

CHAPTER IV

COMMON SENSE AND SCIENTIFIC INQUIRY

UPON THE biological level, organisms have to respond to conditions about them in ways that modify those conditions and the relations of organisms to them so as to restore the reciprocal adaptation that is required for the maintenance of life-functions. Human organisms are involved in the same sort of predicament. Because of the effect of cultural conditions, the problems involved not only have different contents but are capable of statement *as* problems so that inquiry can enter as a factor in their resolution. For in a cultural environment, physical conditions are modified by the complex of customs, traditions, occupations, interests and purposes which envelops them. Modes of response are correspondingly transformed. They avail themselves of the significance which things have acquired, and of the *meanings* provided by language. Obviously, rocks as minerals signify something more in a group that has learned to work iron than it signifies either to sheep and tigers or to a pastoral or agricultural group. The meanings of related symbols, which form the language of a group, also, as was shown in the last chapter, introduce a new type of attitudes and hence of modes of response. I shall designate the environment in which human beings are *directly* involved the common sense environment or "world," and inquiries that take place in making the required adjustments in behavior common sense inquiries.

As is brought out later, the problems that arise in such situations of interaction may be reduced to problems of the use and enjoyment of the objects, activities and products, material and ideological, (or "ideal") of the world in which individuals live. Such inquiries are, accordingly, different from those which have knowledge as their goal. The attainment of knowledge of some things is necessarily involved in common sense inquiries, but it occurs

for the sake of settlement of some issue of use and enjoyment, and not, as in scientific inquiry, for its own sake. In the latter, there is no *direct* involvement of human beings in the *immediate* environment—a fact which carries with it the ground of distinguishing the theoretical from the practical.

The use of the term *common sense* is somewhat arbitrary from a linguistic point of view. But the existence of the kinds of situations referred to and of the kind of inquiries that deal with the difficulties and predicaments they present cannot be doubted. They are those which continuously arise in the conduct of life and the ordering of day-by-day behavior. They are such as constantly arise in the development of the young as they learn to make their way in the physical and social environments in which they live; they occur and recur in the life-activity of every adult, whether farmer, artisan, professional man, law-maker or administrator; citizen of a state, husband, wife, or parent. On their very face they need to be discriminated from inquiries that are distinctively scientific, or that aim at attaining confirmed facts, "laws" and theories.

They need, accordingly, to be designated by some distinctive word, and *common sense* is used for that purpose. Moreover, the term is not wholly arbitrary even from the standpoint of linguistic usage. In the Oxford Dictionary, for example, is found the following definition of common sense: "Good sound practical sense; combined tact and readiness in dealing with the ordinary affairs of life." Common sense in this signification applies to behavior in its connection with the *significance* of things.

There is, clearly, a distinctively intellectual content involved; *good sense* is, in ordinary language, good *judgment*. Sagacity is power to discriminate the factors that are relevant and important in significance in given situations; it is power of discernment; in a proverbial phrase, ability to tell a hawk from a hernshaw, chalk from cheese, and to bring the discriminations made to bear upon what is to be done and what is to be abstained from, in the "ordinary affairs of life." That which, in the opening paragraphs, was called the mode of inquiry dealing with situations of use and enjoyment, is, after all, but a formal way of saying what the dictionary states in its definition of common sense.

There is, however, another dictionary definition: "The general sense, feeling, judgment of mankind or a community." It is in this sense that we speak of the *deliverances* of common sense as if they were a body of settled truths. It applies not to things in their significance but to *meanings* accepted. When the Scottish school of Reid and Stewart erected "common sense" into an ultimate authority and arbiter of philosophic questions, they were carrying this signification to its limit. The reference to practical sagacity in dealing with problems of response and adaptation in use and enjoyment has now gone into the background. "Common" now means "*general*." It designates the conceptions and beliefs that are currently accepted without question by a given group or by mankind in general. They are *common* in the sense of being widely, if not universally, accepted. They are *sense*, in the way in which we speak of the "sense of a meeting" and in which we say things do or do not "make sense." They have something of the same ultimacy and immediacy for a group that "sensation" and "feeling" have for an individual in his contact with surrounding objects. It is a commonplace that every cultural group possesses a set of meanings which are so deeply embedded in its customs, occupations, traditions and ways of interpreting its physical environment and group-life, that they form the basic categories of the language-system by which details are interpreted. Hence they are regulative and "normative" of specific beliefs and judgments.

There is a genuine difference between the two meanings of common sense. But from the standpoint of a given group there is a definite deposit of agreement. They are both of them connected with the conduct of life in relation to an existing environment: one of them in judging the significance of things and events with reference to what should be done; the other, in the ideas that are used to direct and justify activities and judgments. Tabus are, first, customary ways of activities. To us they are mistaken rather than sagacious ways of action. But the system of meanings embodied in the language that carries tradition gives them authority in such highly practical matters as the eating of food and the behavior that is proper in the presence of chieftains and members of the family configuration, so that they control the relations of males

and females and persons of various kinship degrees. To us, such conceptions and beliefs are highly impractical; to those who held them they were matters of higher practical importance than were special modes of behavior in dealing with particular objects. For they set the standards for judging the latter and acting in reference to them. It is possible today, along with our knowledge of the enormous differences that characterize various cultures, to find some unified deposit of activities and of meanings in the "common sense and feeling of *mankind*," especially in matters of basic social cohesion.

In any case, the difference between the two meanings may be reduced, without doing violence to the facts, to the difference between phases and aspects of special practical situations that are looked into, questioned and examined with reference to what may or should be done at a particular time and place and the rules and precepts that are taken for granted in reaching all conclusions and in all socially correct behavior. Both are concerned, one directly and the other indirectly, with "the ordinary affairs of life," in the broad sense of life.

I do not suppose that a generalization of the inquiries and conclusions of this type under the caption of "use and enjoyment" needs much exposition for its support. Use and enjoyment are the ways in which human beings are directly connected with the world about them. Questions of food, shelter, protection, defense, etc., are questions of the use to be made of materials of the environment and of the attitudes to be taken practically towards members of the same group and to other groups taken as wholes. Use, in turn, is for the sake of some consummation or enjoyment. Some things that are far beyond the scope of direct use, like stars and dead ancestors, are objects of magical use, and of enjoyment in rites and legends. If we include the correlative negative ideas of disuse, of abstinence from use, and toleration and suffering, problems of use and enjoyment may be safely said to exhaust the domain of common sense inquiry.

There is direct connection between this fact and the concern of common sense with the *qualitative*. It is by discernment of qualities that the fitness and capacity of things and events for use is decided; that proper foodstuffs, for example, are told or dis-

criminated from those that are unfit, poisonous or tabued. That enjoyment-suffering is qualitative through and through and is concerned with situations in their pervasive qualitative character, is almost too obvious for mention. Furthermore, the operations and responses that are engaged in use and enjoyment of situations are qualitatively marked off. Tanning skins is a process qualitatively different from that of weaving baskets or shaping clay into jars; the rites that are responsive to death are qualitatively different from those appropriate to birth and weddings. Inferiors, superiors and equals are treated in modes of greeting and approach that are qualitatively unlike.

The reason for calling attention to these commonplace facts is that they bring out the basic difference between the subject-matters characteristic of common sense and of scientific inquiries; and they also indicate the differences between the problems and procedures of inquiry that are characteristic of common sense in different stages of culture. I shall first consider the latter point. Common sense in respect to both its content of ideas and beliefs, and its methods of procedure, is anything but a constant. Both its content and its methods alter from time to time not merely in detail but in general pattern. Every invention of a new tool and utensil, every improvement in technique, makes some difference in what is used and enjoyed and in the inquiries that arise with reference to use and enjoyment, with respect to both significance and meaning. Changes in the regulative scheme of relations within a group, family, clan or nation, react even more intensively into some older system of uses and enjoyments.

One has only to note the enormous differences in the contents and methods of common sense in modes of life that are respectively dominantly nomadic, agricultural and industrial. Much that was once taken without question as a matter of common sense is forgotten or actively condemned. Other old conceptions and convictions continue to receive theoretical assent and strong emotional attachment because of their prestige. But they have little hold and application in the ordinary affairs of life. For example, ideas and practices which, in primitive tribes, were interwoven with practically every concern of ordinary affairs, are later relegated to a separate domain, religious or esthetic.

The business of one age becomes the sport and amusement of another age. Even scientific theories and interpretations continue to be affected by conceptions that have ceased to be determinative in the actual practice of inquiry. The special bearing of the fact that "common sense" is anything but a constant upon logical formulations, will concern us in the sequel. Here it is enough to call attention to a point which will later receive detailed examination: namely, the very fitness of the Aristotelian logical organon in respect to the culture and common sense of a certain group in the period in which it was formulated unfits it to be a logical formulation of not only the science but even of the common sense of the present cultural epoch.

I recur now to the bearing of the fact that common sense inquiries are concerned with qualitative matter and operations upon their distinction from scientific inquiries. Fundamentally, the distinction is that brought out in the previous chapter: Namely, that between significances and meanings that are determined in reference to pretty direct existential application and those that are determined on the ground of their systematic relations of coherence and consistency with one another. All that the present mode of statement adds is that, in the first case, "existential application" means application in *qualitative* use and enjoyment of the environment. On the other hand, both the history of science and the present state of science prove that the goal of the systematic relationship of facts and conceptions to one another is dependent upon *elimination* of the qualitative as such and upon reduction to non-qualitative formulation.

The problem of the relation of the domain of common sense to that of science has notoriously taken the form of opposition of the qualitative to the non-qualitative; largely, but not exclusively, the quantitative. The difference has often been formulated as the difference between perceptual material and a system of conceptual constructions. In this form it has constituted, in recent centuries, the chief theme of epistemology and metaphysics. From the standpoint that controls the present discussion, the problem is not epistemological (save as that word means the *logical*) nor is it metaphysical or ontological. In saying that it is logical, it is affirmed that the question at issue is that of the relation to each

other of different kinds of *problems*, since difference in the type of problem demands different emphases in inquiry. It is because of this fact that different logical forms accrue to common sense and scientific objects. From this point of view, the question, summarily stated, is that of the relation to each other of the subject-matters of practical uses and concrete enjoyments and of scientific conclusions; not the subject matters of two different domains whether epistemological or ontological.

The conclusion to be later reached is here anticipated to serve as a guide in following the further discussion. (1) Scientific subject-matter and procedures grow out of the direct problems and methods of common sense, of practical uses and enjoyments, and (2) react into the latter in a way that enormously refines, expands and liberates the contents and the agencies at the disposal of common sense. The separation and opposition of scientific subject-matter to that of common sense, when it is taken to be final, generates those controversial problems of epistemology and metaphysics that still dog the course of philosophy. When scientific subject-matter is seen to bear genetic and functional relation to the subject-matter of common sense, these problems disappear. Scientific subject-matter is intermediate, not final and complete in itself.

I begin the discussion by introducing and explaining the denotative force of the word *situation*. Its import may perhaps be most readily indicated by means of a preliminary negative statement. What is designated by the word "situation" is *not* a single object or event or set of objects and events. For we never experience nor form judgments about objects and events in isolation, but only in connection with a contextual whole. This latter is what is called a "situation." I have mentioned the extent in which modern philosophy had been concerned with the problem of existence as perceptually and conceptually determined. The confusions and fallacies that attend the discussion of this problem have a direct and close connection with the difference between an object and a situation. Psychology has paid much attention to the question of the *process* of perception, and has for its purpose described the perceived object in terms of the results of analysis of the process.

I pass over the fact that, no matter how legitimate the virtual

identification of process and product may be for the special purpose of *psychological* theory, the identification is thoroughly dubious as a generalized ground of philosophical discussion and theory. I do so in order to call attention to the fact that by the very nature of the case the psychological treatment takes a *singular* object or event for the subject-matter of its analysis. In actual experience, there is never any such isolated singular object or event; *an* object or event is always a special part, phase, or aspect, of an enviroing experienced world—a situation. The singular object stands out conspicuously because of its especially focal and crucial position at a given time in determination of some problem of use or enjoyment which the *total* complex environment presents. There is always a *field* in which observation of *this* or *that* object or event occurs. Observation of the latter is made for the sake of finding out what that *field* is with reference to some active adaptive response to be made in carrying forward a *course* of behavior. One has only to recur to animal perception, occurring by means of sense organs, to note that isolation of what is perceived from the course of life-behavior would be not only futile, but obstructive, in many cases fatally so.

A further conclusion follows. When the act and object of perception are isolated from their place and function in promoting and directing a successful course of activities in behalf of use-enjoyment, they are taken to be exclusively *cognitive*. The perceived object, orange, rock, piece of gold, or whatever, is taken to be an object of *knowledge per se*. In the sense of being discriminatingly noticed, it *is* an object of knowledge, but not of knowledge as ultimate and self-sufficient. It is noted or “known” only so far as guidance is thereby given to direction of behavior; so that the situation in which it is found can be appropriately enjoyed or some of its conditions be so used that enjoyment will result or suffering be obviated. It is only when an object of focal observation is regarded as an object of knowledge in isolation that there arises the notion that there are two kinds of knowledge, and two kinds of objects of knowledge, so opposed to each other that philosophy must either choose which is “real” or find some way of reconciling their respective “realities.” When it is seen that in common sense inquiry there is no attempt made to know the object or

event *as such* but only to determine what it signifies with respect to the way in which the entire situation should be dealt with, the opposition and conflict do not arise. The object or event in question is perceived as part of the enviroing world, not in and by itself; it is rightly (validly) perceived if and when it acts as clew and guide in use-enjoyment. We live and act in connection with the existing environment, not in connection with isolated objects, even though a singular thing may be crucially significant in deciding how to respond to total environment.

Recurring to the main topic, it is to be remarked that a situation is a whole in virtue of its immediately pervasive quality. When we describe it from the psychological side, we have to say that the situation as a qualitative whole is sensed or *felt*. Such an expression is, however, valuable only as it is taken negatively to indicate that it is *not*, as such, an object in *discourse*. Stating that it is *felt* is wholly misleading if it gives the impression that the situation is a feeling or an emotion or anything mentalistic. On the contrary, feeling, sensation and emotion have themselves to be identified and described in terms of the immediate presence of a total qualitative situation.

The pervasively qualitative is not only that which binds all constituents into a whole but it is also unique; it constitutes in each situation an *individual* situation, indivisible and unduplicable. Distinctions and relations are instituted *within* a situation; *they* are recurrent and repeatable in different situations. Discourse that is not controlled by reference to a situation is not discourse, but a meaningless jumble, just as a mass of pied type is not a font much less a sentence. A universe of experience is the precondition of a universe of discourse. Without its controlling presence, there is no way to determine the relevancy, weight or coherence of any designated distinction or relation. The universe of experience surrounds and regulates the universe of discourse but never appears as such within the latter. It may be objected that what was previously said contradicts this statement. For we have been discoursing about universes of experience and situations, so that the latter have been brought within the domain of symbols. The objection, when examined, serves to elicit an important consideration. It is a commonplace that a universe of discourse cannot be a

term or element within itself. One universe of discourse may, however, be a term of discourse within *another* universe. The same principle applies in the case of universes of experience.

The reader, whether he agrees or not with what has been said, whether he understands it or not, *has*, as he reads the above passages, a uniquely qualified experienced situation, and his reflective understanding of what is said is controlled by the nature of that immediate situation. One cannot decline to *have* a situation for that is equivalent to having no experience, not even one of disagreement. The most that can be refused or declined is the having of that *specific* situation in which there is reflective recognition (discourse) of the presence of former situations of the kind stated. This very declination is, nevertheless, identical with initiation of another encompassing qualitative experience as a unique whole.

In other words, it *would* be a contradiction if I attempted to demonstrate by means of discourse, the existence of universes of experience. It is not a contradiction by means of discourse to *invite* the reader to have for himself that kind of an immediately experienced situation in which the presence of a situation as a universe of discourse is seen to be the encompassing and regulating condition of all discourse.

There is another difficulty in grasping the meaning of what has been said. It concerns the use of the word "quality." The word is usually associated with something specific, like *red*, *hard*, *sweet*; that is, with distinctions made within a total experience. The intended contrasting meaning may be suggested, although not adequately exemplified, by considering such qualities as are designated by the terms distressing, perplexing, cheerful, disconsolate. For these words do not designate specific qualities in the way in which *hard*, say, designates a particular quality of a rock. For such qualities permeate and color *all* the objects and events that are involved in an experience. The phrase "tertiary qualities," happily introduced by Santayana, does not refer to a third quality like in kind to the "primary" and "secondary" qualities of Locke and merely happening to differ in content. For a tertiary quality qualifies *all* the constituents to which it applies in thoroughgoing fashion.

Probably the meaning of *quality*, in the sense in which quality is said to pervade all elements and relations that are or can be instituted in discourse and thereby to constitute them an individual whole, can be most readily apprehended by referring to the esthetic use of the word. A painting is said to have quality, or a particular painting to have a Titian or Rembrandt quality. The word thus used most certainly does not refer to any particular line, color or part of the painting. It is something that affects and modifies all the constituents of the picture and all of their relations. It is not anything that can be expressed in words for it is something that must be *had*. Discourse may, however, point out the qualities, lines and relations by means of which pervasive and unifying quality is achieved. But so far as this discourse is separated from *having* the immediate total experience, a reflective object takes the place of an esthetic one. Esthetic experience, in its emphatic sense, is mentioned as a way of calling attention to situations and universes of experience. The intended force of the illustration would be lost if esthetic experience as such were supposed to exhaust the scope and significance of a "situation." As has been said, a qualitative and qualifying situation is present as the background and the control of *every* experience. It was for a similar reason that it was earlier stated that reference to tertiary qualities was not adequately exemplary. For such qualities as are designated by "distressing," "cheerful," etc., are *general*, while the quality of distress and cheer that marks an existent situation is not general but is unique and inexpressible in words.

I give one further illustration from a different angle of approach. It is more or less a commonplace that it is possible to carry on observations that amass facts tirelessly and yet the observed "facts" lead nowhere. On the other hand, it is possible to have the work of observation so controlled by a conceptual framework fixed in advance that the very things which are genuinely decisive in the problem in hand and its solution, are completely overlooked. Everything is forced into the predetermined conceptual and theoretical scheme. The way, and the only way, to escape these two evils, is sensitivity to the quality of a situation as a whole. In ordinary language, a problem must be felt before it can be stated. If the unique quality of the situation is *had* immediately, then there

is something that regulates the selection and the weighing of observed facts and their conceptual ordering.

The discussion has reached the point where the basic problem of the relation of common sense material and methods to that of scientific subject-material and method, can be explicitly discussed. In the first place, science takes its departure of necessity from the qualitative objects, processes, and instruments of the common sense world of use and concrete enjoyments and sufferings. The scientific theory of colors and light is extremely abstract and technical. But it is *about* the colors and light involved in everyday affairs. Upon the common sense level, light and colors are not experienced or inquired into as things in isolation nor yet as qualities of objects viewed in isolation. They are experienced, weighed and judged in reference to their place in the occupations and arts (including social ceremonial arts as well as fine arts) the group carries on. Light is a dominant factor in the daily routine of rising from sleep and going about one's business. Differences in the duration of the light of sun and moon interpenetrate almost every tribal custom. Colors are signs of what can be done and of how it should be done in some inclusive situation—such as, judging the prospects of the morrow's weather; selection of appropriate clothing for various occasions; dyeing, making rugs, baskets and jars; and so on in diverse ways too obvious and tedious to enumerate. They play their part either in practical decisions and activities or in enjoyed celebrations, dances, wakes, feasts, etc. What holds of light and color applies to all objects, events and qualities that enter into everyday common sense affairs.

Gradually and by processes that are more or less tortuous and originally unplanned, definite technical processes and instrumentalities are formed and transmitted. Information about things, their properties and behaviors, is amassed, independently of any particular immediate application. It becomes increasingly remote from the situations of use and enjoyment in which it originated. There is then a background of materials and operations available for the development of what we term science, although there is still no sharp dividing line between common sense and science. For purposes of illustration, it may be supposed that primitive astronomy and primitive methods of keeping track of time (closely con-

nected with astronomical observations) grew out of the practical necessities of groups with herds in care of animals with respect to mating and reproduction, and of agricultural groups with reference to sowing, tilling and reaping. Observation of the change of position of constellations and stars, of the relation of the length of daylight to the sun's place in relation to the constellations along the line of the equinox provided the required information. Instrumental devices were developed in order that the observations might be made; definite techniques for using the instruments followed.

Measurement of angles of inclination and declination was a practical part of meeting a practical need. The illustration is, from a historical point of view, more or less speculative. But something of this general kind certainly effected the transition from what we call common sense to what we call science. If we were to take the practical needs of medicine in healing the sick and dealing with wounds, in their relation to the growth of physiological and anatomical knowledge, the case would be even clearer. In the early history of Greek reflective thought, art, or *techne*, and science, were synonymous.

But this is not the whole of the story. Oriental cultures, especially the Assyrian, Babylonian and Egyptian, developed a division between "lower" and "higher" techniques and kinds of knowledge. The lower, roughly speaking, was in possession of those who did the daily practical work; carpentering, dyeing, weaving, making pottery, trading, etc. The higher came to be the possession of a special class, priests and the successors of primitive medicine men. Their knowledge and techniques were "higher" because they were concerned with what were supposed to be matters of ultimate concern; the welfare of the people and especially its rulers—and this welfare involved transactions with the powers that ruled the universe. *Their* kind of practical activity was so different from that of artisans and traders, the objects involved were so different, the social status of the persons engaged in carrying on the activities in question was so enormously different, that the activity of the guardians and administrators of the higher knowledge and techniques was not "practical" in the sense of practical that applied to the ordinary useful worker.

These facts contained dualism in embryo, indeed in more or less mature form. This, when it was reflectively formulated, became the dualism of the empirical and rational, of theory and practice, and, in our own day, of common sense and science.¹

The Greeks were much less subject to ecclesiastic and autocratic political control than were the peoples mentioned. The Greeks are pointed to with considerable justice as those who freed thought and knowledge from external control. But in one fundamentally important way they fixed, for subsequent intellectual history, the division just mentioned—although changing its direction and interpretation. Science and philosophy (which were still one) constituted the higher form of knowledge and activity. It alone was “rational” and alone deserved the names of knowledge and of activity that was “pure” because liberated from the constraints of practice. Experiential knowledge was confined to the artisan and trader, and their activity was “practical” because it was concerned with satisfaction of needs and desires—most of the latter, as in the case of the trader, being base and unworthy anyway.

The free citizen was not supposed to engage in any of these pursuits but to devote himself to politics and the defense of the city-state. Although the scientist-philosopher was compelled by constraint of the body to give some time and thought to satisfaction of wants, as a scientist-philosopher he was engaged in exercising his reason upon rational objects, thereby attaining the only possible complete freedom and perfect enjoyment. The definitely socio-practical division between workers and non-citizens who were servile, and the members of the leisure class who were free citizens, was converted by philosophic formulation into a division between practice and theory, experience and reason. Strictly scientific-philosophic knowledge and activity were finally conceived to be supra-social as well as supra-empirical. They connected those who pursued them with the divine and cut them off from their fellows.

I have engaged in what seems to be a historical excursus not for the sake of giving historical information but in order to indicate the origin of the distinction between empirical knowledge and practice on one hand and rational knowledge and pure activity on the other; between knowledge and practice that are

¹ See L. Hogben, *Mathematics for the Millions*, Ch. 1.

admittedly of social origin and intent and the insight and activity that were supposed to have no social and practical bearings. This origin is itself social-cultural. Such is the irony of the situation. Relatively free as were the minds of Greek thinkers, momentous as were their accomplishments in certain directions, after Greek culture ceased to be a living thing and its products were carried over into different cultures, the inheritance from the Greeks became an incubus upon the progress of experience and of science, save in mathematics. Even in the latter field it kept mathematics for a long time subservient to strictly geometrical formulation.

The later revival of genuine science undoubtedly drew stimulus and inspiration from the products of Greek thought. But these products were reanimated by contact and interaction with just the things of ordinary experience and the instruments of use in practical arts which in classic Greek thought were supposed to contaminate the purity of science. There was a return to the conditions and factors mentioned earlier: qualitative materials, processes and instruments. Phenomena of heat, light and electricity became matters to be experienced under controlled conditions instead of matters to receive rational formulation through pure intellect. The lens and compass and a multitude of the tools and processes of the practical arts were borrowed and adapted to the needs of scientific inquiry. The ordinary processes that had long been at home in the arts, weakening and intensifying, combining and separating, dissolving and evaporating, precipitating and infusing, heating and cooling, etc. etc., were no longer scorned. They were adopted as means of finding out something about nature, instead of being employed only for the sake of accomplishing objects of use and enjoyment.

Symbolic instrumentalities, especially, underwent tremendous reconstruction; they were refined as well as expanded. On one hand they were constructed and related together on the basis of their applicability, through operations, to existence, and they were freed, on the other hand, from reference to direct application in use and enjoyment. The physical problems that emerged in pursuit of experiential knowledge of nature thus required and evoked new symbolic means of registration and manipulation. Analytic geometry and calculus became primary modes of concep-

tual response as quantity, change and motion were found to be not irrational accidents but the keys with which to solve the mysteries of natural existence. Language was, nonetheless, an old and familiar qualitative achievement. The most exact comprehensive mathematical language hardly compares as an achievement with the creation of intelligible speech by primitive peoples. Finally, the test of the validity of conceptions formulated and developed in rational discourse was found to reside in their applicability to existential qualitative material. They were no longer taken to be "true" as constituents of rational discourse in isolation but valid in the degree in which they were capable of organizing the qualitative materials of common sense and of instituting control over them. Those semantic-conceptual constructions that indicate with the greatest degree of definiteness the way in which they are to be applied are, even as conceptions, the most truly rational ones. At every point in the practice of scientific inquiry, the old separation between experience and reason, between theory and doing, was destroyed.

In consequence, the contents and techniques of common sense underwent a revolutionary change. It was noted earlier that common sense is not a constant. But the most revolutionary change it has ever undergone is that effected by the infiltration and incorporation of scientific conclusions and methods into itself. Even the procedures and materials that are connected with elementary environmental conditions of life, such things as food, clothing, shelter and locomotion, have undergone tremendous transformation, while unprecedented needs and unprecedented powers of satisfying them have also emerged. The effect of the embodiment of science in the common sense world and the activities that deal with it in the domain of human relationships is as great as that which has taken place in relation to physical nature. It is only necessary to mention the social changes and problems that have arisen from the new technologies of production and distribution of goods and services. For these technologies are the direct product of the new science. To relate in detail the ways in which science has affected the area of common sense in respect to the relationships of person to person, group to group, people to people, would be to relate the story of social change in the last few centuries. Applications

of science in revolutionizing the forces and conditions of production, distribution and communication have of necessity tremendously modified the conditions under which human beings live and act in connection with one another, whether the conditions be those of interchange and friendly association or of opposition and war.

It is not intimated that the incorporation of scientific conclusions and operations into the common sense attitudes, beliefs and intellectual methods of what is now taken for granted as matters of common sense is as yet complete or coherent. The opposite is the case. In the most important matters the effect of science upon the content and procedures of common sense has been disintegrative. This disintegrative influence is a social, not a logical, fact. But it is the chief reason why it seems so easy, so "natural," to make a sharp division between common sense inquiry and its logic and scientific inquiry and its logic.

Two aspects of the disintegration which creates the semblance of complete opposition and conflict will be noted. One of them is the fact, already noted, that common sense is concerned with a field that is dominantly qualitative, while science is compelled by its own problems and goals to state its subject-matter in terms of magnitude and other mathematical relations which are non-qualitative. The other fact is that since common sense is concerned, directly and indirectly, with problems of use and enjoyment, it is inherently teleological. Science, on the other hand, has progressed by elimination of "final causes" from every domain with which it is concerned, substituting measured correspondences of change. It operates, to use the old terminology, in terms of "efficient causation," irrespective of ends and values. Upon the basis of the position here taken, these differences are due to the fact that different types of problems demand different modes of inquiry for their solution, not to any ultimate division in existential subject-matter.

The subject-matter of science is stated in symbol-constellations that are radically unlike those familiar to common sense; in what, in effect, is a different language. Moreover, there is much highly technical material that has not been incorporated into common sense even by way of technological application in "material" af-

fairs. In the region of highest importance to common sense, namely, that of moral, political, economic ideas and beliefs, and the methods of forming and confirming them, science has had even less effect. Conceptions and methods in the field of human relationships are in much the same state as were the beliefs and methods of common sense in relation to physical nature before the rise of experimental science. These considerations fix the meaning of the statement that the difference that now exists between common sense and science is a social, rather than a logical, matter. If the word "language" is used not just formally, but to include its content of substantial meanings, the difference is a difference of languages.

The problems of science demand a set of data and a system of meanings and symbols so differentiated that science cannot rightly be called "organized common sense." But it is a potential organ for *organizing* common sense in its dealing with its own subject-matter and problems and this potentiality is far from actualization. In the techniques which affect human use of the materials of physical nature in production, science has become a powerful agency of organization. As far as issues of enjoyment, of consumption, are concerned, it has taken little effect. Morals and the problems of social control are hardly touched. Beliefs, conceptions, customs and institutions, whose rise antedated the modern period, still have possession of the field. The union of this fact with the highly technical and remote language of science creates and maintains the feeling and idea of a complete gap. The paths of communication between common sense and science are as yet largely one-way lanes. Science takes its departure from common sense, but the return road into common sense is devious and blocked by existing social conditions.

In the things of greatest import there is little intercommunication. Pre-scientific ideas and beliefs in morals and politics are, moreover, so deeply ingrained in tradition and habit and institutions, that the impact of scientific method is feared as something profoundly hostile to mankind's dearest and deepest interests and values. On the side of philosophical formulation, highly influential schools of thought are devoted to maintaining the domain of values, ideas and ideals as something wholly apart from any possibility of ap-

plication of scientific methods. Earlier philosophic conceptions of the necessary separation between reason and experience, theory and practice, higher and lower activities, are used to justify the necessity of the division.

With respect to the second point, that of a seeming fundamental difference due to the fact that common sense is profoundly teleological in its controlling ideas and methods while science is deliberately indifferent to teleology, it must be noted that in spite of the theoretical difference, physical science has, in practical fact, liberated and vastly extended the range of ends open to common sense and has enormously increased the range and power of the means available for attaining them. In ancient thought, ends were fixed by nature; departure from those ends that were antecedently set and fixed by the very nature of things, was impossible; the attempt to institute ends of human devising was taken to be the sure road to confusion and chaos. In the moral field, this conception still exists and is even probably dominant. But in respect to "material" affairs, it has been completely abandoned. Invention of new agencies and instruments create new ends; they create new consequences which stir men to form new purposes.

The original philosophical meaning of "ends" as fixed completions is almost forgotten. Instead of science eliminating ends and inquiries controlled by teleological considerations, it has, on the contrary, enormously freed and expanded activity and thought in telic matters. This effect is not a matter of opinion but of facts too obvious to be denied. The same sort of thing holds of the qualities with which common sense is inextricably concerned. Multitudes of new qualities have been brought into existence by the applications of physical science, and, what is even more important, our power to bring qualities within actual experience when we so desire, has been intensified almost beyond the possibility of estimate. Consider, as one instance alone, our powers with respect to qualities generated by light and electricity.

The foregoing survey is made for a double purpose. On the one hand the outstanding problem of our civilization is set by the fact that common sense in its content, its "world" and methods, is a house divided against itself. It consists in part, and that part the most vital, of regulative meanings and procedures that antedate

the rise of experimental science in its conclusions and methods. In another part, it is what it is because of application of science. This cleavage marks every phase and aspect of modern life: religious, economic, political, legal, and even artistic.

The existence of this split is put in evidence by those who condemn the "modern" and who hold that the only solution of the chaos in civilization is to revert to the intellectual beliefs and methods that were authoritative in past ages, as well as by radicals and "revolutionaries." Between the two stand the multitude that is confused and insecure. It is for this reason that it is here affirmed that the basic problem of present culture and associated living is that of effecting integration where division now exists. The problem cannot be solved apart from a unified logical method of attack and procedure. The attainment of unified method means that the fundamental unity of the structure of inquiry in common sense and science be recognized, their difference being one in the problems with which they are directly concerned, not to their respective logics. It is not urged that attainment of a unified logic, a theory of inquiry, will resolve the split in our beliefs and procedures. But it is affirmed that it will not be resolved without it.

On the other hand, the problem of unification is one in and for logical theory itself. At the present time logics in vogue do not claim for the most part to be logics of inquiry. In the main, we are asked to take our choice between the traditional logic, which was formulated not only long before the rise of science but when also the content and methods of science were in radical opposition to those of present science, and the new purely "symbolistic logic" that recognizes only mathematics, and even at that is not so much concerned with methods of mathematics as with linguistic formulation of its results. The logic of science is not only separated from common sense, but the best that can be done is to speak of logic *and* scientific method as two different and independent matters. Logic in being "purified" from all experiential taint has become so formalistic that it applies only to itself.

The next chapter deals explicitly with the traditional logic as derived from Aristotle, with a view to showing (1) that of necessity the scientific conditions under which it was formulated are so different from those of existing knowledge that it has been trans-

formed from what it originally was, a logic of *knowledge*, into a purely formal affair, and (2) that there is a necessity for a logical theory based upon scientific conclusions and methods. These are so unlike those of classic science that the need is not revision and extension of the old logic here and there, but a radically different standpoint and a different treatment to be carried through all logical subject matter.