On Human Communication

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A REVIEW, A SURVEY, AND A CRITICISM

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It is only this direct acquaintance, and personal friendship, with those principally active in the field that has made my work possible.

C. C.

Preface

I have written this book at the invitation of the editors of the series "Studies in Communication," to serve as an introduction to that series of volumes which will appear during the next few years. It is intended as a review, a survey, and a criticism—nothing more.

In this work I have attempted to unite the material of numerous lectures which I have had the pleasure of giving in Britain, America, and several European countries during the past five years. This experience has convinced me of the widespread interest today in the whole field of "human communication"—an interest which has been fertilized greatly (and often mistakenly) by the development of "communication theory" and, at the same time, has shown me the difficulties of many newcomers to the field, who find themselves baffled by the speciality and scattered nature of the literature. It is my opinion that there is need for a simple book, such as this, to introduce these apprentices to their masters.

The book is, then, not for experts. It consists of a series of simple essays, written in the simplest language that I am able to command. I am aware that in places it is naive. But if it gives some notion of the relations between the diverse studies of communication, of the causes and the growth of this modern interest, together with some idea of the unification which exists (and even more important, the differences of opinion, controversies, and lack of unification), then this book will have achieved its object.

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I am indebted to Professor Sir Ronald A. Fisher, Cambridge, and to Messrs. Oliver & Boyd, Ltd., Edinburgh, for permission to reprint the sentence: "inductive inference is the only process . . . by which new knowledge comes into the world," from their book *Design of Experiments*.

Contents

CHAPTER ONE

Communication and Organization—an Essay

> *And the Lord said, "Behold the people is one, and they have all one language; and this they begin to do: and now nothing will be restrained from them, which they have imagined to do. Go to, let us go down and there confound their language, that they may not understand one another's speech." So the Lord scattered them abroad from thence upon the face of all the earth: and they left off to build the city. Therefore is the name of it called Babel . . . .*
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> *Genesis*, Ch. 2.

Leibnitz, it has sometime been said, was the last man to know everything. Though this is most certainly a gross exaggeration, it is an epigram with considerable point. For it is true that up to the last years of the eighteenth century our greatest mentors were able not only to compass the whole science of their day, perhaps together with mastery of several languages, but to absorb a broad culture as well. But as the fruits of scientific labor have increasingly been applied to our material betterment, fields of specialized interest have come to be cultivated, and the activities of an ever-increasing body of scientific workers have diverged. Today we are most of us content to carry out an intense cultivation of our own little scientific gardens (to continue the metaphor), deriving occasional pleasure from a chat with our neighbors over the fence, while with them we discuss, criticize, and exhibit our produce.

Too many of us today are scientifically lonely; we tire of talking continually to ourselves, and seek companionship. We attend Symposia and Congresses, perhaps too many! From time to time since the growth of specialization, broad movements have arisen in reaction to this trend, seeking unity and attempting integration.—Some have lived and prospered; others were stillborn.

There are signs of such a movement today; an awareness of a certain unity of a group of studies is growing, originally diverse and disconnected, but all related to our *communicative* activities. The movement is rapidly becoming "popular," so great is the desire for unification, and this popularity carries with it a certain danger. By all means let us encourage any tendency toward unity, any attempts to make common ground, but we must continually be critical. The concept of "communication" certainly arises in a number of disciplines; in sociology, linguistics, psychology, economics; in physiology of the nervous system, in the theory of signs, in communication engineering. Awareness of the universal nature of "communication" has existed for a very long time, in a somewhat vague and empirical way, but recently the mathematical developments which come under the heading of the ' theory of communication" have brought matters to a head, and many there are who regard this work as a panacea. True, it has very considerable relevance to these different disciplines, which we shall try to explain in these pages; but it is not a cure-all. Perhaps, since we shall be discussing this relevance, we had better state a point of view, right at the start, and write it in italics: *At the time of writing, the various aspects of communication, as they are studied under the different disciplines, by no means form a unified study; there is a certain common ground which shows promise of fertility, nothing more.* In this little book, as our subtitle claims, we shall attempt a review, a survey, and a criticism of the study as it is being developed. The level will necessarily be elementary. There is a wide sea of literature which we shall try to chart for the novice, and there are a few classic islands where we shall land and explore in some detail. And in this little ship, our book, we shall be taking no experts amongst the passengers. It is a cruise for novices only, but they will be introduced to the professional crew.

All aboard then—and watch out for rocks!

1. THE SCHEME OF THIS BOOK

It should be emphasized at the outset that this book is in no sense an exposition of the mathematical theory of communication, though we shall be making some reference to this subject and Chapter 5 attempts a survey of its principal concepts and theorems. This book is intended to take its

place as one of a series of texts on communication, to be prepared by different authors, the others of the series being more specific and detailed studies.* This one is introductory—no more.

The various chapters are written, so far as possible, as self-contained essays, and the chapter headings should give some guide. None of the chapters is written for the experts. Thus, linguists are asked to be lenient in reading Chapter 3, and psychologists may regard Chapter 7 as superficial to the extreme. Again, if any mathematicians or logicians come to Chapters 5 and 6—pass on, they are not for you! No; the book is written for that curious person, the "general reader." But you experts, if you read my little volume, please do comment, criticize, and correct. For that is the only way to progress.

One of the great difficulties of discussing a subject that lies in the borderland of a number of well-established fields of study is the choice of language and definitions. It may be true that concepts can be validly relevant in different fields, yet their expression in forms acceptable to students in these various specialities may not prove easy. In each field there may already be sets of definitions, and students may be loth to change, modify, or extend their customary definitions, framed for their specific purposes, to suit the interest of others. But a certain compromise is necessary if we are to find a common language of discussion; so in the Appendix a list of terms is given, together with explanations which in some cases may be dignified by the name of definition. This, it is hoped, forms a self-consistent terminology, and though the definitions given have no official backing, some have a degree of common usage among students of communication theory. The various chapters do not pretend to be expositions, or even summaries (with the doubtful exception of Chapter 5) of different sciences—linguistics, phonetics, communication theory, semantics, psychology. Had this been the intention, the author would have been guilty of supreme conceit. Rather we are seeking to extract from these various sciences the common related concepts and ideas concerning communication, in such a way as to show the historical development and growth of this subject. At the same time we hope to stress in particular some of those snares and pitfalls which, though well known to the specialist, catch the unwary who chance to stray in from other fields.

2. WHAT IS "COMMUNICATION"?

Communication is essentially a social affair. Man has evolved a host of different systems of communication which render his social life possible—

* This series, "Studies in Communication," is to be published during the next few years by The Technology Press of M.I.T. and John Wiley & Sons, Inc.

social life not in the sense of living in packs for hunting or for making war, but in a sense unknown to animals. Most prominent among all these systems of communication is, of course, human speech and language. Human language is not to be equated with the sign systems of animals, for man is not restricted to calling his young, or suggesting mating, or shouting cries of danger; he can with his remarkable faculties of speech give utterance to almost any thought. Like animals, we too have our inborn instinctive cries of alarm, pain, et cetera; we say *Oh!*, *Ah!;* we have smiles, groans, and tears; we blush, shiver, yawn, and frown.* A hen can set her chicks scurrying up to her, by clucking—communication established by a releaser mechanism—*but human language is vastly more than a complicated system of clucking.*

The development of language reflects back upon thought; for with language thoughts may become organized, new thoughts evolved. Self-awareness and the sense of social responsibility have arisen as a result of organized thoughts. Systems of ethics and law have been built up. Man has become self-conscious, responsible, a social creature.

Speech and writing are by no means our only systems of communication. Social intercourse is greatly strengthened by habits of gesture—little movements of the hands and face. With nods, smiles, frowns, handshakes, kisses, fist shakes, and other gestures we can convey most subtle understanding. Also we have economic systems for trafficking not in ideas but in material goods and services; the tokens of communication are coins, bonds, letters of credit, and so on. We have conventions of dress, rules of the road, social formalities, and good manners; we have rules of membership and function in businesses, institutions, and families. But life in the modern world is coming to depend more and more upon "technical" means of communication, telephone and telegraph, radio and printing. Without such technical aids the modern city-state could not exist one week, for it is only by means of them that trade and business can proceed; that goods and services can be distributed where needed; that railways can run on a schedule; that law and order are maintained; that education is possible. Communication renders true social life practicable, for communication means organization. Communications have enabled the social unit to grow, from the village to the town, to the modern city-state, until today we see organized systems of mutual dependence grown to cover whole hemispheres.[230]† Communication engineers have altered the size and shape of the world.

* But such reflexes do not form part of true human language; like the cries of animals they cannot be said to be *right* or *wrong* though, as signs, they can be interpreted by our fellows into the emotions they express.

† This number refers to one of the numbered references at the end of the book.

The development of human language was a tremendous step in evolution; its power for organizing thoughts, and the resulting growth of social organizations of all kinds, has given man, wars or no wars, street accidents or no street accidents, vastly increased potential for survival.

As a start, let us now take a few of the concepts and notions to do with communication, and discuss them briefly, not in any formal scientific sense, but in the language of the market place. A few dictionary definitions may serve as a starting point for our discursive approach here; later we shall see that such definitions are not at variance with those more restricted definitions used in scientific analysis (Appendix). The following have been drawn from the *Concise Oxford English Dictionary:**

Communication, n. Act of imparting (esp. news); information given; intercourse; . . . (Military, Pl.) connexion between base and front.

Message, n. Oral or written communication sent by one person to another.

Information, n. Informing, telling; thing told, knowledge, items of knowledge, news, (on, about); . . . .

Signal, n., v.t. & i. Preconcerted or intelligible sign conveying information . . . at a distance. . . .

Intelligence, n. . . . understanding, sagacity . . . information, news.

News, n. pl. Tidings, new information. . . .

Knowledge, n. . . . familiarity gained by experience, person's range of information. . . .

Belief, n. Trust or confidence (*in*); . . . acceptance as true or existing (of any fact, statement, etc.; . . .). . . .

Organism, n. Organised body with connected interdependent parts sharing common life, . . .; whole with interdependent parts compared to living being.

System, n. Complex whole, set of connected things or parts, organised body of material or immaterial things . . . ; method, organisation, considered principles of procedure, (principle of) classification; . . . .

Such dictionary definitions are the "common usages" of words; scientific usage frequently needs to be more restricted but should not violate common sense—an accusation often mistakenly leveled against scientific words by the layman.

The most frequent use of the words listed above is in connection with *human* communication, as the dictionary suggests. The word "communication" calls to mind most readily the sending or receipt of a letter, or a conversation between two friends; some may think of newspapers issued daily from a central office to thousands of subscribers, or of radio broadcasting; others may think of telephones, linking one speaker and one listener. There are systems too which come to mind only to specialists; for instance, ornithologists and entomologists may think of flocking and swarming, or of the incredible precision with which flight maneuvres are made by certain birds, or the homing of pigeons—problems which have

* With kind permission of the Clarendon Press, Oxford.

been extensively studied, yet are still so imperfectly understood. Again, physiologists may consider the communicative function of the nervous system, co-ordinating the actions of all the parts of an integrated animal. At the other end of the scale, the anthropologist and sociologist are greatly interested in the communication between large groups of people, societies and races, by virtue of their cultures, their economic and religious systems, their laws, languages, and ethical codes. Examples of "communication systems" are endless and varied.

When "members" or "elements" are in communication with one another, they are associating, co-operating, forming an "organization," or sometimes an "organism." Communication is a social function. That old cliché, "a whole is more than the sum of the parts," expresses a truth; the whole, the organization or organism, possesses a structure which is describable as a set of *rules*, and this structure, the rules, may remain unchanged as the individual members or elements are changed. By the possession of this structure the whole organization may be better adapted or better fitted for some goal-seeking activity. Communication means a *sharing* of elements of behavior, or modes of life, by the existence of sets of rules.

It should be emphasized at this point that we shall make no attempt in this book to unify the host of different systems of communication which we see around us, and a few of which we have just instanced. We shall be discussing certain common aspects, nothing more. At the same time we hope to convince the reader of the extremely complex and difficult nature of certain concepts, which superficially seem so easy. And, in particular, we shall make reference to the mathematical theory of communication, but with no intention of applying this as a "unifying" theory. It has a right and proper place in the study of communication, which its originators thoroughly understood, and attempts to extend it outside the technical field in which it first arose will be fraught with pitfalls. Application of this theory to biological systems has scarcely begun, though some preliminary ground clearing has been done.

Perhaps we may be permitted to comment upon a definition of communication, as given by a leading psychologist:[313] "*Communication is the discriminatory response of an organism to a stimulus.*"* The same writer emphasizes that a definition broad enough to embrace all that the word "communication" means to different people may risk finding itself dissipated in generalities. We would agree; such definitions or descriptions serve as little more than foci for discussion. But there are two points we wish to make concerning this psychologist's definition. First, as we shall view it in our present context, communication is not the response itself

* With kind permission of the *Journal of the Acoustical Society of America.*

but is essentially the *relationship* set up by the transmission of stimuli and the evocation of responses. Second, it will be well to expand somewhat upon the notion of a stimulus; we shall need to distinguish between human language and the communicative signs of animals, between languages, codes, and logical sign systems, at least.

The study of the signs used in communication, and of the rules operating upon them and upon their users, forms the core of the study of communication. There is no communication without a system of signs—but there are many kinds of "signs." Let us refer again to the *Oxford English Dictionary:*

Sign, n. . . . written mark conventionally used for word or phrase, symbol, thing used as representation of something . . . presumptive evidence or indication or suggestion or symptom *of* or *that*, distinctive mark, token, guarantee, password . . . portent . . . ; natural or conventional motion or gesture used instead of words to convey information . . . .

Language, n. A vocabulary and way of using it. . . .

Code, n., and v.t. Systematic collection of statutes, body of laws so arranged as to avoid inconsistency and overlapping; . . . set of rules on any subject; prevalent morality of a society or class . . . ; system of mil. or nav. signals. . . .

Symbol, n. . . . Thing regarded by general consent as naturally typifying or representing or recalling something by possession of analogous qualities or by association in fact or thought. . . .

In this book we shall use the word *sign* for any physical event used in communication—human, animal, or machine—avoiding the term *symbol*, which is best reserved for the Crown, the Cross, Uncle Sam, the olive branch, the Devil, Father Time, and others "naturally typifying or representing or recalling . . . by association in fact or thought," religious and cultural symbols interpretable only in specified historical contexts. The term *language* will be used in the sense of human language, "a vocabulary [of signs] and way of using it"; as a set of signs and rules such as we use in everyday speech and conversation, in a highly flexible and mostly illogical way. On the other hand, we shall refer to the strictly formalized systems of signs and rules, such as those of mathematics and logic, as *language systems* or *sign systems.*

The term *code* has a strictly technical usage which we shall adopt here. Messages can be coded when they are already expressed by means of signs (e.g., letters of the English alphabet): then a code is an agreed transformation, usually one to one and reversible, by which messages may be converted from one set of the signs to another. Morse code, semaphore, and the deaf-and-dumb code represent typical examples. In our terminology then, we distinguish sharply between *language*, which is developed organically over long periods of time, and *codes*, which are invented for some specific purpose and follow explicit rules.

Apart from our natural languages (English, French, Italian, etc.), we have many examples of systems of signs and rules, which are mostly of a very inflexible kind. A pack of playing cards represents a set of signs, and the rules of the game ensure communication and patterned behavior among the players. Every motorist in Britain is given a book of rules of the road called the *Highway Code*, and adherence to these signs and rules is supposed to produce concerted, patterned behavior on British roads. There are endless examples of such simple sign systems. A society has a structure, definite sets of relationships between individuals, which is not formless and haphazard but organized. Hierarchies may exist and be recognized, in a family, a business, an institution, a factory, or an army—functional relationships which decide to a great extent the patterned flow of communication. The communication and the structure are subject to sets of rules, rules of conduct, authoritarian dictates, systems of law; and the structures may be highly complex and varied in form. A "code" of ethics is more like a language, having developed organically; it is a set of guiding rules concerning "ought situations," generally accepted, whereby people in a society associate together and have social coherence. Such codes are different in the various societies of the world, though there is an overlap of varying degrees. When the overlap is small a gulf of misunderstanding may open up. Across such a gulf communication may fail; if it does, the organization breaks down.

The whole broad study of language and sign systems has been called, by Charles Morris, the theory of signs,[243,244] and owes much to the earlier philosophy of Charles Peirce.* Morris distinguishes three types of rule operating upon signs, (*a*) *syntactic* rules (rules of syntax; relations between signs); (*b*) *semantic* rules (relations between signs and the things, actions, relationships, qualities—*designata*); (*c*) *pragmatic* rules (relations between signs and their users). We shall be making considerable reference later to the ideas of Peirce and Morris.

3. WHAT IS IT THAT WE COMMUNICATE?

The dictionary definition of communication, which was quoted before, includes the communication of goods and supplies. Certainly the transport of coal, oil, food, and people by the railways, or of parcels by the Post Office, or of raw materials from mine to factory, forms an essential social function; without such transport our society would collapse. But transport of goods is not communication in the sense we are adopting

* Locke used the word "semeiotic" to denote the "doctrine of signs." See reference 207. For an appreciation and survey of Peirce's relevant work in digestible form, see reference 129.

here, and does not raise the same subtle and difficult questions. What "goods" do we exchange when we send messages to one another?

Physically, we transmit signals or signs—audible, visual, tactual. But the mere transmission and reception of a physical signal does not constitute communication. A sign, if it is perceived by the recipient, has the potential for selecting responses in him. Physically, when we communicate, we make noises with our mouths, or gesticulate, or exhibit some token or icon, and these physical signals set up a response behavior.

The theory of communication is partly concerned with the measurement of *information content* of signals, as their essential property in the establishment of communication links. But the information content of signals is not to be regarded as a commodity; it is more a property or potential of the signals, and as a concept it is closely related to the idea of selection, or discrimination. This mathematical theory first arose in telegraphy and telephony, being developed for the purpose of measuring the information content of telecommunication signals. It concerned only the signals themselves, as transmitted along wires, or broadcast through the aether, and is quite abstracted from all questions of "meaning." Nor does it concern the importance, the value, or truth to any particular person. As a theory, it lies at the syntactic level of sign theory and is abstracted from the semantic and pragmatic levels. We shall outline this theory of "selective" information in Chapter 5 and shall argue there and in Chapter 6 that, though the theory does not directly involve biological elements, it is nevertheless quite basic to the study of human communication—basic but insufficient.

It may be helpful if, in this introductory essay, we first approach our problem descriptively, if only to illuminate some of its great difficulties before we enter into scientific discussion and become concerned with *measurement*.

It is always important to distinguish between a physical property (attribute, quality) and a measure, unit, or magnitude of that property. When talking of measurement, any statements we make should be scientific statements, but we may discuss properties, attributes, and qualities in a variety of ways. For example, "color" may be considered artistically, poetically, even musically—but we could not discuss it so in ångstrom units. Again, it is possible to discuss "length" emotionally ("There's a long, long trail a-winding . . ."), though we should not refer to 1000 metres with emotion. So with many other physical concepts, including communication, signals, information. Human communication can be discussed in the language of aesthetics, or of philology or history, for example, as well as in that of physical science. For physical science is not the only system of thinking; it is one particular way.