Fairly extensive control of conditions relevant to human behavior is maintained in industry in the form of wages and conditions of work, in schools in the form of grades and conditions of work, in commerce by anyone in possession of goods or money, by governmental agencies through the police and military, in the psychological clinic through the consent of the controllee, and so on. A degree of effective control, not so easily identified, rests in the hands of entertainers, writers, advertisers, and propagandists. These controls, which are often all too evident in their practical application, are more than sufficient to permit us to extend the results of a laboratory science to the interpretation of human behavior in daily affairs—for either theoretical or practical purposes. Since a science of behavior will continue to increase the effective use of this control, it is now more important than ever to understand the processes involved and to prepare ourselves for the problems which will certainly arise.

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WHY ORGANISMS BEHAVE

The terms "cause" and "effect" are no longer widely used in science. They have been associated with so many theories of the structure and operation of the universe that they mean more than scientists want to say. The terms which replace them, however, refer to the same factual core. A "cause" becomes a "change in an independent variable" and an "effect" a "change in a dependent variable." The old "cause-and-effect connection" becomes a "functional relation." The new terms do not suggest *how* a cause causes its effect; they merely assert that different events tend to occur together in a certain order. This is important, but it is not crucial. There is no particular danger in using "cause" and "effect" in an informal discussion if we are always ready to substitute their more exact counterparts.

We are concerned, then, with the causes of human behavior. We want to know why men behave as they do. Any condition or event which can be shown to have an effect upon behavior must be taken into account. By discovering and analyzing these causes we can predict behavior; to the extent that we can manipulate them, we can control behavior.

There is a curious inconsistency in the zeal with which the doctrine

of personal freedom has been defended, because men have always been fascinated by the search for causes. The spontaneity of human behavior is apparently no more challenging than its "why and wherefore." So strong is the urge to explain behavior that men have been led to anticipate legitimate scientific inquiry and to construct highly implausible theories of causation. This practice is not unusual in the history of science. The study of any subject begins in the realm of superstition. The fanciful explanation precedes the valid. Astronomy began as astrology; chemistry as alchemy. The field of behavior has had, and still has, its astrologers and alchemists. A long history of prescientific explanation furnishes us with a fantastic array of causes which have no function other than to supply spurious answers to questions which must otherwise go unanswered in the early stages of a science.

SOME POPULAR "CAUSES" OF BEHAVIOR

Any conspicuous event which coincides with human behavior is likely to be seized upon as a cause. The position of the planets at the birth of the individual is an example. Usually astrologers do not try to predict specific actions from such causes, but when they tell us that a man will be impetuous, careless, or thoughtful, we must suppose that specific actions are assumed to be affected. Numerology finds a different set of causes—for example, in the numbers which compose the street address of the individual or in the number of letters in his name. Millions of people turn to these spurious causes every year in their desperate need to understand human behavior and to deal with it effectively.

The predictions of astrologers, numerologists, and the like are usually so vague that they cannot be confirmed or disproved properly. Failures are easily overlooked, while an occasional chance hit is dramatic enough to maintain the behavior of the devotee in considerable strength. Certain valid relations which resemble such superstitions offer spurious support. For example, some characteristics of behavior can be traced to the season in which a man is born (though not to the position of the planets at his birth), as well as to climatic conditions due in part to the position of the earth in the

solar system or to events in the sun. Effects of this sort, when properly validated, must not be overlooked. They do not, of course, justify astrology.

Another common practice is to explain behavior in terms of the structure of the individual. The proportions of the body, the shape of the head, the color of the eyes, skin, or hair, the marks on the palms of the hands, and the features of the face have all been said to determine what a man will do. The "jovial fat man," Cassius with his "lean and hungry look," and thousands of other characters or types thoroughly embedded in our language affect our practices in dealing with human behavior. A specific act may never be predicted from physique, but different types of personality imply predispositions to behave in different ways, so that specific acts are presumed to be affected. This practice resembles the mistake we all make when we expect someone who looks like an old acquaintance to behave like him also. When a "type" is once established, it survives in everyday use because the predictions which are made with it, like those of astrology, are vague, and occasional hits may be startling. Spurious support is also offered by many valid relations between behavior and body type. Studies of the physiques of men and women predisposed to different sorts of disorders have from time to time held the attention of students of behavior. The most recent classification of body structure—the somatotyping of W. H. Sheldon—has already been applied to the prediction of temperament and of various forms of delinquency. Valid relations between behavior and body type must, of course, be taken into account in a science of behavior, but these should not be confused with the relations invoked in the uncritical practice of the layman.

Even when a correlation between behavior and body structure is demonstrated, it is not always clear which is the cause of which. Even if it could be shown by proper statistical methods that fat men are especially likely to be jolly, it still would not follow that the physique causes the temperament. Fat people are at a disadvantage in many ways, and they may develop jolly behavior as a special competitive technique. Jolly people may grow fat because they are free of the emotional disturbances which drive other people to overwork or to

neglect their diet or their health. Fat people may be jolly because they have been successful in satisfying their needs through excessive eating. Where the feature of physique can be modified, then, we must ask whether the behavior or the feature comes first.

When we find, or think we have found, that conspicuous physical features explain part of a man's behavior, it is tempting to suppose that inconspicuous features explain other parts. This is implied in the assertion that a man shows certain behavior because he was "born that way." To object to this is not to argue that behavior is never determined by hereditary factors. Behavior requires a behaving organism which is the product of a genetic process. Gross differences in the behavior of different species show that the genetic constitution, whether observed in the body structure of the individual or inferred from a genetic history, is important. But the doctrine of "being born that way" has little to do with demonstrated facts. It is usually an appeal to ignorance. "Heredity," as the layman uses the term, is a fictional explanation of the behavior attributed to it.

Even when it can be shown that some aspect of behavior is due to season of birth, gross body type, or genetic constitution, the fact is of limited use. It may help us in predicting behavior, but it is of little value in an experimental analysis or in practical control because such a condition cannot be manipulated after the individual has been conceived. The most that can be said is that the knowledge of the genetic factor may enable us to make better use of other causes. If we know that an individual has certain inherent limitations, we may use our techniques of control more intelligently, but we cannot alter the genetic factor.

The practical deficiencies of programs involving causes of this sort may explain some of the vehemence with which they are commonly debated. Many people study human behavior because they want to do something about it—they want to make men happier, more efficient and productive, less aggressive, and so on. To these people, inherited determiners—as epitomized in various "racial types"—appear to be insurmountable barriers, since they leave no course of action but the slow and doubtful program of eugenics. The evidence for genetic traits is therefore closely scrutinized, and any indication that it is weak or inconsistent is received with enthusiasm. But the practical issue must not be allowed to interfere in determining the extent to which behavioral dispositions are inherited. The matter is not so crucial as is often supposed, for we shall see that there are other types of causes available for those who want quicker results.

INNER "CAUSES"

Every science has at some time or other looked for causes of action inside the things it has studied. Sometimes the practice has proved useful, sometimes it has not. There is nothing wrong with an inner explanation as such, but events which are located inside a system are likely to be difficult to observe. For this reason we are encouraged to assign properties to them without justification. Worse still, we can invent causes of this sort without fear of contradiction. The motion of a rolling stone was once attributed to its *vis viva*. The chemical properties of bodies were thought to be derived from the *principles* or *essences* of which they were composed. Combustion was explained by the *phlogiston* inside the combustible object. Wounds healed and bodies grew well because of a *vis medicatrix*. It has been especially tempting to attribute the behavior of a living organism to the behavior of an inner agent, as the following examples may suggest.

Neural causes. The layman uses the nervous system as a ready explanation of behavior. The English language contains hundreds of expressions which imply such a causal relationship. At the end of a long trial we read that the jury shows signs of *brain fag*, that the *nerves* of the accused are *on edge*, that the wife of the accused is on the verge of a *nervous breakdown*, and that his lawyer is generally thought to have lacked the *brains* needed to stand up to the prosecution. Obviously, no direct observations have been made of the nervous systems of any of these people. Their "brains" and "nerves" have been invented on the spur of the moment to lend substance to what might otherwise seem a superficial account of their behavior.

The sciences of neurology and physiology have not divested themselves entirely of a similar practice. Since techniques for observing the electrical and chemical processes in nervous tissue had not yet

been developed, early information about the nervous system was limited to its gross anatomy. Neural processes could only be inferred from the behavior which was said to result from them. Such inferences were legitimate enough as scientific theories, but they could not justifiably be used to explain the very behavior upon which they were based. The hypotheses of the early physiologist may have been sounder than those of the layman, but until independent evidence could be obtained, they were no more satisfactory as explanations of behavior. Direct information about many of the chemical and electrical processes in the nervous system is now available. Statements about the nervous system are no longer necessarily inferential or fictional. But there is still a measure of circularity in much physiological explanation, even in the writings of specialists. In World War I a familiar disorder was called "shell shock." Disturbances in behavior were explained by arguing that violent explosions had damaged the structure of the nervous system, though no direct evidence of such damage was available. In World War II the same disorder was classified as "neuropsychiatric." The prefix seems to show a continuing unwillingness to abandon explanations in terms of hypothetical neural damage.

Eventually a science of the nervous system based upon direct observation rather than inference will describe the neural states and events which immediately precede instances of behavior. We shall know the precise neurological conditions which immediately precede, say, the response, "No, thank you." These events in turn will be found to be preceded by other neurological events, and these in turn by others. This series will lead us back to events outside the nervous system and, eventually, outside the organism. In the chapters which follow we shall consider external events of this sort in some detail. We shall then be better able to evaluate the place of neurological explanations of behavior. However, we may note here that we do not have and may never have this sort of neurological information at the moment it is needed in order to predict a specific instance of behavior. It is even more unlikely that we shall be able to alter the nervous system directly in order to set up the antecedent conditions of a particular instance. The causes to be sought in the nervous system are, therefore, of limited usefulness in the prediction and control of specific behavior.

Psychic inner causes. An even more common practice is to explain behavior in terms of an inner agent which lacks physical dimensions and is called "mental" or "psychic." The purest form of the psychic explanation is seen in the animism of primitive peoples. From the immobility of the body after death it is inferred that a spirit responsible for movement has departed. The *enthusiastic* person is, as the etymology of the word implies, energized by a "god within." It is only a modest refinement to attribute every feature of the behavior of the physical organism to a corresponding feature of the "mind" or of some inner "personality." The inner man is regarded as driving the body very much as the man at the steering wheel drives a car. The inner man wills an action, the outer executes it. The inner loses his appetite, the outer stops eating. The inner man wants and the outer gets. The inner has the impulse which the outer obeys.

It is not the layman alone who resorts to these practices, for many reputable psychologists use a similar dualistic system of explanation. The inner man is sometimes personified clearly, as when delinquent behavior is attributed to a "disordered personality," or he may be dealt with in fragments, as when behavior is attributed to mental processes, faculties, and traits. Since the inner man does not occupy space, he may be multiplied at will. It has been argued that a single physical organism is controlled by several psychic agents and that its behavior is the resultant of their several wills. The Freudian concepts of the ego, superego, and id are often used in this way. They are frequently regarded as nonsubstantial creatures, often in violent conflict, whose defeats or victories lead to the adjusted or maladjusted behavior of the physical organism in which they reside.

Direct observation of the mind comparable with the observation of the nervous system has not proved feasible. It is true that many people believe that they observe their "mental states" just as the physiologist observes neural events, but another interpretation of what they observe is possible, as we shall see in Chapter XVII. Introspective psychology no longer pretends to supply direct information

about events which are the causal antecedents, rather than the mere accompaniments, of behavior. It defines its "subjective" events in ways which strip them of any usefulness in a causal analysis. The events appealed to in early mentalistic explanations of behavior have remained beyond the reach of observation. Freud insisted upon this by emphasizing the role of the unconscious—a frank recognition that important mental processes are not directly observable. The Freudian literature supplies many examples of behavior from which unconscious wishes, impulses, instincts, and emotions are inferred. Unconscious thought-processes have also been used to explain intellectual achievements. Though the mathematician may feel that he knows "how he thinks," he is often unable to give a coherent account of the mental processes leading to the solution of a specific problem. But any mental event which is unconscious is necessarily inferential, and the explanation is therefore not based upon independent observations of a valid cause.

The fictional nature of this form of inner cause is shown by the ease with which the mental process is discovered to have just the properties needed to account for the behavior. When a professor turns up in the wrong classroom or gives the wrong lecture, it is because his *mind* is, at least for the moment, *absent*. If he forgets to give a reading assignment, it is because it has slipped his *mind* (a hint from the class may re*mind* him of it). He begins to tell an old joke but pauses for a moment, and it is evident to everyone that he is trying to make up his *mind* whether or not he has already used the joke that term. His lectures grow more tedious with the years, and questions from the class confuse him more and more, because his *mind* is failing. What he says is often disorganized because his *ideas* are confused. He is occasionally unnecessarily emphatic because of the force of his *ideas*. When he repeats himself, it is because he has an *idée fixe;* and when he repeats what others have said, it is because he borrows his *ideas*. Upon occasion there is nothing in what he says because he lacks *ideas*. In all this it is obvious that the mind and the ideas, together with their special characteristics, are being invented on the spot to provide spurious explanations. A science of behavior can hope to gain very little from so cavalier a practice. Since mental

or psychic events are asserted to lack the dimensions of physical science, we have an additional reason for rejecting them.

Conceptual inner causes. The commonest inner causes have no specific dimensions at all, either neurological or psychic. When we say that a man eats *because* he is hungry, smokes a great deal *because* he has the tobacco habit, fights *because* of the instinct of pugnacity, behaves brilliantly *because* of his intelligence, or plays the piano well *because* of his musical ability, we seem to be referring to causes. But on analysis these phrases prove to be merely redundant descriptions. A single set of facts is described by the two statements: "He eats" and "He is hungry." A single set of facts is described by the two statements: "He smokes a great deal" and "He has the smoking habit." A single set of facts is described by the two statements: "He plays well" and "He has musical ability." The practice of explaining one statement in terms of the other is dangerous because it suggests that we have found the cause and therefore need search no further. Moreover, such terms as "hunger," "habit," and "intelligence" convert what are essentially the properties of a process or relation into what appear to be things. Thus we are unprepared for the properties eventually to be discovered in the behavior itself and continue to look for something which may not exist.

THE VARIABLES OF WHICH BEHAVIOR IS A FUNCTION

The practice of looking inside the organism for an explanation of behavior has tended to obscure the variables which are immediately available for a scientific analysis. These variables lie outside the organism, in its immediate environment and in its environmental history. They have a physical status to which the usual techniques of science are adapted, and they make it possible to explain behavior as other subjects are explained in science. These independent variables are of many sorts and their relations to behavior are often subtle and complex, but we cannot hope to give an adequate account of behavior without analyzing them.

Consider the act of drinking a glass of water. This is not likely to be an important bit of behavior in anyone's life, but it supplies

convenient example. We may describe the topography of the behavior in such a way that a given instance may be identified quite accurately by any qualified observer. Suppose now we bring someone into a room and place a glass of water before him. Will he drink? There appear to be only two possibilities: either he will or he will not. But we speak of the *chances* that he will drink, and this notion may be refined for scientific use. What we want to evaluate is the *probability* that he will drink. This may range from virtual certainty that drinking will occur to virtual certainty that it will not. The very considerable problem of how to measure such a probability will be discussed later. For the moment, we are interested in how the probability may be increased or decreased.

Everyday experience suggests several possibilities, and laboratory and clinical observations have added others. It is decidedly not true that a horse may be led to water but cannot be made to drink. By arranging a history of severe deprivation we could be "absolutely sure" that drinking would occur. In the same way we may be sure that the glass of water in our experiment will be drunk. Although we are not likely to arrange them experimentally, deprivations of the necessary magnitude sometimes occur outside the laboratory. We may obtain an effect similar to that of deprivation by speeding up the excretion of water. For example, we may induce sweating by raising the temperature of the room or by forcing heavy exercise, or we may increase the excretion of urine by mixing salt or urea in food taken prior to the experiment. It is also well known that loss of blood, as on a battlefield, sharply increases the probability of drinking. On the other hand, we may set the probability at virtually zero by inducing or forcing our subject to drink a large quantity of water before the experiment.

If we are to predict whether or not our subject will drink, we must know as much as possible about these variables. If we are to induce him to drink, we must be able to manipulate them. In both cases, moreover, either for accurate prediction or control, we must investigate the effect of each variable quantitatively with the methods and techniques of a laboratory science.

Other variables may, of course, affect the result. Our subject may

be "afraid" that something has been added to the water as a practical joke or for experimental purposes. He may even "suspect" that the water has been poisoned. He may have grown up in a culture in which water is drunk only when no one is watching. He may refuse to drink simply to prove that we cannot predict or control his behavior. These possibilities do not disprove the relations between drinking and the variables listed in the preceding paragraphs; they simply remind us that other variables may have to be taken into account. We must know the history of our subject with respect to the behavior of drinking water, and if we cannot eliminate social factors from the situation, then we must know the history of his personal relations to people resembling the experimenter. Adequate prediction in any science requires information about all relevant variables, and the control of a subject matter for practical purposes makes the same demands.

Other types of "explanation" do not permit us to dispense with these requirements or to fulfill them in any easier way. It is of no help to be told that our subject will drink provided he was born under a particular sign of the zodiac which shows a preoccupation with water or provided he is the lean and thirsty type or was, in short, "born thirsty." Explanations in terms of inner states or agents, however, may require some further comment. To what extent is it helpful to be told, "He drinks because he is thirsty"? If to be thirsty means nothing more than to have a tendency to drink, this is mere redundancy. If it means that he drinks because of a state of thirst, an inner causal event is invoked. If this state is purely inferential—if no dimensions are assigned to it which would make direct observation possible—it cannot serve as an explanation. But if it has physiological or psychic properties, what role can it play in a science of behavior?

The physiologist may point out that several ways of raising the probability of drinking have a common effect: they increase the concentration of solutions in the body. Through some mechanism not yet well understood, this may bring about a corresponding change in the nervous system which in turn makes drinking more probable. In the same way, it may be argued that all these operations make the organ-

ism "feel thirsty" or "want a drink" and that such a psychic state also acts upon the nervous system in some unexplained way to induce drinking. In each case we have a causal chain consisting of three links: (1) an operation performed upon the organism from without—for example, water deprivation; (2) an inner condition—for example, physiological or psychic thirst; and (3) a kind of behavior—for example, drinking. Independent information about the second link would obviously permit us to predict the third without recourse to the first. It would be a preferred type of variable because it would be nonhistoric; the first link may lie in the past history of the organism, but the second is a current condition. Direct information about the second link is, however, seldom, if ever, available. Sometimes we infer the second link from the third: an animal is judged to be thirsty if it drinks. In that case, the explanation is spurious. Sometimes we infer the second link from the first: an animal is said to be thirsty if it has not drunk for a long time. In that case, we obviously cannot dispense with the prior history.

The second link is useless in the *control* of behavior unless we can manipulate it. At the moment, we have no way of directly altering neural processes at appropriate moments in the life of a behaving organism, nor has any way been discovered to alter a psychic process. We usually set up the second link through the first: we make an animal thirsty, in either the physiological or the psychic sense, by depriving it of water, feeding it salt, and so on. In that case, the second link obviously does not permit us to dispense with the first. Even if some new technical discovery were to enable us to set up or change the second link directly, we should still have to deal with those enormous areas in which human behavior is controlled through manipulation of the first link. A technique of operating upon the second link would increase our control of behavior, but the techniques which have already been developed would still remain to be analyzed.

The most objectionable practice is to follow the causal sequence back only as far as a hypothetical second link. This is a serious handicap both in a theoretical science and in the practical control of behavior. It is no help to be told that to get an organism to drink we are simply to "make it thirsty" unless we are also told how this is to be done. When we have obtained the necessary prescription for thirst, the whole proposal is more complex than it need be. Similarly, when an example of maladjusted behavior is explained by saying that the individual is "suffering from anxiety," we have still to be told the cause of the anxiety. But the external conditions which are then invoked could have been directly related to the maladjusted behavior. Again, when we are told that a man stole a loaf of bread because "he was hungry," we have still to learn of the external conditions responsible for the "hunger." These conditions would have sufficed to explain the theft.

The objection to inner states is not that they do not exist, but that they are not relevant in a functional analysis. We cannot account for the behavior of any system while staying wholly inside it; eventually we must turn to forces operating upon the organism from without. Unless there is a weak spot in our causal chain so that the second link is not lawfully determined by the first, or the third by the second, then the first and third links must be lawfully related. If we must always go back beyond the second link for prediction and control, we may avoid many tiresome and exhausting digressions by examining the third link as a function of the first. Valid information about the second link may throw light upon this relationship but can in no way alter it.

A FUNCTIONAL ANALYSIS

The external variables of which behavior is a function provide for what may be called a causal or functional analysis. We undertake to predict and control the behavior of the individual organism. This is our "dependent variable"—the effect for which we are to find the cause. Our "independent variables"—the causes of behavior—are the external conditions of which behavior is a function. Relations between the two—the "cause-and-effect relationships" in behavior—are the laws of a science. A synthesis of these laws expressed in quantitative terms yields a comprehensive picture of the organism as a behaving system.

This must be done within the bounds of a natural science. We

cannot assume that behavior has any peculiar properties which require unique methods or special kinds of knowledge. It is often argued that an act is not so important as the "intent" which lies behind it, or that it can be described only in terms of what it "means" to the behaving individual or to others whom it may affect. If statements of this sort are useful for scientific purposes, they must be based upon observable events, and we may confine ourselves to such events exclusively in a functional analysis. We shall see later that although such terms as "meaning" and "intent" appear to refer to properties of behavior, they usually conceal references to independent variables. This is also true of "aggressive," "friendly," "disorganized," "intelligent," and other terms which appear to describe properties of behavior but in reality refer to its controlling relations.

The independent variables must also be described in physical terms. An effort is often made to avoid the labor of analyzing a physical situation by guessing what it "means" to an organism or by distinguishing between the physical world and a psychological world of "experience." This practice also reflects a confusion between dependent and independent variables. The events affecting an organism must be capable of description in the language of physical science. It is sometimes argued that certain "social forces" or the "influences" of culture or tradition are exceptions. But we cannot appeal to entities of this sort without explaining how they can affect both the scientist and the individual under observation. The physical events which must then be appealed to in such an explanation will supply us with alternative material suitable for a physical analysis.

By confining ourselves to these observable events, we gain a considerable advantage, not only in theory, but in practice. A "social force" is no more useful in manipulating behavior than an inner state of hunger, anxiety, or skepticism. Just as we must trace these inner events to the manipulable variables of which they are said to be functions before we may put them to practical use, so we must identify the physical events through which a "social force" is said to affect the organism before we can manipulate it for purposes of control. In dealing with the directly observable data we need not refer to either the inner state or the outer force.

The material to be analyzed in a science of behavior comes from many sources:

(1) Our *casual observations* are not to be dismissed entirely. They are especially important in the early stages of investigation. Generalizations based upon them, even without explicit analysis, supply useful hunches for further study.

(2) In *controlled field observation*, as exemplified by some of the methods of anthropology, the data are sampled more carefully and conclusions stated more explicitly than in casual observation. Standard instruments and practices increase the accuracy and uniformity of field observation.

(3) *Clinical observation* has supplied extensive material. Standard practices in interviewing and testing bring out behavior which may be easily measured, summarized, and compared with the behavior of others. Although it usually emphasizes the disorders which bring people to clinics, the clinical sample is often unusually interesting and of special value when the exceptional condition points up an important feature of behavior.

(4) Extensive observations of behavior have been made under more rigidly controlled conditions in *industrial, military, and other institutional research*. This work often differs from field or clinical observation in its greater use of the experimental method.

(5) *Laboratory studies of human behavior* provide especially useful material. The experimental method includes the use of instruments which improve our contact with behavior and with the variables of which it is a function. Recording devices enable us to observe behavior over long periods of time, and accurate recording and measurement make effective quantitative analysis possible. The most important feature of the laboratory method is the deliberate manipulation of variables: the importance of a given condition is determined by changing it in a controlled fashion and observing the result.

Current experimental research on human behavior is sometimes not so comprehensive as one might wish. Not all behavioral processes are easy to set up in the laboratory, and precision of measurement is sometimes obtained only at the price of unreality in conditions. Those who are primarily concerned with the everyday life of the

individual are often impatient with these artificialities, but insofar as relevant relationships can be brought under experimental control, the laboratory offers the best chance of obtaining the quantitative results needed in a scientific analysis.

(6) The extensive results of *laboratory studies of the behavior of animals below the human level* are also available. The use of this material often meets with the objection that there is an essential gap between man and the other animals, and that the results of one cannot be extrapolated to the other. To insist upon this discontinuity at the beginning of a scientific investigation is to beg the question. Human behavior is distinguished by its complexity, its variety, and its greater accomplishments, but the basic processes are not therefore necessarily different. Science advances from the simple to the complex; it is constantly concerned with whether the processes and laws discovered at one stage are adequate for the next. It would be rash to assert at this point that there is no essential difference between human behavior and the behavior of lower species; but until an attempt has been made to deal with both in the same terms, it would be equally rash to assert that there is. A discussion of human embryology makes considerable use of research on the embryos of chicks, pigs, and other animals. Treatises on digestion, respiration, circulation, endocrine secretion, and other physiological processes deal with rats, hamsters, rabbits, and so on, even though the interest is primarily in human beings. The study of behavior has much to gain from the same practice.

We study the behavior of animals because it is simpler. Basic processes are revealed more easily and can be recorded over longer periods of time. Our observations are not complicated by the social relation between subject and experimenter. Conditions may be better controlled. We may arrange genetic histories to control certain variables and special life histories to control others—for example, if we are interested in how an organism learns to see, we can raise an animal in darkness until the experiment is begun. We are also able to control current circumstances to an extent not easily realized in human behavior—for example, we can vary states of deprivation over wide ranges. These are advantages which should not be dismissed on the a priori contention that human behavior is inevitably set apart as a separate field.

ANALYSIS OF THE DATA

There are many ways in which data concerning human behavior may be formulated and analyzed. The plan to be followed in the present book may be summarized as follows:

Section II contains a classification of the variables of which behavior is a function and a survey of the processes through which behavior changes when any of these variables is changed.

Section III provides a broader view of the organism as a whole. Certain complex arrangements are considered in which one part of the behavior of the individual alters some of the variables of which other parts are a function. These are the activities which we describe by saying, for example, that the individual "controls himself," "thinks out a solution to a problem," or "is aware of his own behavior."

Section IV analyzes the interaction of two or more individuals in a social system. One person is often part of the environment of another, and this relationship is usually reciprocal. An adequate account of a given social episode explains the behavior of all participants.

Section V analyzes various techniques through which human behavior is controlled in government, religion, psychotherapy, economics, and education. In each of these fields the individual and the controlling agency constitute a social system in the sense of Section IV.

Section VI surveys the total culture as a social environment, and discusses the general problem of the control of human behavior.

The plan is obviously an example of extrapolation from the simple to the complex. No principle is used in any part of the book which is not discussed in Section II. The basic relations and processes of this section are derived from data obtained under conditions which most closely approximate those of an exact science. In Section V complex examples of human behavior drawn from certain established fields of knowledge are analyzed in terms of these simpler processes