occur simultaneously in reality, the human observer must, for dialectic reasons, observe these phenomena in succession. Although, for example, an observer in an interpersonal situation may be concerned at one moment with the assesement of the behavior of another human being, he may at the next instant proceed to observe his own feelings and thoughts; but by the time he really arrives at that observation, the behavior of the other person may have changed. In order to gain a more complete picture of the other person, he therefore must make some assumptions which will stabilize the situation. The observer usually assumes that his self-observations and the observations of the other person occur simultaneously, although he knows that this assumption does not correspond to reality. The complementarity of information — that is, aspects which complement each other but which, at the time they are gathered, are mutually exclusive — is a formidable problem in the majority of human functions (50). One such dichotomy is the participant and the observer; another pertains to proprio-functions and extero-functions; a third dichotomy is action as implementation and action as language; a fourth is structure and process; and there are many others.

The complementarity between proprio- and extero-functions is for

the psychiatrist of greatest importance. The proprio-functions refer at all levels of communication to the system in which the observer is an integral part, and the extero-functions refer to those systems in which the observer is not a part. One can distinguish between proprio-perception, -evaluation, and -transmission and extero-perception, -evaluation, and -transmission. Proprioception at the individual level consists of focusing upon stimuli arising inside the organism, evaluating such matters as fatigue, headache, temperature sensations, shame, guilt, or anxiety. Conversely, in exteroception, an individual focuses upon stimuli arising outside of his organism; he observes objects or nature, and the self as seen or heard through his exteroceptive sense organs. In proprio-transmission, the messages are directed at internal destinations and are not intended for communication with the outside world; it is a rather unconscious phenomenon involving primarily the smooth muscles. Muscular tension, involuntary movements, and contractions of the smooth muscles of the respiratory, intestinal, and vascular systems are examples of propriotransmission. In exterotransmission, conversely, the message is directed at external destinations, and the transmission is mediated principally through contractions of the striated muscles. It manifests itself in speech, gesture, and in other instrumental actions. Proprioevaluation is undertaken solely for the purpose of internal consumption so that the individual can evaluate feelings of gratification or frustration, make choices, and consider the need for restraining his desire for action. In exteroevaluation, it is the consideration of external events that matters, here the individual can evaluate his impact upon others, his roles, the social situation, and other pertinent factors.

Proprioception at the group level is centered on perceiving events happening in one's own group — for example, a football team in a huddle assesses the state of its own team. In exteroception, the behavior of the other group is observed — for example, a football team perceives the weakness of the other team. In propriotransmission, the activities serve the purpose of conveying a message to other members of the group — for example, a police patrol maintains communication with headquarters. In exterotransmission, the activities are oriented towards other groups — for example, the activities of propaganda and advertising agencies are measured in terms of the reactions of the audience. In proprioevaluation, the state of one's own group is evaluated — for example, an arctic expedition may find it meaningful to assess the state of health of its own group. In exteroevaluation, one group evaluates another group — for example, the Supreme Court

reviews a verdict of a lower court, or the executive committee of an organization reviews the actions of another organization.

At the social level, all participants are almost unaware of being an infinitesimal part of an extensive communication system. In general, people may be slightly more aware of the existence of these large super-personal systems when they observe other cultures or when they study the anonymous messages and mass communications within their own culture. Proprioception at the societal level occurs rarely; perhaps it is limited to historians, sociologists, economists, and colonial administrators who study the broad aspects of their own culture. Exteroception is more frequent since observation of the enemy or of other nations is a rather common occurrence. In propriotransmission, the actions of the group are directed towards one's own culture — primarily towards posterity. And in exterotransmission, messages are directed at other cultures — for example, the messages of the white man to what he considers more primitive civilizations. Proprioevaluation considers one's own culture in absolute terms; for example, people decide what sort of constitution they wish to have. In exteroevaluation, other cultures are assessed, especially in times preceding great wars and large-scale social conflicts.

The human being can undertake a number of *operations with information* which will yield additional information. Selection, maximization, amplification, interpolation, extrapolation, suppression, and abstraction are but a few examples. When a person encounters difficulties in action, he resorts to this intellect. With the help of thought, which is born of failure and fulfills an essentially reparatory function, action is analyzed, past events are reconstructed, and future events are anticipated; and opportunity for substitute gratification in fantasy occurs in meditation and self-observation. But not all operations with information constitute a gain for the individual. In abstraction, for example, an observer has to focus upon generalities and has to neglect specific and unique features; indeed, he cares only for the statistical mass effect. In this sense, abstraction is a one-way procedure, since it is impossible to infer the specific events from knowledge of principles. When abstraction and extrapolation are carried too far, when information is not properly weighted and is one-sidedly maximized, catastrophe is around the corner: either the person becomes neurotic or psychotic or the erroneous evaluation of reality prevents his survival.

Operations with information serve the purpose of maintaining the steady state of the communication system. It is obvious that such

operations may be fluid or rigid, and true or untrue with reference to reality. In order to encompass the effect upon the system, operations with information may be termed open-end, optimal, and closed-end.

At the personal level, the closed-end functions are exemplified by repetitive, unalterable, persevering, and stereotyped operations involving perception, judgment, and action. The open-end functions are represented by chaotic, unstable, or excessively fluid operations with mutually contradictory frames of reference which are so transient and overlapping that they cannot be utilized. They manifest themselves in the inability to organize or to integrate, the inability to check and countercheck information, and the lack of stabilization in habit formation. Optimal operations with flexible frames of reference range in between the open and closed procedures. Under optimal conditions, perceptive entities such as cues are changed when proven ineffective, evaluation is geared to problem-solving operations, and transmission is concerned with flexible action which is subordinated to the functioning of the whole organism.

One of the most important operations with information is learning, which consists of stabilization of existing functions by renouncing new choices and repeating the old ones. Closed-end functions refer to excessive learning in which adaptation is renounced because of overspecialization, while the open-end procedures refer to the inability to learn and renunciation of the advantages gained by repetitive performance.

In interpersonal communication systems, closed-end operations manifest themselves by rigidity to the extent of endangering the existence of the system: perception is so stereotyped that nothing new can be encompassed; evaluation is logically so consistent that it becomes inconsistent with nature; and transmission is repetitive to the point of boredom. The compulsive neurotic is a pertinent example. Open-end operations, in contrast, are so loosely defined that change becomes too rapid: perceptions are varied and inconsistent; evaluations are contradictory and serve the whims of the moment; and in transmission anything can be said or done. The whole procedure lacks long-term goals and is essentially overadaptive to the point of shiftiness. Optimal operations are flexibly defined according to purpose. That which interpersonally may be seen, judged, or talked about varies and is always subservient to the imminent task, and this includes the notion of disrupting the relationship if it is no longer useful.

In group systems, closed-end operations involve excessive specialization and division of labor. Thus the group, because of its formal organization, finds itself in a precarious equilibrium which is exemplified in bureaucratic and authoritarian practices. The open systems, in contrast, have an excessively loose and undefined group structure. Here we find lack of specialization and fluctuation of role distribution, while the rules are made up or changed with progressive development. Such chaotic or transient systems of communication are characteristic of war-time, emergency, and frontier situations. Finally, under optimal conditions, the group structure is stabilized and varies according to circumstance. Because of the flexible assignment of specialization, corrective mechanisms operate effectively under such conditions.

At the societal level, closed-end operations pertain to rigidly defined roles of groups as they occur, for example, in an old caste society which functions without the buffer effects of a class society. In the open-end systems of operation, roles and rules are loosely defined, and nobody knows precisely what the function of a group is; an example of this kind is found in the culture-contact groups of great harbor cities like Shanghai. Under optimal conditions, then, roles and rules of these groups and the functions of society are flexibly defined. Examples of this type are numerous in the founding years of any nation.

While the concept of information refers to the inside representation of outside events, the concepts of language and *codification* refer to the technical aspects of the recording of such information. Retention of information necessitates some imprints or traces which, when they are known to several people or to the same person at various dates, are referred to as a code.

All *action* can function as language. Any action undertaken by an organism is a statement which, when perceived and understood by other organisms, becomes a message. Messages are conveyed by signals which as they travel along certain pathways can be conceived of as signs (65). A sign possesses problem-solving properties or cue value for an observer by force of its own structure and because of the attention which is paid to it. A reciprocal relationship exists between signs and signals. For example, one must assume that neural impulses in transit are rather uniform and that they probably vary only in time and intensity. The multifariousness of a human being's impressions, therefore, cannot be satisfactorily explained by the variability of nervous signals, but rather by the channeling of these signals into certain network configurations referred to as signs. The relationship between the

uniformity of signals and the heterogeneity of signs inside the organism is reversed when one considers the communications network outside of the organism, for in the latter the variability is due to variations in signals. When perception takes place, the multiplicity of signals is translated within the human organism into a multiplicity of signs, which process is reversed when transmission of messages towards the outside becomes necessary.

The principal human code is language. Here it seems profitable to distinguish, with Morris (39), a number of related disciplines. Semiotics, which is the science of signs, concerns itself with events in their functions as symbols. Within the field of semiotics one finds the field of syntactics, which is concerned with the relationships of symbols to other symbols; the field of semantics, which deals with the relations of signs to the events or objects they purport to designate; and the field of pragmatics, which is the science of the relation of signs to their human interpreters. Psychiatrists are, of course, most interested in the pragmatic aspects of language.

Language, in the narrower sense of the word, denotes the universal properties of events. That which is in common with other events is expressed in words or symbols, the field of mathematics being the supreme example of such relational statements. In order to describe more unique events, language has to list a large number of universal aspects, and through special spatial and temporal arrangements of these factors the more divergent nature of these events is indicated. Thus language in action (26) conveys statements of probability. Really unique events can only be experienced; they can never be described (29).

When an observer studies a single human being in isolation from others, the nature of codification inside of this individual cannot be explored directly; today, however, it is generally accepted that information is codified in terms of nervous impulses or signals which travel along certain nervous pathways. In addition, information is probably also codified in terms of chemical impulses which are conveyed contiguously from cell to cell and along the humoral pathways.

Codification at the interpersonal level is accessible to observation and experimentation. In its simplest form, a person may point to a thing, an organ, or an action and let it speak for itself. This process may be referred to as ostensive communication. Next in complexity are the action symbols, which can vary from universally understood gestures to highly individualized forms of expression. Finally we have the spoken

or written word, mathematics, and all other types of essentially verbal forms of codification (37).

Although language continues to be the essential form of codification, it loses some of its importance at the group level. Much information is codified in terms of the activities of the organized group. For example, each individual may hold a small piece of information which is entirely useless to him alone; but when he is in contact with a group — be it a football team or a symphony orchestra — the isolated pieces of information fall into place. Some of this information becomes accessible in action only, and one must assume that the codification of this type of information is contained in the group as a whole. Just as a metacarpal bone has little or no information about the organism as a whole, so does an individual have little information about the group. The codification of information is divided among many people, and only when the mosaic is put together does it become significant.

At the cultural and societal level, the codification processes are spread over large geographical areas and a considerable segment of time. The time-binding effect of cultural codifications bridges the gap between generations. Custom and tradition, and particularly language, are handed down through the ages. But the thousands of individuals who contributed towards a culture remain anonymous; for example, the architects and workers who built cathedrals and amphitheatres of the past remain unknown by name. The pyramids of Egypt were built by thousands of unidentified people — a message to posterity codified in stone. In analyzing space-binding codifications, one finds that roles do not refer to individual persons any more but denote the specialized functions of a group within the organized network of society. At this level, one talks, for example, about lawyers, physicians, and farmers rather than about any single individual, and rules then define the inter-relatedness of these groups.

In thinking about codification (50), it is well to remember that these processes are a function of the time and space scales of the system. Large organizations spread their codifications over larger segments of space and time than smaller organizations. And it may well be that many forms of codification have escaped man's attention, either because they are too large or because they are too small in terms of our own human scales of observation.

While verbal language is generally accepted as a common code system in communication, the concept of silent action as codification seems to present some particular difficulties. People commonly assume

that information is transmitted in terms of words or gestures; they tend to forget that the direct observation of action, for example, of a man tying his shoelaces or offering his girl friend a cigarette, is perhaps the most important system of interpersonal codification. Words and gestures stand primarily for other events; they have little intrinsic value of their own and therefore are readily regarded as symbols. In contrast, silent actions (exclusive of gesture) always have a potentially twofold function: they are an implementation in their own right, or they may stand for something else, or both. This double meaning of actions introduces great difficulties into the evaluation of nonverbal communication inasmuch as a perceiver can never be quite sure when an action is intended to convey a message and when it is intended for other purposes.

Even at the personal level some information seems to be coded in terms of action. A person cannot learn to play the piano, for example, by reading a book; instead he has to move his muscles if he wishes to get the feeling of it. The same is true of athletes, who actually practice the motions of golf or tennis prior to a competition in order to recall the actions that they are going to need. Apparently some signs are coded in the organism by a network which includes, in addition to the central nervous system component, the effector organs in action.

At the interpersonal level, information is really contained in the interaction between two or more persons; it is elicited by complementary action of several people. Sexual intercourse seems to be the best example of this; each partner possesses part of the information, and the parts, when combined, are complementary in nature, resulting in true interaction of the couple.

At the group level, the information possessed by a specialized team — for example, a bomber crew — is elicited by translating it into action. Each member of the group has a piece of information and proceeds with a piece of action; but this information or action is meaningless unless it is combined into a whole. Group action, therefore, is characterized by the fact that each individual has to cooperate. The success of the group depends upon this cooperation — nobody can do it alone — and the survival of the individual depends in part upon the successful action of the group. The predictability of group action is of a different order of difficulty from the predictability of interpersonal action because as an individual no one is capable of encompassing all the information pertinent for prediction. There is no “group brain”.

At the societal level, the connections between action and codification

are even less comprehensible. There is no "cultural brain", and the information is scattered over centuries. Predictability is minimal, and nobody is capable of combining in one head all the information that is available. That which large groups do to each other seems to be known more in terms of action than in terms of information; but, nonetheless, the theoretical assumption must be made that information exists which is shared by the members of a society or a cultural group. This knowledge is obviously in part taken over from previous generations who gradually evolved child-raising practices, laws, styles of architecture, techniques of agriculture, and a host of other things which would contribute toward their survival.

In summary, it can be stated that the code systems used by human beings are numerous. They vary from nervous impulses, chemical agents, contraction of muscles, and actions of organisms to social action of aggregates of human beings. Practically any object or action may stand for something else; therefore it is important to discover the instructions which accompany messages, including directions about the code system which is being used.

Metacommunication

A musician who wishes to play a piece of music which is new to him has to first identify the key and the clef in which the notes are written, for both represent instructions to the player regarding the interpretation of the musical symbols. In direct person-to-person communication without mediation through a musical score the same relationship exists. A person who perceives a message divides it into two parts : one part might be labeled the content of the message; and the other, the instructions. These instructions which refer to the interpretation of the message constitute communications about communication, or "meta-communication" (50).

Both sender and receiver are involved in metacommunication. The sender must bear in mind that it is his task to instruct the receiver, and the receiver in turn has to interpret the instructional messages which accompany the main body of the message. Instructions given by the sender may be explicit or may remain implicit in the situation, and the interpretations made by the receiver may or may not correspond to the intentions of the sender. The sender of a message may give explicit instructions; for example, a person who enters a room and introduces himself as the telephone repair man instructs the other people about his forthcoming actions. Less explicit are the instructions given through the

uniforms of policemen, judges, and other officials; when such functionaries speak, they assume that the listener will interpret their words in accordance with the role that they have assumed. In person-to-person communication, a gesture may contain the explanation and the instructions for the interpretation of the words that are being said; or, conversely, words may contain the explanations for a diagram which represents the content. Be that as it may, consciously or unconsciously every sender and every receiver divides the message into two parts — the content, and the instructions.

In many situations, instructions are not given explicitly by the speakers because the assumption is made that the other persons know what they are. These implicit instructions, which people assume need not be expressed because they are shared by all, are termed “values”. In any culture, the ways of communication are prescribed by tradition and are taught to the child as he grows up. The signals used to evoke in the listener the appropriate set of assumptions are usually of a non-verbal nature. The intonation of a voice, the way an action sequence is structured, the speed of presentation, and many other subtle patterns may be used as instructions. Furthermore, omissions may serve as a way of giving instructions. If a person does not greet another or does not shake hands when a greeting or handshaking might be expected, the omission may serve as instruction for the interpretation of forthcoming messages. A person who smokes a cigarette lets it be known that he does not smoke a cigar and does not smoke a pipe, and may thereby instruct the visitor not to smoke a cigar. Metacommunicative instructions which are left implicit require that all the participants share the same values if communication is to be successful. The experienced and mature person has a knowledge of all the implications and of all the metacommunicative shadings prevailing in a given culture and sub-culture (50). This level of functioning is rarely attainable for the mentally sick patient.

A brief review of the varieties of metacommunication may help the reader to gain a bird's-eye view of the complexity of the problem. Explicit instructions are usually given in written or spoken words — for example, the manuals issued with new pieces of machinery and equipment, or the orders given in a military chain of command. In daily life, in contrast, verbal instructions may not necessarily predominate; roles and the props which identify roles are the most frequently used instructions. Personal identification marks, uniforms, style of dress, hair-do, jewelry, hats, coats, umbrellas, brief cases, shoes, and other be-

longings of a personal nature and the particular pattern in which they are arranged convey to the perceiver a great many instructions as to how forthcoming messages are to be interpreted. In public life, the uniforms worn by military persons, police officers, and firemen, the gowns worn by professors at commencement exercises, and the robes worn by judges in court remain the most specific reminders of the roles that these persons have assumed. Sometimes it is the situational props rather than the personal equipment which instruct the participants in how to send and how to receive messages. Accordingly, messages in a church will be given and interpreted differently from the same messages spoken on the dance floor, in a office building, or in the sports arena.

Posture, facial expression, and gesture, as well as movement of the body, convey another set of instructions. An erect or submissive posture, the deliberately formal or informal posture, the military bearing, or the stiff-necked attitude convey distinct instructions. Facial expressions and gestures refer primarily to the emotional state of the person, and these, combined with the posture, may transmit to the receiver the pompous, grave, and solemn attitude of a judge or the pugnaciousness of a prize fighter. The hurried movements of the person who is trying to catch a train, the relaxed movements of a person sunning himself on the bench in the park, the threatening movements of an angry person, the signs of greeting and farewell, and the gestures of seduction and insistence all accompany verbal or nonverbal messages in forms of instructions. Sometimes the metacommunicative messages are contained in the structure of a statement which enables the perceiver to identify from the way things are said that the speaker is a salesman or a psychiatrist, a policeman or a delivery boy. The structure of a sentence, the emphasis and the twist given, may thus betray purposely or unconsciously the intentions of the speaker.

The rules inherent in a situation likewise determine the flow of messages and constitute metacommunicative instructions. As part of the general value system, everybody knows how to behave in a committee meeting or on the football field, in the movies or at a funeral. However, in person-to-person communication the complexity is increased by all those statements which are designed to indicate that a change of rules, of values, and of roles has taken place. For example, the psychiatrist, though being a therapist, assumes various roles as a result of a mutual understanding between him and the patient. Likewise the district attorney, the clergyman, and the policeman assume sub-

sidary roles within the over-all role. After a committee meeting, for example, some of the men may gather together in an informal way to have a drink; and since the official ceremony is terminated, different roles and rules apply. In person-to-person conversation, people may first talk to each other in the roles of buyer and seller, then converse as man and woman, and finally proceed to their roles as fellow members in a orchestra — all of these changes embracing a time period of only a few seconds. Instructions may also be contained in the way a sequence of messages is presented, the contrasts that are chosen, the omissions that are made, the intensities that are used — in brief, they are contained in the complexities of the pattern itself.

Upon initial contact in a new situation with strange people, the first thing that happens is a mutual exploration of each other's methods of metacommunication. An astute person explores another person in order to find out what sort of codes, rules, and roles the other person embraces so that the forthcoming messages may be correctly transmitted as well as interpreted. Meeting new people means learning new ways of metacommunication, while meeting old friends usually means adhering to a more stabilized form of metacommunication (50).

Feedback and Correction

In daily language the word "statement" refers to an expressive action of an individual, or essentially to the fact that something has been transmitted. The term "message" refers to statements which have been interpreted, in which the intention of the sender to achieve a desired result is implicitly acknowledged. Whenever the intention of the sender coincides with the result achieved in the receiver, then the message has been understood. It is well to remember that the receiver can only infer the intentions of the sender, and the sender can only observe the reactions elicited in the receiver. There always remains an element of uncertainty, although, through correction, the uncertainty can be narrowed down practically to the point of elimination.

In the process of transmitting a message, a number of unintentional signals will arise which are likely to blur the message. Communication engineers refer to the signals which are added in the course of transmission but which were not intended by the sender as "noise". These unwanted additions are due to the external circumstances beyond the control of sender or receiver. In human communication, where the channels of transmission are not distinctly separated as in communication engineering, there is an additional source of distortion which de-