UNIVERSAL
LIBRARY
OU_164911
UNIVERSAL
LIBRARY

INTRODUCTION TO PHILOSOPHICAL ANALYSIS

BY

JAMES BURNHAM

AND

PHILIP WHEELWRIGHT

OF THE DEPARTMENT OF PHILOSOPHY
WASHINGTON SQUARE COLLEGE
NEW YORK UNIVERSITY

NEW YORK
HENRY HOLT AND COMPANY

COPYRIGHT, 1932,
BY
HENRY HOLT AND COMPANY, INC.

PRINTED IN THE
UNITED STATES OF AMERICA

CONTENTS

PART ONE: METHOD

CHAPTER I

THE TASK OF PHILOSOPHY 3
1. Is Philosophy Possible?
2. The Philosophic Attitude.
3. Philosophic Technique.
4. Philosophical Criticism.

CHAPTER II

MEANING 26
1. The Meaning Situation.
2. The Thinking Process.
3. Further Remarks about Meaning.
4. The Mental Aspect of Meaning: What is an Idea?
5. The Objectification of Meaning.

CHAPTER III

LOGICAL MEANING 68
1. The Two Uses of Language.
2. Terms.
3. Definition.
4. Ambiguity.
5. Propositions.

CHAPTER IV

LOGICAL STRUCTURE 102
1. Relations.
2. Relations between Propositions.
3. A Few Devices.
4. Toward Complications.

5. The Dilemma.
6. The Counter-dilemma.
7. Rebuttal and *Reductio ad Absurdum*.

CHAPTER V

FACTUAL REASONING 129
1. Hypotheses.
2. Generalization.
3. Causal Analysis.
4. Physical Determinism.
5. Functional Correlation.
6. Statistical Generalization.
7. The Later Stages of Scientific Reasoning.

CHAPTER VI

DIALECTICAL METHOD 168
1. Realms of Discourse.
2. Dialectical Method.
3. Metaphysics.
4. Fallacies of Metaphysical Reasoning.

PART TWO: PROBLEMS

CHAPTER VII

THE WORLD OF PHYSICS 201
1. The Common-Sense World.
2. Classical Physics.
3. Contemporary Physics.
4. The Problem of Reality.

CHAPTER VIII

THE WORLD OF LIVING THINGS 254
1. Biology and the Physical Sciences.
2. Is Biology a Science?
3. Evolution.

CHAPTER IX

THE SELF 300
1. Historical Preliminary.
2. The Cartesian Dualism.
3. Man a Machine.
4. Subjectivism.
5. Toward Sanity.

CHAPTER X

MORAL VALUES 348
1. The Moral Realm of Discourse.
2. Moral Values and Cognate Realms of Fact.
3. Postulates of the Moral Realm.
4. Problems of the Moral Realm.

CHAPTER XI

RELIGION 385
1. What a Philosophy of Religion Can Do.
2. Religious and Scientific World-Views.
3. Current Attempts at Compromise.
4. The Nature of Belief.
5. The Attributes of Divinity.

CHAPTER XII

THE ESTHETIC EXPERIENCE 417
1. Reductions of the Esthetic Experience.
2. The Autonomy of the Esthetic Experience.
3. The Importance of the Esthetic Experience.

CHAPTER XIII

THE PHILOSOPHIC ATTITUDE 446

INDEX 459

PART ONE
METHOD

CHAPTER I

THE TASK OF PHILOSOPHY

I throw my dog a piece of meat: he tenses certain muscles, relaxes others, flexes his hind legs, throws his head back, suddenly opens and shuts his jaws just in time to catch the meat cleanly, takes a quick bite or two, swallows, and looks very much satisfied. I sit in an Italian church, and watch a young girl praying before the high altar, her head bowed, her hands clasped. I listen to a friend of mine telling with regret how his young son, in spite of punishments, every day leaves school at recess to take a walk in the neighboring country. I stand in an Athens twilight beside a peasant from a mountain district who has for the past half hour silently been watching the Parthenon blacken in the sunset.

My eyes follow casually drops of water melting from an icicle attached to the eaves of a high roof. The icicle breaks off, and with it smaller pieces of ice and snow. They fall with increasing speed, at first together; then the heavier pieces of ice outdistance the rest, and are shattered against the ground some moments before the smaller particles of snow finish their drop. In a half directed chain of reflections I begin to consider this lag in the time at which the snow reached the ground. The ice is heavier, but I know that this is no part of the explanation; and I remember my surprise when I first learned that there was nothing in the nature of heavy bodies that made them drop faster than light bodies. The lag, I know, is caused by the differences in the resistance offered by the air to the motions of the particles of ice and snow, differ-

ences related to the proportion between surface and mass in the various particles. For, apart from this difference of air resistance and certain other variable factors, I know that all bodies on the earth are drawn with the same force in a straight line toward the center of the earth. And I reflect further that the law expressing the uniform tendency of terrestial bodies is only a local application of the universal law in accordance with which the earth and the other planets continue their set courses around the sun; and that, finally, the force referred to in this universal law of gravitation is interpreted by the equations of the relativists as a characteristic of space itself.

The analysis of the fall of the ice and snow might be carried still further, either by elaborating certain details, or by relating it to even more general beliefs about the orderliness of the universe. But each of the other experiences also offers material for analysis, though if followed naturally, the procedure in each case will be different. The action of the dog seems to involve a most abstruse causal analysis and interpretation: a recognition of what was in my hand as meat, of my movements as meaning that I was about to throw the meat, an accurate judgment of the complex trajectory of the meat through the air, a confidence that what his nose and eyes informed him was meat *was* meat, and would nourish, not poison him; contemplation of the girl before the altar might lead to reflections on the nature of God, on the mysteries of religion, on the ecstasies of the mystics; the boy's choice of a walk rather than school suggests perhaps the most searching questions of what, in the end, are the goods that we should seek; watching the Greek peasant, we may wonder about the ultimate nature of beauty, to which so many men have devoted the best of their lives and their thoughts. Yet when we reach these reflective structures surrounding the nature of space, cause, God, good, beauty,

we seem, somehow, to have divorced ourselves from the warm, familiar experiences that formed the starting points for reflection.

And certainly there has been from many points of view a falsification. For one thing, neither the dog nor the girl nor the boy nor the peasant went very far into the kind of analysis whose possibility has been suggested. We can only dimly imagine what the dog's world is like; but we all know, or think we know, what the girl's and the boy's and the peasant's world is like: it is the world of our ordinary experience (*realita vividád* — 'lived-through experience,' the Spanish can say more thoroughly), made up of people and objects, space and time, hard and soft, colors and sounds and smells, sorrows and loves, desires, hopes, death — all more or less ordered, more or less intelligible, more or less enduring. At most times we are irresistibly led to consider this familiar world as somehow simply *given*, for us to look out on and know. But anyone who has seen a small baby, unable to recognize any of the objects around him, unable even to distinguish his own body from the cradle he lies in, grasping with the same gesture at a rattle by his side or a lamp across the room, will not need to be convinced that the baby's world is not the same. And the abstract world of relativity equations and the incommunicable world of a mystic's ecstasies are again not the same.

In thinking we can never start at the beginning. We think at first without realizing it, without distinguishing it from other activities; and when we first think critically and self-consciously we have already countless confused habits, prejudices, beliefs, doubts that condition the manner and content of our thought. These have been formed in us by the necessities of living, just as the dog, who will never know what cause is, yet acts in catching and eating the meat as if confident in the validity of many

causal judgments. In philosophy, which is an attempt to think critically and self-consciously in a more directed manner than usual, this continuity of experience must always be remembered. At heights of abstraction it is, as we shall see, often forgotten; but we should know nothing of atoms if we did not first know stones and chairs; nor would we ever debate the nature of the good if we had not first discovered a conflict of desires.

Experience is irreducible, ineluctable, a pure and simple fact. It is not conceivable that any system could finally comprehend it. To modify the quality of experience, by developing a technique for analysing the relations among its various aspects, and by finding an acceptable attitude before its diverse complexities is the task of philosophy.

1. Is Philosophy Possible?

In beginning the study of philosophy it is important not to expect the wrong kind of results, not to expect the same kind of answers to questions that are obtained in business or in studying the sciences. Such expectations must inevitably be disappointed, and philosophy then declared worthless because it has not accomplished what it never professed to be able to accomplish. Of course we may feel, in the end, that the results philosophy does achieve are not worth much; but this is a different type of judgment. To take an example from another field, it would be foolish to say that Picasso has failed because his paintings do not look like the ordinary objects around us. It was never part of his intention that they should. But we may reject Picasso on the ground that all paintings should be closely representative of ordinary objects — though this can hardly be done intelligently unless we understand the opposed point of view. From such misunderstandings as these have arisen certain charges against philosophy which will here be examined.

(1) In the first place, it is declared that the futility of philosophy is shown by its history. It has not progressed as the sciences have. The sciences can point to definite results: not only have they established an impressive and rapidly growing body of objectively verifiable truths, but by applying these truths they have made possible the amazing inventions of the last few centuries that have given us an unprecedented control over nature, and have quite literally changed the face of the earth and the life of mankind. Philosophy, on the other hand, has never got beyond the disputes that Socrates and his companions carried on in the Athenian market-place. It asks questions to which, apparently, no verifiable answer can be given; and consequently has gone on for more than twenty-five hundred years asking them without success. What is man's destiny? What is truth? How are we to distinguish between right and wrong conduct? Is there a God and if so what is his nature? Are the events that go on in the universe expressions of a hidden cosmic purpose, or merely the inexorable effects of physical forces? Such questions, their verbal form changed from age to age with the changing thought-fashions, seem no closer to satisfactory answers than at the beginning.

To be sure, there is no scarcity of people who think that they have found the answers; every religious creed and every 'school' of philosophy is made up of them. Yet when their answers are compared with one another they seem to cancel each other out. Doubtless many philosophers speak dogmatically enough in defense of their own positions: "Truth is correspondence with verifiable fact"; "Truth is determined by intellectual consistency"; "Truth is whatever best satisfies the needs and desires of men"; "Truth is fundamentally intuitive, and both reasoning and observation of fact are secondary to those immediate intuitions (such as my own existence, the

existence of a world in space and time, the existence of other persons) which alone make experience possible." The oppositions among the answers to the other questions that have been listed are more familiar and even more direct; the contrary dogmatisms only prolong the conflict, and the questions continue to be asked.

Consequently, practical persons, who want definite answers to their questions, are likely to agree with the judgment of Callicles, in Plato's dialogue, *Gorgias:*

> When I see one of your young men studying philosophy, that I consider to be quite in character, and becoming a man of liberal education, and him who neglects philosophy I regard as an inferior man, who will never aspire to anything great or noble. But if I see him continuing to study philosophy in later life, and not leaving off, I think that he ought to be beaten, Socrates; for, as I was saying, such an one, even though he have good natural parts, becomes effeminate. He flies from the busy center and the market-place, in which, as the poet says, men become distinguished: he creeps into a corner for the rest of his life, and talks in a whisper with three or four admiring youths, but never speaks out like a freeman in a satisfactory manner.

Or, phrased in contemporary language, they may go even further:

> Many apparent questions which begin with the words 'What' and 'Why' are not questions at all, but requests for emotive satisfaction.[1]

If the problems of philosophy cannot be solved, or even perhaps are not problems at all but only verbal delusions, does not philosophy become no more than a pastime, like crossword puzzles or backgammon? And in that case, ought we not become positivists and confine at least our more serious attention to questions whose answers can be sought by the methods of science?

[1] I. A. Richards, *Principles of Literary Criticism.*

(2) But not only is it stated that philosophy is dealing with a group of problems to which it can give no satisfactory answers, and consequently making no discernible progress. The critics of philosophy go farther and declare that actually it is losing ground, and that the various sciences, advancing on its long possessed domain, are taking over one by one the problems that were once philosophy's, and with the help of experimental methods are giving them far more exact and generally acceptable answers than philosophy could ever have done. There was, for instance, the question first asked by the ancient Milesian philosophers, "What is the underlying substance from which all other things are derived?" Thales, the first of this group, said that it was water; Anaximander, his successor, an unlimited reservoir in which all qualities — dark, light, moist, dry, hot, cold, etc. — were contained; Anaximenes, the last prominent member of the group, air. Each of these men could find ample indications in experience pointing toward the answer he gave, but their investigations were not experimentally controlled and their solutions in consequence seem to the modern mind little more than picturesque guesswork. Nowadays, in contrast, the question from what are things derived is considered no longer a subject for philosophical speculation but for chemical and physical analysis. It is to be answered by the patient laboratory research that resulted in the great atomic theories elaborated so spectacularly during the nineteenth century, and, more recently, in the electrical and wave theories of the structure of matter. Again, psychology has invaded traditional conceptions of philosophy; and older notions of the soul as an inner spiritual power controlling the activity of the body are being challenged by mechanistic explanations of mental activity in terms of conditioned reflexes, engrams, and neural patterns — explanations that seem to admit of

objective verification in a manner not applicable to the philosophical explanations. Examples could be multiplied indefinitely — the contrast between the study of the motion of bodies through philosophical deductions from the nature of motion, and through the science of mechanics as begun by Galileo at the end of the sixteenth century; the early Greek theory of four elements qualitatively differentiated contrasted with the quantitative method in chemical analysis made precise by Lavoisier in the eighteenth century . . . — but these should suffice to give substance to the charge we are reviewing. From considerations such as these, many persons are led to believe that philosophy is only a hangover from primitive superstitions, and that the sooner it is shaken off the sooner will science be free to get results unconfused by useless atavisms.

Both of these objections are based on popular and widespread misconceptions about what is to be expected from philosophy. The second — for the moment we shall postpone any attempt to answer the first — observes that each of the special sciences, astronomy, physics, biology, economics, geology, and the many others, has a definitely marked out and limited field on which its researches and other activities are concentrated. In each case the field can be defined, perhaps roughly and inadequately, but at any rate clearly enough so that a problem can readily be identified as astronomical, biological, economic, etc. It is then taken for granted that philosophy must claim for itself a clearly limited field analogous to the fields claimed by the special sciences; but, as we have seen, much of what philosophy claimed for itself in the past has been taken over or is now being taken over by various sciences; and from this it is further concluded that eventually everything will be made part

of the subject-matter of science, and dealt with by scientific experimentation.

Two additional preliminary steps are involved in the reasoning which we are here interpreting: (i) wherever science has in the past taken over a body of problems that had formerly been matters for philosophical speculation (as when chemistry took over many of the problems of alchemy, or psychology some of the problems of religious mysticism, or astronomy and field physics the problems of cosmology, or as in the cases cited above) it has produced verifiable results and practical consequences in a way that philosophy has never done; and (ii) the value of any study or activity is to be measured by its ability to produce verifiable results, and practical consequences in the form of inventions, machines, cures, or useful statistics. From all these considerations it is concluded that the eventual complete surrender of philosophy to the sciences is not only inevitable, but very much to be wished for.

It is evident that back of this reasoning lies an attitude remarkably prevalent today, though there is some excuse for believing that it is now on the decline, after reaching a climax toward the end of the last century. It is an attitude growing out of what may be called the Religion of Science, a religion that for many people in the nineteenth century took the place of older, traditional faiths which had supposedly been undermined by scientific criticism. To deny the amazing, indeed incalculable effects of scientific progress would be not only narrow-minded but quite meaningless, since they are so intimately a part of our lives that every moment we live is directly conditioned by them. The steam engine, the internal combustion engine, steel, petroleum, the uses to which electricity has been put, all sprung from scientific research, have made a world so changed that it may hardly be

called the same as the world of a thousand or even five hundred years ago. But, recognizing this in all its importance, it is quite another thing to claim for scientific method the right to be the sole interpreter of experience. It is important, essential to realize that the theoretic and intellectual pretentions of science can only be judged after a long and careful analysis. We forget this in adhering to the Religion of Science. For science occupies in the popular mind today a place closely similar to that held by magic in primitive cultures or by the Church in the Middle Ages. It has its medicine men and priests who make mysterious and unintelligible statements broadcast through the newspapers, far more ambiguous than any quoted from the Delphic Oracle. It produces its miracles, as in the past, by curing diseases, and by breaking the common sense laws of nature through such astounding spectacles as talkies, radios, and airplanes. And, as in all religions, at its heart lie self-contradictory first principles, not comprehensible by reason: the ether, Carnot's law, space-time, matter, unimaginably large (and small) numbers.

In estimating science's claim to be the exclusive master of our serious attention, it is therefore important to distinguish the superstitious reverence accompanying the Religion of Science from the calm judgment of science's actual and possible achievements. Science's greatest accomplishments have been of two general kinds: (i) the relating together of more and more phenomena through mathematically formulated laws; (ii) the physical control of material objects through inventions made possible by the practical application of (i) plus imagination and luck. Just how important, from all points of view, (i) is we are not yet in a position to decide. How immensely important (ii) is, is obvious. It would, moreover, be foolish to pretend that philosophy has not often speculated

about matters that can be satisfactorily handled only by the application of the scientific method (though this is not always unfortunate: often the speculation has given a needed impetus to science); and it would be equally foolish to deny the effectiveness of the scientific method when applied to such matters. Chemists, even if they have not reached the goal of the philosophical alchemists of the Middle Ages and converted lead into gold, have reached even more remarkable goals of their own: have, for example, converted petroleum into gasoline, coal into perfume, water into two gases. Medicine, though it has not conquered death, has lessened the amount of physical pain in the world. Physics, though it cannot abolish the spatio-temporal conditions of experience, yet through the telegraph, telephone, radio, and means of rapid transportation, modifies them more than older prophets even dreamed of. About these things there is no doubt. But does it therefore follow that everything is of this character, that is, amenable to the scientific method?

Certainly not.

In the first place the reasoning of science contains as we shall see many non-scientific elements. These have often been deplored by scientists; but actually they are essential to science; and in any case science could hardly contain itself. Recognizing this, some contemporary philosophers, compromising with the popular misconceptions, tend to look upon philosophy as a generalized Science of the sciences. This, though it may be true enough so far as it goes, is much too restricted a view.

But more important, granted that science is the most successful technique for discovering objectively verifiable answers, we are perfectly at liberty to question in many fields and for many purposes the value and even the possibility of such answers. Indeed, as we shall see later in detail, questions are 'objectively verifiable' — apart from

such practical consequences as are inescapable — only when we are content to accept the grounds, that is to say the implicit presuppositions, of verification. These grounds as elaborated by science may very well not be applicable to, for instance, the moral, religious, or esthetic interests suggested by the incidents mentioned at the beginning of this chapter. Experience is infinitely diverse; and philosophy wishes not to limit its diversities, as would be demanded by the adoption of *any single point of view*, but to understand them. What, more precisely, is here involved will emerge from an expansion of the related aspects of philosophy already referred to: the *synoptic* — philosophy as an *attitude;* the *critical* or *dialectical* aspect — philosophy as a *technique.*

2. The Philosophic Attitude

(1) The anatomy of specialization. An easily recognized phenomenon in Western thought since the Renaissance has been the specialization of knowledge. In ancient Greece or in Europe during the Middle Ages men like Plato, Aristotle, Albertus Magnus, and Thomas Aquinas could fairly claim to know nearly everything that was worth knowing. Even so late as the end of the fifteenth century Leon Battista Alberti and Leonardo da Vinci were generally considered by their contemporaries *uomini universali*, 'universal men.' The vast growth in the amount and detail of knowledge has made this no longer possible. Consequently, a given branch of inquiry, having special interests of its own to serve, gradually breaks away from the common body of knowledge and develops methods of investigation appropriate to its interests. Thus we may trace historically the rise to a relatively independent status of astronomy, physics, chemistry, economics, biology, esthetics, (more recently) psy-

chology, sociology, and many others. The organization of courses in an ordinary college bulletin illustrates the completeness and definiteness of this specialization at the present time.

When we open a textbook in one of these specialized fields we notice perhaps first of all — particularly if we are not familiar with the field — a large number of *words* that are not used in ordinary conversation, but that are essential to an understanding of the subject of the textbook; and we find ordinary words employed in extraordinary ways. In fact the first few chapters may be little more than an attempt to define words. In, for example, a textbook of psychology we will find 'psychosis,' 'phenomenon,' 'conation,' 'volition,' 'affect,' 'cognition,' 'presentation,' 'ideation,' 'hedonic tone,' 'endo-somatic,' 'coenaesthesia,' 'instinct,' 'reflex,' 'inhibition,' 'chronaxies,' 'libido,' 'neurone,' and hundreds more. Each specialized field, that is, has a *language* of its own. But it will have a language in a more fundamental sense than a mere system of words: the words will *stand for* something (the 'object' of its investigations); and when, hereafter, we speak of the *language* of a specialized field of knowledge we are referring not to the words, but to what the words stand for. The whole system of language of any definite and elaborated field will then constitute what may be called a *realm of discourse.*

The advantages of thus arranging knowledge in partitions, of building up separate realms of discourse, are clear enough. Without them, in the modern world, it would be impossible to accomplish anything. The disadvantages, however, are often overlooked: In the first place, they make each field less accessible to other fields, as we realize whenever we talk to a specialist in a field about which we know little. Before we can understand him we must learn his language. Second, and even more

important, too much specialization turns aside our energies from the perhaps fundamental task of harmonizing and integrating the various human activities and interests.

(2) **Ideologies.** Specialists in some one given realm of discourse capable of intellectual refinement very often take a further step: on the basis of the language in which they are adept they build up *ideologies*. An ideology may be defined as a group of ideas and beliefs appropiate enough to a single realm of discourse, but which gets taken too seriously, and is applied indiscriminately outside this realm, or even, with the aid of sanctifying adjectives like 'real' and 'true', to all experience.

Perhaps the most evident examples of such ideologies are to be found in political history. During the sixteenth century there arose in England, France, and Spain, through the operation of innumerable causes too complex ever to be fully explained, the system of political control we call 'absolute monarchy.' Then, after the system was established, two different ideologies were built up, in one of which the absolute monarch appeared to hold power by 'Divine Right,' in the other, by an implied contract through which the 'people' surrendered their rights to the 'sovereign.' More recently, the same sort of ideological branch has sprung from the democratic-humanitarian movement partially successful at the end of the eighteenth century. Many people in the United States today are still convinced that man has 'naturally' certain inalienable rights and privileges; and in arguments over political questions these are often appealed to as final authority.

But another type of ideology is more directly connected with our present inquiries. As examples of this there may be cited: (i) The economic interpretation of history and values, in which it is stated that all historical events, all human beliefs, moral codes, religious and esthetic

systems are explicable only in terms of the interplay of conflicting economic forces. The extreme view here suggested is perhaps less widely held than a decade ago; but in a modified form it is still prevalent and perhaps increasing its influence. (ii) The behavioristic interpretation of man, in which emotions are held to be 'nothing but' movements of the viscera; thought and consciousness in general, nothing but complicated movements of the molecules of the brain. We must be careful to distinguish the ideology based on behaviorism from the method of behaviorism; we may of course recognize the usefulness of the latter in the laboratory without accepting any of the former. (iii) The physical interpretation of all reality, in terms of electrons or quantum transitions. (iv) The 'logical' or 'metaphysical' interpretation of the universe, in which all that happens is treated as instances of some necessary, eternal, and logically satisfactory system of 'reality.'

Such ideologies and the attitudes that go with them may be called *dogmatic*. Opposed to each and all of them is the philosophic attitude.

(3) **Philosophic vision.** Philosophic vision involves a willingness to understand and appreciate the diverse meanings summed up in every realm of discourse. This cannot be simply standing intellectually outside and looking in: for one thing, there is no outside. A democratic-humanitarian may be unreflective and dogmatic about his ideals and beliefs; but a communist will not for that reason understand them any better. If the democrat can see only their virtues, the communist can see only their faults. A poet may very well recognize the limitations of a dogmatic physicist's reduction of reality to quantum-transitions, but his recognition will be philosophic only when it includes both an *appreciation* and an *analysis* of the physicist's point of view. These two must go together;

for appreciation without analysis easily degenerates into a sentimental 'tolerance' and the watered skepticism of an intellectual dilettante; and analysis alone amounts usually either to mere academic word-chopping or to a covering for some unexpressed ideology of the analyst.

Each realm of discourse, that is, must first be accepted from its own standpoint. When we speak of 'philosophic vision' we are emphasizing this acceptance, this effort, by avoiding all stereotyped and insular attitudes, to include in our view, as nearly as we can, the whole of life. But along with this acceptance must go a recognition of the limitations of each realm of discourse, made possible by the analytic or dialectical side of philosophy, which we shall now consider.

3. Philosophic Technique

Philosophic technique, since it is allegedly able to deal with any realm of discourse, cannot so readily be formulated in advance as a technique adapted to a specific field and a specific set of problems, as for instance a cobbling or tennis or geological technique. What is meant by it will become clearer through its actual use in handling various realms of discourse as in the second part of this book. We can, nevertheless, suggest beforehand certain of its important functions.

(1) In every realm of discourse to which logical method is appropriate there are certain fundamental or root terms on which as a foundation the system of meanings comprising the realm of discourse in question is built. The following will serve as examples.

From mathematics, the notions of *unity*, *infinity*, and of such primary relations as *addition* and *equality*. From physics, *time*, *length*, *mass*. Or, from the new physics,

space-time (*n-dimensional continuum*), *c* (the velocity of light), *events* related by *intervals*. From ethics, the notion of *good* (or some verbal synonym).

At least some of these root terms must be *indefinable within their own realm of discourse*. This should not be difficult to realize, for if it were not the case, when we attempted to define any particular term one of two results would follow: either our definitions would dissolve into an infinite regress, or we should in the end circle back to the term with which we started (though we might have changed the *word* used and thus be deceived into thinking we had defined it in terms other than itself). That is, if we define *a* in terms of *b*, *b* in terms of *c*, *c* in terms of *d*, etc., either we shall go on for ever, or get back to *a* — or come to rest at some term which we simply *accept* as undefined so far as the *type* of meaning in question is concerned.

Oddly enough, it is often rather arbitrary just which of the fundamental terms in any realm we accept as undefined. For instance, if we accept time (T), length (L), and mass (M) as undefined, we can express space in terms of L^3, velocity as $\frac{L}{T}$, force as $\frac{ML}{T^2}$, etc. But the process might easily be reversed. Now, from a mathematical point of view, velocity will *be* $\frac{L}{T}$ or force $\frac{ML}{T^2}$. But in building up a view of the physical world we probably shall regard space, velocity, and force as something in their own right, not to be identified with the mathematical expressions for them; and we shall therefore have to treat them also as undefined.

It is necessary to add that this arbitrariness in the selection of undefined fundamental terms does not extend to all fields alike. It is the case with physics; but it is

difficult to see how any mathematics could be built up without the concept of unity [1], though the reasons for this are perhaps extra-mathematical.

(2) In every realm of discourse to which logical method is appropriate there are, furthermore, certain fundamental propositions on which the structure of the realm of discourse in question rests. The following, from the same realms as above (1) will serve as examples. From mathematics: "For every finite value of x, there is a finite value $x + 1$"; "In addition, the order of procedure is immaterial." From Newtonian physics: "Every material body will continue in a state of rest or of uniform motion in a straight line unless acted upon by an external force"; "To every action there is always an equal and opposite reaction"; also the three great 'Conservation Laws' of mass, quantity of motion, and energy. From relativity physics: "The interval along the geodesic of a light impulse is zero." From empirical science generally: "There is a uniformity, either absolute or approximate, among events, such that probable predictions of future events can be made on the basis of events observed in the past." From ethics: "Some things (ideals or acts or motives) are better (more good) than others." Any particular and definite ethical attitude requires further some form or forms of the proposition: "This particular ideal, act, or motive is good"; or, "This one is better and more choiceworthy than that one."

Just as certain root terms must be accepted without definition, it is clear that some at least of the fundamental propositions in each realm of discourse must be accepted without proof, since everything else is, presumably, to

[1] Unity may, perhaps, be defined by reference to some other realm of discourse (e.g. class logic), but it remains undefined if the analysis is restricted to mathematics alone.

be proved from them. Unproved propositions are often divided into *axioms*, which have no intelligible alternative within the same realm of discourse, and *postulates*, which do have one or more intelligible alternatives. There is a tendency, particularly noticeable in recent years, for more and more propositions once regarded as axioms to become regarded as postulates, and we shall generally use the latter term to include all unproved propositions.

Again as with root terms, it is somewhat arbitrary just what propositions we consider postulates. The general 'causal postulate' given above presumably could never be proved, since it refers to the future. But certain physical laws (as will be shown, for instance, in Chapter VII) may apparently be deduced from the method of defining terms.

It is the business of a philosophic technique to clarify these fundamental terms and propositions in each realm of discourse. Since Part II is largely devoted to this effort, we may conclude here with a few general remarks.

(i) It is probably already clear that the discovery of these terms and propositions is extremely difficult, and that complete success is scarcely to be hoped for. In fact an introductory study can do little more than indicate the type of problem that arises. In addition to troubles from the arbitrariness noted above, we continually deceive ourselves by supposing that something has been defined or proved when actually a verbal shift has occurred, or an irrelevant meaning introduced from another realm of discourse. Examples of the first are to be found, for instance, in many ethical theories substituting the *words* 'virtue' or 'the desirable' or some more or less synonymous word for 'good'; of the second, in the supposition that 'infinity' is something extremely large, or 'mass' a quality of heaviness or size such as known when we lift a material body.

(ii) The approach of philosophic technique is not genetic or historical, but logical. That is to say, these terms and propositions are not those that appear first in any field of knowledge, nor the ones that we learn first when studying some field. In fact, none of them is ever articulated until the field of knowledge in question is well advanced, and has built up a fairly coherent intellectual structure.

(iii) We should not be misled by a usual attitude toward 'what cannot be proved,' which might conclude that postulates are an inferior and shaky sort of knowledge. The truth is that modified forms of certain postulates are among our surest knowledge, and we are forced by the necessities of living to act as if they were valid long before we could put them into logical form. In believing that we can make a conscious choice between two possible actions there is implied some form of an ethical postulate; in eating a piece of meat, confident that it will nourish us, some form of the causal postulate.

(iv) It is rather generally agreed among philosophers and scientists that the number of undefined terms and postulates in any realm of discourse should be reduced to the fewest possible. The reasons for this are not always easy to understand, but they seem to be based chiefly either on the esthetic satisfaction that can be derived from a set of meanings so organized, or on grounds of intellectual expediency.

(v) A postulate cannot be judged as true or false. There is clearly no standard by which its truth or falsity could be judged, at least within the realm of discourse in which it belongs. It is rather to be thought of as more or less useful, desirable, or intelligible.

(3) It will be observed that philosophic technique is really not one method, but an indefinite variety of methods. It would be an unjustified dogmatism to be-

lieve that exactly the same type of analysis can be applied to mathematics, physics, sociology, ethics, economics, psychology. A general similarity in methods of analysis is however possible in these and similar fields, since they can all be given more or less adequate expression in logical propositions and logical terms.

But there are other not less important aspects of experience in dealing with which the possibilities of logical analysis are much more strictly limited. As prominent examples: the rather confused, haphazard world we usually live in; such things as friendship, love, and luck; the interests of art and religion. In handling such aspects of experience, therefore, a developed philosophic technique must change its method to one more suited to the meanings they include.

4. Philosophical Criticism

The last section no doubt leaves an impression of human knowledge and experience divided into discrete, unconnected partitions. It is just this impression that Section 2 was designed to counteract. Philosophical criticism is a working together of philosophic vision and philosophic technique; the two are part of the same process.

Philosophy wishes to become critical toward experience: it wishes to understand what is meant by anything it is considering; and to do this it must understand also other actual or possible alternative meanings. All consciousness is potentially critical. We can perceive darkness only by a dimly remembered contrast with what it is not, with light; otherwise we could not recognize the perception of darkness as such. We can know red because it is not other colors. At a more complex level, even predominantly uncritical beliefs, such as that any view inconsistent with certain divine revelations is false, or that all experi-

ence can be adequately explained in physical terms, or that the accumulation of money is the ultimate human goal, are nevertheless critical to the extent that they can be held true only by implied contrast to other possible beliefs that are held false.

Philosophy wishes to extend this process of criticism, to become conscious as fully as possible of the related alternatives and contrasts. The technique that has been outlined is a method of achieving this within any given realm of discourse. But when the root terms and postulates have been reached, no further criticism is possible within that realm of discourse, since therein they are fundamental. Criticism must then attempt what may be called, by analogy from the terms we have been employing, *linguistic translation;* it must interpret the postulates and root terms from the point of view of some other realm of discourse. Thus we may criticize ethics genetically, and show how our ideas of the good have grown from primitive taboos and social customs. This process is reversible (a point that is often overlooked), for we may equally well criticize the genetic approach ethically, and perhaps decide that it has little value. Likewise we may trace the relation between the structuralized notions of the sciences and the more familiar realities of the everyday world: the relation between the time of physics and our immediate experience of succession; or the relation already suggested between mass and our feeling of weight and size. The mechanistic determinism postulated by science may act as a comment on religion; and religion in its turn, for those to whom it is real, will be as legitimate a comment on mechanism. There must be this viewing-together to complete and supplement the analysis.

This does not mean that the philosophic attitude forbids the adoption of any definite point of view — materialism or Catholicism or idealism or Communism or whatever

it may be. It insists only that the point of view be understood and its limitations recognized. For, though no point of view is wholly uncritical, none can be finally critical. In the end philosophy must be critical even toward itself.

Perhaps in this discussion there have been suggested replies to the first objection to philosophy that we considered: why has it never been able to answer the questions it asks? why hasn't it progressed? Progress implies a fixed standard by which we can measure the degree of progress, but philosophy is critical toward standards, of whatever kind. If it is argued that Truth provides a standard, and that the gradual accumulations of true answers to its questions will constitute progress, philosophy points out that truth is a word, and like all words has many meanings. If we say that it is true that (a) all material bodies are acted upon by gravity; (b) two plus two equals four; (c) God is just; (d) that man is my friend; (e) beauty is truth — these statements, the truths of which they are capable, and the ways in which we could know those truths are all perhaps unbridgeably different.

Philosophy does have a practical value, though that value is generally exploited by the individual sciences. It raises fresh questions, suggests possibilities, new methods of investigation; and as these get put into definite enough form the sciences take them over and apply them. Indeed, the whole mathematical method, by which alone modern science was made possible, was a philosophical achievement.

But, whether or not it would be possible, there is no necessity to justify philosophy on the grounds of its practical achievements. An ant or a bee gets a great deal done; and it may be sometimes suspected that a question admits of a definite answer only because it is, in the end, a rather unimportant question.

CHAPTER II

MEANING

1. The Meaning Situation

The conclusions of the preceding chapter will suggest that philosophy might be called the study of *meanings*, the effort to understand different kinds of meaning and their relations to each other. This, then, presents us with a first question: "What is meaning?" and it will be the business of this chapter to make the question more intelligible. To make the question more intelligible, *not* to answer it. For it should be clear to begin with that this question, which is equivalent to, "What does meaning mean?" could never really be answered except in terms of itself. Nevertheless, there is a good deal we can say about it.

Let us consider *any conscious situation*. But here we are met at the start with an apparently insurmountable difficulty, for a new question arises: "What is a conscious situation?" This can be given any number of *verbal* answers. We can say that a conscious situation is anything involving sensations, knowledge, thinking, feeling, anything in which there is an element of active awareness, whether of objects, emotions, ideas, laws, equations, truths, abstractions, persons, qualities, dreams, or angels. Such verbal substitutes and expansions do make more evident what is referred to by 'a conscious situation,' but none of them nor all of them together can provide a wholly satisfactory definition. The reason for this is not hard to understand: consciousness is unique; everything else we can refer to has a meaning *for* consciousness in

some way or other, and therefore cannot be an adequate substitute for consciousness. We can, therefore, describe consciousness only by *metaphors* (or some other figure of speech). A failure to understand the metaphorical nature of all descriptions or definitions of consciousness is responsible for many puzzling problems in traditional philosophy. It will make this exposition clearer to illustrate certain of these misunderstandings.

(1) From a common-sense viewpoint, we as conscious human beings are the relatively passive observers of a 'reality' that lies outside us — the ordinary world we know — and *sight* is what most people suppose gives us our closest approach to this reality. It seems to disclose to us an 'external world' of objects in space and time. Now we can stand at a window, and look out on a yard full of grass, trees, people, etc. In thinking naïvely, we carry this experience of looking through a window over to our notion of visual consciousness; and, since visual consciousness (sight) seems to us the most important kind of consciousness, we tend to interpret all consciousness as an extraordinary type of 'looking through a window.' This metaphor, it may be imagined, has led to the many theories of an independent soul, autonomous and self-contained, using the bodily senses as windows through which to look out on reality (it is summed up, for instance, in poetry by the line, "The eye is window to the soul."). Such a view was at one time almost universal, and is still common.

(2) A slightly more sophisticated view uses the metaphor of a *mirror*. Consciousness is thought of as somehow *reflecting* events that go on outside of it. Many of the founders of modern philosophy, such as Sir Francis Bacon and René Descartes, in spite of their great differences on other points, were alike misled by a mirror metaphor.

Are not the organs of the senses of one kind with the organs of reflexion, the eye with a glass [= mirror in Elizabethan English] . . .[1]

And the human understanding is like a false mirror, which, receiving rays irregularly, distorts and discolours the nature of things by mingling its own nature with it.[2]

Descartes, on the other hand, believed that consciousness reflected the outer world truly, except so far as distorted by the will.

(3) A view closely allied to this treats consciousness as a clean slate (*tabula rasa*) on which sense impressions make their marks; or as a formless putty, which passively receives sense impressions. The English school of philosophers in the eighteenth century (notably John Locke and Bishop George Berkeley) thought in terms of this metaphor.

The allied metaphors of both (2) and (3) lead to an insoluble problem: how can consciousness be *of* something entirely distinct from and outside of consciousness?

(4) A fourth metaphor, not quite so easy to locate, because it is not so clearly stated, may be considered a *mould:* consciousness is a mould of a certain definite shape and form, that is filled with a reality which, though in itself unknowable, must nevertheless conform to the shape of the mould. Some metaphor of this kind must have been present to Immanuel Kant, who, by elaborating it, tried to solve the difficulties of the English school.

(5) The metaphor popular among many thinkers today is that of a *telephone system* (this is, for obvious reasons, confined to recent times; whereas the other four have long traditions in historical philosophy, though their vogue has succeeded in somewhat the order given). Consciousness is thought of as an infinitely complicated telephone exchange; the afferent nerves bring in impulses to the spinal

[1] Bacon, *The Advancement of Learning.* [2] Bacon, *Novum Organum*, I, 41.

cord and brain, which combine and re-combine them with other impulses, and send out some combination over the motor nerves. This is, roughly, the view of modern psychology. But it will be observed that this view is totally different from all the others because, when carried to an extreme, it involves the denial of consciousness itself (a denial made explicit in dogmatic behaviorism). Nerves, glands, brain, etc., are all that is left. In other words, the question "What is consciousness?" is ruled out. It may of course be true that ruling out this question will prove the best method of solving many other (e.g. physiological) questions. But the question will still be there for whoever wishes to ask it.[1]

It is not necessary to understand all the complexities of these positions. The purpose of citing them is simply to show how each of them results from taking too seriously what can never be more than a metaphor. Furthermore, it suggests that the distinctions and analyses made in this chapter are not to be thought of as in any sense complete or final: they could not be so. They are tentative approaches toward a partial clarity.

Accordingly, in this book *consciousness* or *awareness* will be accepted as an undefined term, as discussed in Chapter I. Or, in other words, we shall take for granted that we know at least vaguely what we are talking about when we talk about 'a conscious situation.'

With these modifications: In any conscious situation we may, for the purposes of analysis, distinguish the following elements: (i) a *sign;* (ii) something signified, which we shall call a *meaning;* (iii) a person for whom (or point of view for which) that sign has that meaning.

Thus: (a) I hear a shout (sign) which signifies to me the presence of my friend so-and-so (meaning); (b) I see a red light (sign) which tells me to stop my car (meaning);

[1] This point will be discussed in greater detail in Chapter IX.

(c) I feel a certain kind of pain (sign) which signifies to me a toothache (meaning); (d) I see a yellow paper with purple marks on it (sign — telegram) which signifies to me certain of my wife's activities and feelings (meaning); (e) I hear a few musical notes (sign) which signify to me Brahms' First Symphony and many associations attached to it (meaning); (f) a physician sees yellow irises (sign) which signify to him jaundice (meaning); (g) a soldier feels a sting in his guts (sign) which signifies to him death (meaning); (h) a priest pronounces the words, *Hoc est enim corpus meum* (sign), which signify to him the mystery of transubstantiation (meaning); (i) a painter sees a landscape (sign) which signifies to him a brilliant imagined painting (meaning); (j) at a movie the audience sees a rose wilt (sign) which signifies to it the rape of the heroine (meaning); (k) in the laboratory an experimenter sees a needle move (sign) which signifies to him a million volts of electricity and a raise in salary (meaning); (l) a westerner hears a sharp rattle (sign) which signifies to him snake-danger-run (meaning); (m) an astronomer hears a spoken word, 'universe' (sign), which signifies to him the stars and the milky way and the complex immensities of time and space (meaning); (n) a sailor looks at the stars and the milky way (sign) which signify to him "about a half hour more till a cup of coffee" (meaning).

This, then, is the meaning situation: a sign, a meaning, a person. But, naturally, this analysis falsifies, like any other. It suggests, for instance, that consciousness or experience is static, and that we can isolate stable, unchanging units, signs and meanings. Experience is, on the contrary, always changing; it is organic, continuous, dynamic. And that is why there is no such thing as a 'mere idea,' 'mental image,' or discrete 'mental event.' *Every* idea refers to something beyond itself; *every* sign has a meaning, — some meaning: the problem is to de-

termine what kind. The continuity of experience is emphasized when we speak of the 'stream' or 'flow' of consciousness. There are, of course, breaks, as when our attention is suddenly distracted (whence we speak of a 'chain' or 'succession' of ideas). If the break is complete enough, we have the phenomena known as 'amnesia,' 'aphasia,' 'double personality.' But even in these it is doubtful that there is real discontinuity. Even sleep or fainting or total anesthesia is not a complete break from the standpoint of the person involved; it is only by an *ex post facto* interpretation that he calls it a break. Real discontinuity is perhaps death; though those who believe in personal immortality would deny also this.

Yet, though this analysis does in the end falsify, it is not wholly arbitrary. Experience does lend itself to interpretation in terms of signs and meanings. Indeed if it did not (the words used might be different) we could not continue living. If certain events could not be accepted as signs for certain others (a roar for a lion, a fever for a disease, a visual impression for nourishing food), and if these signs were not repeated more or less similarly, experience would be chaotic, and we should soon succumb to the chaos. We could never form habits, never 'learn.' Any increase in knowledge includes the growing ability to handle signs, with the assurance that the manipulations of the signs will correspond to determinate relationships among the meanings they refer to: someone adds up a column of figures and thus discovers the total weight of a ship's cargo; the ship sails, the captain's confidence in the validity of the sign process of addition promising him that his ship will not sink on the voyage. But such considerations as these will occupy us further in later sections. We shall conclude this section with one more preliminary definition.

We must distinguish between ordinary signs and *re-*

flexive signs. This is a distinction the importance of which can hardly be over-rated. A reflexive sign is a sign which is itself part of its meaning. An ordinary sign merely directs attention to its meaning, as a red light to the action of stopping, or a menu to food, or a stock ticker to actual transactions in shares, or a timetable to the movements of trains. But a reflexive sign *is also meant.* For example, a certain 'visual awareness' is a sign signifying 'my desk' to me; but it is also part of what I mean by 'my desk'; it would certainly no longer be 'my desk' if I could not under any circumstances see it. My desk is something I can see, bump against in the dark, write on, sit on, etc.; any one of these aspects is essential to the whole of what I mean by my desk; and any one of them may be, in a proper context, a reflexive sign for the whole. The whole will never be part of my awareness. I can never see the whole desk at once or feel it all at once, but when I say that it 'belongs to me,' I do not mean that the word 'desk' or any particular aspect of the desk I may be aware of when making the statement (perhaps no more than a dim memory) belongs to me: I mean the whole group of all actual or possible aspects of the desk. In fact, an object can be defined as a *function of its reflexive signs;* though the determination of just what signs are reflexive in any given case is extremely difficult. We shall return frequently to this distinction.

Anything whatever, of any degree of complexity, may be either a sign or a meaning. Taking any conscious situation, our analysis of the meaning possibilities may proceed in any of a countless number of directions. We shall now proceed to examine two of them.

2. The Thinking Process

From the many ambiguities in uses of the term 'thinking' it will be useful to distinguish here between: (i) think-

ing in the sense of any however desultory flow of consciousness, and (ii) thinking that is more systematically controlled by reference to its meanings. In the following passage from James Joyce's *Ulysses*, Leopold Bloom is thinking in the first sense:

The far east. Lovely spot it must be: the garden of the world, big lazy leaves to float about on, cactuses, flowery meads, snaky lianas they call them. Wonder is it like that. Those Cinghalese lobbing around in the sun, in *dolce far niente*. Not doing a hand's turn all day. Sleep six months out of twelve. Too hot to quarrel. Influence of the climate. Lethargy. Flowers of idleness. The air feeds most. Azotes. Hothouse in Botanic gardens. Sensitive plants. Water lilies. Petals too tired to. Sleeping sickness in the air. Walk on roseleaves. Imagine trying to eat tripe and cowheel. Where was the chap I saw in that picture somewhere? Ah, in the dead sea, floating on his back, reading a book with a parasol open. Couldn't sink if you tried: so thick with salt. Because the weight of the water, no, the weight of the body in the water is equal to the weight of the. Or is it the volume is equal to the weight? It's a law something like that. Vance in High school cracking his finger-joints, teaching. The college curriculum. Cracking curriculum. . . .

In the second sense, which we may call 'reasoning,' Inspector French was thinking:

Now, if you think, you will see that the entire case follows from those two statements. Let us run over it. If Joss gave the sleeping draught shortly after leaving London, as he said, and if Sir John was murdered within eight to ten hours of receiving it, death must have occurred, say, between four and six o'clock that morning. If this were so it follows absolutely that the murder took place in the train. There is no escape from this conclusion except by assuming that Sir John got a *second* sleeping draught on the next evening, which would be a bit too far-fetched a coincidence for real life.

Now, if this is correct, it is obvious that it was not Sir John who crossed to Ireland, and therefore that he was impersonated by the traveller to Sandy Row, and second, that in some way his body was removed from the train before the latter reached Stranraer. Where could these changes have been made? The affair at Castle Douglas at once gives the answer. This view is confirmed by the brown cloaks and the ladder, as well as by the insistence that the sleeping berths should be on the right-hand side of the train, all of which were necessary for the exchange. . . .[1]

The second type of thinking is differentiated from the first by having the thoughts that make it up fitted coherently into a practical situation and a logical structure. Joyce, the author, was probably thinking in the second sense when he wrote the first passage quoted, because he was selecting those arrangements of words that could communicate to a reader Bloom's experience; but Bloom himself is not (in this sense) thinking.

A psychologist might be interested equally in both types of thinking, but the second has a 'logical validity' that the first lacks. We might characterize thinking of the first type as fast or slow, heavy or light, calm or impassioned; the second type, however, would be called 'valid' or 'invalid' (when its logical structure is in question), or 'true' or 'false' (when we are concerned with its conformity or non-conformity with some standard). Thus we can still understand the *reasoning* of Aristotle, which is, possibly, alive today; but his thinking (in the first sense) died twenty-three centuries ago.

There is no sharp division between thinking and reasoning. Border line cases run together, and we are often deceived by the successful results of a haphazard thinking process into believing that we have actually carried out a carefully planned line of reasoning.

[1] Freeman Wills Crofts, *Sir John Magill's Last Journey.*

Each person being a 'sport of nature,' *jeu de l'amour et du hasard*, it results that the highest ambition and even the deepest thoughts of this improvised creature are inevitably affected by their origin. His activity is always relative, and his masterpieces are casual. He thinks perishably, he thinks as an individual, he thinks by lucky flukes; and he merely blunders on the best of his ideas, since they spring from secret and fortuitous occasions which he hesitates to confess.[1]

In our analysis at present, however, we are primarily concerned with more or less controlled thinking, or reasoning. For convenience, it will be useful to distinguish four stages in a typical reasoning process: (1) observation, (2) interpretation, (3) rational elaboration, (4) verification. Stated thus, they are merely an abstract scheme. These stages are not always separate in time, nor all equally emphasized, nor do they represent the only possible way of analyzing. Intellectual problems differ in type, and the reasoning processes applicable to them correspondingly differ. Still, something will be gained by taking up carefully each stage, and its possibilities.

(1) **Observation.** Observation is not merely a first step in the reasoning process, but usually a thread running through the whole process. It is, however, more prominent at the beginning, since it gives rise to the problem which the reasoning sets out to solve. On the basis of our observations we gradually come to certain conclusions. The observations present themselves as potential signs whose meanings are obscure or conflicting; the reasoning process tries to clarify and elaborate the meanings (as when, for instance, a physician tries to identify certain observed symptoms with the usual symptoms of some known disease and thus predict their probable consequences). This might be called a forward or advancing process. But we can reverse our direction, and from a

[1] Paul Valéry, *Variety*, tr. by Malcolm Cowley.

new point of view treat what were formerly the signs as meanings. That is, we can seek to analyze the observation itself, and to discover its constituents. We can ask the question: just what do we observe?

Let us take an elementary example, such as: I hear a mouse, and conclude that there must be unprotected food somewhere about the house. Here the first part, "I hear a mouse," is, presumably, the observation. That is what we start out with, as *given*. But if we reflect on this observation we might conclude that strictly speaking what we hear is not a mouse but only a certain sound which we automatically interpret as a sign signifying the presence of a mouse somewhere in space and time (now, back of the wainscoting). A very complex activity seems to have been carried out instantaneously, without our being aware of it: *something* happens, in some way related to our consciousness; this connects itself up with other similar events in the past which have been accompanied either by visual experiences (which we call the appearance of a mouse) or by the sound of the word 'mouse' (heard or imagined) or by tactual sensations of something soft and squirmy and of sharp teeth or by certain feelings of disgust, fright, or affection, or by all or any combination of these and other experiences.[1] If we had never before encountered an experience in which a mouse entered, nor read about or heard about mice, we should never have observed the mouse *as a mouse*.

Any observation whatever may be analyzed in this way. But many people who would accept the analysis in the case of "I hear a mouse" might hesitate in the case of "I see a mouse." In sight, as has already been noted,

[1] This is explained by physiological psychology in terms of engrams, conditioned reflexes, motor blocks, established neural patterns, etc. Any standard textbook of psychology may be consulted in this connection. The analysis given in this section is logical rather than physiological, and does not depend on any particular physiological or psychological theory.

we seem to have a direct acquaintance: there is the mouse, right before us. But here, again, analysis seems to reveal that there is only a certain visual awareness acting as a sign instantaneously signifying the whole complex of meanings which we call a mouse. Even the visual awareness is complex, for our observation that we are seeing something gray and moving out there in space depends on a previous knowledge of spatial relations. The mouse is not simply something seen: he has weight, extension, life, habits, can be felt, killed, eaten, etc. The sight of the mouse is thus a reflexive sign standing for the total function of meanings that is the mouse, as we can know him.

We may connect this with what was said above (page 30) about the impossibility of there being a 'mere idea' or 'discrete mental image.' We can never have a completely isolated, 'unit' experience: we could not know it, or what would amount to the same thing, it would not be a person who was having it. The logical conditions of experience seem to be: (*a*) an event somehow related to our consciousness; (*b*) the relation of this event to other past events connected with our consciousness; (*c*) the grasping together of the new and old events in such a way as to make up the actual conscious experience. Without the organization implied by the third condition we should never reach more than an idiot's view of life, such as has been studied by William Faulkner in his novel, *The Sound and the Fury*. The idiot Benjy in this novel "hears the roof" instead of hearing the rain (on the roof); when the light is turned out in his room at night, "the room goes away," instead of, as we should say, becoming no longer visible. These three conditions are not steps, separated by time intervals; they are logical conditions, without which, apparently, we should not be conscious.

Yet there is something naturally repellent about this analysis of observation, and the way it is carried out should suggest a warning against drawing too hasty conclusions from it. For in actual experience we do see a mouse, a table, a spoon, a person, or whatever it may be, and it is something of a perversion to say that actually we do not see them but interpret automatically some bare unknown awareness. And it should always be remembered that it is the finished, meaningful observation that forms the starting point of our analysis, though the analysis forces us to suppose that the logical starting point is elsewhere. Consequently, it is dangerous to become dogmatic about the nature of 'reality' on the basis of the analysis. Nevertheless, that this analysis, or one something like it, is called for (though we cannot be sure what its importance is), receives additional and striking support from the two following considerations.

(i) *The possibility of error.* If we never had reason to believe that we had made mistakes in our observations we should probably never have raised any questions about the nature of observation. But, alas, the realization of the fallibility of our observations is forced on us every hour. The mouse we hear turns out to be only a piece of plaster falling inside the wall; the man we see, while walking on a foggy night, is only a tree stump; the article we have corrected half a dozen times in proof, when finally printed has still four or five typographical errors. In a sense, of course, it is not the observation that is wrong. We did have the conscious experience of hearing a mouse, seeing a man, and reading correctly spelled words. But we do not stop there; and as soon as it becomes necessary to fit these experiences into a more elaborate situation, they become conflicting. We walk nearer the supposed man, and presently he no longer looks like a man but like a stump. If we have any doubts left, we can feel

the stump, or try to talk to it. We conclude, finally, that we must call our first observation an 'illusion.' The same thing happens in the case of a mirage: the traveler 'sees' the oasis definitely enough; but his later experiences convince him that it does not conform to the requirements of being a 'real' oasis — he walks toward it and does not get any nearer, and finally it disappears, both of which characteristics do not apply to 'real objects.' Now, and this is often overlooked, *as* illusions and mirages the experiences in question may be 'real' enough, and as such they must be taken into account. But they are not 'real' in the ordinary sense of the term: they do not meet requirements we have come to expect of 'objects'; they do not fit into a structure of meaning possibilities that seems to be not wholly dependent on our own individual experience. The only intelligible explanation for this conflict seems to be that all observation involves an automatic and nearly instantaneous interpretation, an interpretation that we may not be in the least conscious of. And, since an interpretation is involved, it follows that any observation at all *may* be mistaken, that is that it may not turn out to signify the meanings that we expected of it.

It must be insisted that this is apparently true of any observation whatever. Scientists often argue that observed experiments in laboratories are indisputable 'facts,' and cannot be denied. But we can analyze any scientific experiment in just the same way that we analyzed the experience of seeing or hearing a mouse. What does the scientist observe? He may say that he has, for example, observed the variations in the resistance of a certain coil to an electric current under given changing conditions. But has he seen or heard or touched this 'resistance' or this 'electric current' or even this 'coil' (which is probably concealed under many layers of in-

sulation)? Of course not. He has been watching certain needles move across certain numbered scales, and he has interpreted the numbers and movements in his own way. And even the observation of the moving needles, as we have seen, involves an elaborate interpretation on the basis of related past events. A 'fact' is distinguished from other observations only because its interpretation is so generally accredited.

(ii) *The changing character of what we observe.* The second consideration which seems to make this analysis of observation necessary is based on the changes in what we observe. This is related to 'errors,' but has even wider implications.

We are forced from many points of view to conclude that the world of familiar experience, in spite of its appearance of stability and definiteness, is yet not the same for all persons, nor for the same person at different times. Since this will be discussed later, in other connections, we need mention here only one or two of the more obvious arguments leading to this conclusion. A first is founded on the study of infant psychology. This is evidently indirect, for none of us knows just what the experience of a baby is like. A baby will, for example, reach for a bright object that it sees. But, when the baby is very young, it will reach in the same way whether the object is near enough to be well within its grasp, or some distance away. It is natural to suppose from this that the baby has only the most chaotic idea of *space;* that the baby's world is not arranged spatially the way ours is. Moreover, a baby will not associate the size, color, texture, and weight of objects as we do; and in general, its world seems to be what William James has called "a blooming, buzzing confusion" — a confusion at least from our point of view.

We do not have to rely, however, on the somewhat

risky reconstructions from the conduct of babies. We can reach the same conclusions from a reflective examination of our own more developed experience. When, for example, we hear a complicated symphony for the first time it is likely to sound like a confused jumble of music. When we get to know it better, after we have studied it perhaps, and hear it again, we shall recognize definite themes and melodies related together in an intelligible manner. Though it may be the same group of phonograph records that we are playing, we shall actually be 'hearing' something different. The same thing is true of the experience of looking at a painting: at first sight we may 'see' nothing of the careful pyramidal composition that has been used by the artist; and when we do work it out, the whole quality of the painting for us will be profoundly modified. What is of additional interest is that, once we recognize the themes or the composition, we can never get back to the original experience, or anything like it: we shall always hear or see in the new way. Another experience of the same sort occurs frequently: a man has lived all his life within sight of a group of hills, without noticing anything strange about them; if one day a friend points out that a certain hill looks just like a man (or an animal of some kind or a sugar loaf, or whatever it may be), and if the first man can bring himself to 'see' the resemblance, he will very probably never be able *not* to see it in the future. Again, an Easterner in the West for the first time will usually, because of the clarity of the atmosphere, misjudge greatly all distances. He will 'see' a range of mountains about three miles away, and will discover his mistake only when he has ridden many times the distance to reach them. But when he has grown accustomed to this, he will then and forever after, 'see' the mountains at twenty miles. The pictures in Sunday Supplements, in which you are supposed to 'find' two

squirrels are more obvious examples: at first, though you look carefully at the picture from every point of view, you see nothing of them; when they are found, you cannot prevent yourself from seeing them. Hearing a foreign and unknown language provides additional curious testimony: to an American speaking only American, other languages, such as French and Italian, sound extremely fast, jumbled, elided, and careless. A Frenchman or Italian, however, will so characterize the speech of an American, and thinks his own language graceful, clear, and easy, with each sound exactly differentiated. History suggests even more extraordinary instances of these changes in what we observe. There is reason to believe that today we actually see the stars as farther away from us, than they were seen in Greece or medieval Europe. And astronomers have testified that they *see* the sun as a sphere rather than as the disc that most of us see.

These examples could be multiplied endlessly. Once again, the only intelligible explanation seems to be that observation, any observation, includes complex automatic interpretation.

(2) **Interpretation.** In the last section it has been shown how there is interpretation in all observation, however elementary. But interpretation, starting with observation, may go on more or less deliberately, in what has been referred to as an advancing or forward direction. And in most problems that come up, this forward interpretation is the only one in question. We accept the results of observation as *signs*, and concern ourselves with the elucidation of the meanings they stand for. The interpretation involved in observation and the more deliberate interpretation *from* observation are thus not to be thought of as exactly the same process: not only is the first 'unconscious' and automatic, but only after a complicated and indirect analysis do we conclude that it

has taken place; the second, on the other hand, is always at least partly deliberate and conscious, is subject to control, and is an activity familiar to anyone whether or not he has studied its characteristics. Let us take a simple example.

A physician is called to visit a patient, and after a brief, routine examination, has observed a group of symptoms, $x, y, z \ldots$ (a flushed face, a fever of 102°, a pulse ten beats above normal, a sore throat, a headache, loss of appetite, listlessness, etc.). Taking the observed symptoms as signs, his job is to diagnose from them the disease from which the patient is suffering, that is to clarify the meaning of these signs. Now what we call influenza is a combination of the symptoms $x, y, z \ldots$ with certain other symptoms $a, b, c \ldots$ (including, for instance, the continuance of this or an even higher fever for several days, certain intestinal disturbances, often certain congestions in the lungs, etc.). If in the physician's experience, actual and imagined, $x, y, z \ldots$ had been invariably connected with $a, b, c \ldots$, his diagnosis of influenza might be so prompt as to be swallowed up in the initial observations; and he could say "you have influenza" as confidently as, under other circumstances, he might have said, "I see a mouse."

Unfortunately the physician's problem is seldom this clear cut. $x, y, z \ldots$ can signify other meanings besides influenza: e.g. they are sometimes connected with $d, e, f \ldots$ (the diminution or absence of reflex action, the subsidence of the fever in a day or so, subsequent paralysis of certain muscles, etc.), in a new combination that we call poliomyelitis (infantile paralysis). And they may be symptoms of still other diseases. The fact that $x, y, z \ldots$ (the observed signs, or symptoms) may signify any of several meanings raises serious difficulties. Influenza, paralysis, or the other diseases may any one of them

be the correct interpretation; and until we have further grounds for choosing among them, they must all be regarded as rival *hypotheses*, none as yet established.

In some cases *a*, *b*, *c* . . . and *d*, *e*, *f* . . . are directly observable symptoms, and the physician can merely wait for one or the other set to appear, whereupon one hypothesis is verified and the other discarded. If, for instance, the patient develops paralysis of the leg muscles in a few days, the poliomyelitis hypothesis will be fairly certainly upheld. No lengthy process of reasoning would be necessary, and we should not need to treat 'rational elaboration' as a separate part of the thinking process. But, in the present example, this would be most disadvantageous from the point of view of the patient, since the treatments for influenza and paralysis are usually different. There is obviously much to be gained by deciding at once between the hypotheses, on the basis if possible of what has already been observed, and thus anticipating through reasoning the conjectural future observations.

Indeed, without a certain amount of rational analysis, it would probably be impossible to verify any hypothesis by observation. Because we should not know what to look for. If poliomyelitis did not occur to the physician as a possibility, he would never think of trying to verify it by testing the reflex actions of his patient. As a conscientious and competent physician he will observe a great many symptoms before coming to his conclusions; but reasoning (and imagination) are necessary in knowing what observations are *relevant*. The religion of the patient or his income or his political prejudices would not help him decide between the hypotheses; but the patient's age (if he were adult, it would probably not be paralysis), his previous diseases, and such more general conditions as the presence of an epidemic of one of the diseases in the community, clearly would.

The necessity for rational elaboration before verification can be possible is even more evident in the advanced stages of the sciences. When an abstract law is formulated in physics the physicist must reason long and carefully before he knows what experimental results (what possible observations) might be expected if the law were true. One of the great difficulties with the theories of relativity physics is that mathematical physicists have been able to figure out so few experiments by which they could be tested. Moreover, there are other problems in which rational elaboration takes the place of empirical verification, as in demonstrating a theorem in 'pure' mathematics, or (with certain modifications) in reasoning about values.

(3) **Rational Elaboration.** Rational elaboration carries on, more coherently and systematically, the process of interpretation. It is the activity usually referred to when we speak of 'reasoning'; but we should not think of reasoning as marked off in any magical way from the rest of our activities. We have been tracing its development from observation and elementary interpretation. Reasoning may be thought of as arising when habitual or so called 'instinctive' responses are unable to meet some situation with which we are confronted. It is our habit, let us say, to put our watch on the bureau every night before going to bed, and to pick it up again in the morning while dressing, without ever thinking about it. If one morning it were not on the bureau we might begin looking everywhere about the room and other rooms until we happened, perhaps, to find it (trial and error method). On the other hand, the strangeness of the situation (not seeing the watch in its customary place) might shock us into reasoning: instead of looking at once, we might do some of the looking in imagination (that is, we might reason); remembering how late we had gone to bed the

night before might suggest that we had left the watch on the chair with the suit we had taken off; or, remembering that the watch had been slow lately might suggest that we had taken it to the jewellers. Eugenio Rignano defines reasoning as "nothing else . . . than a *series of operations or experiments simply thought of*," or, we might add, of possible future observations anticipated imaginatively. Rignano gives the following illustrations of his definition:

I mislay my umbrella, and ask myself whether I have not left it in one of the places where I had to stop this morning. But I recollect that it has not ceased raining the whole morning, so at once reason thus: it is impossible that I returned home without my umbrella; otherwise I should have been drenched; which did not happen, as I had no need to change my clothes.

Here my reasoning consists solely in the fact that I imagine myself running through the street in the rain without an umbrella. This experience, occurring in thought alone, results, as I already know, in a certain state of my clothes (drenched clothes), which is different from what was actually the case.[1]

It was a similar process of reasoning that led Galileo, before he had recourse to experimental verification, to 'prove' that the velocities of two falling bodies, contrary to the Aristotelian doctrine which prevailed up till then, do not depend on the respective weights of these bodies at all. This reasoning was essentially the performance in thought only of *the experiment which served him afterwards for an actual verification.* The experiment consisted in finding a body double the weight of another and dropping these two bodies together from the same height. "*I pictured to myself*," he tells, "two bodies of equal mass and weight *such as two bricks*, falling from the same height at the same moment. It is obvious that these two bodies will descend with the same velocity, that is to say with the velocity assigned to them by nature. If this velocity had to be increased by some other body, the latter must necessarily move with a greater velocity. But, *if the bricks are imagined falling*

[1] *The Psychology of Reasoning*, p. 72.

united and attached to each other, which of the two will it be that, by adding its impetus to the other, is able to double the velocity of the other, since this velocity cannot be increased by the supervention of another body if the latter does not move with a greater velocity? From this it must be granted that the union of the two bricks does not alter their primitive velocity." [1]

Of course, as we get more adept at handling signs of different orders the necessity for actual pictorial imaginings gradually disappears. If a South African native knew that whiskey cost three skins a bottle, and he wanted seven bottles, he would probably have to count out the skins three by three. We can get the result in one mental operation because we know the multiplication table. But whoever invented the multiplication table had to do the actual counting out mentally.

These examples will suggest two considerable advantages that reasoning has over actual experimenting: First, reasoning is usually quicker, simpler, and often safer. The last characteristic is especially important since some experiments, such as suicide or murder, are irrevocable; hence it is well to rehearse mentally their probable results before attempting to carry them out. In the second place, reasoning has a more general demonstrative value than experiments and is more 'fruitful,' since it reveals relations, which actual experimenting (at least if unaccompanied by reasoning) would not do. An experiment tells us something about itself alone. Only reasoning will tell us how the results of that experiment may be expected to apply to other similar experiments. A proposition from Euclid may be expected to apply in theory to any triangle; actual measurement applies only to the one measured.

These, and other, advantages of reasoning over experimenting are impressive and important. But the

[1] *Ibid.*, pp. 75–6.

dangers in not checking up our reasoning, to which we shall return in Chapter V, are no less evident; and we may well give heed to Francis Bacon when he writes, "God forbid that we should give out a dream of our own imagination for a pattern of the world . . ."

Let us consider two concrete situations that might call for a certain amount of rational elaboration: (1) "There is a corpse"; (2) "Oh, how I'd like to marry Belinda!" In knowing these situations to begin with, we shall already have interpreted them in various ways. In the case of the first, we shall have concluded that it is a corpse rather than a stuffed mummy or an hallucination; of the second, that Belinda is of a certain sex, age, appearance, character that offer possibilities which give a certain meaning to marriage. But a more rigorous analysis of the meanings of the situations may be required.

In analyzing any situation, we can discover it to have (as in the example of the physician's diagnosis) an indefinitely large number of *properties* — that is, meanings which the situation, taken as a sign, legitimately signifies. Any one of these properties, or any group of them, may be *abstracted*, may be considered apart from the one concrete situation as a whole. Meeting a dog, we may consider the property of having four legs apart from the situation of seeing this particular dog. When a property is thus abstracted, light is thrown on a number of its relations which would without this emphasis be obscured; and these now discerned relations may in their turn throw fresh light on the original situation.

Let *a* stand for the original situation.

Let *b* stand for the property that we have abstracted from it.

Let *c* stand for some other property or situation which is in some way associated with *b*.

If, then, we judge *a* to have the property *b* (the judgment might be nearly instantaneous, or might come only after a searching analysis); and if we judge *b* to be a sign of *c;* we may infer that *a*, also, is in some sense a sign of *c*. Let us apply this to our first concrete situation:

Let *a* be the corpse that we see.

Let *b* be the property of having certain distinctive bruises and discolorations, which our examination has convinced us may be asserted of the corpse.

Let *c* be a situation supposedly signified by *b:* e.g., that a murderer has been at work.

Here are three *terms* in our argument. To begin with, we are maintaining two *propositions* about the relations that hold among them: (*p*) that the corpse has the property of having these bruises and discolorations (*a* is a sign of *b*); (*q*) that these indicate that a murderer has been at work (*b* is a sign of *c*). From *p* and *q* a third proposition is inferred: (*r*) that the corpse indicates that a murderer has been at work (*a* is a sign of *c*). Propositions *p* and *q* are the materials out of which the argument is built, and are called *premises*. Proposition *r*, which we infer by using propositions *p* and *q*, is called the *conclusion*.[1]

Of course, any actual process of reasoning is not likely to be as simple as this; and, in fact, the conclusion reached in this example might have been drawn so rapidly that we should not have distinguished the steps in the reasoning. Ordinarily we are not content to stop at a single conclusion. Having reasoned to the conclusion *r*,

[1] In traditional logic it is customary to use the letters S, M, and P for *a*, *b*, and *c* respectively. S, the subject of the conclusion, is called the *minor term;* P, the predicate of the conclusion, is called the *major term;* M, the term that forms the link between the two, is called the *middle term.* It is also customary to distinguish between the two premises: proposition *p*, which contains the minor term, is called the *minor premise;* proposition *q*, which contains the major term, is called the *major premise.*

we might extend the process, perhaps in some such way as the following. We might treat *c*, the situation now arrived at, as a new starting point; and from it we might abstract some one property, let us say its moral aspect, its wrongness (*d*). This in turn would call up the idea of justifiable punishment (*e*). As before, these connections might be expressed as logically related propositions leading to some such conclusion as, "The murderer who has been at work here ought to be punished."

It will be noted that one of the premises implicit in this second argument ("Where a murderer has been at work wrong has been done") is a different kind of proposition from the major premise in the first argument ("The bruises indicate that a murderer has been at work"). The proposition asserting a connection between *b* and *c* is a *factual* or *descriptive* one, since what it asserts is an actual connection between certain marks on a dead body and the work of a murderer. The proposition introducing *d* as its predicate, on the other hand, is a *normative* or *evaluative* one. What is maintained is not an actual connection, but an *ideal* relation often not carried out in actual affairs; the wrongness of murder makes it fitting that the murderer should be punished, whether he actually is or not.

Probably no arguments are wholly factual or wholly normative, but they may be predominantly one or the other. The above argument as it started out was factual, and then became normative. The reasoning that might be carried on from the second situation given above ("Oh, how I'd like to marry Belinda!") would no doubt be both factual and normative. The factual elements would include a survey of the best methods of bringing about the marriage and the likelihood of their success, together with a calculation of their effects — expense in money and time, loss of solitude, etc. The normative arguments would attempt to judge the goods of marriage

as balanced against the goods that might, as a result of marriage, be lost.

(4) **Verification.** Wherever it is possible, verification of the conclusions may be considered a last step in the reasoning process as it has here been outlined. In factual problems verification, however difficult it may be, at least will usually have a definite meaning. We can find the murderer and make him confess, or an eyewitness and make him tell what he saw. However, no verification is absolute; some doubt will always be left: the murderer may be lying, or the eyewitness mistaken in what he thinks he saw. Moreover, as has already been noted, there are certain supposedly factual problems in which it is extremely difficult to know what kind of evidence would constitute verification. A possible example of such a situation is shown in the so-called Fitzgerald Contraction, a theory which was formerly used to explain certain anomalies in physics. According to this theory all observed lengths contract in proportion to their velocity relative to the observer. But apparently this contraction could not be measured in any usual sense, since any measuring instrument would also contract a corresponding amount. This suggests an important corollary: even in factual problems, verification is possible only when we are agreed on the *kind* of evidence which *might* constitute verification. The history of science shows how necessary it is to keep this in mind. For instance, many of the same experiments that were once supposed to prove the theory of phlogiston in chemistry were later used to disprove it, after rational elaboration had suggested new hypotheses about the constitution of matter.

In problems in pure mathematics, verification lies entirely in the rational elaboration from given undefined terms and postulates. It would be absurd to appeal to observation or experiment to prove the binomial theorem.

Moreover, in predominantly normative (moral and esthetic) problems verification loses much of its meaning for a somewhat different reason. For here the truth in the situation is partly, though not wholly, made by the very process of reasoning. To return to the example already given, and ask, "Which do I really want, Belinda or solitude?" If on rationally elaborating the problem I conclude that solitude is better, and then apply my conclusion by actually giving up Belinda, there is obviously no possible experimental proof that I have or have not made the better choice. True, I may later regret my solitude, but that does not prove me wrong. Belinda might have been worse. Even if later I change my mind, marry Belinda, and thereby gain great happiness, that does not prove that I would have gained the same happiness had I married her at first. Perhaps the interval of absence was what decided the outcome. Or again, even if, after giving up Belinda, I do regret my solitude, I may as a reasoning being treat this regret as a new situation to be rationally elaborated. And I may conclude that the regret is wrong, that however much I still long for Belinda, I *ought not* long for her. In other words, values are not wholly dependent on facts; and for this reason, the factual verification of value or normative problems is largely irrelevant.

3. Further Remarks About Meaning

We have seen that reasoning involves the analysis, elucidation, and structuralization of meanings. Certain aspects of experience are taken as signs, signifying certain meanings; these meanings are analyzed into constituents, and one or more of these constituents are in turn taken as signs pointing toward other meanings. There is clearly no limit to the possibilities of this process. It

may be asked, however, just why we take this particular sign as a sign of that particular meaning. Why do we interpret the property of having certain bruises as the sign of a murderer's work rather than of, say, indigestion? The answer to this is to be found in the *relatedness* of experience, and the ability of every element of experience, acting as a sign, to *mean more than itself*. Of course, in a sense, this is not an answer: that experience should be more or less coherently related is simply a fact, and cannot be accounted for except tautologously, by saying that it is the character of experience to be related. It is impossible even to imagine a completely disordered experience, since there are no terms in which it could be imagined — all our terms being a part of our experience.

From one point of view, experience is ceaselessly changing; but meanings within experience present relatively static aspects, and are *associated* in various ways. Through these associations, certain elements in a present conscious situation are recognized as 'identical with' or related to elements in past conscious situations. We are enabled to say: "This is the same house I saw yesterday," or, "A certain similarity to past experiences suggests that this is a gun." These associations lead on to others: if it is the same house, we shall expect to find in it the same rooms and the same people; if we are right about the alleged gun, we shall expect it to behave like a gun (e.g., we shall expect other elements in future experiences to be related as they have been in past experiences of 'guns' — if we load it and pull the trigger, we shall expect it to fire). Most corpses displaying a certain type of bruise have been the work of murderers; presumably this one is also.

We have already seen that even the simplest observation ("I hear a mouse") presupposes such association,

that without it experience would be impossible. If consciousness were merely the passive recording of what went on in some mysterious way outside of it, it would be like a needle recording on a chart the variations in the electrical output of a generator. From the standpoint of the electrician the curve traced by the needle may have all kinds of meanings, symmetries and harmonies; but for the needle there is only the one point where it happens to be. Consciousness on the contrary overlaps itself in all sorts of ways: its more direct meanings are related variously to an indefinite variety of meanings. The psychological basis of these relations is studied as the so-called laws of association. It would be foolish, however, to suppose that we could ever know *all* the laws of association. Not only are they far too complex, but the articulate knowledge of them would itself alter them.[1]

Though we shall never know what associations led Einstein to his equations or Gerard Manley Hopkins to his metaphors, a very little reflection discloses many types of association constantly at work. Putting a nickel in the subway turnstile has always enabled us to go through, and we therefore suppose that it will this time. Turning the switch has always made the light go on, and we suppose that it will continue to do so; we are so sure of it that we speak of 'turning on the light' instead of 'turning the switch.' The similarity between spatial arrangements in a present experience and those of a past remembered

[1] The interested reader may again be referred to any standard textbook of psychology. The laws are sometimes grouped under such headings as: (1) frequency of past association; (2) similarity and contrast; (3) spatio-temporal continuity and contiguity; (4) emotional congruity; (5) functional relatedness; (6) vividness of past association. The beginnings of the study of the *physiological* basis of association have been made in this century under the leadership of Dr. I. P. Pavlov, whose chief book, *Conditioned Reflexes*, may also be consulted in this connection.

experience make us believe we are in the same place and observing the same objects. Seeing one color reminds us of other colors; a hot summer day of a cold winter day. If we are sad over something that happened today, we may remember something otherwise entirely different that happened when we were sad once before. All these types of association are classified variously by psychologists. Without entering into their intricacies, we shall conclude the discussion of association with two general observations.

(1) **The importance of the context.** In trying to discover the type of association involved by any situation it is necessary to take into account, so far as is possible, the whole relevant context. When the physician is interpreting the observed symptoms in his patient, not merely what he 'sees' is important in conditioning his interpretation (diagnosis), but also such facts as the presence of an epidemic in the neighborhood, the medical history of the patient, etc. When events succeed each other in an extraordinary fashion, apparently violating 'physical laws' — as when, for instance, we get in a taxi from one part of town to another without seeming to cross all the intervening streets; or when we watch a young lady on the stage apparently rising from the floor — though we should recognize these experiences as real enough in their way, we should in interpreting them remember that in the one case we were drunk and in the other witnessing the performance of a 'magician.' Moreover, an essential element of 'the whole relevant context' will always be our interests, activities, and attitudes. For the physician, the patient's symptoms will signify some disease or other; for an enemy of the patient, perhaps an ugly disposition; for a friend, perhaps an emotion, sorrow or despair. A 'cure' achieved by bathing in the waters at a Saint's Shrine may signify for a religious person a miracle, the

kindly personal intervention of God in natural events; for some psychologist, it may signify a striking example of the efficacy of the 'subconscious' in controlling bodily states; for a physiologist, the complex reactions between the chemical constituents of an external solution and the chemical constituents of the human body. A gun may be a suitable wall decoration for a retired sportsman, a weapon for a soldier, or a new kind of toy for a small child. When a scientist is endeavoring to prove a favorite hypothesis, he is very likely to fail to associate those meanings which might tend to discredit it.

(2) **Structural association.** The analysis of the type of association operating in any conscious situation is evidently of great importance in understanding the meanings which are signified. But it must be further remarked that our primary interest is not in the *psychological basis* of association, not in, that is to say, the hidden *causes* that are efficacious in conditioning our interpretations. Or rather, let us say, we are interested in these causes only so that we may bring them to light, become actively conscious of them, become *critical toward* them, because then we are able, to some extent at least, to *control* them. Attainment of this control is the object of the critical and conscious structures of mathematics, logic, and science. On the basis of 'automatic' and 'unconscious' association we come to expect that when we turn the switch the room will be illuminated. This expectation may in certain eventualities be disappointed: we may turn the switch and nothing else may happen. Such an outcome will momentarily shock 'common sense,' but we shall quickly fit it into a hypothetical structure and no longer find it anomalous, for this structure will take account of the fact that the connection between turning the switch and illumination, though usual enough to be firmly relied on, is not at all necessary. For, in accepting the hypo-

thetical structure, we accept the assumption that some cause, discovered or undiscovered — perhaps a burnt out fuse or a broken filament — will account for the unexpected outcome. The aim of the structures of mathematics, logic, and science is to estimate the validity of the types of relatedness that are encountered in experience. It should be clear that if the automatic associations were not first operating, we should never formulate the conscious structures. We should never reach the idea of logically and mathematically necessary relations unless they were suggested and assured by the general character of experience; but once we have reached them they in their turn are seen to be definitive of experience, and we interpret the meanings of any situation in their light.

Certain of these remarks about association may be rephrased in terms of the sign-meaning relationship as follows.

(1) Anything may, as the context changes, be either a *sign* that signifies, or a *meaning* that is signified. For instance: the *word* 'chair' as I write it is a sign signifying to me the chair in which I am sitting. But in a new context which includes the wish for 'physical' analysis, the chair I am sitting in is a sign signifying a more abstractly analyzed notion of a certain 'physical object,' with certain properties such as hardness, color, weight, and spatial relations; this preliminary notion of a physical object, in a still more complex context, becomes itself a sign signifying as meaning an aggregate of very small particles possessed only of a few occult properties such as mass and impenetrability arranged in a certain spatial and temporal order and acted upon by certain forces; and this too may become a sign signifying certain quantum transitions functioning according to very complex mathematical equations in a spatio-temporal continuum.

Again: the *name* Austin is a sign signifying to me a certain person, a friend of mine (the meaning); but the notion of the friend may now become a sign signifying a certain evening spent in his company; and the notion of that evening may become a sign signifying another person whom I happened to meet during it; and the memory of this second person may become a sign signifying the second person's *name*, Arthur.

(2) The sign-meaning relationship is *reversible*, when certain shifts in context occur. The *word* 'tree' signifies a certain object in the natural world that I am acquainted with; but the *sight* of an actual tree might in turn signify the *word*. To a behaviorist, a conscious experience of pain might signify certain internal and external bodily movements; but if we were to observe similar bodily movements in another person, they in their turn would signify that other person's conscious experience of pain.

(3) In considering meanings, three aspects may be distinguished.

(i) *Cognitive:* the meanings signified, for example, by a restaurant menu, a guide-book, scientific laws and experiments, stock quotations. The essential characteristic of cognitive meanings is, as we shall see more fully in the next chapter, that they can be significantly declared *true* or *false*. These meanings may also be called *propositional*. In their communicative aspect they may be thought of as *conveying information*.

(ii) *Emotive:* the meanings signified by most religious ritual, much poetry, the observation of pain in a conscious being, such statements as "I love you," "The damned fool!" etc., are primarily emotive in character.

(iii) *Directive:* the meanings signified by a red stop light, a railway signal, a shout of "Look out!" a sign, "Dangerous Curve Ahead," etc., are primarily directive: they prompt to action.

Of course each of these three enters into *all* meanings. The point is one of emphasis. "Look out!" may on analysis be seen to convey the information that a car is rapidly approaching; but a pedestrian whose attention is on this rather than on the directive aspect (including the act of jumping back) may end in the hospital. A poem may give information about a sunflower or a landscape; but people who try to learn about sunflowers and landscapes from poems soon give up poetry. A stock circular may tell something about an oil field; but its primary meaning is directive — to get customers to buy stock — as purchasers of the stock may afterwards discover, to their sorrow. "I love you" undoubtedly gives information; but a suitor who puts much faith in the apparent information it gives may later find himself married to a most unsuitable wife.

The profound importance of recognizing this threefold division is due to the fact that almost everyone confuses these three kinds of meaning. This has already been pointed out in the examples listed in the preceding paragraph. But these are relatively trivial. In one way or another, the confusion is a chief cause lying back of the failure to appreciate poetry, the alleged opposition between religion and science, the misuse of propaganda in wartime. Propaganda *seems* to be giving information, but actually its meanings are almost entirely emotive and directive. There is a tendency to recognize this at the present day, but the recognition brings in another falsification: it is said that this emotive and directive aspect is evil, and that we should consider war only in the light of the 'facts' — that is, of the information involved. But it is surely permissible to believe that it is at least as good for a nation to go to war to sustain certain emotional attitudes as to recover debts or get land. The critical attitude insists merely that one should know which

kind of end one is fighting for. This is allied to the mistake of those philosophers who believe that all meanings can be reduced to cognitive ones that can be treated in logical propositions. For certain purposes it is undoubtedly true that only the cognitive aspects of meaning should be considered (in science, for example), but that does not mean that the emotive and directive aspects are any the less 'real' or valuable.

We shall return to these distinctions when discussing words in the next chapter.

(4) The same sign may have different meanings for different persons, or for the same person at different times. This has already been made clear in treating 'the importance of the context.' As a further example, we may consider the meaning of the moon to an astronomer and to a lover; or the sight of food to a man hungry and the same man just fed. But we may make an even more general statement: that signs will, in all probability, never have exactly the same meanings for different people or for the same person at different times. For two astronomers, the moon may have as a sign meanings very closely allied, but their associations will not be in all respects identical, simply because they are two different persons; the sight of the food to a man hungry today and the same man hungry tomorrow will have meanings somewhat changed simply by the intervening time, during which new associations have been built up.

(5) Different signs may 'mean the same thing.' A red traffic light, a policeman's raised hand, the letters 'S–T–O–P' on a signpost may all mean to the motorist *stop*. Though, as we may readily see from (4), there will be only a relative sameness — that is, only certain aspects will be the same: if the motorist had just committed a traffic violation some of the meanings would be changed from those attached ordinarily to these signs;

if the motorist were a communist the red light would signify meanings he would not share with a motorist who was an electrician.

4. The Mental Aspect of Meaning: What is an Idea?

There is an ambiguity in the use of the word 'idea' which has already been suggested (in the discussion of the two meanings of 'thinking,' and of structural association), but which, because of its importance, we shall approach once again, more explicitly.

(1) In one use of the word 'idea' a mental event is referred to. It (say our idea of a tree which we are not at present observing) can be analyzed psychologically as a compound of: a remembered visual awareness of a tree; a vague emotion; a tendency to do something; a tendency to say the word 'tree'; the remembered sound of the word 'tree'; etc. Or an indirectly related analysis can be carried on physiologically (behavioristically), and the idea can be considered a compound of certain physical events occurring: in the optical centers of the brain (the remembered visual awareness); in the viscera (the vague emotion); in certain muscles (tendency to do); in the larynx (tendency to say); in the auditory centers (remembered sound); etc.

Dissociations of this kind may help to clarify our notions of the thinking process. But it should be noted that we need not be and almost never are conscious of these ingredients of an idea as ingredients. We discover them only after an *ex post facto* abstract analysis. Without them the idea would be different, just as without salt cake would be different. But we don't taste the salt in the cake. Cake is not simply a sum of salt, flour, milk, eggs, butter, and sugar (though without these things it

would not be): it is also *cake*. Nor is an idea simply a sum of its psychological or physiological ingredients. In fact, we can never analyze an idea as it actually occurs in experience, but only afterwards, when it is isolated and treated (by other ideas) as a *meaning*. For this reason, these analyses of the psychological or physiological *basis* of ideas are likely to be misleading, particularly because the words used in them have many irrelevant and confusing associations of their own.

We are using 'idea' in this sense, as a 'mental event,' when we say "a succession of ideas," or "His ideas are his own property," or "His ideas come slowly." We may note further about these 'mental events' that they are continuously changing and never repeated. My present idea of a tree is a different mental event from my idea of a tree two minutes ago. My ideas succeed themselves at all sorts of speeds in every direction, with constantly varying emotional accompaniments and overtones.

(2) But the word 'idea' is also used to refer to a *meaning*, as when we say for instance, "His ideas are logical." The dangers hidden in a confusion between these two uses of the word 'idea' ('idea as mental event' and 'idea as meaning') are brought sharply to focus in some of the philosophic doctrines of 'idealism.' These start out by saying (or unconsciously assuming) that "All we know are ideas." If 'ideas' is used broadly enough to cover both uses this is in a sense true — though it is not a very important thing to say, since it amounts to "All we know is what we know." But a little later the doctrine, forgetting the original broad use of 'idea,' reasons as if the statement that "All we know are mental events" has been established. This latter statement is certainly *not* true; and the chief reason why some philosophers think that it is true seems to rest on this ambiguity in the use of the word 'idea.' The differences in the two uses of

'idea' is brought out by considerations such as the following:

(i) We can never do more than guess (more or less adequately) a person's 'ideas' in the first sense. Just what mental events are occurring within another person's experience is not capable of direct investigation. On the other hand, we can often verify a person's 'ideas' in the second sense: he *means* a house or a tree or a plan of action. If someone telephones and asks me to lend him a volume of Shakespeare I shall never know exactly what mental events, thoughts, emotions, feelings lie back of the request. But that I have understood his meaning will be demonstrated if I turn over to him the right book.

(ii) Mental events, as we have seen, change continuously. Meanings can be relatively static; they need not change in the same way nor anything like so rapidly. When we are 'thinking about making money' our *thinking* changes its shape in every conceivable manner, but there remains a fairly stable reference: we are thinking about *making money*, not about committing mayhem. Thinking about 'that house' may bring in innumerably complicated associations; but the meaning 'that house' keeps at least relatively constant.

(iii) So far as we can judge (but see (i) above) the mental events called 'thinking about that house' vary from person to person. There are different degrees of visual and auditory imagery, kinesthetic, laryngeal, visceral feelings. But the meaning 'that house' can be sufficiently the same for two people, as will be demonstrated by their ability for example to find their way to it after being told its location.

(iv) Analysis in terms of mental events is conspicuously inadequate in the case of such meanings as 'infinity,' 'eternity,' 'very high numbers,' 'divinity,' 'justice,' etc. Recognizing this inadequacy leads some people to con-

clude that these notions have no meaning; but this is only another way of saying that they have a special kind of meaning. They certainly have *some* kind of meaning, and criticism should attempt to discover just what it is, and how it is distinguished from 'concrete' and 'perceptual' meanings. When we demonstrate a geometrical theorem about *any* triangle, it is clear that we can never have a mental 'image' of 'any triangle,' yet 'any triangle' is referred to by the proof. But this inadequacy extends even to our notions of concrete 'things.' We 'mean' a *complete* person or desk or tennis ball, yet the analysis of mental events does not show adequately anything corresponding to such meanings.

5. The Objectification of Meaning

The whole of the experience of any one person is different from that of every other person; that difference makes him one person rather than another. Certain aspects of experience, however, are shared as signs signifying more or less similar meanings — though how much of the meaning in any given case will be similar is difficult if not impossible to tell. The red traffic light is turned on and all the motorists on the street stop their cars. In spite of all the individual and private meanings connected with their various experiences, the fact that they have all shared at least some elements of the experience of seeing a red light and that that has acted as a sign signifying meanings at least in some respects similar is evidenced by their all stopping.

Communication is possible because certain aspects of experience can be shared as signs. Some one in a theater shouts, "Fire!" and the whole audience rushes toward the exits. The sound of the word has become a sign signifying to each of the audience a complex experience, similar

enough for each so that he acts in more or less the same way as his neighbors. A sign, such as the word 'fire,' which *communicates meanings* is called a *symbol.* A group of symbols organized to communicate meanings on a complex scale is called a '*language.*'

From one point of view all signs communicate meanings — within the experience of a single person they are linking together past, present, and future meanings. But when we speak of a symbol we refer only to those signs which communicate (or may communicate) meanings from one person to another. The development of signs into symbols goes on for the most part quite automatically. A baby has an experience of what it will later know as a 'dog.' This first experience includes many potentially separable elements such as certain visual awarenesses, certain smells, certain tactual sensations, auditory sensations (the bark), a bite on the hand accompanied with pain and emotions of fear, etc. Later on any one of these elements may become a sign signifying all the rest; and the sight of the dog makes the baby keep its hands out of reach; or the bark alone may make the baby tremble with the fear that is part of the total experience signified by the bark acting as sign. Still later an imitation of the bark by an elder brother may become a sign signifying the total experience and may cause the same emotional response; the imitation of the bark has become a symbol. Such 'natural symbols' presuppose, clearly, shared experiences among those for whom they are effective.

Very few symbol situations are as simple as this one. The varied trains of associations (in the history of the individual or of mankind) quickly become too complex for analysis, and we have symbols so distantly related to what they mean that they may be called conventional. Such, for example, is the sound of the word 'dog' or the sight of the letters 'd-o-g' on a page, which may serve

as conventional symbols signifying the whole complex dog-experience. Of course this does not mean that we shall have the whole meaning 'in mind' whenever we use the word 'dog' — the whole meaning is, rather, *potentially* signified by the conventional symbol. And the remarkable result is that when we have developed a facility for handling conventional symbols we can reach conclusions about the total meanings they stand for, even though throughout the whole process our attention has been fastened only on the symbols themselves. Indeed this, as we have seen, is what happens whenever we 'reason anything out,' or apply the results of mathematical calculation to a practical problem, as in the case of the ship's cargo (p. 31). Moreover it should be noticed that, though we can sometimes trace the development of conventional symbols from natural symbols — onomatopœic words such as 'buzz' and 'grunt,' and many ordinary gestures would be examples — the sign-meaning relationship is often quite arbitrary. In developed stages of languages (in the individual sciences and in mathematics, for instance) symbols may be selected for no other reason than that the situation calls for the conventional representation of a newly isolated meaning, as in the case of many of the words added to physics during this century. It should be remembered that everything which has been said about signs will apply also to symbols; and particularly that the meaning of the symbol is variable and depends on the whole context in which it appears. For many purposes of exact reasoning it is important, as we shall see, that the meaning of a symbol shall remain fixed throughout the reasoning process; but this is an ideal impossible of attainment. It is most nearly approached in mathematics, though there only at the expense of a degree of abstraction that makes questionable the application of mathematical reasoning to any other than mathematical experience.

The languages formed by a related group of symbols are not necessarily verbal. In conversation often much more is communicated by gestures, changes of facial expression, slight movements, than by the words that are used. A clasp of the hand may communicate an emotion far better than a dozen speeches. And each of the fine arts communicates unique (in this case, primarily *reflexive*) meanings through its own symbols. Mathematics has a highly individualized symbol system, communicating its own proper (mathematical) meanings. Not to recognize these differences in languages and the qualitative uniqueness of the meanings each language is able to communicate is to isolate oneself from many of the possibilities of experience.

It is with words — verbal language — however, that we are to be chiefly concerned. And, for Western mankind at any rate, words have an advantage over all other symbols by their greater flexibility and comprehensiveness: they can refer to more kinds of meanings than any other symbols we have. Our civilization, our thoughts, our feelings, our actions, are dependent on words to such an extent that words seem at times our most essential possession. But unfortunately the dangers in the misuse of words increase as fast as or faster than the advantages in using them correctly.

CHAPTER III

LOGICAL MEANING

1. The Two Uses of Language

The meanings of all words are variable. We may, if we wish, imagine words standing for clear, definite, and precise meanings that can be exactly communicated; but we can never be sure we have found them. Reality is infinitely diverse, and cannot be thus delimited. We know this already: for a word, taken as a sound or as a pattern of black lines on a page, is a sign whose meaning, in the broadest sense, includes everything associated with it. These associations will never be in all respects identical for two persons, simply because they are two different persons; nor for the same person at two different times, simply because of what has happened during the time intervening.

But words are not merely accidental signs; they are symbols, and we have defined symbols as signs which communicate. That part of the meaning of a sign which is or can be communicated or shared is *objective;* and so far as it is objective, may be treated apart from the idiosyncracies of individual associations. This use of 'objective' must be carefully distinguished from the way 'objective' is ordinarily used. When people speak of 'objective reality' at the present time they are usually referring to the 'physical world,' the meanings studied by the natural sciences — particularly by physics: my thoughts and feelings and desires are 'subjective'; that chair and tree, or at least the electrons and quantum transitions that make them up, are 'objective.' The word

is to be used in a sense which is, theoretically at least, much wider: any meanings are objective *so far as they can be shared.* We may note at once two characteristics of objectivity that have been implicit in the preceding discussion:

(1) That some meanings are in some way objective is tacitly assumed by all conversation, argument, or by any social endeavor such as business, politics, games, or any form of coöperation. We shall accept this assumption without any attempt to establish its validity. Just what meanings or aspects of meanings are objective is, however, quite another question, one far too complex for adequate treatment in an elementary study. We may say, therefore, that the meaning of a symbol or set of symbols is objective by definition; but in any given case we shall not hope to be entirely clear about what the objective meaning is.

(2) Objectivity is at least partly a matter of degree. Here again we must avoid associations from the ordinary use of 'objectivity,' which explains objectivity in terms of a physical world existing apart from experience, which we all know. That we all share somehow some kind of a common reality no one can seriously and consistently doubt; but it is quite possibly ineffable, and in any case we should not prejudice our judgment about its nature. Using objectivity as herein defined, the physical world's objectivity is clearly variable: the baby, a painter, a physicist, an astronomer, a Bushman, a stockbroker, a beetle, an eagle, an amœba obviously do not share the same objective physical meanings. The objectivity of other kinds of meaning likewise varies. The growth of friendship or love from casual acquaintance strikingly illustrates one kind of developing objectivity: more and more meanings are shared, and can be communicated, often, by fewer and fewer symbols. Perhaps the most

dramatic examples of developed objectivity are to be found in the great religions, in which the accumulated experience of millions of individuals and hundreds of generations has become objectified not only within the lives of their members, but outwardly through prayers, ritual, religious symbols of all kinds, and elaborate dogma.

The degree of objectivity depends on what was called in the last chapter 'structural association.' The meanings of any realm of discourse fit into some sort of structure, exact or inexact, readily or with difficulty communicable; and by understanding the realm of discourse within which a symbol is being employed, we are better able to understand that symbol's objective meaning through its relations to the other meanings of the realm in question — indeed, these relations in a sense *are* its meaning. Of course we need not be conscious of the realm of discourse in which the symbol appears: these structures have been built up through the history of mankind, and we absorb them from our education and our environment in general. The realm of discourse in which we ordinarily speak, write, and act is the common-sense world. Its structure is loose and incoherent, but it is sufficient to enable symbols to become conventional enough for usual purposes. Take, for instance, the three words 'scalds,' 'guts,' 'plumber.' These will have private associations for everyone, particularly for those who have been scalded or been operated on for appendicitis or kept house, but they have also common, accepted, *objective* meanings for all users: sufficiently objective so that we should know where to look in the telephone book if a pipe burst or what to tell the doctor if the cook had had an accident. The symbols are to this extent logical: that apart from the manifold and largely accidental meanings they have for different persons and in different circumstances, they signify an *invariant*

residuum of meaning. They have become, in a sense, formulas.

The more rigid and coherent the structure of a realm of discourse, the more invariant and conventional are the meanings of the symbols it employs. This is exactly what happens in each of the special sciences. In ordinary speech 'resistance,' 'elasticity,' 'work' are symbols with a certain degree of objectivity but also signs with all kinds of loose and individual meanings; in mechanics the objectivity is far more precise, and a physicist will know with a fair degree of certainty the meaning of a brother physicist who uses them. The meanings symbolized in mathematics are, from this point of view, the most objective of all. They are objective not because of the number of people who share them, but because those who *do* share them are all absolutely agreed what their meaning is *so long as it is a question of mathematical meaning alone.* That is, no mathematician would conceivably disagree that 2 plus 3 equalled 5; though he might easily disagree on how mathematical meanings should be applied to other meanings (whether, for instance, the equations of relativity physics are applicable to certain optical phenomena). Two mathematicians might have very different intellectual and emotional associations connected with the binomial theorem; the external context in which the binomial theorem was referred to might change immeasurably — a mathematician might have indigestion or be in Chicago or live in a cellar or have a temperature of 106°; but all of these would be irrelevant to the mathematical meaning of the binomial theorem, which would remain invariant.

The *logical use of language* finds its ideal in just this: the formation of a set of symbols of such a nature that, granted the realm of discourse in question, each symbol will adequately communicate an invariant and conven-

tional meaning no matter what the external context. Mathematics may be thought to have approximated this ideal. But it does so only by handling meanings so abstract that its realm of discourse is severely limited. There is some reason to believe that such limitation must take place as language becomes more logical.[1]

The attainment of objectivity may, however, take place in another manner, by what we shall here call the *poetic use of language*. Poetry (the term here includes much more than what would be printed or recited as 'poetry') takes words ordinarily having conventional objective meanings, and by forcing them into a new and independent structure objectifies fresh meanings. For instance, when Flamineo, in the last act of Webster's *The White Devil*, pretends to be shot, he cries:

> O I smell soote,
> Most stinking soote, the chimneis a-fire,
> My liver's purboil'd like scotch holly-bread;
> There's a plumber laying pipes in my guts, it scalds;
> Wilt thou out-live mee?

'Plumber,' 'guts,' 'scalds' are apparently the same words that we have just noticed; but they are different symbols: they are referring to more than the meanings that they would have in ordinary discourse. They are *metaphors* in that they forcibly connect up meanings not linked together in the realms of discourse that govern our familiar experience. All words are partly metaphorical, since their meanings join qualities, properties, relations, etc. that can be separated by analysis; but we call them metaphors only when their synthesis of meanings is fresh and unusual. The history of words shows how metaphors gradually stiffen into conventional meanings — any page

[1] In this connection it is interesting to compare the meanings of certain logical relations (e.g. 'implication') in, for instance, Whitehead and Russell's *Principia Mathematica*, with their more usual meanings.

of the *Oxford Dictionary* provides illustrations; but most words in most uses are dead metaphors. It is the business of poetry to objectify new meanings —

> At the violet hour, when the eyes and back
> Turn upward from the desk, when the human engine waits
> Like a taxi throbbing waiting,
> I Teresias, though blind, throbbing between two lives,
> Old man with wrinkled female breasts, can see
> At the violet hour. . . .[1]

Here the most commonplace words, through various poetic maneuvers, have been fitted into a structure that makes them new and startling symbols.

We shall return to the poetic use of language in Chapter XII, and go on now with the logical use of language. Whatever may be our final judgment of their relative values, the poetic use is ordinarily not fitted to argument, reasoning, or many 'practical' ends because the objectification it achieves holds only for the particular poem before us. We must have an instrument whose orderliness, if humbler, is on a wider scale.

2. Terms

The logical use of language takes as its units of meaning either *terms* (in traditional logic) or *propositions* (in modern logic). In the first case we consider terms as units which can be built up into propositions; in the second, propositions as units which can be split up into terms. Superficially it would seem to be indifferent which we chose, though from some points of view it is not; at any rate we shall avoid the argument, and begin with a discussion of terms.

A *term* is an invariant meaning, considered apart from any assertion or denial made about it, established by con-

[1] T. S. Eliot, *The Waste Land.*

vention as belonging to some word or group of words or technical symbol derived from words. Most of what is involved by this will be clear from the preceding section. Logical language tries to get rid of the vagueness necessarily attached to our ordinary use of words, not by actually dispelling all private associations (which is impossible) nor by fixing the meaning freshly each time (as poetry does), but *by definition:* i.e., by legislating a distinction between those meanings of a word which shall logically belong to it in each of its uses, and all other meanings which, though they will always be turning up, are by the definition declared not part of the word's logical meaning. Meanings thus established are called terms.

The so-called Law of Identity, '*a* is *a*' — ignoring the metaphysical implications that some schools of philosophers attach to it — may be regarded as an abbreviated way of summing up the first postulate of a logic which sets out to reduce meanings to relations between terms. It may then be restated: "A *term* is self-identical"; or, "Any term (for which *a* or some other written or spoken symbol may stand) should be kept invariant." This is a theoretic ideal of logical discourse. Though it is obviously both impossible and unnecessary to keep a term self-identical throughout all uses of it (it would be more correct to say, "Obviously we can't be sure that we are dealing with the same term," since in theory at least, the term *is* invariant), it is very important to keep our terms as invariant as we can throughout the course of a discussion that intends to be logical.

(1) A term is not a word, and must be distinguished from words: words are symbols which stand for terms. For logical purposes *dog*, *chien*, *Hund*, and even some such group of words as "a domesticated four-legged animal that barks and is reputed to be friend to man" stand all

four for the same term: that is, in most contexts, to a person acquainted with English, French, and German, the same objective meaning would be communicated. Moreover, one word may be many terms, as in the case of 'law' (legal, physical, moral), 'board' (of directors, — and lodging, lumber, table) and most other words: in any discussion it would have to be made clear which of these references was being made.

(2) A term is not an idea 'in the mind,' not a 'mental event.' This distinction was made clear in the last chapter. A term is the meaning-aspect of an idea when it has been made definite enough to be conventionally symbolized by a word or other recognizable formula. An idea that has thus been made logical is called a *concept*, and a term is therefore the meaning-aspect of a concept.

(3) *Denotation and connotation.* There is a distinction made in logic between the denotation and the connotation of a term. It is a distinction fairly clear on the surface, but obscure if too much analyzed. Each term applies to a certain number of particulars: its range of application is its *denotation.* But each term also specifies (implies) certain qualities, properties, etc., about each of the particulars to which it applies (whereby its range is limited to those particulars rather than to others); and what it specifies or implies is its *connotation.* Thus: The term 'man' applies to each man that was, is, or will be, and this is its denotative aspect; and the term 'man' specifies a certain group of meanings (such as being an animal, two-legged, rational, etc.), and this specification is its connotative aspect. In other words a term may be regarded both as denoting a *class* of things (or we had better say, of *x*'s, since they need not of course be physical) and as connoting certain qualities or properties. There is evidently a very intimate relation between the denotative and connotative aspects of a term, for by virtue of the

qualities that are specified as belonging to it, the possible *x*'s to which it can refer are limited.

It is by virtue of these limitations, which the *specified meanings* of a term impose on its *range of application*, that we can distinguish between what is and what is not a member of any given class. Thus, 'vehicle' means "that in or on which any person or thing may be carried, esp. on land" (Webster's Dictionary), and consequently denotes a very large number and variety of *x*'s indifferently. But 'bicycle,' since it is a special kind of vehicle, connotes all the qualities connoted by 'vehicle' and more besides: it means a vehicle with also the special properties of having two wheels one behind the other and of being propelled by revolving pedals. These additional connotations make the denotation of 'bicycle' more limited than the denotation of 'vehicle,' for whereas all *x*'s that are bicycles are also vehicles, we can point to many *x*'s that are vehicles but, lacking the additional characteristics, not bicycles. In general, when two terms *a* and *b* are related in such a way that *a* connotes all that *b* connotes and more besides, *a* is *subsumed under b:* that is, the class of *x*'s that *a* denotes is included within the class of *x*'s that *b* denotes. For even if in the actual world there happen to be no *x*'s that are '*b* and at the same time not *a*,' still so far as additional meaningful characteristics have been ascribed to *a*, it is *logically possible* that some of the *x*'s which are *b* should lack those additional characteristics; logically possible, therefore, that there should be *x*'s which are '*b* but not *a*.' In this strictly logical sense, then, it is a characteristic of terms which are subsumptively related that their connotation and denotation vary inversely (though not, of course, in any mathematical ratio). This leads to the somewhat paradoxical corollary that according to the specificity of its connotation a class may have (i) many members ('man'), (ii) a single member ('the

twenty-eighth President of the United States'), (iii) no members at all with respect to the realm of discourse to which it belongs ('griffon,' with respect to the physical world; 'round square' with respect to the realm of mathematical possibility), or (iv) all possible members that have meaning for a given realm of discourse ('odd or even numbers' with respect to the system of rational integers). A class like (iii) is called a *null class;* a class like (iv), a *universal class.*

It should be noted that this technical way in which logic uses the words 'denotation' and 'connotation' is very different from their more familiar use. In everyday speech, the denotation of a word is its primary (or sometimes its publicly accepted) meaning; the connotation, its secondary meaning (or sometimes its private associations) for this or that person. This latter distinction holds for words, not for terms; and is valid, therefore, outside of the abstract realm of discourse that we have defined logic to be.

3. Definition

Strictly speaking, the definition of terms other than those employed within logic itself is an application rather than a part of logic. Nevertheless, since in this book we are not dealing with logic *in vacuo*, it seems natural to take up definition at this point. If our actual terms were like the ideal term *a* we should not need to worry about definition. But they are not; and the effort of definition is to decide as exactly as possible what objective meaning will be attached to some definiendum (a word or the equivalent of a word) either always or throughout some discussion. It is sometimes said that definition seeks to determine *the* meaning of a word. This is nonsense, for the meaning of a word is whatever it happens to be. Definition seeks rather to decide what we shall accept the

meaning as being; that is to say, it marks off as clearly as possible the term which the definiendum is declared to signify.

(1) **Verbal definition.** The chief function of verbal definition is to establish different signs which will be accepted as the same symbol. This is how we learn a foreign language: 'dog' is 'chien.' This, however, does not help to make clear the objective meaning of a symbol since it assumes that the meaning is known already. It nevertheless is very important. Not only do we learn foreign languages by it, but a change in signs may make symbols much easier to handle, as when the Arabic system of handling numbers was substituted for the Roman.

This also is a very dangerous method of definition, because the sign substitution may wrongly be supposed to clarify terms. Thus: We give a verbal definition of 'soul' — "the soul is a psychic entity" — and then demonstrate the immortality of the soul on the grounds of the non-destructibility of psychic entities. Or: We verbally define the 'good' as 'that which we desire,' and then demonstrate that nothing is good except what people happen at any given time to desire.

It may be stated as a rule that a verbal definition is neither true nor false, and no conclusions may be drawn from it. It is a device of expository convenience.

(2) **Denotative or illustrative definition.** For many practical purposes this is the best and it is probably also the most usual method of definition. It is, as we have seen, the way we learn our terms — through the method of 'pointing at' or 'giving examples.' "What is a horse?" "That's a horse, and that's a horse, and that's a horse, but that's a mule." "What is gravity?" "Gravity is what makes the apples fall in autumn and the elevator drop to the bottom of the shaft when the cable breaks." "What is justice?" "Justice is when you pay your debts and

don't try to cheat people and don't tell lies about your competitors and don't think people are guilty of crimes just because their politics and religion are different from yours." It may be remarked that when discussing such terms as justice, art, and beauty, clarity is often more likely to be gained in this way than through abstract formalities alone.

Nevertheless, for logical purposes there are serious objections to this method of definition. In the first place it is likely to be too arbitrary and disordered, as we can notice in for instance a business man's notion of what acts are just. But further, the ability to point to many objects as so-and-so (horses) seems to imply somehow a logically (not of course psychologically) prior principle in accordance with which the pointing is done. Or at least if such a principle were made articulate it would help to fit the meaning of the term into a coherent structure. Socrates was fond of pointing out this difficulty:

Soc. . . . By the gods, Meno, be generous, and tell me what you say that virtue is; for I shall be truly delighted to find that I have been mistaken, and that you and Gorgias do really have this knowledge; although I have been just saying that I have never found anybody who had.

Meno. There will be no difficulty, Socrates, in answering your question. Let us take first the virtue of a man — he should know how to administer the state, and in the administration of it to benefit his friends and harm his enemies, he must also be careful not to suffer himself. A woman's virtue, if you wish to know about that, may also be easily described: her duty is to order her house, and keep what is indoors, and obey her husband. Every age, every condition of life, young or old, male or female, bond or free, has a different virtue: there are virtues numberless, and no lack of definitions of them; for virtue is relative to the actions and ages of each of us in all that we do. And the same may be said of vice, Socrates.

Soc. How fortunate I am, Meno! When I ask you for one

virtue, you present me with a swarm of them, which are in your keeping. Suppose that I carry on the figure of the swarm, and ask of you, What is the nature of the bee? and you answer that there are many kinds of bees, and I reply: But do bees differ as bees, because there are many and different kinds of them; or are they not rather to be distinguished by some other quality, as for example beauty, size or shape? How would you answer me?

Meno. I should answer that bees do not differ from one another, as bees.

Soc. And if I went on to say: That is what I desire to know, Meno; tell me what is the quality in which they do not differ, but are all alike . . .[1]

(3) **Definition per genus et differentiam.** (Also called *connotative* or *Aristotelian* definition.) What Socrates has asked Meno to give him, in short, is a definition that by fixing the logical connotation of the definiendum (in this case the word 'virtue') will make its denotation less arbitrary than is likely to be the case when the definition is nothing more than pointing to one example after another. Such definition is made possible by the nature of the subsumptive relation. It consists in declaring (i) some relevant larger class under which the definiendum may be subsumed (the *genus*), and (ii) the additional characteristics which differentiate the definiendum from other members of the larger class (the *differentia*). Thus, a dog is a mammal; but it is differentiated from other mammals by being easily domesticated, four-legged, barking, belonging to the family of digitigrade Carnivora, etc. Other rough examples of this method of definition would be:

'Planet': astronomical body (*genus*) moving around the center of gravity of the solar system (*differentia*).

'Trolley': public vehicle (G) run by electricity derived from an overhead wire (D).

[1] Plato, *Meno*, tr. Jowett, 71D–72C.

'Automobile': vehicle (G) propelled by a self-contained power unit (D) (it will be observed that this definition is really contained in the word 'automobile' itself).

'Baby': human being (G) very young (D).

Through definitions *per genus et differentiam* we can give an objective order to the meanings of our terms. Many rules are given to aid in this method of definition — such as that the differentia should give the 'essence' of the term to be defined, and that the principle of division (*fundamentum divisionis*) of classification should be the same throughout the process of defining a set of terms — but we need not go into them. The general purpose is clear. It should be noticed that when we define in this way it is assumed that the meaning of the genus and differentia by which we define is already known — an assumption not made in denotative definition.

(4) **Quantitative and mathematical definition.** Mathematics and modern science do not ordinarily make use of the subsumptive relation, and therefore do not ordinarily define *per genus et differentiam*. Position in space, for example, is defined with reference to some system of coördinate axes; its 'definition' consists merely in a group of numbers expressing its relations along these axes. A rational number would not be defined by subsumption under some other number, but, if a definition were called for, as occupying a certain determinate position in the number series, or as the sum or quotient or product of other numbers. This method, which consists in the restriction of the possible connotations of a term to its mathematical properties, is one of the distinctive characteristics of modern science. Many terms are thus treated as aggregates of a certain number of arbitrarily chosen units: as when chemical compounds are studied quantitatively; or when the resistance of a coil of wire is determined as being so many 'ohms,' or a man (from

certain points of view) so many 'grams,' or work so many 'foot-pounds.' The importance of the shift in methods of defining from (3) to (4), from a hierarchy of classes to a system of mathematical relations, which was one aspect of the great cultural shift that occurred at the Renaissance, can hardly be exaggerated, for it involves a change in the whole way of viewing reality. This will be brought out indirectly in Chapter V, and more specifically in Chapters VII and VIII, in the discussion of science.

Definition, then, sets out to establish what shall be the conventionally accepted objective meaning of a symbol. Definitions which are non-verbal and non-denotative do this by pointing out the relations of this meaning with other meanings, and for logical purposes, the totality of the relations *is* the meaning desired. Definition is thus 'circular' by nature; we can avoid circularity in any single realm of discourse, as we have seen, by taking certain terms as undefined; but since realms of discourse are not absolute, in the long run they will be circular whatever we do. Aristotelian definition is suitable for logical purposes because (almost in spite of itself) it consists in just this study of the relations of meanings with each other. It is, however, limited because it tends to reduce all relations to subsumption, or the subject-predicate relation. By sufficient distortion this may be theoretically possible; but many terms are better defined through other relations.

No definition is final; it is good and adequate if it emphasizes relations and distinctions sufficient to the matter in hand. For most people a telephone is sufficiently defined by a brief description of its appearance and function; but the definition of an employee of the telephone company must be more exact and elaborate. A motorist does not need a better definition of gasoline than "a liquid made from petroleum that makes your car go and

can be bought at filling stations"; but a chemist interested in developing new processes of refining has to have a more complex definition, which will include, for instance, the chemical formula. Neither is the 'right' or 'true' definition; the *word* gasoline is two different *symbols*, one for the motorist and one for the chemist, and there are two different though related objective meanings. A 'chair' is a piece of furniture designed to be sat upon; and it is ridiculous for a physicist to tell me that it is *really* a bundle of electrons; for my purposes the word 'chair' is correctly defined as something to sit on; for certain of the physicist's purposes it is important that the word 'chair' be another symbol referring to another meaning (the electrons). These two meanings may very well be related; but we cannot conclude that one is right and the other wrong unless we understand the situation that is to be clarified by the definition: certainly on most occasions my definition rather than the physicist's is preferable.

Logicians give certain rules characterizing valid definitions. It is not necessary to take these too seriously, but it will be useful to review briefly a few of them:

(i) A definition should be based on important rather than on trivial or irrelevant characteristics. As we have seen, importance and relevance depend on the purpose of the definition; but they should not be judged too superficially. 'Man' might be defined as a mammal with relatively less hair or fur than other mammals, but there would be few occasions on which this distinction would be worth noting.

(ii) A definition should not be narrower in application than what is being defined. Examples of the violation of this rule would be: "A politician is a member of Congress"; "Reality is physical."

(iii) A definition should not be wider in application than what is being defined. Examples of the violation

of this rule would be: "A politician is a person interested in public affairs"; "Algebra is a science dealing with abstract relations."

(iv) A definition should not contain the word (or words) to be defined, nor their mere verbal equivalents or opposites. This rules out verbal definitions, as discussed above: "Physics is a science which studies physical phenomena"; "Life is the sum-total of the forces that resist death."

(v) A definition should not be expressed in obscure or figurative language. This rule holds pretty well in logical discussions, though on other occasions there may be something gained by a judiciously figurative use of language. At any rate it is manifestly dangerous to support arguments on such supposed definitions as: "Knowledge is power"; "God is our Father"; "The world is a machine."

(vi) A definition should not be negative where it can be affirmative. Examples of the violation of this rule would be: "Mind is that which is immaterial"; "A point is that which has no parts and no magnitude." The reason for this rule is due to the fact that when we define say 'baldness' as 'no hair,' from a theoretical logical standpoint 'no hair' can refer to anything at all except hair — including *having* big teeth or two legs. But actually in such cases we always take for granted the more specific reference; and particularly when a term is negative in meaning it may often be profitably defined negatively. This rule seems to be a special case of rule (iii); a negative definition is bad when its application as we understand it — not simply its verbal application — is too wide.

4. Ambiguity

The purpose of definition is to make our terms sufficiently clear: that is, to avoid ambiguity. In fact, many

logicians state as a rule that no terms in an argument are to be used ambiguously. Unfortunately, due to the limitations of human nature, this is a rule that can never be followed. The difficulty is clearly recognized by Professor Ralph M. Eaton (in this passage 'equivocation' means an ambiguous use of words):

> Logicians have seldom given the attention to equivocation that it deserves. Its philosophical interest is profound. They have thought that it arises from the careless — or intentional — use of language in double senses, and from this alone. The name 'equivocation' is in fact more suited to the rhetorical than the logical aspect of these *confused meanings*. Confused meanings are not amenable to the principles of logic; yet it is impossible by the very nature of facts to avoid confusions of meaning; for the actual world is a place of twilight zones, of the passage of opposites into opposites, where the sharp distinctions necessary to logic are blurred. Mr. A. N. Whitehead has remarked that as soon as we become perfectly clear about what we mean, we can be sure that some very important point has been left out. Confusion of meaning does not arise alone from the misuse of words; this is one of its minor sources. It is forced upon us by reality itself; we can never be absolutely certain that a concrete truth has been caught in the net of our logic.[1]

Now from a theoretic point of view terms are never ambiguous, because they are by definition the communicated objective meaning of symbols. But whenever we leave the theoretic term '*a*' and use some actual term, the chance of confusion is present. Ambiguity is therefore not strictly a logical but a *verbal* difficulty: it results because of the fact that we can never be sure just what meaning a given word is supposed to stand for.

Ambiguity should be distinguished from *vagueness*. All words are more or less vague, but the vagueness may be

[1] *General Logic*, pp. 101–2.

unimportant. For instance, if I am crossing a street and someone shouts 'Look out!' the shout is vague because it might be directing me to take any of a number of actions. But ordinarily all that is necessary is that I pay a little extra attention to my movements. However, a situation might arise when I should have to make some one particular movement to avoid being hit — to jump backwards rather than forwards — and the vagueness of 'Look out!' would have become ambiguous, and the result of the ambiguity might put me in the hospital. Ambiguity arises when the communicated meanings of a word (or words) are not as clear as the situation demands. If someone asked, "What was he doing?" I might answer vaguely, "Holding something in his hand," and be correct enough; in a murder trial the verdict might depend on whether that 'something' had been a gun or a fountain pen.

Though we cannot avoid ambiguity completely, we can reduce it by careful definition, and by recognizing types of ambiguity that frequently appear. When recognized, we can take measures to counteract them. The following examples of different types of ambiguity, though by no means exhaustive, will point out the leading dangers:

(1) Simple ambiguity, caused by the fact that one word is many symbols. ". . . but I have also observed certain laws established in nature by God . . ." [1] The ambiguity here rests on the use of the word 'law,' a confusion between a 'physical law' and the 'law of the land.' The law of the land is established and enforced by political authority; but, without very painstaking analysis, there is no reason to suppose that what we *call* 'physical laws' are 'established' in any usual sense by any one. The same ambiguity is found when we speak of 'obeying the law of

[1] Descartes, *Discourse on Method.*

gravitation.' Puns are often examples of this type of ambiguity.

(2) The confusion of 'relative' and 'absolute' terms. "The hypothesis of evolution is wrong because it is admitted even by its supporters to be not absolutely proved; therefore let us accept the account of creation given in *Genesis*." This argument is ambiguous because in factual matters 'wrong' is a relative term expressing the degree of probability; considered solely from a factual point of view *Genesis* may be even more wrong. The same ambiguity would be found in arguing that the country as a whole is more prosperous now than thirty years ago because the average salary is twice as high: perhaps the change in what money can buy has more than made up for the difference in amount of money.

(3) The confusion of the collective use of a class word with its distributive use. This gives rise to the fallacies traditionally called: (i) The Fallacy of Composition. "Every member of the team is a star player, and therefore it is a star team." "Each person's good is his own happiness; therefore the good of society as a whole is the greatest happiness of the greatest number"; (ii) The Fallacy of Division. "The country has accepted Prohibition, which means that most people in the country have accepted it." "Water *is* H_2O."

(4) The acceptance, because of the deceptive verbal form, of a term in a less modified form than is intended. "Never tell a lie." But there are some occasions, as doctors or guests at a dull party realize, when this generality does not apply — nor, indeed, is it meant to. Almost all general statements, maxims, 'saws' are subject to this ambiguity if they are taken 'literally.'

(5) The confusion due to the curiosities of grammar. "No cat has nine tails; one cat has one more tail than no cat; therefore one cat has ten tails." What are known in

traditional logic as 'false obversion' and 'false conversion' are usually examples of this ambiguity, as for instance to interpret "None but the industrious deserve to succeed" as equivalent to "All who are industrious deserve to succeed" and thence draw the conclusion that because a man is industrious he necessarily deserves to succeed.

(6) An abstract meaning taken as if concrete, sometimes known as *hypostatization*. This leads to remarks about abstractions which would apply only to the sort of things that we can see, touch, taste, etc. Most of the arguments about the existence of the ether, force, inertia, electrons involve this ambiguity: these certainly do not exist in exactly the same way that tables or trees or houses exist, and the meaning of 'existence' must be reformulated to apply to them. The debates in philosophy over 'the reality of universals' such as 'man,' 'house,' 'tree,' are additional examples.

(7) Confusions arising from a new situation that requires the dissociation of meanings that have formerly been unanalyzed within the meaning of a term. In the Middle Ages 'up' and 'down' had apparently each a clear and definite meaning. After Copernicus suggested that the earth might be considered as revolving, the meanings of these terms became ambiguous, because it then seemed that what was up now was down twelve hours later. Or again, physicists were unable to work out the primary law of physics known as "the Conservation of Energy" until two separate meanings — 'Force' and 'Energy' — which had both been included within the meaning of 'Force,' were dissociated. This same type of ambiguity lurks in the usual supposition that excellence in a work of art is necessarily connected with the work of art's ability to 'stand the test of time.'

(8) The introduction of unexamined assumptions into the meaning of a word or of a question. When the latter,

we get what may be called the fallacy of double question: nineteenth century physicists asked, "What is the velocity of the earth through space?" unconsciously assuming an affirmative answer to the prior question, "Does the earth have a velocity through space?" — a question which contemporary physicists believe to be meaningless. The first question is said to *beg* the second question.

When such assumptions are read into the meaning of a word we get a *question-begging epithet.* Thus, if someone declares that "Every effect has a cause," his use of the word 'effect' prejudges or begs the question at issue, since effect gets a meaning only as correlative to cause.

(9) Confusion concerning the direction of an argument; concerning what is to be proved. This is sometimes known as *ignoratio elenchi*, or irrelevant conclusion. If the prosecuting attorney undertook to prove that the only fit punishment for so foul and hideous a murder was death, when the real issue was whether the defendant had actually committed the perhaps admittedly foul and hideous murder, this ambiguity would be involved. Many theological arguments seem to be of this sort: as when the presence of evil in the world is made palatable by stating that a good and just God permits it, when the question may well be whether or not there is a good and just God.

(10) Confusions due to shifts in the verbal context. Thus, if the publicity manager of a play quotes a dramatic critic as having written "populace ought to rise up and see this play" when the critic had actually written, "An enraged populace ought to rise up and see this play run out of town," he is exploiting the possibilities of this type of ambiguity. Familiar lines of poetry quoted out of their poetic surroundings are often thus ambiguous. We use "a custom / More honour'd in the breach than the observance" to refer to a (good) custom that is more frequently broken than observed; whereas in *Hamlet* it

refers to a custom that ought to be suspended, that would be better honored if it were suspended.

(11) Relational ambiguity. In ancient Greece this type of ambiguity gave rise to several much discussed paradoxes. One of the simplest of them was the so-called 'paradox of the heap,' which consisted of asking a person whether one grain of sand made a heap of sand, to which he of course replied no; whether a thousand did, to which he replied yes; and then asking at what point between one and a thousand the grains of sand *begin* to constitute a heap. To this last question no answer other than a purely arbitrary one can be given, and the notion of a 'heap of sand' was therefore felt to be self-contradictory. The contradiction is resolved, however, if a distinction is recognized between the relation of contradictories ('heap' vs. 'not-heap'), which is the only one the paradox takes account of, and the relation of degree ('more or less' of a heap) which this way of analyzing the heap would demand.

Several of the famous paradoxes of Zeno were due to similar confusions. For example, Zeno argued that when an arrow appears to be travelling through the air it is not really moving; for motion would imply travelling from one spatial point to another (or as Zeno said, from where it is to where it is not), but this condition can never be realized, since at every moment of time the arrow is where it is and not somewhere else. In other words, there is no moment at which the arrow is travelling from one point to another, since at each moment it is at some one particular point; that is to say, it is at rest at that point. There are several possible ways of attacking this fallacy, though all of them would consist in defining in one way or another the relational ambiguity involved. One could, for example, distinguish between the continuity of space and time, which is presupposed in our ordinary conception of

motion, and the discrete parts into which we break both space and time, when we have occasion to talk merely about points and instants without including the intervals that actually must always exist between them. Any type of analysis, if pressed too far, will lead to paradox. Or again, even if we accept the analysis of time as an infinite collection of instants and space as an infinite collection of points, it is still possible to avoid the paradox, by distinguishing between (i) motion, defined by a *one-one correlation* between a series of discrete points and a series of discrete instants, (ii) rest, defined by a *one-many relation* between a single point and two, therefore an infinite number of, discrete instants, (iii) the simple relation between a single point and a single instant, which is what Zeno has postulated of the flying arrow and which, since it is a situation common to both (i) and (ii), defines specifically neither motion nor rest.

Other examples of this ambiguity would be: confusion between transitive and non-transitive relations (these terms will be defined in the next chapter), such as when one concludes that because *a* is similar to *b*, *b* to *c*, *c* to *d*, . . . *n*, therefore *a* is similar to *n;* confusion between the relation of continuity and the relation of identity as in the argument that mathematics and logic must be identical because no sharp line can be drawn between them; or confusion, more generally, between the uses of a strict logical methodology and the problems (such as esthetic and many practical problems) where it is inapplicable or misleading.

(12) Confusions due to shifts in general (implicit and contextual) reference. This type of ambiguity is frequently made use of in plays and novels as 'dramatic irony.' For example, when Macbeth tells his wife, "Duncan comes here tonight," and Lady Macbeth asks, "And when goes hence?" the superficially ordinary ques-

tion, a natural one for a hostess expecting a guest, is given an ambiguous significance because Macbeth, his wife, and the audience know that Duncan's murder is being prepared for that night. In literature this is a legitimate and often most effective device, but in logical discussion, where it tends to take the form of a confusion between realms of discourse, it leads to trouble. A critic might say, "This picture is all right, but it has no meaning," failing to recognize that he is probably looking for the wrong kind of meaning. Again, scientists often confuse the notion of 'observer' in the context of modern physics, where the term is merely defining a reference point for measurement, with 'observer' in its more usual, non-scientific context, where it means a person who is actively conscious of something.

(13) Confusion due to unjustified emotive trappings. Many words and word-groups normally carry with them a good deal of emotive suggestiveness. There is no great harm in this ordinarily; but often the emotive suggestions combine with ambiguity to debauch an argument that should be kept clear. Even a fairly sober account of social and economic conditions in Russia published with the title *The Red Trade Menace* will not always be rated on its factual merits. A judge and jury may not be as unprejudiced as theoretic ideals require when defendants widely known as 'Reds' and 'Atheists' are before them. 'Atrocities' committed by the 'Enemy' are not likely to be closely investigated. In Wall Street language, the 'constructive element' is those speculators working to send stocks higher (the bulls), though a careful economist might at times feel that stocks were too high for the welfare of business.

There is nothing final in such a classification of ambiguities. An ambiguity may often be classified under any

of several types. But this grouping will serve to emphasize some of the problems encountered when we attempt to handle words exactly.

5. Propositions

The objections to taking the term as the unit of logical meaning emerge from a study of definition and ambiguity. In the first place, words are ambiguous; when a word appears alone we never know how it is being used, that is we cannot be sure what term it is standing for. Even when the word is joined to other words ambiguity remains, but it is decreased. The word 'law' is very ambiguous indeed by itself; it is less ambiguous when we write 'physical law'; it is still less ambiguous when we write, "The physical law of the refraction of light is proved by the following series of experiments." In the last case we can be fairly certain about what kind of 'law' we are talking. But furthermore, no term *does* have a meaning in isolation. Its meaning can be discovered only through its relations to other terms. It is therefore preferable to take as our unit of logical meaning something which will express a relation between terms, which is, roughly, the function of a proposition.

If the proposition is to be the unit of meaning it clearly must be undefined within logic itself, and it is therefore taken in propositional logic as an undefined or primitive unit of meaning. We can, however, make some effort to clarify what is being talked about when we use the word 'proposition.'

Miss Stebbing, in *A Modern Introduction to Logic*, says that a proposition is "anything that is believed, disbelieved, doubted, or supposed." Or again, we might say, a proposition is the kind of meaning that can be significantly affirmed or denied; the kind of meaning to which

'true' and 'false' are directly relevant. A term does not fulfill any of these conditions: 'water' or 'fire' by themselves cannot be either affirmed or denied. But "Water runs uphill" or "Fire burns" do fulfill these conditions: under ordinary circumstances the first is *false*, the second *true*. The point is not whether in any particular case a proposition is true or false; but that in any particular case it would make some sense to call it true or false.

Every sentence has meaning, not as being the natural means by which a physical faculty is realized, but, as we have said, by convention. Yet every sentence is not a proposition; only such are propositions as have in them either truth or falsity. Thus a prayer is a sentence, but is neither true nor false.[1]

(1) It should be observed that a proposition is not the same thing as a sentence, any more than a term is the same thing as a word. "The dog barks," "Le chien aboie," "Der Hund bellt" are different sentences, but for logical purposes they are the same proposition. Furthermore, many sentences are not propositions. Exclamatory sentences, short prayers and cursing are usually not propositions, though the latter two might be in a religious context. Thus, when we say to some one, "You bastard!" we are often not affirming the truth of the factual question of his legitimacy, but communicating an emotion; it would be foolish to say that the remark is true or false; rather the emotion communicated is justified or unjustified, worthy or unworthy. Similarly, when Crashaw begins his hymn to St. Theresa, "Love, thou art absolute sole Lord / Of life and death . . ." the meaning is not primarily propositional so far as the poem is concerned. There is the verbal appearance of a proposition, but the chief question is not one of truth or falsity, but how the poetic meaning fits into the esthetic structure which constitutes the

[1] Aristotle, *De Interpretatione*, IV, 17a, 1–5, tr. Edghill.

poem. Taken in another context, outside the poem, the sentence might become a proposition, and might be affirmed or denied.

Even a declarative sentence used logically is not identical with the propositional meaning it symbolizes. Grammatical changes in the structure of the sentence need not indicate corresponding logical changes in the logical structure of the proposition. "Othello strangled Desdemona" and "It was Desdemona whom Othello strangled" are grammatically two different sentences. In most contexts, however, they symbolize the same proposition, and identical inferences could be logically drawn from them: e.g., if strangling is a crime then Othello is a criminal.

(2) The proposition is not the same thing as a judgment. The judgment is an act of accepting or rejecting, in whole or in part, as certain or probable or plausible, a propositional meaning. "Marriages are made in Heaven" and "Watercress is an imperfect substitute for salad" are propositions; doubtless they represent judgments in the mind of whoever asserts them; but they may be judged, perhaps differently, by the reader or hearer as true or as false, or as true from some points of view and false from others.

(3) *The principle of significant assertion.* A proposition is supposed to assert something, and we must make sure that it really does assert something and is not merely a verbal exercise. One test of this is: if to assert a proposition means something logically, to deny it means something as well. Of course the denial may be *false;* but at least the *possibility* of significant denial must make sense. Thus, if we say "Water boils at 212° Fahrenheit," it makes sense to deny that water boils at 212°; the denial happens to be false, but we can understand what the situation would be like if it were true. If an alleged

proposition fails to meet this condition it is no true proposition, and there is doubtless a question-begging term lurking somewhere within it.

This Principle is of the greatest importance, and the failure to observe it leads to the most lamentable confusions in thinking. To illustrate such a failure we shall use an example already cited in another connection:

Many people at the present time state as an alleged proposition, "All reality is physical." Undoubtedly it has all the verbal appearance of an unequivocal proposition; moreover its supposed 'truth' or 'falsity' is argued about, often most bitterly; and those who assert it bring forward elaborate proofs by which they hope to establish its truth. It is shown, for instance, how 'the soul' is 'nothing but' the material organization of the higher nervous centers; how 'God' and 'angels' can be accounted for by glandular secretions; how 'goodness' and 'beauty' are only certain states of the 'organism' when confronted by certain arrangements of external electrons and protons. All of this makes a very imposing array indeed. But let us apply our test for significant assertion. Let us ask a materialist who states that "All reality is physical": "What would reality conceivably be like if it were not physical? how could we possibly know it or test it?" The materialist will probably reply, "That is just the point. There is no possible way of testing or knowing non-physical reality, and we may therefore conclude that the notion of non-physical reality is a dream and illusion." What has happened is just this: the methods of the physical sciences have presented the materialist with elaborate and dependable methods for checking up on reality — so elaborate and dependable that he rules out anything that cannot be checked up by them as non-real, or else devises some way of reducing it to physical terms. Either 'reality' or 'physical' is a question-begging term.

Either by 'reality' the materialist to start out with means 'physical reality' or he is using 'physical' so broadly that it means the same thing as 'reality': that is, the statement "All reality is physical" is logically equivalent either to "All physical reality is physical" or "All reality is reality." In both cases the statement is a tautology and no true proposition.

This analysis may seem over-simplified in view of the amount of debate that has gone on during the last century over this alleged proposition. The statement, it will be argued, *must* mean something if it is able to rouse such discussion. Now it should be observed that we have been speaking of propositional meaning alone. The statement "All reality is physical" unquestionably *does* mean something, and a great deal; but its meaning is not propositional. Its meaning is in large part emotive and directive, and might be paraphrased somewhat as follows: "Let's drop this superstitious nonsense about the soul and religion and abstract moral ideals and stick to the fertile methods of the physical sciences. Only by applying those methods to all problems can we secure the progress, development, and welfare of mankind." Or, on the other hand, it may be interpreted as a definition: "By reality we shall mean what can be handled by the methods of the physical sciences." If we take it as a definition there is no strictly logical objection to it; moreover it may turn out to be a useful definition, since we have to make distinctions of some kind, and this is a distinction which can be made fairly clear. But we must always be prepared to recognize that we may reject the definition when we wish to, and that on certain occasions it is advisable to do so.

Examples of the violation of the Principle might be multiplied endlessly. An understanding of it might be helped by the independent analysis of: "All great poetry is essentially moral." "The only true good is pleasure."

(4) Propositions may be classified as follows, according to the nature of the judgment involved:

(i) *Descriptive.* Descriptive propositions may also be called *factual:* that is they are statements of fact, though of course the statement need not be true. They are assertions of fact within some realm of discourse or other — not necessarily the realm of discourse we call the physical world. They are theoretically *verifiable* as either true, false, or having a certain degree of probability. "Asparagus is poisonous." "I left my umbrella at Macy's." "The velocity of light is approximately 300,000 kilometers a second." "The soul is immortal." (See Chapter V.)

(ii) *Normative.* Normative propositions are assertions of value. "It is good to have a lot of money." "That is the most beautiful painting Rembrandt ever painted." "It is bad to spend too much of your time working." Clearly such statements can be significantly affirmed or denied; they can be discussed and criticized. But, as we saw in Chapter II, they are not verifiable in the same sense that descriptive statements are verifiable, and the terms 'true' and 'false' therefore apply to them in a different manner. It will perhaps avoid confusion to regard normative propositions as 'acceptable' or 'unacceptable,' 'plausible' or not 'plausible,' 'convincing' or 'unconvincing,' rather than as 'true' or 'false.' (See Chapters VI and X.)

(iii) *Structural or a priori.* In the case of structural propositions, 'true' and 'false' have still another meaning. For their truth or falsity is derived not from any particular experience or experiences, but from the general character of experience as revealed in certain types of relations. Hence structural propositions cannot be proved or refuted by appeals to experience (as in (i)), nor are they subject to the hazards of dialectical discussion (as in (ii)); they depend wholly on the logical nature of certain relations,

which is the same for any type of experience to which the relations are relevant. Obviously they are not completely divorced from experience; if the general character of experience were different we should assert different sets of structural propositions, since those we now assert would no longer be even remotely relevant, and probably would never have occurred to us; but they are divorced from particular experiences. "$x^2 - 2xy + y^2 = (x + y)(x - y)$." "$4 + 3 = 7$." "If it is true that when p is true q is true, and when q is true r is true, it then follows that when p is true r is true." "If it is true that when p is true q is true, it then follows that when q is false p is false." (See Chapter IV.)

These three types are all genuine propositions, in which logically distinct meanings are intelligibly related to each other. Definitions, on the other hand, are not propositions, though we must make a distinction between verbal and non-verbal definitions. As was noted above, nothing can be concluded from a merely verbal definition, since it involves only a sign substitution. Even real definitions are not propositions because they are in theory only making clear the meanings already implicit in the definiendum. However, if we are willing to accept a real definition, conclusions of a sort can be drawn from it when it is combined with the proper sort of genuine proposition. If, for instance, we accept a definition of an apple as the fruit of a certain recognizable variety of tree, we might combine this with the proposition, "This is such a tree," and come to the legitimate conclusion, "Therefore its fruit, if any, are apples."

(5) The internal structure of propositions. If we analyze a proposition, we may consider that, for logical purposes, it affirms a relation between two or more terms — $a\mathrm{R}b\mathrm{R}c\mathrm{R} \ldots n$, where a, b, $c \ldots n$ represent any non-identical terms, and R the relation. Within any

proposition, however, we have a certain amount of choice about how we shall distinguish the terms; and our choice will depend on the kind of argument we wish to construct. Given, for example, the proposition, "Logic is duller than poetry." If we want to fit this into an argument together with a second proposition, "Psychology is duller than logic," we must take 'logic' and 'poetry' as the terms (*b*, *c*) and 'duller than' as the relation (R) asserted to hold between them. This relation holds between psychology (*a*) and logic as well as between logic and poetry; and since the relation is transitive (this word will be explained in the next chapter), it holds also between psychology and poetry: whence we may conclude: "Psychology is duller than poetry."

Suppose, however, that we wished to join our original proposition, "Logic is duller than poetry," to a new proposition, "All studies duller than poetry ought to be dropped from the curriculum." It will now be necessary to interpret the original proposition as having the two terms, 'logic' and 'studies duller than poetry,' and the relation between them one of class membership: that is, 'logic' belongs to the class of studies all of which are characterized by being 'duller than poetry.' The new proposition asserts universally of such studies that they should be 'dropped from the curriculum,' and we may thence conclude: "Logic should be dropped from the curriculum."

(6) Propositions of the first and second order. Propositions of the first order are the type we have just discussed in (5), that is, propositions which assert a relation between terms: "Mathematicians are wise men"; "The moon is made of green cheese." Propositions of the second order are those which assert a relation between two or more propositions of the first order: "Whenever it rains one does well to carry an umbrella"; "If he understands the

theory of relativity he is a better man than I imagined"; "If business improves it will be a good thing for the Republican Party." It should be noticed, however, that these two types are sometimes mutually translatable. Thus, "Mathematicians are wise men" becomes, translated into a proposition of the second order, "If anyone is a mathematician he must be wise."

CHAPTER IV

LOGICAL STRUCTURE

1. Relations

(A) If all Red Indians are one-eyed and if all Congressmen are Red Indians, it then follows that all Congressmen are one-eyed.

If we consider this argument it is evident that the inference it makes is not very useful, since in all probability it would never be applied: that is, no one will wish to remove the hypothetical 'if' before the first two propositions. But let us compare it with:

(B) If all mammals have lungs and if all men are mammals, it then follows that all men have lungs.

Clearly there is a great difference between (A) and (B), yet from one point of view they seem closely similar. The difference is just this: if we remove the *if*'s from (B) we have three propositions that happen to be *true;* if we remove the *if*'s from (A) we have three propositions that happen to be *false*. But *as arguments* (A) is just as good as (B). Now in the present chapter we shall be occupied not with the truth or falsity (or probability) of individual assertions, but with the *structure of arguments*, with the form of reasoning. We must therefore distinguish at the outset between truth and *validity*. Validity is a question solely of the structure of arguments, and may be treated quite apart from the truth or falsity of the assertions that make up the arguments. (A) and (B) are equally valid. The argument, "If some men are vertebrates, and if

Ghandi is a man, it then follows that Ghandi is a vertebrate," is *invalid* even though its individual parts, when asserted categorically, are true.

Logical structure is founded on certain traits belonging to *relations*. We cannot define relations, but we have been taking them for granted in discussing propositions, and we can usually recognize them. They are, however, so various that they can be variously read into any given passage. Thus, in the proposition, "Philonous is the brother of Lafcadio," Philonous stands to Lafcadio in the relation 'brother of'; if, on the other hand, 'brother of Lafcadio' is taken as a single term, Philonous stands to it in the relation 'characterized by being' or 'having the characteristic of.'

We shall not go into the many properties of relations that are discussed in books on 'symbolic logic.' But for the types of logical structure that are of particular importance in approaching philosophical problems, two classifications are important:

(1) Relations may be classified as *symmetrical*, *asymmetrical*, and *non-symmetrical*.

(i) A *symmetrical* relation is one such that if *a* bears that relation to *b*, *b* must bear the same relation to *a*. Examples would be: 'equal to'; 'unequal to'; 'brother or sister of'; 'playing cards with'; 'different from.'

(ii) An *asymmetrical* relation is one such that if *a* bears that relation to *b*, *b* cannot bear the same relation to *a*. Examples would be: 'father of'; 'greater than'; 'west of.'

(iii) A *non-symmetrical* relation is one such that if *a* bears that relation to *b*, *b* may or may not bear the same relation to *a*. Examples would be: 'brother of'; 'related to by a mathematical difference that is a factor of itself'; 'never without the co-presence of'; 'in love with.'

It is evident that the symmetricality and asymmetricality of relations enable us to draw valid inferences, while their non-symmetricality does not. Thus, if we know that *a* is playing cards with *b*, we may at once infer that *b* is playing cards with *a*; if we know that *a* is the father of *b*, we may at once infer that *b* is *not* the father of *a* (we may in fact infer that *b* stands in a *converse* relation to *a*, which as in the case of 'father of' we might know to be 'son or daughter of'); but from knowing that *a* is in love with *b* we cannot validly infer whether or not *b* is in love with *a*.

(2) Relations may be classified as *transitive*, *intransitive*, and *non-intransitive*. This classification is independent of the preceding.

(i) A *transitive* relation is one such that if *a* bears that relation to *b* and *b* bears it to *c*, *a* must bear it to *c*. Examples would be: 'ancestor of'; 'greater than'; 'equal to'; 'west of.'

(ii) An *intransitive* relation is one such that if *a* bears it to *b* and *b* bears it to *c*, *a* cannot bear it to *c*. Examples would be: 'father of'; 'greater by 3'; 'half of.'

(iii) A *non-transitive* relation is one such that if *a* bears it to *b* and *b* bears it to *c*, *a* may or may not bear it to *c*. Examples would be: 'friend of'; 'murderer of'; 'unequal to.'

It is evident that the transitivity and intransitivity of relations enable us to draw valid inferences, while their non-transitivity does not. Thus, if we know that *a* is greater than *b* and that *b* is greater than *c*, we may at once infer that *a* is greater than *c*; if we know that *a* is half of *b* and that *b* is half of *c*, we may at once infer that *a* is *not* half of *c*; but from knowing that *a* is the friend of *b* and that *b* is the friend of *c* we can draw no valid inference about whether or not *a* is the friend of *c*.

2. Relations between Propositions

We shall now consider certain important relations that can hold between propositions, whereby *simple* (first order) propositions are combined to form *compound* (second order) propositions. For convenience, we shall let p, q, r, . . . n stand for propositions. Thus, instead of writing "All material bodies gravitate" or "Caviare is a strange mete like blacke sope" or "Bison are indigenous to North America," we shall write p; whereas q, r, etc. will stand for propositions that are not identical with p nor with each other. Thus generalized as p, q, and r, we may consider the validity of relations holding among p, q, and r apart from the truth or falsity of any definite propositions which in a particular argument might take their places.

Where possible p, q, and r should be used for simple propositions; compound propositions can then be expressed as relations holding between them. We saw in the last chapter, however, that the distinction between simple and compound propositions is not always sharp.

p is any proposition considered apart from its truth or falsity. $\sim p$ will stand for the contradictory of p, for the proposition that would be got by denying p. Strictly, logic studies the validity of relations holding between propositions *if* their truth or falsity is asserted. The assertion — that a proposition is true or that a relation between propositions holds — we shall symbolize by '$\vdash$.' A proposition of the form $\vdash p$ is called *categorical*. Thus, $\vdash p$ and $\vdash q$ might stand respectively for "It's never too late to mend" and "Communication is difficult." $\vdash \sim p$ and $\vdash \sim q$ would then stand for "It is false that it's never too late to mend" (or, "It's at least sometimes too late to mend") and "It is false that communication is difficult" (or, disregarding possible verbal ambiguities, "Communication is not difficult"). We shall further as-

sume, so long as we stick to generalized logical structure, that either p or $\sim p$, and not both, is in every case true (though we have seen that there are degrees of truth and falsity in most concrete propositions).

The compound propositions formed by relating simple propositions are of two kinds: *conjunctive* and *composite*. Conjunctive propositions are those formed by the conjunctive relation, expressed usually by the word 'and': 'p and q'; 'p and q and r.' We shall write these simply '$p\ q$'; '$p\ q\ r$.' Conjunctive propositions are not very important (by themselves) for logical purposes, for the following reason: from the assertion of the truth or falsity of any one constituent proposition of a conjunctive proposition we can infer nothing about the truth or falsity of the other constituent (or constituents). Given 'p and q': if we assert p to be true, nothing further follows about the truth or falsity of q; if we assert q to be true, nothing further follows about the truth or falsity of p. And likewise if we assert either to be false.

In composite propositions, on the other hand, there are certain connections between the truth values of the simple propositions that go to make up the compound propositions; and the truth or falsity of any one constituent is sometimes a function of the truth or falsity of another. By this is meant that sometimes it is possible to make a valid inference from the truth or falsity of one constituent proposition to the truth or falsity of another. This will be made clear by a brief outline of three types of composite proposition:

(i) The *implicative* proposition, formed by the implicative relation: 'if p then q' (or, expanded, 'if p is true then q is true'). We shall write this $p < q$. p is called the

implicans or *antecedent* of q, which is called the *implicate* or *consequent.* "If he is honorable, he will tell the truth."

Now, the assertion of an implicative proposition ($\vdash p < q$) does not assert the truth either of p or of q, but simply that the implicative relation holds between p and q. But by asserting independently the truth of p, the implicans, we can infer the truth of q, the implicate. "He is honorable." "Therefore he will tell the truth." Again, by asserting independently the falsity of the implicate ($\vdash \sim q$), we can infer the falsity of the implicans ($\vdash \sim p$). "He does not tell the truth." "Therefore he is not honorable." But from the assertion of the truth of q (the implicate) or the falsity of p (the implicans), we are not entitled to infer anything about the truth or falsity of, respectively, p or q. If he tells the truth it may be for reasons of expediency and not necessarily because he is honorable. Likewise, if he is not honorable, he may nevertheless tell the truth through the operation of some other motive. These truth functions may be summarized as follows.

Given: $\vdash (p < q)$
$\vdash p$; therefore $\vdash q$
$\vdash \sim q$; therefore $\vdash \sim p$
$\vdash q$: p is indeterminate
$\vdash \sim p$: q is indeterminate

It is evident that the implicative relation is *non-symmetrical:* that is, from the proposition '$p < q$' the proposition '$q < p$' does not necessarily follow (though in some cases, of course, it might). From the statement, "If you drink much arsenic you will die" we are not entitled to infer "If you die, you must have drunk a lot of arsenic." The proposition '$q < p$' is a different proposition from '$p < q$.'

(ii) The *alternative* proposition, formed by the alternative relation: 'either p or q' (or, expanded, 'either p is true or q is true'). We shall write this $p \vee q$. In an alternative proposition p and q are called *alternants*. "Either he is ill or he is busy." This relation is symmetrical: $q \vee p$ may be substituted for $p \vee q$.

Colloquially 'either . . . or' often means 'either . . . or . . . and not both.' When we say, "My hat is either in the closet or in the dining room," it cannot, we know, be both in the closet and in the dining room. But it is more advantageous from a logical point of view, because logically simpler, to leave this latter possibility open: 'either p or q, and possibly both.' In the example given in the preceding paragraph, the person in question might be both ill and busy; the alternative proposition states only that he must be at least one or the other. We can then derive the colloquial use by joining an alternative with a disjunctive proposition (to be discussed in (iii)). Accepting the simpler interpretation, we may say: if either alternant is false, the other must be true; but if either is true, the other is indeterminate. If he is not ill, he must be busy; if he is not busy, he must be ill; if he is ill, he may or may not be busy; if he is busy, he may or may not be ill.

Given: $\vdash (p \vee q)$
$\vdash \sim p$; therefore $\vdash q$
$\vdash \sim q$; therefore $\vdash p$
$\vdash p$: q is indeterminate
$\vdash q$: p is indeterminate

(iii) The *disjunctive* proposition, formed by the disjunctive relation: 'not both p and q.' We shall write this $p \wedge q$. In a disjunctive proposition p and q are called *disjuncts*. This relation, like the alternative relation, is symmetrical, and $q \wedge p$ may be substituted for $p \wedge q$.

"He is not both going to play tennis and swim." And, it should be noticed, perhaps neither.

If either disjunct is true, the other must be false; but if either is false, the other is indeterminate. If he is swimming he is not going to play tennis; but if he is not swimming he may or may not play tennis.

Given: $\vdash (p \wedge q)$
$\vdash p$; therefore $\vdash \sim q$
$\vdash q$; therefore $\vdash \sim p$
$\vdash \sim p$: q is indeterminate
$\vdash \sim q$: p is indeterminate

Here again it should be noted that the actual use of language is much more complex than the structurally simple logical relation. "You can't be both a murderer and a home-breaker!" in some contexts might be a way of exclaiming that you are probably both; and in others, by a shift of accent, would be meant to suggest that you are at least one. And in general we may once more observe that wherever words come in there also enter possibilities of ambiguity. For instance, when we say "Unless it is nice weather I shan't go out" one is likely to infer "If it is nice weather I shall go out." But logically this entitles us to infer merely "If it is not nice weather I shan't go out." 'Unless p, q,' written as an implication, becomes '$\sim p < q$.' Again, "Only if I get a raise in salary shall I go to Europe" becomes "If I do not get a raise, I shall not go to Europe." Schematically: 'only if p, q' becomes '$\sim p < \sim q$.'

Two further relations holding between these compound propositions should be noted: (iv) *Logical equivalence* — if p then q and also if q then p; that is, $(p < q)(q < p)$. We shall write this $p \equiv q$. (v) *Logical contradiction* — $(p \vee q)(p \wedge q)$.

For the sake of simplicity in exposition, the composite relations have been listed as different sorts of relations holding between propositions. If we wish, however, all may be derived from any one, through certain logical equivalences that hold among them. And, as we have seen, two separate implicative propositions may be derived: $(p < q) \equiv (\sim q < \sim p)$. "If you drink much arsenic you will die" is equivalent to "If you do not die you haven't been drinking much arsenic." The two implicative propositions so related are known as *contrapositives*, and the transformation from one to the other as *contraposition*.

We may sum up the equivalences that hold among composite propositions in the following table.

Implicative	*Implicative*	*Disjunctive*	*Alternative*
$(p < q)$	$\equiv (\sim q < \sim p)$	$\equiv (p \wedge \sim q)$	$\equiv (\sim p \vee q)$
$(\sim p < \sim q)$	$\equiv (q < p)$	$\equiv (\sim p \wedge q)$	$\equiv (p \vee \sim q)$
$(p < \sim q)$	$\equiv (q < \sim p)$	$\equiv (p \wedge q)$	$\equiv (\sim p \vee \sim q)$
$(\sim p < q)$	$\equiv (\sim q < p)$	$\equiv (\sim p \wedge \sim q)$	$\equiv (p \vee q)$

Since p and q stand for any non-identical propositions, given a composite proposition in any of the four forms we are entitled to infer the remaining three with no additional information.

Starting with an alternative proposition —

Alternative: You are either stupid or wicked.

Implicative: If you are not stupid you are wicked.

Implicative: If you are not wicked you are stupid.

Disjunctive: You are not both not stupid and not wicked.

Starting with an implicative proposition —

Implicative: If God's in his heaven, all's right with the world.

Implicative: If all's not right with the world, God's not in his heaven.

Disjunctive: It cannot be the case both that God's in his heaven and all's not right with the world.

Alternative: Either God's not in his heaven or all's right with the world.

Starting with a disjunctive proposition —

Disjunctive: You can't both eat your cake and have it too.

Alternative: Either you can't eat your cake or you can't have it.

Implicative: If you eat your cake you can't have it.

Implicative: If you want to have your cake you can't eat it.

In the following sections certain elementary logical structures will be taken up. In the case of each the generalized symbolic form will first be given, with the chief implication which is asserted surrounded by dots — '$\cdot<\cdot$' This marks the division between premises and conclusion, the place where if the argument were stated in words 'therefore' would appear. An analysis will follow showing the steps in the argument.

3. A Few Devices

(1) A logical structure by which a conclusion is declared to follow from two or more premises is called a *syllogism.*

$$\vdash (p < q)p \cdot<\cdot q$$

If p then q

p

Therefore q

(2) A longer, interlocked chain of reasoning is known as a *sorites.* Simpler chains use implicative propositions (more extended arguments using other types of propositions will be discussed later).

$$\vdash (p < q)(q < r)(r < s)p \cdot <\cdot s$$

If p then q
If q then r
If r then s
p
Therefore s

The implicative relation is transitive, and therefore from the three implicative premises alone we may conclude hypothetically, $p < s$. By taking these together with the categorical premise asserting p, we may conclude categorically, $\vdash s$.

(3) In *rebuttal* we accept the same chain of implicative propositions as one set of premises; but as our categorical premise we take a denial of the conclusion of the argument to be rebutted — a denial which is perhaps itself the conclusion of another chain of reasoning.

Given: $\vdash (p < q)(q < r)(r < s)p \cdot <\cdot s$

Rebuttal: $\vdash (n < \sim s)(\sim s < \sim r)(\sim r < \sim q)(\sim q < \sim p)n \cdot <\cdot \sim p$

If p then q
If q then r
If r then s
p
Therefore s

Rebuttal: If n then $\sim s$
If $\sim s$ then $\sim r$
If $\sim r$ then $\sim q$
If $\sim q$ then $\sim p$
n
Therefore $\sim p$

Each of the implicative propositions has been contraposed, as explained above. Of course in any actual argument not all of the steps will usually be made explicit:

Since the universe is guided by divine justice, we must be ultimately rewarded and punished for our merits and demerits. But if this is so there must be a future life for each individual, wherein he shall receive the rewards and penalties not meted him in this life. That is why I believe in personal immortality.

Rebuttal: Scientific examination of the physiological conditions of consciousness makes personal immortality a ridiculous supposition. This means that there is no opportunity for the adjusting of moral accounts not adjusted in the present life. The universe, therefore, is not guided by divine justice.

(4) Very few actual arguments are complete from a structural point of view. Usually one of the premises, or less often the conclusion, does not have to be stated, and we get an abbreviated form of argument called in logic an *enthymeme*. For example: "He can't be very honest, because he's a politician." Here the conclusion ("He can't be very honest") is supported by an unstated premise: "If anyone is a politician he can't be very honest." A special rhetorical effect is often gained by omitting the conclusion: "When people get angry in an argument they're usually not very sure of their position; and here you are getting angry."

Sometimes both one premise and the conclusion are left unstated, to be inferred from the single premise that is made explicit. "Only a coward would do what you are doing." Logically this is equivalent to "If anyone does what you are doing he's a coward." The hearer is obviously intended to assert the implicans and thus get the affirmative conclusion, "You are a coward." Or, "If he's a musician I'll lay an egg." In this case the hearer is expected to assume that I'll not lay an egg (deny the implicate) and thus reach the negative conclusion. "He's not a musician." "Yes indeed, your ideal of universal socialism is quite charming, and as soon as human nature becomes purged of all suspicion and greed I dare say you will be able to realize it." In the course of an argument the logical steps are seldom all articulated; and a good preliminary measure in attacking an argument is often to discover what premises would have to be supplied to complete it.

4. Toward Complications

Consider the syllogism:

$$\vdash (p < q)p \cdot <\cdot q$$

If p then q

p

Therefore q

The argument may be complicated by having either the antecedent or the consequent (implicans or implicate) take an alternative or a conjunctive form. Thus:

(1) $\vdash [(p \vee n) < q](p \vee n) \cdot <\cdot q$

If either p or n then q

Either p or n

Therefore q

(2) $\vdash [(p\ n) < q](p\ n) \cdot <\cdot q$

If both p and n then q

Both p and n

Therefore q

(3) $\vdash [p < (q \vee r)]p \cdot <\cdot (q \vee r)$

If p then either q or r

p

Therefore either q or r

(4) $\vdash [p < (q\ r)]p \cdot <\cdot (q\ r)$

If p then both q and r

p

Therefore both q and r

These offer no difficulty, and are too obvious to need examples. The forms, however, become somewhat more complex when, instead of affirming the antecedent, we deny the consequent:

(5) $\vdash [(p \vee n) < q] \sim q \cdot <\cdot \sim (p \vee n) \equiv (\sim p \sim n)$
If either p or n then q
$\sim q$
Therefore neither p nor n ($\sim p$ and also $\sim n$)

(6) $\vdash [(p\ n) < q] \sim q \cdot <\cdot (p \wedge n) \equiv (\sim p \vee \sim n)$
If both p and n then q
$\sim q$
Therefore not both p and n (either $\sim p$ or $\sim n$)

(7) $\vdash [p < (q \vee r)] \sim (q \vee r) \cdot <\cdot \sim p$
If p then either q or r
Neither q nor r ($\sim q$ and also $\sim r$)
Therefore $\sim p$

(8) $\vdash [p < (q\ r)](q \wedge r) \cdot <\cdot \sim p$
If p then both q and r
Not both q and r (either $\sim q$ or $\sim r$)
Therefore $\sim p$

The following will serve as examples of forms (5)–(8):

(5) If he were either a hundred percent American or a successful business man he would support the present system of government. He does not, however, support the present system, and is therefore neither a hundred percent American nor a successful business man (not a hundred percent American and also not a successful business man).

(6) If Prohibition is both morally desirable and economically advantageous it ought to be enforced. But many intelligent people are opposed to the enforcement of Prohibition. Presumably, then, they believe it is *not* both morally desirable and economically advantageous (i.e. they believe that it is either morally undesirable or economically disadvantageous — and possibly, of course, both.)

(7) If censorship is to work it must either educate people not to want improper books or prevent them from being sold. But it can neither educate people not to want improper books nor

can it prevent them from being sold. Therefore censorship can't work.

Zeno's paradox, previously referred to, is generally stated in this form.

In order to move a body must move either in the place where it is or in a place where it is not. But it cannot move in the place where it is, for so long as it stays in the place where it is, it is at rest. And it is manifestly impossible for it to move in a place where it is not. Therefore it cannot move.

In this case the '$\sim q$' is supported by an enthymemic syllogism. In the following argument from Plato's dialogue, *Meno*, both parts of the premise are thus supported; and furthermore the first premise and the conclusion are understood without being made explicit.

It is impossible for a man to seek (learn) either that which he knows or that of which he is ignorant. For no man would seek to learn that which he knows, because he has the knowledge of it already, and has no need for seeking for what he has. Nor could any man seek for what he is ignorant of, because he would not then know what he is seeking for.

(8) If we are to enjoy life in the present age we must both make a great deal of money to spend and have considerable leisure in which to spend it. But it is difficult to see how, with only twenty-four hours a day at our disposal, we shall be able to do both; and consequently it seems improbable that we shall enjoy life.

There are innumerable ways of complicating these forms, but it is not necessary to list all possibilities.

5. The Dilemma

The *dilemma* is an argumentative device of great importance, frequently to be discovered, in more or less

complete form, in philosophical and every other kind of discussion. Its first premise is a conjunctive proposition of the third order, having as constituents two implicative (second order) propositions: If p then q and if r then s. Four possibilities then arise, according as the second premise affirms the two antecedents or denies the two consequents, and according as it is conjunctive or alternative:

(9) $\vdash (p < q)(r < s)(p \vee r) \cdot <\cdot (q \vee s)$
If p then q and if r then s
Either p or r
Therefore either q or s

(10) $\vdash (p < q)(r < s)(p\ r) \cdot <\cdot (q\ s)$
If p then q and if r then s
Both p and r
Therefore both q and s

(11) $\vdash (p < q)(r < s) \sim (q \vee s) \cdot <\cdot \sim (p \vee r) \equiv (\sim p \sim r)$
If p then q and if r then s
Neither q nor s (both $\sim q$ and $\sim s$)
Therefore neither p nor r (both $\sim p$ and $\sim r$)

(12) $\vdash (p < q)(r < s)(q \wedge s) \cdot <\cdot (p \wedge r) \equiv (\sim p \vee \sim s)$
If p then q and if r then s
Not both q and s (either $\sim q$ or $\sim s$)
Therefore not both p and r (either $\sim p$ or $\sim r$)

Numbers (10) and (11) are perhaps not to be considered dilemmas, because their second premise is conjunctive rather than composite: each is the equivalent of two simple syllogisms of the type that has already been discussed. But we shall see that they bear important relations to numbers (9) and (12) when we take them up

presently (p. 126). For no particular reason, (9) is usually called a 'constructive dilemma' and (12) a 'destructive dilemma.' The alternatives presented in the second premise are called the 'horns' of the dilemma. To 'go between the horns of the dilemma' is to question the second premise: to question, that is, whether the alternatives are really exhaustive — whether it might not be possible to avoid both of them. To 'take the dilemma by the horns' is to question whether the consequences stated in the first premise follow.

(9) If the President signs the bill he will incur the enmity of Wall Street; if he vetos it he will incur the enmity of Congress. But he must either sign or veto it. Hence he must either incur the enmity of Wall Street or incur the enmity of Congress.

(12) If God is benevolent He must desire to avert human suffering, and if He is omnipotent He must be able to do so. However, the fact that there is human suffering shows that either He does not desire to avert it or He is unable to do so. We must conclude therefore that God is either not benevolent or not omnipotent.

It should be observed that the reason why a dilemma is effective in argument is that the alternants of the conclusion have some important quality or implication in common which is taken for granted by both the dilemmatist and his audience. Thus in our example of (9) it is understood that to incur the enmity of Wall Street or of Congress is in either case to lose a certain amount of political strength; and in our example of (12), that for God to be not benevolent or not omnipotent in either case breaks down the orthodox Christian conception of God. Carrying out this tail-piece of a dilemma and thus making explicit the categorical conclusion that is implicit in each of the alternants is in effect to supplement a constructive dilemma (form (9)) with an argument of form (1); and

to supplement a destructive dilemma (form (12)) with an argument of form (8). Given a constructive dilemma:

If p then q and if r then s
Either p or r
Therefore either q or s

we can take the conclusion as one premise of a new syllogism; and, adding as a second premise 'if either q or s then t,' we get as a second conclusion, 'therefore t.' Since 'if either q or s then t' can be transformed into 'if q then t and if s then t,' the argument can be elided as follows, omitting the first conclusion:

(13) $\vdash (p \vee r)(p < q)(r < s)(q < t)(s < t) \cdot <_{\cdot} t$
Either p or r
If p then q and if r then s
If q then t and if s then t
Therefore t

We may call this a full dilemma, in contradistinction to the former, which may be called a partial or hypothetical dilemma.

The President must either sign or veto the bill. If he signs the bill he will incur the enmity of Wall Street; if he vetos it he will incur the enmity of Congress. If he incurs the enmity of Wall Street he will be losing political strength; if he incurs the enmity of Congress he will likewise be losing political strength. Therefore whatever happens he will be losing political strength.

As a comment on human nature it may be noted that the dilemma is most often used to support an undesirable conclusion. However, it need not be —

I must either save the money I earn or spend it. If I save my money I shall provide against troubles in my old age; if I spend it I shall have an amusing time. If I have provided against troubles in my old age I have achieved a good end; if I

have an amusing time I have likewise achieved a good end. Therefore in any case I have achieved a good end.

Given a destructive dilemma:

If p then q and if r then s
Not both q and s (either $\sim q$ or $\sim s$)
Therefore not both p and r (either $\sim p$ or $\sim r$)

we can use this conclusion as one premise of a new syllogism; and, adding as a second premise, 'if n then both p and r,' get as a second conclusion, 'therefore $\sim n$.' Eliding, we get our second type of full dilemma:

(14) $\vdash [n < (p\,r)](p < q)(r < s)(q \wedge s) \cdot <\cdot \sim n$
If n then both p and r
If p then q and if r then s
Not both q and s (either $\sim q$ or $\sim s$)
Therefore $\sim n$

In words —

If the orthodox Christian conception is to be believed, God is both benevolent and omnipotent. If God is benevolent He must desire to avert human suffering, and if He is omnipotent He must be able to do so. But the fact that there is human suffering shows that either He does not desire to avert it or is unable to do so. Therefore the orthodox Christian conception is not to be believed.

Or —

American capitalistic theory states that each man should be given equal economic opportunity and unrestricted possibility of economic gain from his own enterprise. Equal opportunity would require that no economic conditions should favor one man rather than another at the outset of his economic career; but when one man advances in economic status over another there is automatically involved a restriction of the opportunities of the other, and a balance economically in favor of the children

and friends of the man who has thus advanced. (Omitting the next premise): Therefore American capitalistic theory is self-refuting.

The dilemmas we have been considering we may call 'material' dilemmas. By this is meant that, in forms (9) and (13), the alternative proposition $(p \vee r)$ is simply asserted, without logical necessity (or, in the cases of forms (12) and (14), the disjunctive proposition $(q \wedge s)$). Now in what may be called a 'formal' dilemma we take as the alternative proposition, $(p \vee \sim p)$, a proposition which from a purely logical point of view must be true — p must be either true or false. We then get for our formal constructive dilemma (we shall omit application to the destructive dilemma, which should be obvious enough):

$$(15) \vdash (p \vee \sim p)(p < q)(\sim p < s)(q < t)(s < t) \cdot <\cdot t$$

Either p or $\sim p$
If p then q and if $\sim p$ then s
If q then t and if s then t
Therefore t

In attacking a dilemma we can, as we have seen, grasp it by the horns or go between them. These maneuvers, however, are not so much attacks on the dilemmatic structure as denials of the truth of, respectively: (*a*) One or both halves of the third-order conjunctive proposition, 'If p then q and if r then s'; (*b*) the alternative (or disjunctive) proposition that is our other chief premise. Naturally, whenever we leave the structural realm of logic — that is, whenever we give concrete values to our p's and q's — we should examine carefully the truth of each premise. Only extra-logical information will tell us when we are justified in asserting the truth of specific propositions in the forms 'if p then q and if r then s,' 'either p or q,' 'not both q and s.'

When considering a purely formal dilemma, however, we do not have to worry about $(p \vee \sim p)$, because so far as logic is concerned, this proposition must be true. But when we are using words instead of p and $\sim p$ there arises, through the operation of certain of the ambiguities discussed in the last chapter, a deceptive and persuasive confusion that may be called the *dilemmatic fallacy*. This is due first to the difference between *logical contradictories* (p and $\sim p$) and verbal statements that have the *appearance of being contradictories*. For, even though our words may have the appearance of genuine logical contradictories, we are likely to treat them at some point during an argument as merely opposed to each other (as contraries or disjuncts) rather than as exhaustive alternatives. What happens in a dilemma is this: we are willing to accept the alternative premise because it has the verbal appearance of an $(p \vee \sim p)$ proposition — and if we so understood it throughout the dilemma we should not run into trouble; the third-order conjunctive proposition also *seems* persuasive — but only because the words used for p and $\sim p$ no longer stand for strict contradictories. The dilemmatic fallacy can best be explained through a definite example.

Either it is right to kill another human being or it is not right. If it is right, murder is not a crime and should not be punished. If it is not right, there is no justification for putting anyone to death, which would only multiply wrongs. Thus, in either case, capital punishment cannot be defended.

An analysis of this dilemma would reveal that in the first proposition "it is right to kill another human being" and "it is not right to kill another human being" are treated as if they were strict logical contradictories — otherwise the proposition would not be accepted as a true premise. But in the succeeding propositions they are handled as if

merely contraries, and the shifting meanings of the word 'right' are utilized to lend plausibility to statements which could only properly be understood if the whole context through which each has meaning were made explicit. A more subtle example of the dilemmatic fallacy, which depends upon confusions in realms of discourse, such as will be discussed in Chapter VI, is the following:

> What we know must be either external to our minds or not external to our minds. If external, we can never be sure that our ideas give us a correct account of it; if not external, then the reality of what we know is purely mental. If we can never be sure that our ideas give a correct account, then our only valid knowledge is of our ideas alone; and this likewise follows if the reality of what we know is purely mental. And consequently, whether what we know is external or not external, in any case our only valid knowledge is of our ideas.

Of course facts can make alternatives exhaustive when they are not logical contradictories. For instance, in one of the dilemmas cited above, "The President must either sign the bill or veto it" exhausts all possibilities not because vetoing the bill is logically contradictory to signing it, but because the Constitution provides that not signing it will be a veto by definition (when ten days elapse). The general nature of experience presents many exhaustive alternatives, such as "We must either eat or die"; and they have even been established by divine fiat: "He who is not with Me is against Me."

6. The Counter-dilemma

The 'counter-dilemma' is an argumentative device that will sometimes work and sometimes will not. Given the partial dilemma:

$\vdash (p < q)(r < s)(p \vee r) \cdot <\cdot (q \vee s)$
If p then q and if r then s
Either p or r
Therefore either q or s

Now if, by shifting the emphasis, it can be persuasively declared that another consequence of p is $\sim s$, and that another consequence of r is $\sim q$, a 'counter-dilemma' can be constructed as follows:

$\vdash (p < \sim s)(r < \sim q)(p \vee r) \cdot <\cdot (\sim s \vee \sim q)$
If p then $\sim s$ and if r then $\sim q$
Either p or r
Therefore either $\sim s$ or $\sim q$

Logically the two conclusions are consistent with each other: since if q were true and s were false, or if q were false and s true, both conclusions would be simultaneously true. The effectiveness of a counter-dilemma lies not in refuting the explicit conclusion of the original partial dilemma, but in implicitly refuting the t which we have seen is usually attached to both alternants of the conclusion. Thus the full form of the counter-dilemma would be:

$\vdash (p \vee r)(p < \sim s)(r < \sim q)(\sim s < \sim t)(\sim q < \sim t) \cdot <\cdot \sim t$
Either p or r
If p then $\sim s$ and if r then $\sim q$
If $\sim s$ then $\sim t$ and if $\sim q$ then $\sim t$
Therefore $\sim t$

Thus in the earlier illustration about the President either signing or vetoing the bill, we found an implied categorical conclusion that in either case he would lose political strength. A counter-dilemma would not logically refute

this conclusion so much as oppose to it a contrary and counteracting conclusion:

The President must either sign or veto the bill. If he signs the bill he will please Congress; if he vetos the bill he will please Wall Street. If he pleases Congress he will gain support; if he pleases Wall Street he will gain support. Therefore whatever happens he will strengthen his position.

How true the new premises are, and how much weight should be attached to them, must of course be decided from our knowledge of the actual situation that is being dealt with.

A classical example of the reply to a dilemma by a counter-dilemma is the famous story, *Litigiosus*. Protagoras, the Greek sophist, had agreed to give Euathlus instruction in 'rhetoric' (i.e. argumentation) on condition that Euathlus should pay half the tuition fee at the close of the course and half when he had won his first case in court. After finishing the instruction Euathlus failed to try any cases in court. Protagoras, becoming suspicious and fearing he would never collect the other half of his fee, brought suit against Euathlus, and Euathlus conducted his own defence. Protagoras in arguing his case used the following dilemma:

If Euathlus loses this case, he must pay by judgment of the court; if he wins, he must pay by the terms of our agreement.

But he must either win the case or lose it.

Therefore, however it turns out, he must pay.

Euathlus retorted:

If I win this case, I don't have to pay by the judgment of the court; if I lose, I don't have to pay by the terms of the agreement.

But I must either win the case or lose it.

Therefore, however it turns out, I don't have to pay.

7. Rebuttal and Reductio ad Absurdum

We saw (on p. 117) that forms (10) and (11) are not, strictly speaking, dilemmas, since they have conjunctive second premises. They are, however, useful in certain dilemmatic activities, and we may call them 'conjunctive dilemmas.'

We have seen how the simple syllogism 'if p then q; p; therefore q' is rebutted by denying q, and thence concluding $\sim p$.

Given the full dilemma:

$\vdash (p \vee r)(p < q)(r < s)(q < t)(s < t) \cdot < \cdot t$
Either p or r
If p then q and if r then s
If q then t and if s then t
Therefore t

To rebut, we begin by denying t, contraposing the implicative propositions, and reaching as our conclusion a *conjunctive* denial of the original alternants. Thus:

$\vdash \sim t\ (\sim t < \sim s)(\sim t < \sim q)(\sim s < \sim r)(\sim q < \sim p) \cdot <\cdot \sim (p \vee r) \equiv (\sim p \sim r)$
$\sim t$
If $\sim t$ then $\sim s$ and if $\sim t$ then $\sim q$
If $\sim s$ then $\sim r$ and if $\sim q$ then $\sim p$
Therefore $\sim p$ and also $\sim r$ (neither p nor r)

Or, given the destructive dilemma:

$\vdash [n < (p\ r)](p < q)(r < s)(q \wedge s) \cdot <\cdot \sim n$
If n then both p and r
If p then q and if r then s
Not both q and s (either $\sim q$ or $\sim s$)
Therefore $\sim n$

Rebuttal:

$\vdash\ n\,[n < (p\ r)](p < q)(r < s) \cdot <\cdot (q\ s)$
n
If n then both p and r
If p then q and if r then s
Therefore both q and s (neither $\sim q$ nor $\sim s$)

This is all obvious enough. But let us suppose that in the constructive dilemma, p and r are undeniable, exhaustive alternants. In such a case the 'conjunctive dilemma' can be used as an indirect way of supporting the original conclusion; for the conclusion of the conjunctive dilemma is impossible. Used thus, the method is called *Reductio ad Absurdum:* an inverted dilemma. This may be illustrated with a formal dilemma, so that the alternative premise shall be genuinely undeniable.

Given the formal constructive full dilemma:

$\vdash (p \vee \sim p)(p < q)(\sim p < s)(q < t)(s < t) \cdot <\cdot t$
Either p or $\sim p$
If p then q and if $\sim p$ then s
If q then t and if s then t
Therefore t

Reductio ad Absurdum, to reach the same conclusion (t) indirectly:

$\vdash [(\sim t < \sim s)(\sim t < \sim q)(\sim s < p)(\sim q < \sim p)]$
$< [\sim t < (p \sim p)] \cdot <\cdot t$
Assume: $\sim t$
If $\sim t$ then $\sim s$ and if $\sim t$ then $\sim q$
If $\sim s$ then p and if $\sim q$ then $\sim p$
Therefore if $\sim t$ then both p and $\sim p$
Which is impossible.
Therefore t

Disregarding the ambiguities, we may apply this method to the previous argument proving that capital punishment cannot be defended:

Assume that capital punishment may be defended. If so, then we are justified in putting criminals to death; and if so, murder is a crime. But if we are justified in putting criminals to death it is right to kill another human being; and if murder is a crime it is not right to kill another human being. Therefore if capital punishment may be defended it is both right and not right to kill another human being. Which is impossible. Therefore, capital punishment cannot be defended.

CHAPTER V

FACTUAL REASONING

1. Hypotheses

We have in the last chapter been dealing with relations between the truth or falsity of one proposition and the truth or falsity of another or other propositions. We have not yet clearly raised the question of how we can determine whether any proposition is itself true. But this question, it has already been pointed out, is not the first question that should be asked about a proposition: before wondering whether a proposition is true, we should be clear about what it means. One of the first steps in such a clarification is to determine whether the proposition is primarily factual, normative, or structural.

In the present chapter we are concerned with factual propositions. However, as we saw in Chapter II, these contain always not only some reference (however indirect) to the given, to sense data, but an interpretation of the given with reference to a structure which goes beyond the momentarily given. Their truth is subject to *verification;* that is, is bound up with the possibilities of future experience. This is the case even with what seems to be the recording of a simple 'fact.' When I say, "This sweater is red," I may mean no more than, "This sweater looks red to me"; and if so there is no more to be said, since I have presented the only available evidence. But as a rule I mean more than this, particularly if an occasion arises, as it might when purchasing a sweater, for questioning the statement. I should mean not merely that it looks red to me, but that other people of normal eyesight, looking

at it under ordinary light, would say that it looked red to them. I should, moreover, expect it to look gray under a green light, or purple under a blue light. The situation would seldom call for these tests; but if it did, and if they were not met, I should conclude that I had been mistaken, that the sweater was not in fact red.

It does not, however, need so unlikely an example to convince us that facts are not often simply 'facts,' that in every factual proposition there is an element of interpretation, theory, and structure. We know after very little thought how easily our interests, prejudices, and emotions influence us to accept one explanation or belief rather than another. It is much easier to establish the truth of the corruption and deceit of an enemy, competitor, or opponent than of a friend. It is doubtful that an evolutionary hypothesis would have been seriously thought of if man did not seem to appear as the most excellent product. It is far less difficult to discover what we are looking for, what we want to find, than what we have no interest in. Judicial theory and practice make a distinction between testimonial or 'direct' evidence and circumstantial or 'indirect' evidence; but testimony itself involves the assumptions that the witness has not erred in either observation or memory, and is trying to tell the truth. That these assumptions are seldom fully justified any complicated trial will show.

Every factual or descriptive proposition is, then, a *hypothesis*, a more or less tentative affirmation which might at least conceivably be further verified, and which is to be rejected or modified if negative evidence turns up. A recognition of the tentative character of all factual propositions is sometimes taken to mean that factual 'truth' is entirely relative, and that the attainment of factual certainty is impossible. In a sense this follows, but not in the sense that might at first be understood.

The rejection or modification of a hypothesis does *not* necessarily mean that the hypothesis was 'untrue.' This seeming paradox may be explained by the following principle: *the truth of a factual proposition has no meaning apart from the evidence upon which the proposition is based*, whether or not that evidence is explicitly stated. New evidence creates a new situation. If the older factual proposition, or hypothesis, is not suitable with reference to this new situation, it may be modified or rejected, and what is in effect a new hypothesis may be substituted. But we may still say that if correctly formulated the older hypothesis was and remains true with reference to the situation it was meant to cover.

We may illustrate the hypothetical nature of factual propositions, and the formation and testing of factual hypotheses by a more extended example. Suppose that a detective, called on a case, enters a certain room in a certain house. He will be confronted by a mass of sense-data which he will begin automatically and unconsciously interpreting. Most of the material for interpretation he will immediately (and probably unconsciously) reject as *irrelevant*. The grounds of relevancy will be formed by his profession and its general interests, the preconceptions arising from the mysterious telephone call of five minutes before, etc. If he is a good detective, he will be willing to reconsider at all times his criteria of relevance, but in all kinds of empirical reasoning the problem can be made precise only by elimination. The scientist in his laboratory, for most purposes, disregards the beauty or ugliness of the subject of his experiment, his own feelings, the whistling going on outside, the position of the stars. Just so, the detective will notice only a minor fraction of what in the room might be noticed.

He sees lying in the middle of the floor a woman in an evening gown, with a small hole in the middle of her

forehead smeared with blood. This is his first big fact. His problem is not epistemological; he does not doubt the 'evidence of his senses,' nor wonder whether what he sees is part of the real, objective world. His problem is a practical one, and he accepts the fact as a starting point in his investigation. If put into words, his perception would probably be, "Here is a woman who has been murdered by gunfire a short time ago." This is of course an interpretation; later evidence may suggest that actually the woman had been poisoned and that the gunshot was a blind. If the detective is intelligent he will be ready to revise his 'facts' in the light of future evidence; but he must start somewhere, and a murdered woman together with his professional interest gives a clear problem a fairly good send-off. The importance of his professional interest should not be underestimated, for it is this combined with the facts that set the problem, and test the relevance of hypotheses concerning it. A clergyman, for example, in the same situation, might be concerned chiefly with the moral wrongness of murder, an aspect irrelevant from the point of view of the detective.

The detective continues to look around. He discovers a gun not far from the woman on the floor, and two wine glasses on the table. These, too, seem relevant facts. Later investigation discloses that on the gun and on one of the wine glasses are the fingerprints of a man named Smith. This suggests a more precise hypothesis: not only has the woman been murdered, but murdered by Smith. Possible alternatives still remain open, and the investigation continues. Among a great many more discoveries there come to light additional facts which seem to be of importance: Smith had been in love with the woman, but had been rejected the day before the alleged murder; Smith was the chief beneficiary in her will, but on the day of the murder she had been talking to her lawyer about

changing the will; Smith is known as a remarkably good shot; the wine left in the glasses is identified as the same vintage Smith usually drinks. The detective concludes finally that he has sufficient evidence on which to arrest Smith for the murder of the woman, and he does so.

A jury must now decide whether the detective's hypothesis is a good one, whether his factual proposition is 'true.' It seems convincing; but perhaps the maid killed the woman. A series of explanations for the facts might then be found somewhat as follows. Smith did indeed drink the wine with the woman, but left early; he lent the maid his gun on the way out; he and the woman had drunk the wine as a sign of forgiveness for the quarrel of the day before; she was going to call her lawyer the next day to tell him the old will should stand. Or perhaps it was suicide; in despair at the breaking off of their affair, the woman had pulled Smith's gun from his pocket and shot herself; Smith, frightened, had fled. On what grounds should the jury decide among the various possible hypotheses? Or, more generally, what are the requirements for a good hypothesis? Certain of these may be summarized roughly as follows. We shall take up some of them and others later in this chapter and following chapters, from different points of view.

(1) **Comprehension of all relevant facts.** The hypothesis should provide an explanation for all the relevant facts, or at least for more than can be done by any other suggested hypothesis. Thus, in the above case, suicide makes it difficult to explain why Smith's fingerprints and not the woman's were found on the gun; also the fact that Smith is a good shot does not fit in. It should be observed that 'relevance' is partly question-begging. Smith's shooting ability *may* not be in the least relevant. And other facts not taken into consideration might be very relevant indeed — Smith's religion, or his known moral

habits. In every investigation relevance is largely determined by the interests at stake, by the purpose, avowed or implicit, of the investigation. A modern psychologist does not deal with the objective reference of intuition of God or of non-physical reality, which for the psychologist is not relevant; the only aspect of the intuition handled by the psychologist is the 'mental' or 'psychological' condition which is involved. Every scientist rules out the relevance of 'errors of observation' to the truth of his equations.

(2) **Consistency.** The preferred hypothesis should provide the most consistent explanation for the facts. There should be, first, an internal consistency, whereby the chains of reasoning and observation linking together the facts do so as intimately as possible. The ideal of internal consistency is furnished by logic and mathematics, but in factual matters, we should be able to give a consistent account in terms of a temporal sequence as well as of a logical order. The maid-murderer hypothesis would make the temporal sequence hard to arrange properly. Furthermore, the various events would not exhibit any close relations: there would seem to be no connection between Smith's drinking the wine with the woman, and his handing the maid the gun. Again, none of the subsidiary explanations suggested by the hypothesis should be contradictory. If it were established that the murder must have been committed in the room the detective first entered, and on that night; and if it were independently established that Smith at that time had been on a boat in the middle of the Atlantic; then, this contradiction would rule out Smith as murderer. From the point of view of the older hypothesis that heavy bodies go down there is an inconsistency in the behavior of airplanes; and this inconsistency constitutes an additional reason for qualifying or rejecting the older hypothesis as an explana-

tion of facts now at our disposal (though it was true enough for the facts it covered).

But the hypothesis must be consistent also externally with the general character of experience, or at least with experience within the realm of discourse in question. In detective novels, murderers and criminals are always doing 'incredible' and 'monstrous' deeds. But in actuality detectives would scarcely ever solve mysteries if on the whole murderers and criminals didn't act fairly much alike, and if they didn't conform in the most general respects to mankind at large. Of the three suggested hypotheses to explain the murder of the woman, the Smith hypothesis is undoubtedly most consistent with the way people do usually act. Indeed, as the case is stated, this would be the chief reason for rejecting the suicide hypothesis, which from most other points of view provides a rather adequate explanation, and one which omits none of the clues (that is, relevant facts). An interesting operation of this requirement of external consistency was provided by the Michelson-Morley experiment. This experiment seemed to show that there was no difference in the velocity of light no matter what the direction was in which it was measured. That it did show this was accepted by most scientists as a *fact*, though naturally it was a fact in which a complex interpretation was involved. This particular experiment could easily and obviously have been explained by supposing that the earth was at rest in space (with the sun, planets, and stars revolving around it), since then there would be no reason to expect a difference in velocity. But, though this explanation would have been internally consistent, i.e. it would have linked together the facts of this experiment, it would have been inconsistent, for reasons into which we do not need to enter, with the generally accepted structure of classical physics and astronomy. This explanation was therefore

rejected, and two alternatives remained open: either the experimental findings had been misinterpreted, or there was something wrong with the general structure of classical physics and astronomy. By most scientists the latter alternative was accepted, and this was one of the outstanding experiments that influenced the formation of the theory of relativity.

It should be observed, however, that the requirement of external consistency can be readily overemphasized. It is a rather extreme dogmatism to suppose that an adequate interpretation of experience must be consistent through and through.

(3) **Simplicity.** The preferred hypothesis, generally speaking, should be the one which explains all the relevant facts most simply. Here again we meet a question-begging term, since we must define 'simple' with reference to the type of hypothesis which we do in practice prefer. However, there is an obvious point of view from which the Smith-murderer hypothesis is the simplest of the three in the case we have considered. It brings in the *fewest assumptions* — about motives, emotions, coincidences, etc. Under the maid-murderer hypothesis, several separate hypotheses would have to be brought in to make the explanations convincing (to explain, for instance, why Smith gave the maid the gun, how Smith and the woman managed to make up the quarrel, why the maid's fingerprints weren't on the gun); but all the facts group naturally under the one hypothesis that Smith was the murderer.

In a murder case, where the reasoning is close to fairly direct observation, the requirement of simplicity is not of great importance and is often misleading; but in the hypotheses of developed science, which are far removed from direct observation, and in which *structure* predominates, simplicity is a chief concern, and becomes capable of more precise formulation. Scientific simplicity is first

of all *mathematical simplicity*. When Copernicus suggested his hypothesis that the earth moved around the sun and not the sun around the earth, there were no facts (including observed astronomical data) which it explained better than the former hypothesis, and many which it did not explain so well (the common-sense evidence of our eyes seeing the sun go around, and our feet sensing the solidity and stability of the earth, etc.). But the Copernican hypothesis made the complicated geometric systems of cycles and epi-cycles by which the data were explained mathematically very much more simple. Indeed it might well be argued that mathematical simplicity and harmony are the first and most important requirements of the theoretic aspect of modern science. And if we do not grant the universal validity of this requirement, we might without undue obscurantism be led to modify the more extreme theoretic conclusions of science.

Scientific simplicity also demands the smallest number of assumptions and undefined terms which will explain the relevant facts, a requirement known as the *Principle of Parsimony*. Thus, Newton's 'universal law of gravitation' was to be preferred to older hypotheses, because through one mysterious property (gravitation) and one mathematical relation involving the variable $\frac{g\,mm'}{r^2}$, a large number of motions could be explained which before required separate properties and laws — the tendency of heavy bodies to fall, of light bodies to go up, of planets to move around the sun, etc. Or, again, through the developed notion of hydrogen ion concentration the observed behavior of a countless number of acids can be explained; whereas once a large group of independent assumptions and hypotheses were needed. This requirement is a derivative of the general requirement of 'mathematical simplicity': the fewer the assumptions and undefined

terms, the more the field is adapted to harmonious, simple, and ordered mathematical treatment. Thirdly, scientific simplicity demands that the explanations of events be in terms of what is considered 'physical reality.' If a peasant saw a train go by, and said that a devil made it go, there would certainly be a point of view from which his explanation was far simpler than the energy transformation formulas by which a scientist might account for the train's movement, but that point of view the scientist rules out.

(4) **The convergence of evidence.** In complicated matters, a good hypothesis is usually supported not by a single linked chain of facts and interpretations, but by convergent or cumulative evidence. Thus, one approach might be abandoned, and the hypothesis might still hold; and in any case the validity of the converged evidence is much greater than the mere sum of each approach considered separately. To take an elementary example: the factual proposition "I hear a cricket" would be supported if I later saw the cricket, and still more strongly supported if I held the cricket in my hand. Or if I advanced the hypothesis while fishing, "I've got a strike," new evidence in the form of seeing the fish and preferably getting him in my net would be needed even to make the original hypothesis reasonably probable. In the detective problem developed above, all the cited evidence unites in pointing to Smith, a strong factor in establishing Smith's guilt. Each independent clue might be easily explained away, but all of them together present a very solid front. But it should be noted that here once more the rather obscure factor of 'relevance' enters in. There are perhaps other clues and many of them which the detective never discovers and whose possibility he never considers, which would more than outweigh all the rest. In any factual problem this possibility will always remain open.

A modified form of the theory of evolution is a good

example of how this accumulation operates in science. To support the view that organic species were not all separately created, but are at least partially interrelated, evidence can be drawn from such diverse fields as: (i) paleontology; (ii) comparative anatomy; (iii) the study of vestigial organs; (iv) embryology; (v) geographical distribution; (vi) the experience of stock breeders and gardeners; (vii) the controlled experiments on plants and animals, instituted by De Vries. It is doubtful that any of the lines of evidence taken singly could have established the theory so firmly; but taken together, they convinced most scientists.

This example serves to bring out an important qualification: the converging lines of evidence are by no means always of equal value. Without the other lines of evidence, (iii) and (iv) would be of practically no significance. Or, in the detective's problem, the evidence of two or three dependable eye-witnesses might outbalance all the 'circumstantial' evidence; and a definitely established alibi would cancel both testimony and evidence. In advanced sciences, however, we never get anything corresponding to perfect alibis, since interpretation and structure have so far transcended the initial data; and the convergence of evidence from differing approaches becomes therefore of greater importance.

(5) **Amenability to prediction.** A hypothesis tends to be supported when, reasoning from it, predictions are made and later verified. In simple cases such predictions are often not articulated, but they are implicit in every factual proposition and capable of articulation. When I see a friend of mine walking toward me, I am making a tacit prediction of future sequences of experience: that I shall continue to 'see' him as he approaches, that he will continue to 'look like' my friend, that he will speak to me if I speak to him, etc. As a rule there will be no

occasion to make these predictions explicit, as we saw in the case of the red sweater. But if one of them should fail, if for instance the person should get nearer and no longer look like my friend, I should conclude that my 'perception' had been mistaken. When the detective concludes on the basis of certain facts that Smith is the murderer, he implicitly predicts that future facts will fit in with his hypothesis, that Smith will not be able to establish an alibi, that Smith may be got to confess, that so far as Smith's movements on the night of the murder can be traced, nothing will be discovered to contradict the theory that he was in the murder room at the proper hour. It will be observed that prediction plays its part in hypotheses referring to the past and present just as much as in those referring to the future. The past is known to us only by the traces it has left in the present, and which may be unearthed in the future. The woman was murdered in the past, but the detective discovers clues to the murder in the future.

In science prediction is of the greatest importance, and is controlled and made exact by experimental methods. If the atomic theory of matter holds, chemical substances will combine in definite proportions. Laboratory analysis can show that chemical substances do so combine. On the basis of the relativity equations, Einstein predicted a certain shift in the observed position of certain stars during an eclipse of the sun, different from the position predicted with the help of classical field physics. During the eclipse of 1919 the star photographs seemed to agree more closely with Einstein's predictions than with predictions based on the classical equations (though there is still some dispute among astronomers on the correct interpretation of the photographs), and this result had a great influence in helping to establish the theory of relativity.

Quite apart from any theoretical importance, the immense practical importance of successful prediction is evident, since through it science can be applied. We have, indeed, seen throughout this discussion that all of the theoretical requirements for factual propositions are open to criticism, but no one can deny their practical significance. This has led some philosophers to consider this practical significance the sole criterion of the 'truth' of factual propositions. This conclusion is inadequate, though it is useful in counter-balancing the theoretic claims that are sometimes made for scientific method. How far the requirements that have here been outlined are applicable to experience in general, and how rigidly they are to be interpreted even within science itself, are subjects to which we shall more than once return.

2. Generalization

In all knowledge we take for granted certain general connections. Even when we seem to infer from particular to particular by analogy — my dog has resemblances in structures and behavior to me, and therefore probably feels pain when run over by an automobile — we make tacitly a *general* judgment: there is a general connection between certain types of physiological makeup and behavior and the possibility of the conscious experience of pain. Going back to the detective: seeing the woman with a hole in her forehead he infers that she has been shot. The inference is derived from a general connection in his past experience between such holes and shooting. To gain entrance to a house we push a button near the door, confident in a general connection between pressing such buttons, the ringing of an interior bell, and the arrival of someone to open the door. As we have seen, the psychological basis of our knowledge of general connec-

tions is found in our tendency to form habitual associations. These, however, unless controlled, are dangerously misleading. "The human understanding is of its own nature prone to suppose the existence of more order and regularity in the world than it finds" [1] — or, perhaps, a differently arranged order.

The human understanding when it has once adopted an opinion (either as being the received opinion or as being agreeable to itself) draws all things else to support and agree with it. And though there be a greater number and weight of instances to be found on the other side, yet these it either neglects and despises, or else by some distinction sets aside and rejects; in order that by this great and pernicious predetermination the authority of its former conclusions may remain inviolate. And therefore it was a good answer that was made by one who when they showed him hanging in a temple a picture of those who had paid their vows as having escaped shipwreck, and would have him say whether he did not now acknowledge the power of the gods — "Aye," asked he again, "but where are they painted that were drowned after their vows?" And such is the way of all superstition, whether in astrology, dreams, omens, divine judgments, or the like: wherein men, having a delight in such vanities, mark the events where they are fulfilled, but where they fail, though this happen much oftener, neglect and pass them by.[2]

Uncontrolled, our habitual associations give rise to the half-truths of common sense — "Birds of a feather flock together," "Experience is the best teacher," "The Republican party brings prosperity," "Never tell a lie," "Honest is the best policy" — often adequate enough for ordinary activities, but unable to meet situations of any complexity.

When generalization is guided by systematic control it may be called *induction*. The methods of induction have never been satisfactorily formularized. This is

[1] Bacon, *Novum Organum*, Aph. 45. [2] *Ibid.* Aph. 46.

partly due to the nature of induction, which is too complicated to be reduced to formula; but partly to certain misconceptions about the aims of induction. Induction does not arrive, even ideally, at propositions having an *a priori* validity, like those of logic and mathematics. It seeks to make more accurate statements of general connections among events, and its results are always subject to possible modification in the future.

The basis of induction is to be discovered in certain characteristics of experience, and certain assumptions that we make about future experience.

(1) The given (sense data) is such that it contains solable elements which we can be aware of as 'universals,' that is, as the same as, resembling, related to, similar to other elements of the given, in short capable of being classified with other elements in some way. When we say, 'This looks red," we are stating that there is an element (the 'looks-red') in our present experience like certain other elements in past experience. If every element were utterly unlike every other, there would be no possibility of knowledge, and experience would have no meaning. Such a condition, however, cannot even be imagined.

(2) We find, in the succession of the elements of the given, *some sort of order*. It is not necessary to postulate that this order is of any particular sort, or that it is at all coherent or complete. We are continually searching for an order, some order, and if we do not find it in one way we try another, for practical purposes disregarding those elements which are not orderly. The devices at our disposal in ordering the given, the various methods of classification, the applications of mathematics, etc., are ingenious enough to order sufficiently what is, on any honest account, rather chaotic. Through our interpretations we build up our knowledge of a relatively stable reality.

(3) We are able, for the purposes of analysis if with no other justification, to isolate aspects of reality as 'particulars.' These particulars may be, on occasion, events, objects, things, properties, organisms, or whatever it is we are treating as a unit, whether as a unit to analyze or to relate to other units. Now, and this is of greatest importance, induction is not concerned with particulars *as such*, but with particulars as instances of a universal, as members of a class or system. Inductive methods are devised not to deal with this sea-urchin here now, or this chemical compound now in this test tube, but with this sea-urchin as an example of sea-urchins in general, or this compound as a typical instance of all such compounds.

Induction is not involved in cases where all the particulars can be dealt with directly. Thus, if I had ten bricks before me and stated the proposition, "These ten bricks are red," it would be a factual proposition, but induction would not be in question. Its truth would depend simply on the accuracy of my observation. But if from this observation I conclude, "All bricks are red," I should be making an inductive generalization — which would be, of course, false. The problem of induction may be summed up as follows: From known propositions about known particulars taken as members of a class or as belonging to a system, to reach propositions holding for the other particulars belonging to the class or the system.

The first step is therefore the realization that a particular lends itself to generalization; that it is not simply a here-now, but might belong to a system or a class in which there were other particulars. Without this every event would be unique, and no generalization would be possible.

To common sense, the next refinement in generalization would seem to be dependent upon the frequency of associ-

ation. Common sense would no doubt be willing to accept some such postulate as: "If *a* has always been accompanied by *b* in the past, there is a probability that it will be in the future, and the probability is the higher the oftener the association has occurred in the past." Reasoning on this basis we might conclude that the sun will rise tomorrow morning, or that all normal men have two legs. But with apparently equal justification a native of Central Africa might conclude that all men are black, or a small boy that all older people knew a great deal. Logicians therefore generally attach little importance to the mere multiplication of instances. However, their deprecation is not altogether deserved. Certainly it is by this method that we gain most of our common-sense knowledge. And the Central African's generalization is undoubtedly probable on the evidence at his disposal. His mistake lies in his judgment of the system or class into which the particulars upon which he has based his generalization fit. There has been present a constant factor, *c*, the property of being a native of Central Africa, which he has not taken into account. This restricts the scope of the generalization which he can properly make to: "All men who are also natives of Central Africa are black," and this generalization is highly probable. Again, from the fact that every apple we see on the top of a full barrel is good, we do not conclude that every apple in the barrel is good. There is a constant factor present in each observed instance, namely 'being on top of the barrel.' Previous generalizations about the nature of apple dealers teach us that this factor is relevant to any generalization about all the apples. Ideally — though actually it is never possible — a generalization should take into account all relevant factors. If, then, we wish to arrive at a generalization involving a known factor, *a* (in the above case, 'man') and some one other factor, *b*, our procedure

will go on from the naïvely observed past correlations in which *a* figured to the careful elimination of irrelevant factors. If, for instance, we wish to reach precise generalizations about colds, it will not be enough to recall our observation that colds usually are more common in winter and bad weather. We shall be led from observation to experiment, to the methods which have been developed in science, which is the most notable development of factual reasoning. But before outlining certain aspects of scientific method, we shall consider briefly another type of reasoning closely allied to — if not to be identified with — induction.

The use of analogy. If we know the various characteristics of hens' eggs; and if we see a pile of objects in a grocery looking something like hens' eggs and labeled ducks' eggs; and if we conclude that they might also be cooked and eaten; we shall be reasoning by analogy. If a scientist discovers that deficient secretion of insulin causes diabetes in sheep, and reasons that this may also be the cause of diabetes in humans, he too is reasoning by analogy. The essential feature of analogical reasoning is *the inference from known resemblances to other resemblances not directly known.* This reasoning is obviously always present in our dealings with the actual world. Upon it is based the possibility of classification, and in fact our whole handling of experience; what we know now is perceived to be like what we have known in some respects and we infer that the resemblance extends to other respects; thus we make use of what the past has taught us to deal with the present and future. A surgeon knows that a patient is like other patients in outward form, and infers that he will find his appendix where he has found it in the others; an insurance salesman discovers that a prospect is married, and infers that he will be susceptible to the same selling approach as in the case of other married men;

an astronomer knows that certain shifts in the spectrum stand for the presence of certain elements on the earth, and infers that they do likewise on the sun or the stars.

What is taken for granted in analogical reasoning? The most elementary principle seems to be the following: "If *a* resembles *b* in any way whatsoever, there is some probability, however slight, that *a* resembles *b* in some further way." Stated more generally: "If certain properties of a particular (or group of particulars) are known, and if any other particular (or group of particulars) is known to have some of these properties, it will probably have others." The problem is of course to infer correctly what others. We know from our past mistakes how often our analogies are unjustified: because someone has a pleasant face we infer by analogy that he is honest; because a book is by a certain author we infer that it is worth reading; because a bottle is labeled "Grade A milk" we infer that its contents are safe to drink.

It should be noted that there is no analogical problem when we can get our knowledge by direct observation and experiment; the problem arises when we wish to extend observation and experiment. Thus, scientists have analyzed many anatomical and physiological resemblances between men and certain of the higher mammals. From this they have inferred analogically that men and these higher mammals resemble each other in the property of having been descended from common ancestors. It may be remarked that the probability of this conclusion, on these grounds alone, is so small as to be almost negligible. It could be countered with an analogical argument of at least equal validity: men differ from these higher mammals in perhaps as many (or more) specifiable ways as they resemble them, and therefore probably differ in ancestry.

This last example will serve to show the close relation between induction and analogy. If a generalization could

be made probable, correlating certain types of anatomical similarity and common ancestry, the probability that the scientists' conclusion held would be increased. But conversely analogy enters into induction: only through analogy do we apprehend to what particulars a generalization is relevant. Analogy is connotative: from certain properties *a* and *b* share to make inferences about other properties of *a* and *b;* induction, denotative: from a known connection between certain particulars to make inferences about the other particulars belonging to the same class or system. The logical problems of analogy are thus closely similar to those of induction, though they are approached from diverse points of view.

3. Causal Analysis

Science begins in ordinary inductive generalizations. But science wishes to make its generalizations more accurate, and applicable to wider and wider classes of phenomena. It must therefore attempt to avoid the difficulties suggested in the last section, to take account of all relevant factors, to note exceptions and 'negative instances.' In order to achieve these ends observation gives way to experiment. There is no sharp line between them: experiment begins when we attempt consciously to control the conditions of our observations.

The aim of experiment, at least in its early stages, is said to be the discovery of the *causes* of phenomena. Cause is a notion familiar to common sense, but from a methodological point of view (with which we are now concerned) it is far from clear. We say that striking a match is the cause of the flame, over-population the cause of wars, pneumonia the cause of death. What do we mean when we say this? Let us put aside until Chapter VII the idea of cause as a mysterious 'agency' or 'power'

forcing events to take place, and try to discover a meaning of cause related to the scheme of inductive generalization.

A commuter misses his train one morning[1] and asks himself why he missed it, that is, "What was the cause of my missing this train?" He compares his watch with the station clock and discovers that his watch is five minutes slow. He feels then that the question is answered, that the cause is the slowness of his watch. But what if he extended his analysis? The train was scheduled to leave at 8.00 A.M. His house was ten minutes walk away, and he left his house when his watch read 7.50, allowing sufficient time, as he thought. True enough, if his watch had been correct he would have caught the train. But also he would have caught the train if the train had been five minutes late. Or he would have caught it if he had left at 7.45 by his watch. Or if he had bought a house only half as far from the station, and the other factors — e.g., leaving at 7.50 by his watch — had remained the same. Or if the railroad engineers had built the line nearer his house; or if he had left after his first cup of coffee instead of after his second; or if he hadn't stayed up late the night before and been too groggy to shave quickly; etc. Which event is to be judged correctly the cause of missing the train: the slow watch, the on-time train, the position of his house, the drinking of the second cup of coffee, the decision of the engineers?

It will be observed that a question of temporal sequence seems to enter into the determination of a causal relation. All these events fit into some kind of temporal order. This is seen even more clearly in a simple situation such as striking a match: the striking, the supposed cause, precedes in time the flame, the supposed effect. However, no one wishes to believe that cause is *merely* a matter of temporal succession: all of the events the commuter con-

[1] Example adapted from Meyerson, *Identity and Reality*.

siders preceded in time his missing the train, but he does not judge any of them to be the cause on that account alone. Countless other events also preceded it, such as the arrival of the milkman, the Civil War, and the creation of the world. Nor is the event which *immediately* preceded missing the train any more useful: innumerable other events immediately preceded it, including the death of several hundred Chinese from starvation, and perhaps the formation of a new star in space.

If we symbolize 'missing the train' by *b*, can we say that *a* is the cause of *b* if *a* precedes *b* in time and is the *sufficient condition* of *b* (that is, if the relation 'if *a* then *b*' holds)? This seems to be near what common sense often means by cause: if the watch is slow, the commuter will miss his train; if the match is struck, flame will follow — though, as analysis shows, these conditions, because of the other factors involved, are not genuinely sufficient. But in any case more than this is meant, because, as we have seen, many other events have preceded *b* in time and may equally well be sufficient conditions of *b*. We wish to know not only the sufficient but also the *necessary* condition of *b*, that event without which *b* would not have occurred; an *a* which will fit also into the relation, 'if not-*a* then not-*b*.' The requirements may be summed up in the following definition: "The cause of a given event is that event (or group of events) in whose presence, and only in whose presence, the given event occurs." But this is an application to the physical world of the relation of 'logical equivalence' which was discussed in the last chapter, and we may therefore say: *a* is the cause of *b* if *a* precedes *b* in time, and the relation $a \equiv b$ holds.

The causal relation becomes thus an ideal type of inductive generalization; and once again it should be observed that not this particular *a* and this particular *b*

are in question, but this *a* and this *b* as instances of a class or system of *a*'s and *b*'s. History, not science, deals with particulars as such. The relation is ideal because, though we may approximate it more and more accurately, we can never know with certainty that we have discovered a case in which it holds. In the case of the late watch and missing the train it obviously does not. The late watch is neither the necessary nor the sufficient condition of missing the train. Nevertheless, accepting the late watch as cause is of great *practical* importance to the commuter, since it is a *possible* condition of lateness which he can easily control, whereas he cannot change the position of the railway line. It is useful to know that striking a match is the cause of flame, because we thereby know how to get a flame when we want one. But we realize that this relation is by no means necessary; there are numerous factors such as the presence of a high wind, the absence of oxygen, dampness, faulty match boxes, that must be taken into account in the formulation of any causal laws relating the striking of matches and flames.

Experimental methods are designed to eliminate the inaccuracies of common-sense generalization, and they carry out under control methods latent in ordinary observation. The supposed causal relation between striking a match and flame is not necessary because it requires the presence of certain constant factors such as sufficient oxygen. The situation is more complicated, and a first step toward accuracy must be the isolation of constant factors, and the determination of their relevance or lack of relevance to the causal connection that is being investigated. The analysis this requires may be carried out more successfully when experimental control is possible.

If something suggests to a scientist a causal connection between *a* and *b*, he will study a number of instances in which *a* and *b* occur together but where the attendant

circumstances are varied as much as possible. It will thus be demonstrated that the connection between *a* and *b* does not depend upon any of the circumstances that vary. If, for instance, a scientist suspects a connection between a certain type of germ he has isolated and malaria, he will be more convinced that this connection holds if in every case of malaria the germ is found, no matter what the previous history of the patient, the color of his skin and eyes, the condition of his heart, the haemoglobin content of his blood, etc. This method may be summed up as follows: "In investigating *a*, the circumstances in which various instances of *a*'s occurrence differ may be eliminated from any statement of causal connection between *a* and some *x*, and *x* must be sought from the analysis of the circumstances which remain the same." Of course, later investigation may suggest that *x* is to be sought in a further analysis of the circumstances that were at first eliminated. Pneumonia occurs in all sorts of weather, and we may therefore rule out weather as the cause of pneumonia. Weather may be (and is) a contributing factor in making pneumonia more likely; but the scientist must narrow down his problem, to get exact results on a small scale, before connecting up these results more widely. It is, it should be noted, extremely difficult to vary properly the attendant circumstances. Scientists believed for a long while in the spontaneous creation of life in dead organisms before realizing that all the dead organisms which they examined were exposed to air, and that live bacteria are present in air. That we still do and shall always similarly overlook such factors is emphasized every day in every laboratory.

A second method in causal analysis, which sums up a usual experimental procedure, may be formularized as follows: "In investigating *a*, if two instances occur in one of which *a* is present and in the other *a* absent, the cir-

cumstances which are the same in the two instances may be eliminated from any statement of causal connection between *a* and some *x*, and *x* must be sought among the circumstances in which the instances differ." This is the method suggested in the passage from Bacon quoted above (p. 142). Of those who have made vows to the gods some have drowned and some have not; therefore saying vows to the gods is probably not causally connected with drowning. This method is used in most scientific research. If a physiologist, investigating rickets, studies two rats one of which is allowed no sunlight and develops rickets, and the other of which gets sunlight and does not develop rickets, their diets and general environment remaining the same, he is entitled to infer that their diets and general environment were probably not causally connected with the rickets. Actually, when this experiment was first tried, and when it was connected with observations of human infants living where they got no sunlight, more than this was inferred: namely, that absence of sunlight was *the cause* of rickets. And, in general, this method is sometimes supposed to determine causes exactly. This supposition is not, however, justified.

Two boxers are fighting; one hits the other in the solar plexus; the other falls to the floor and dies. Are we entitled to say that the blow in the solar plexus is the 'cause' of death? We have here a case for the application of this method: there are two 'instances' succeeding each other in time, in one of which (the progress of the fight up to the time of the blow) neither the blow nor death occur, and in the other of which (the succeeding few seconds) both blow and death occur. The readily ascertainable other factors are apparently unchanged — the general health of the opponents, the presence of people watching them, their position in a ring, wearing boxing gloves, etc. We may correctly infer that the unchanged factors are probably

not causally connected with the death. But to say that the blow is the cause of death is only a rough approximation; it is suitable enough for common-sense purposes, but science must analyze more exactly. Undoubtedly death succeeded the blow in time, but we mean more than this by the causal relation. If they are causally related, they are instances of a general connection or law governing such blows and such types of death. But 'blows,' and 'death' are notions too rough to fit into precise laws. The events must be analyzed further, into a sequence of minute events leading from one to the other: following the blow a neural disturbance, the paralysis of certain muscles probably including the heart, suffocation due to the failure of the heart to beat, etc. A physician might say that the cause of death was the suffocation. For events are not discrete units: they grow into one another, and there is no point at which one finishes and another begins. How we separate the sequences of events into definite particulars (*a*, *b*, etc.) will depend largely on the purpose of our analysis. For the spectators, calling the blow the cause is accurate enough; for the physician perhaps not.

At an early stage in the investigations it was sufficiently accurate to state a causal connection between sunlight and rickets. More exact analysis shows that not sunlight in general but the ultra-violet rays in sunlight are connected. It further shows that diet is not irrelevant, but that certain foods containing a certain 'vitamin' are also connected. Cause is a working concept, appropriate to the initial stages of an investigation, and serving to make a problem more precise. Other things remaining equal, if *b* succeeds *a* in time, *a* is the cause of *b;* through experiment the other things may be controlled, and the problem limited. But other things never do remain equal, and *a* and *b* need further analysis. Cause, in scientific reasoning, is part of the wider problem of general connection

according to law. The typical scientific law is not the statement of a causal relation (that so-and-so is the cause of such-and-such), but the statement, usually in mathematical form, of a functional relation between certain variables. When some of the variables take definite values, the others take definite values. The significant aspect of Newton's law of gravitation is not to be found in the popular notion of a cause, 'gravitation,' pulling bodies toward the earth and keeping planets in their path around the sun; but in a scientific generalization which correlates the behavior of bodies through an equation involving the product of their masses and the squares of the distances between their centers of mass.

4. Physical Determinism

During the discussion of inductive generalization we have been taking for granted certain underlying postulates about the nature of the physical world as we come to know it. For it is obvious that unless the future were at least in some respects like the past, unless physical events were more or less orderly in their occurrence, no amount of individual observations and experiments would assist us in formulating general laws. We could not be sure that the observations and experiments applied beyond the particular events that they dealt with. Actually, it is true that there is no objective certainty that they do so apply. Science must therefore *postulate* that they do; but these postulates will be of a special sort, since unless they applied science would be impossible, and experience in general would be so chaotic as to be meaningless.

Two most important postulates of scientific method may, then, be summed up as follows:

(1) *There is some probability that any given particular is connected with some other given particular according to*

some general law. This may be called the *postulate of the probability of physical determinism.* The necessity for making this postulate is clear enough, since there would be no use looking for laws unless there was some probability that there are such laws. We are not required, however, to postulate that *all* particulars are connected according to general laws, which is extremely doubtful, but merely that science will assume the probability of a general law in any situation it investigates. This postulate, therefore, helps to define the field of science: particulars not so related lie outside of scientific investigation.

(2) *The factors relevant to any statement of general connection involving a given particular are limited.* This is a form of what is sometimes called the *postulate of the limitation of independent variety.* That science must accept this postulate is also obvious: in studying any given problem the scientist would get nowhere if he had to take the whole universe always into account. But it should be observed that the limitations are not of any one sort or in any one direction; they cannot, that is, be defined *a priori;* but they become clearer as science progresses. For science has a history; and the grounds of relevance are formed by past experience, but especially by the past history of science. A scientist does not begin his investigation from the beginning. It is limited for him by the whole course of previous investigations.

This second postulate is the theoretical basis for the importance of 'negative instances' and the elimination of irrelevancies by controlled experiment. The experimenter studying some phenomenon postulates a general connection between it and something; the more possibilities he eliminates, the greater the probability that the general connection will hold in what remains — if the possibilities are not infinite. If they were infinite, elimination would do no good, because anything subtracted from infinity

leaves infinity still the remainder. There is no reason to suppose, however, that in any analysis all irrelevancies will be eliminated; the possibilities may be numerous beyond enumeration, but so far as they are not regarded as infinite, the requirements of scientific method are met.

A study of the actual procedure of scientific investigation shows everywhere the use of this limiting postulate in practice. More or less accidentally, some kind of connection between eating liver and the increase of the haemoglobin blood content in certain organisms is observed — an important connection, since increase of haemoglobin relieves or cures pernicious anaemia. But for a patient to eat a great amount of liver daily is unappetizing. Research analyzes liver into constituents, and eliminates various of these constituents by the second method discussed under causal analysis (p. 152). If there is any connection between liver and the production of haemoglobin, then, it is to be found in the constituents not eliminated. And at the present time patients suffering from pernicious anaemia are not forced to eat a great amount of liver, but simply a small amount of a definite 'liver extract.'

The truth of empirical generalizations can never be demonstrated, but by scientific method their probability can be increased. It is this that constitutes a chief distinction between factual propositions and logical or mathematical propositions, whose truth depends simply on the internal coherence and consistency of the logical or mathematical structure. From the point of view of coherence, consistency, and simplicity, science does approach logic and mathematics as its ideals; but from other points of view science does not approach them, even as limits. For no matter how large the structural element in science becomes, scientific propositions are factual, and therefore are true only with reference to the evidence on which

they are based; and therefore subject to verification, and change if, when conditions would permit it, the verification does not materialize.

This peculiarity justifies the *theoretical* importance of negative instances, the elimination of irrelevancies, and prediction. As we have seen, scientists attach great importance to successful predictions made from hypotheses. Now a prediction is in a sense an implicative proposition $p < q$ applied to a temporal sequence in the physical world. Accepting p as true, q follows logically; and, applied, q may be predicted to occur under certain spatio-temporal conditions. To return to an illustration already mentioned: "If the atomic theory of matter holds (p), chemical substances will combine in definite proportions (q)." It can be shown in a laboratory that chemical substances do so combine, that q is true ($\vdash q$). But, by reference to Chapter IV, we shall see that from the truth of q, the truth of p does not logically follow: $q < p$ is not implied by the counter-implication $p < q$. If q turned out to be false ($\sim q$), the falsity of p ($\sim p$) *would* be implied, and for that reason, unsuccessful predictions (if they have been correctly deduced) can *demonstrate* the falsity of hypotheses. But positive instances, successful predictions, can never demonstrate the truth of hypotheses. They do, however, *increase the probability* that the hypothesis is true, since they become additional evidence for the hypothesis. In science no such simple proposition as '$p < q$' is found. It is always, whether or not so expressed: "If p has a certain probability on the basis of r, s, t . . . (where r, s, t . . . represent the evidence), then q." Establishing the truth of q adds q to the evidence and increases the probability of p. This relation is not found in the structure of formal logic, but it is a fundamental relation in scientific or any kind of factual reasoning.

5. Functional Correlation

One of the most striking characteristics of what we call Nature is the presence of innumerable phenomena which seem to vary in some more or less regular way — the succession of the seasons, the ebb and flow of the tides, the sequence of day and night, the history of organisms from birth to maturity to death, are among conspicuous examples. Moreover, not only do these phenomena vary in a regular way, but the variations of one often seem to be connected with the variations of another or others — the succession of the seasons with the appearance of plants in spring, their ripening in summer, their death in autumn; the ebb and flow of the tides with the changing appearances of the moon, etc. Naïve observation of such *functional correlation* leads insensibly to what seems to be an additional method for establishing causal relations. This may be stated roughly as follows: "If *a* varies in some regular manner when *b* varies in some regular manner, there is some probability that *a* and *b* are causally related to each other or both to some third phenomenon." On these grounds we tend to state a connection between the tides and the moon; or between certain physiological conditions, such as the secretion of ductless glands, and 'emotions' of which we are conscious; or (as would be applied in tuning a violin) between tension and rate of vibration; or between the length of a conducting wire and the amount of electrical 'resistance'; or between atheism and crime; or between distribution of gold supply and prosperity; or between the pressure and volume of gases. In each case observations, experiments, and statistics can be produced to show that whenever one factor varies in some regular way, the other also varies, and the variations can be correlated in some fashion. When these correlations are made precise by science, they take the form of

mathematical functions. A mathematical function may be defined as a variable magnitude so related to another variable magnitude that for every determinate value of one there is a corresponding determinate value of the other.

A mathematical function is, as we have seen, the typical form of a scientific law. But so far as the proof of causal relations goes, there is nothing essentially new in this method. An observed correlation between *a* and *b* gives some probability to a causal connection between them, and this is made more accurate by further careful observation and experiment. It is particularly difficult in the use of this method to be sure that all relevant factors are taken properly into account. In the last generation atheism and crime have both increased in the United States. This increase, then, is apparently *not* connected with the factors that have remained the same — the size of the country, the number of states, the distance from New York to Chicago. But a good many things besides atheism and crime have changed also during the last generation, and more convincing correlations might be established involving some of them, and lessening the causal intimacy of atheism and crime. Even the more exact correlation between the behavior of the moon and of the tides is not a conclusive proof that they are causally connected. It does prove that their changes are not dependent on what remains the same — the distribution of continents, the general behavior of mankind, the chemical constitution of sea-water. But, for advanced science, the relation between the moon and the tides is shown more convincingly through the whole general structure of science, through deduction for instance from the 'universal' law of gravitation, than through functional correlation alone.

Nevertheless, whatever its theoretic status, science puts chief emphasis on functional correlation. Most of what

goes on in laboratories is the functional correlation of various phenomena, recorded in the graphs, tables, charts of any article or book dealing with scientific research. This, however, is due not so much to the logical superiority of the method, but to a theory or belief tacitly accepted throughout the history of western mankind in the fundamentally mathematical character of physical reality. "Just as the eye was made to see colors, and the ear to hear sounds, so the human mind was made to understand, not whatever you please, but quantity." [1]

6. Statistical Generalization

If we think over the generalizations by which we guide our lives, there are few, if any, that we suppose to be true in the ideal form $a \equiv b$. They state, rather, connections that have a certain degree of probability on the basis of our own and other persons' experience. The proposition, "It is always safe to ride on railway trains," is manifestly false, disproved by a single negative instance, of which there have been many. But the proposition, "If one rides on a railway train, one will probably be safe," is true; one may ride and be killed, but this does not disprove the proposition, which allows for exceptions. Such propositions form the basis of action: most food is all right to eat; the taxi won't break down taking me to the station; letters get to the people to whom they are addressed.

When the probability is put into mathematical form, these generalizations are called *statistical*. If there are five people in a room, two of whom have blue eyes, and if one of the five leaves the room, and if our *only* evidence in judging who has left is our knowledge of the colors of the eyes, the probability that a blue-eyed person has left

[1] Kepler, *Opera*, I, 31.

is $\frac{2}{3}$. This is true by definition. Stated generally: "If, of n units, m have the characteristic x, the probability that any one unit chosen at random has the characteristic x is $\frac{m}{n}$." The inductive problem enters in, as before, only when we extend our results beyond the observed particulars. A poll on prohibition is taken among 5,000,000 American citizens, and the result is 2 to 1 against prohibition. On the basis of this result we generalize; and conclude that in the case of any individual, about whom we know no more than that he is an American citizen, the probability of his being against prohibition is $\frac{2}{3}$. This extension beyond the observed particulars clearly involves the general postulates of inductive method; but it aims at the knowledge not of invariant connections, but simply of the probability of certain connections.

The most successful examples of statistical generalization are provided by the actuarial work of insurance companies. In all cases their generalizations extend beyond directly known particulars. Yet they are so accurate that the companies are able to make money. When a man of thirty takes out a life insurance policy, there is a definite probability that he will live one more year, a different probability that he will live two more years, and so on. These probabilities are based on a classification of the man simply as "a man living in the United States, thirty years old." If the classification were narrowed to "a man of exceptionally good health" or "a man with tuberculosis," the probabilities would of course be different. The statistics of the insurance company, moreover, do not predict what *will* happen to any particular man, but what will *probably* happen. If this probability is justified in the large number of cases covered by their policies, rates based on this probability will pay dividends. Of course a particular company might be unfortunate in

getting nothing but unhealthy or unlucky policy-holders; but statistical generalizations must postulate that 'special factors' will cancel out if enough particulars are included — in the long run.

If there are 100 particulars, 40 of which have the property *a*, the probability that any *one* has the property *a* is $\frac{40}{100}$ or $\frac{2}{5}$. This probability is by definition, and the statement "If *x* is one of these 100 particulars, there is a probability $\frac{2}{5}$ that that *x* is *a*" is true *a priori*. But suppose we wished to extend this statement to 1000 particulars, knowing directly only the 100. Would the probability still hold? There would, by the rules of induction, be a certain *probability* that it would hold, a considerable probability, if, in the 100 we had examined, there were no general connection between *a* and some other factor *not* connected with the remaining 900. If we found 100 men in a city, 40 of whom were blue-eyed, and wished to extend our statement of the probability of any one of a 1000 of the city's inhabitants being blue-eyed, we should have to take care that there was no special factor affecting the probabilities in the case of the 100, such as nationality, which would not apply to the others. Our probabilities must be based on what are called *fair samples*. From a poll on prohibition in New York City it is not legitimate to draw conclusions about the prohibition sentiment of the entire country. The procedure is the same as in ordinary inductive generalization, and consists essentially in the determination of what factors are relevant. If *a* and *b* are exactly alike in all relevant factors (which can never be determined with certainty), then the same probability fraction applies to both of them. Mere increase of numbers of particulars does not necessarily increase the accuracy of the statement of probability very much if it is to extend to other particulars, because of the danger of a constant factor affecting the result. Nevertheless, in-

crease of numbers usually helps indirectly through the probability that the particulars examined are *not* all alike, and the chance that the unexamined constant factor will thus automatically be eliminated.

The use of statistical generalizations in the so-called 'social sciences' is too well known to require illustration. It was once thought that the social sciences used statistics because they dealt with a subject-matter (chiefly human beings) not yet amenable to the more exact methods of physics, astronomy, chemistry, etc. As we shall see in Chapter VII, there is at the present time a tendency to believe that the laws of the exact sciences are also, though perhaps not in the same sense, fundamentally statistical.

7. The Later Stages of Scientific Reasoning

The impression gained from a study of inductive generalization may very well be that its theoretic foundations are somewhat shaky. And if it is thought that the aim of induction is to give us knowledge of unalterable laws holding universally among the phenomena of the real world this impression is undoubtedly justified. Induction can give us some knowledge, of a certain amount of probability upon its evidence, of relations holding among events, and that is all. That, moreover, is a good deal, and all we should expect of it.

In science as we know it, however, the discovery of isolated generalizations from the study of particulars is only the first and elementary stage. It *is* the first stage, and upon it the rest is based. But almost at the beginning various generalizations are seen to be related to each other, to enforce each other, to join together into more abstract and more extensive generalizations. The whole body of science is built slowly into a structure.

If science is thought of in terms of human needs, there

are two which it seems to satisfy: the practical, pragmatic need for control; and the need for theory, structure, 'explanation.' 'Positivists,' social thinkers, inventors have emphasized the first, but the need for structure is perhaps even more basic. Surely this was more important for the great scientists themselves: Newton and Faraday were hardly looking forward to a radio in the corner of a speakeasy, or a subway in the rush hour.

The structure to which science (at least the physical sciences) approximates we have already spoken of in connection with the formation of hypotheses. It is, roughly, the deductive and logically *a priori* structure of mathematics, though it will never attain this structure, because science has always a reference to particulars. As more and more precise generalizations are reached, they are perceived to have logical relations to each other. Tentative, fragmentary generalizations covering small groups of phenomena are seen as logical derivatives from wider generalizations; relations are seen to exist, through mathematically expressed laws, between phenomena of apparently the most diverse sorts. Unification of this structure serves our practical needs; but if science is to be understood its esthetic aspect must not be overlooked.

There are no 'brute facts' to start from. The simplest generalization needs a theory, a belief, to make it even possible. The great structural abstractions of relativity physics imply a whole view of the world, and an attitude toward reality. Experience forms almost automatically a belief in certain generalizations about the motions of material bodies: that some go down and some up, that heavy bodies fall faster than light ones. Experience teaches us unconsciously something about points of light we call stars. It was a mathematician, Ptolemy, who grouped together observations about the motions of stars, planets, the sun, and the moon into a coherent structure.

This was in no sense a simple generalization from particular observations. No observations would have told him about his cycles and epi-cycles revolving intricately about the earth. Another mathematician, Copernicus, suggested a new mathematical hypothesis, which made the astronomical structure simpler and more elegant. And in advancing it he disregarded what might seem to be one of the most obvious facts of all experience — the firmness and solidity of the earth we live on. Another mathematician, Kepler, using observations gathered patiently by Tycho Brahe, improved the mathematical harmony of the structure by treating the hypothetical movements of the planets as ellipses. At the same time Galileo denied the apparent evidence of our senses that heavy bodies fall faster than light bodies, and derived the motions of all bodies on the earth from a few simple equations. Galileo 'proved' his laws by experiments, but he wrote himself that the experiments were only to convince the ignorant, that mathematical reason alone demonstrated them. Newton, one of the greatest mathematicians, by a brilliant imaginative hypothesis, showed that all these subsidiary laws, those governing the motions of the planets and the motions of bodies on the earth, could be mathematically deduced from a single universal law, which he called the law of gravitation. And Einstein has shown that Newton's law can be deduced as a special instance of even more abstract and generalized equations. If we ask which is true, Aristotle's generalization that bodies fall with varying speeds toward the earth, or Einstein's structuralized abstraction, it is not an easy question to answer. Bodies certainly do fall with varying speeds. Are we to explain this, as Aristotle did, as being part of their 'nature,' or are we to correlate this diversity with a large number of other phenomena, grouped under a small number of interrelated equations? It is not easy to answer, because it is so hard

to see what the question means. But if we accept science, we accept the effort to attain a mathematically integrated structure of reality which is to be judged not only by its ability to correlate all the 'facts' (which could be done by other types of structure and in other ways), but by its mathematical harmony, consistency, and coherence.

CHAPTER VI

DIALECTICAL METHOD

1. Realms of Discourse

Every inquiry is limited in scope; if it were not it would be meaningless. Spinoza's principle, *determinatio est negatio* ("to say definitely what a thing is, is at the same time to say what it is not") is one of the axioms which all clear discussion must accept. If a problem is to be discussed satisfactorily we must have some standard of what is relevant and what is irrelevant to the problem; that is, we must be as clear as possible about its subject-matter: it must have one subject-matter *rather than* another. In other words, every problem — and likewise every term and proposition used in the problem — has a certain *range of reference.* The range of reference of a given problem or group of related problems may be called its *realm of discourse.*

The term 'realm of discourse' should not be interpreted to mean that the scope of each inquiry is clearly demarcated from that of every other. The boundary lines are clear only where the subject-matter of the inquiry consists of terms that have been previously straightened out by definitions — terms, therefore, which refer only at second-hand to the shifting and somewhat vague multiplicity of ordinary experience. In most problems we have to set up our boundary lines gradually, as the problem is gradually elaborated and clarified. And, since human interests are more or less organically knit up, there is naturally enough much overlapping. But though we cannot ordinarily expect a sharp separation of one realm of

discourse from another, we can differentiate them by the *dominant* problems by which each is characterized. For example, if A shoots B, the event may give rise to several types of inquiry. That is, it may be accepted as relevant material in several realms of discourse, each distinguished by some problem or set of problems that is dominant. In the field of physics, if the situation were taken cognizance of at all, the dominant problems would be concerned with the force and direction of the projected bullet. For psychology the dominant problems would be about the motives of the murderer and the previous experiences, suggestions, emotions, thoughts, decisions, repressions, that might have furnished a background for those motives. For behaviorism (which as we shall see in Chapter IX, is, in its more extreme formulation, closer to physiology than to psychology) the dominant problems would have to do with the purely physical stimuli and the purely physical 'reaction possibilities' which preceded the shooting as well as the effects that the shooting might be supposed to have on the physical behavior of the still living members of society. For ethics the dominant problems would be whether the shooting, the supposed motives for it and the predicted effects, were good or bad; for theology, whether consistent with Divine Law. Evidently, then, all these realms of discourse (and doubtless many more) are in certain of their phases identical, but are nevertheless distinguished in the important respect that the shared material is in each realm related to a different set of dominant problems.

But not only are there problems within a realm of discourse itself. Realms of discourse, since they can be jointly objects of interest for a single inquirer, can also be made objects of one inquiry: we can ask about their various interrelations and attempt to formulate more clearly their differences. Questions of this kind are called

metaphysical; any reply that is formulated in answer to such a question is called a *metaphysical judgment;* and the subject-matter constituted by such questions is called *metaphysics.*

It is often supposed that metaphysics is primarily concerned with the question "What is the ultimate nature of reality?" and since no completely adequate answer to such a question will probably ever be given, that metaphysics is a quite worthless study. Now it was pointed out in Chapter I that questions are not necessarily asked in order to be given answers; some questions are asked chiefly to enable us to understand a problem better, to show us more clearly what is meant by it. The sciences, as they have established more exactly formulated problems, have generally succeeded in dropping the earlier vaguer formulations that started them off; but in metaphysics, because of its more comprehensive nature, this distinction is harder to observe. Furthermore, a question like "What is reality?" is only partly the question it looks like. At least partly it is a request for emotional satisfaction. Consequently, any direct categorical answer to it, of the form '*x* alone is real,' will be largely emotive: a declaration of cosmic allegiance. Examples of this type of assertion will be taken up later in this chapter; but the point to be emphasized is that the legitimacy of metaphysics does not depend on the possibility of successfully establishing such assertions. There remains in any case a legitimate and important rôle for metaphysics — that of clarifying the interrelations of the various major realms of discourse in such a way as to fit them, with the least possible distortion of their specific natures, into some kind of intelligible structure. The method by which this task is carried out is called, as stated in Chapter I, *dialectic,* and it is now time to examine more closely the nature of the dialectical method.

2. Dialectical Method

It is by now clear that every perception, every word, every proposition, and every realm of discourse can have meaning only by being somehow limited. The perception is this perception *as distinguished from* other remembered or imagined perceptions, the word or proposition means one thing *rather than* another, the realm of discourse gives verbal expression to some group of meanings and embraces some group of problems *rather than* some other. Toward these limitations and the unexamined presuppositions to which they give rise it is possible to become critical, and such criticism is the business of dialectic.

All thinking, so far as it is genuinely thinking and not merely a mental repetition of words, is to an extent dialectical. Our reasoning is never purely linear, starting with clearly defined presuppositions and moving by a definite number of distinct steps to a strictly implied conclusion. Once an act of reasoning has been completed it can be represented as consisting of formal relationships such as those expounded in Chapter IV. Such a representation is often extremely useful: while it does not describe the way the reasoning took place it does show the implicit relations which determine whether we shall build up formal constructions in one direction or another. But if we think of reasoning in this way it is because we are looking at the results rather than at the actual process. Shall I sacrifice my dinner or at least eat a cheaper one in order to go to a concert? Suppose I genuinely wish both to dine in luxury and to attend the concert and that my poverty makes it impossible to do both. Then a dialectical situation will arise. Ethical theorists sometimes talk as if it were possible to apply some definite standard such as 'pleasure' and by examining the proposed acts to see how much 'pleasure' each is likely

to bring, to make a purely logical choice in favor of the more pleasurable alternative. Possibly there are some occasions where this would roughly describe the way we reason, but in at least many of our deliberations the analysis is inadequate because of the different meaning given to 'greater pleasure' according as we choose the one way or the other. What experience tells me is that from the sumptuous dinner I shall get a greater amount of *one kind* of enjoyable experience, from the concert a greater amount of a very different kind. In deliberating which to choose the principal effort consists in trying to comprehend adequately the two kinds of enjoyable experience and ask which of them I accept as the more valuable. The deliberation does not proceed by isolating some abstract quality called 'pleasure' which both experiences share, and then measuring the amount possessed by each. It proceeds rather by what may be called a 'dramatic representation' of the total experience consequent upon each choice; and in choosing between the two experiences as we envisage them our method is dialectical in so far as we are critical towards the special kind of enjoyment offered by each; that is to say, so far as we are able imaginatively to apprehend in each case both the positive goods and the limitations, losses, or sacrifices that will be entailed.

Scientific reasoning, too, is dialectical, so far as in gathering data to establish an hypothesis the hypothesis is therein given additional significance. Very often, it is true, an experimenter — this is especially true of a student working 'under direction' in a college laboratory — knows in advance pretty much what results he is expected to find, and if they are not forthcoming his work of reasoning may be limited to devising explanations for their absence. But where a genuine scientific discovery is made there is not merely an added fact grafted onto pre-existent knowledge; there is also a newly critical attitude formed toward

some aspect of the pre-existent knowledge itself. The apple which, according to legend, Newton saw drop was not for him merely a new fact; in any usual sense it was hardly a new fact at all. It would be foolish to picture Newton as watching an apple drop and then reasoning by a succession of logical steps to his formulation of the law of gravitation. If that description were adequate why had not the appearance of some previously falling body led to the same discovery? From any purely formal standpoint, the law of gravitation is as much implied in one falling body as in another. What uniquely characterized this celebrated situation was not a group of implicit logical relations, since these had been present, unrecognized, in countless situations of the past; but an actual dialectical process by which Newton became critical toward some of the presuppositions that had previously determined, and therefore limited, the kind of theories that it could occur to him to build.

But though we may grant that all reasoning is to some extent dialectical, the extent is generally much limited. Most of our inquiries have fairly fixed limits prescribed to their critical scope, whether by habit, prejudice, or — as in the case preëminently of science — definition. To what extent can the dialectical method of philosophy be more thorough-going? For, remembering the principle, *determinatio est negatio*, must not every philosophical inquiry also make presuppositions and be likewise limited? Is not dialectical method essentially self-contradictory, since while criticizing this or that group of presuppositions it is making tacit presuppositions of its own? At the very least it is presupposing the validity of a critical approach to problems. And actually, in any given application of dialectic, we know that it is likely to presuppose much more. Theological dogmas are critically examined often because we have a perhaps unexamined faith in the

superior validity of scientific method; political standpatism is criticized by one who takes for granted the superior virtues of a more liberal attitude; in general, we can recognize the prejudices of our neighbor only when they are set in relief by the different kind of prejudices that propel our own thinking. This being the case, is not dialectical method, if not impossible, at least strictly limited in the extent to which it can be carried out; and is not philosophy, therefore, whose technique is conspicuously dialectical, a quite superfluous discipline?

The answer to this question becomes apparent when we reflect how the dialectical process actually goes on. In any given dialectical situation certain presuppositions are accepted, but it is at least theoretically possible to find out what these are and in that way, even while retaining them, to recognize their limitations. When we recognize clearly enough the limitations of a given dialectical situation our thought steps thereby beyond those limits, the earlier problems are understood in terms of a wider context, and the dialectical situation is thereby enlarged. It is in this sense that there is a profound truth in the statement, "Knowledge is power." Even the desirability of the critical method itself, which is tacitly assumed in every actual dialectical procedure, can be examined critically without any manifest contradiction. We can become critical toward the critical method to the extent that we can recall various unreflective states that we have from time to time enjoyed, and we can thus be aware that in accepting the advantages of the critical attitude we are at the same time sacrificing a different sort of advantage — the possibly greater contentment that would come from asking no questions about life. And while the making of such a comparison is doubtless in turn colored by unexamined prejudices, this merely means that dialectic, being the actual dynamic process of thinking critically,

can be pushed as far as the ingenuity of the reasoner permits and as the nature of the problem requires. To push it insufficiently far makes for superficial thinking; to push it too far leads into quibbling and word-chopping. In these matters there is no fixed rule. The degree of analysis required by a given problem must be determined afresh, as intelligently as possible, in each new dialectical situation.

Dialectic of values. One of the most important and most common applications of dialectical method is to problems of value, or *normative* problems. For normative problems are closer to most aspects of everyday life than are, for example, the metaphysical problems that we shall presently consider; and they offer greater possibilities of disagreement than other everyday problems. If I assert that the Empire State Building is higher than the Chrysler Building I am unlikely to challenge serious disagreement; and if anyone does disagree I shall not argue with him, I shall simply invite him to measure the two buildings, or to compare their apparent heights when viewed from a distance measured to be equidistant from them; and because we all accept a set of mathematically identical and invariant standards for measuring distance — yardsticks, tape measures, etc. — I am confident of being able to prove to him by experiment that he is wrong. But if I assert that the Empire State Building is more handsome than the Chrysler I am more likely to invite disagreement, and there appears to be no simple way of dispelling it. I can discuss the matter, pointing to the greater simplicity of the Empire State Building and the presence of distracting details on the Chrysler, but if someone were to reply that he prefers ornateness to simplicity it is hardly fruitful to carry the argument farther. The standard of 'handsomeness' that I was proposing in this discussion is not accepted; and just as behind any dialectical process there

must lie certain tacit presuppositions which are however brought to relatively clear expression by the dialectic itself, so in discussing a normative problem both parties to the discussion must agree at least to some extent on certain *norms*, or *standards* — that is to say, presuppositions about the values involved. These standards may be largely implicit, but one of the functions of dialectic is to bring them as far as possible into the open, to *explicate* them. And if the discussion brings out that the ulterior values assumed by each of the disputants are fundamentally opposed to each other, it is hardly worth, so far as that particular point is concerned, pursuing; its principal benefit has been to show the futility of further discussion.

A similar condition — tacit acceptance of at least partially the same standards, whose nature gets partly brought to light by the discussion itself — holds also when the discussion is about *moral problems*. A moral problem is a special (though probably the most familiar) kind of normative problem, concerned not merely with what is good or bad, more excellent or less excellent, but with *what ought to be done*. To raise a moral problem is at the same time to raise a normative problem, for in deliberating about what ought to be done we are also asking what, if done, would be better; but not all normative problems are moral, for we can ask the latter question without asking the former. This is commonly the case with questions of esthetics and also with discussions about unattainable Utopias and about the abstract desirability of imagined acts which are not, as a matter of fact, within our power. When the question at issue is a moral one the standards involved take the form of *standards of conduct* or *moral ends*. These are similar to other types of standard and of dialectical presupposition generally, in that they are usually more or less implicit to begin

with and are brought to a more articulate form in the course of the discussion, and in the further respect that if two sets of moral ends are completely at variance no amount of discussion is likely to heal the breach. Imagine, for example, an argument with a communist about the desirability of the Soviet form of government. He, let us suppose, argues that it makes for a more equitable distribution of goods and at the same time, by its greater centralization of authority, for a more stable and therefore more enduring society. These two effects, he argues, economic equality and economic-political stability, will alleviate the principal causes of human misery and therein promote so far as possible the greatest happiness of the greatest number. Suppose, on the other hand, the anti-communist declares that true happiness is impossible without a great degree of individual freedom and social diversity, both of which he finds inconsistent with the extreme centralization of authority and mechanization of function promoted by the Soviet government. Both disputants agree that in some sense the 'happiness' of as many people as possible is desirable. Naturally, the fact that they apply 'happiness' in such different ways shows that they do not mean quite the same thing by it; still, the word symbolizes some kind of agreement, and though this may be perhaps no more than a general sentiment of good-will toward human beings at large it is sufficient to orient the discussion. Agreeing on social happiness as an end, the disputants can then raise such subsidiary questions as: the extent to which and the ways in which centralization and mechanization are actually going on in Russia, the extent to which this can be paralleled in other countries, whether these evils are greater or less than the poverty, injustice and general social anarchy that the Soviet plan avowedly hopes to minimize or even eradicate. No complete agreement is likely; indeed, 'complete'

agreement would make discussion impossible no less than a too radical disagreement. What is needed is a sufficient agreement about fundamental things to preserve the discussion. If the anti-communist had replied in the first place that he was not over-much interested in the general happiness but primarily in the happiness of himself, his friends, and persons sharing his own interests, it is not easy to see how much of a discussion could ensue, for the disputants would have had no common ground.

3. Metaphysics

The general principles of dialectical reasoning involved in the foregoing illustrations are equally important when dialectic is applied to the more abstruse problems of metaphysics. Metaphysics has already been defined as a study of the distinctions and interrelations of major realms of discourse, in such a way as to fit them, without losing sight of their specific natures, into some kind of intelligible structure. This definition implies that metaphysics has a twofold nature. So far as it consists in clarifying the meaning of each realm of discourse with reference to others, it is *critical;* so far as it consists in positing a system in which these different orders of being are given different places according to the degree of 'reality' that they are declared to have, it is *systematic* or *doctrinal.*

(1) **Critical metaphysics.** The first step in a critical approach to any realm of discourse is to specify the dominant *categories* of that realm. By 'category' is meant "one of the highest classes to which the objects of knowledge or thought can be reduced" (Webster), that is, one of the most abstract characteristics of experience. *Red* and *blue,* while partially abstract since they must each cover a multitude of differing cases, are concrete as

compared with the more highly generalized notion of *color*. Color, in turn, can be subsumed under a higher generalization, which is discoverable when we reflect by what name we designate the property that color, sound, and the like have in common. We call them all *qualities*. The notion of quality is a very highly generalized one indeed, but it is specific to this degree at least, that, used accurately, it can be discerned to be logically distinct from the notion of *quantity*, *space*, *time*, *substance*, *cause*, *mind*, *value*. It is possible to shift the meanings of these words so as to make some of them appear to be merely special cases of others. Such shifts will be discussed presently; for the moment it is enough to observe that they are in various ways possible, and that philosophers have never been agreed on just what classifications of categories to consider final. Probably the best classification that has been devised is that of the French philosopher, Charles Renouvier, who listed nine categories: *relation* (which is at once the most general category and also an abstract characteristic present in all the categories), *number*, *spatial position*, *temporal succession*, *quality*, *becoming*, *causality*, *'finality'* (telic principle), *personhood*. Still, the list is not immune from attack, and the best way of dealing with the problem of categories is not to attempt to formulate a completely satisfactory list of them, but rather to attempt in dialectical reasoning to recognize categorial [1] differences and interrelations wherever they appear.

The importance of such a recognition becomes evident whenever dialectical procedure is pushed very far, as for instance in a dialectical critique of science. It is evident that 'science' is an abstract term, since there is no one

[1] The adjective 'categorial' means 'pertaining to categories,' and should not be confused with 'categorical,' which refers to judgments and propositions and means 'affirmed unconditionally.'

science but many sciences, each having a different and sometimes quite distinct subject-matter. Partly the difficulty of characterizing science is due to the ambiguity of the word, which makes it refer not only to the empirical sciences but also to mathematics, and which enables esoteric doctrines to be sometimes called 'occult sciences.' But disregarding these special uses of the word, we can discover a similarity among the various sciences — not so much in their subject-matters as in their aims, methods, and definitions. These aspects of science were discussed in the last chapter; they may be summed up here as follows: (1) In some sense or other it begins by *describing* phenomena; it does not, explicitly at least, evaluate them. (2) Its descriptions are selective, admitting as true data only those aspects of things that are, so far as possible, *publicly verifiable*. (3) It is not interested in an individual as such but only considered *as representing a class* and as possessing characteristics shared by other members of the class. (4) The most important of the shared characteristics, particularly in the more developed sciences and in the more developed stages of science, is that of being *measurable;* whence it follows that science in making its selective description tends to stress the quantitative aspect of things and either to ignore or to regard as relatively unimportant by-products the immediately qualitative aspects. (5) It is *deterministic;* it accepts the postulate of causal determinism (whether for every individual event, as in classical mechanics, or for statistically determined classes, as in some branches of modern physics) as a regulative ideal — that is, as holding good even in situations where its validity cannot be empirically verified. By recognizing these characteristics, or some similar grouping, as essential to the meaning of what is properly called science, it becomes possible to get a clearer notion of the possibilities of valid realms of discourse that are not

scientific. Experiences so far as they are (1) evaluated, (2) private, (3) complete in themselves, (4) qualitative, (5) fortuitous, are not accepted as material for science. Frequently it is not recognized even by scientists how much material they are constantly ignoring, for in actual experience the scientific and the non-scientific aspects are found mixed up together, and since the work of separation is carried out instantaneously according to the dictates of the problem on which one is engaged, there is danger of forgetting that it has actually taken place. But one has only to reflect on the difference between the Newtonian view of space and the different sorts of spatial experiences in dreams, in imaginings, in the unfamiliar spatial perspectives that make up a painting by Cézanne, or even in just gazing into the sky and seeing the stars as not so very distant pin-points of light; between time as measured by clocks and calendars and time as experienced when hours and days seem now to creep by, now to have escaped before we have half enjoyed them; between the physicist's analysis of matter into patterns of electrical charges and our own immediate acquaintance with matter as something hard, pushable, and sometimes (not always: we 'enter' the water) impenetrable; between the scientist's postulate of a deterministic universe and our own frequent experience of chance events, of our being taken by surprise — of these and other similar differences, in order to see how marked are the limitations of the scientific ideal and how far removed from familiar experiences are the concepts of theoretical science. We are here up against a major division of categories: those defining the scientist's 'world' and those which are not relevant to that world. That non-scientific categories somehow *are* and do somehow have meaning is demonstrable *a priori* from the dialectical principles already laid down: if science is more than an empty word it must have definite

characteristics; and a set of characteristics can be definite only by being limited, that is by *not being* some other set. A set of five such characteristics belonging to science and an opposing set of five contrasting characteristics has just been laid down; but by observing the principles of dialectical analysis it is clear that even if science were not granted to possess this particular set of characteristics it would have to possess *some* set, and the *a priori* validity of a non-scientific realm (or realms) of discourse would be therewith granted.

(2) **Systematic metaphysics.** Viewing opposing categories or sets of categories in opposition makes it possible to formulate the question, Which of the sets is the more *real?* This is the most general formulation of the problem of systematic metaphysics. Are physical things alone real? Or is God the only reality? Or shall I designate as real only those aspects of things which I can experience or enjoy or participate in? All these and many more assertions have from time to time been offered. Probably it would be wisest not to hope for any limited, standardized application of 'real' to take precedence over others. The word is serviceable in orienting discussions that pass dialectically beyond the limits of highly standardized meanings, and its own meaning must be thought of as unified only in a much more abstract sense. The following quotation from Professor C. I. Lewis makes this clear:

> The word 'real' has a single meaning, of course, in the same sense that 'useful' or any other such elliptical term has a single meaning. Nothing is useful for every purpose, and perhaps everything is useful for some purpose. A definition of 'useful' *in general* would not divide things into two classes, the useful and the useless. Nor could we arrive at such a definition by attempting to collect all useful things into a class and remark their common characters, since we should probably have everything in the class and nothing outside it to represent the useless.

Instead, we should first have to consider the different types of usefulness or of useful things and then discover, if possible, what it is that characterizes the useful as contrasted with the useless in all these different cases. We should find, of course, that it was not some sense-quality but a relation to an end which was the universal mark of usefulness. Similarly, to arrive at a general definition of 'the real' it would not do to lump together all sorts of realities in one class and seek directly for their common character. Everything in this class would be at once real, in some category, and unreal in others. And nothing would be left outside it. The subject of our generalization must be, instead, the distinction real-unreal in all the different categories.[1]

Following out Lewis' suggestion, what can we say is the common character of the different uses of 'real' and the different distinctions of real-unreal with respect to the several categories? The meaning of 'real' when thus analyzed appears to be *relevance to the realm of discourse in terms of which the judgment of reality is made.* To this extent, then, the application of the words 'real' and 'unreal' shifts according to the realm of discourse that is taken as standard of reference. The nature of à realm of discourse is determined, as we have seen, by the nature of the set of problems that constitutes it. Consequently when we have established and clearly understood a set of problems, we have therein fixed the meaning of 'real' *relatively to those problems.* If our problem is to determine the acceleration of a falling body the color of the body is irrelevant — that is, unreal with respect to the problem. If our problem is to determine the probable responses that a human organism will make to given stimuli, the feelings and thoughts — in general, the mind — of the individual being thus experimented on are irrelevant and therefore unreal with respect to this problem. If science in general

[1] *Mind and the World-Order*, pp. 15–16.

is conceived as aiming at establishing formulas for the systematization of the publicly verifiable aspects of things, then the aspects which are not publicly verifiable or which cannot without changing their character be systematized — thoughts and feelings and values, and the beauty and ugliness and excitement and dreariness of things, and the countless vague random fleeting qualities for which we have never devised names — all these must be called unreal from the standpoint of science. There are other points of view, of course, from which the categories of science would in turn be unreal, or of inferior reality. The protons and electrons of which, from the physicist's standpoint, Belinda is composed are quite unreal from the standpoint of love-making. Love-making has its own glimpses of reality, and the successful lover will know better than to confuse these with the, to him, irrelevant realities of science. On a more general and theoretical level there are many philosophies that reduce scientific categories to the status either of pure illusion or of, at best, a distortion of the Reality that can be rightly apprehended only in another way — by an ecstatic vision of God, or, as in the philosophy of Bergson, by a pure intuition of the continuous flow of experience, which we can get only by living and which we lose sight of when we try to think about it in terms of science or logic. The history of philosophy is, from one point of view, a record of the attempts that have been made to give systematic expression to different standards of what Reality is. And the task of metaphysical criticism may be restated as the task of clarifying, afresh within each new context, the specific meanings that 'real' will from time to time have.

But as for the standards on which the different doctrines of reality are based, can anything further be said about them? 'Real,' it has already been said, means relevance to the realm of discourse in terms of which the

judgment of reality is made. But what determines which realm of discourse is to be chosen as such a standard? The most plausible reply is that in declaring one realm of discourse, or certain categories employed in it, to be more real than others, the metaphysician is making a judgment of *value;* and that metaphysical judgments are therefore a form of, or at least closely similar to, normative judgments. When the evaluative basis of metaphysical judgments is recognized, a metaphysical doctrine can be interpreted as an attempt to give systematic expression to what is at bottom a declaration of the most worthwhile aspects of things: it is the metaphysician's own declaration of cosmic allegiance.

4. Fallacies of Metaphysical Reasoning

Because of the intrinsic difficulty of its subject-matter metaphysical reasoning is especially susceptible to subtle and not easily discoverable fallacies. The most general kind of fallacy, and in a sense the basis of all fallacies, is ambiguity. Various forms of ambiguity were discussed in Chapter III; they may be reconsidered here, especially Types 11 and 12, so far as they relate to metaphysical reasoning. In other words, the ambiguities that will concern us in this chapter are those in which the double referent straddles two or more realms of discourse. These may be called *metaphysical ambiguities.*

Some metaphysical ambiguities are clear-cut and easy to point out, since the referents between which the meaning of the word swings are each of them sufficiently definite. 'Space' and 'time' are examples of words whose ambiguity, while of metaphysical significance, is fairly clear-cut. Omitting poetic and more purely metaphoric usages, which will be discussed in Chapter XII, each of these words appears to have two principal meanings: the

one in terms of the scientific notion of 'dimension,' the other in terms of more or less immediate experience. In the one sense 'space' and 'time' are abstractly conceived dimensions in terms of which every 'physical event' is defined; they are uniform, public, and measurable. In the other sense 'space' is what we see stretched out before us, it characterizes the objects we dream about, it changes its character when one is dizzy or drunk; 'time' is an ever-present state of conscious activity, big with memories of the past and with expectations of the future. In this case, the ambiguity can be removed by simply giving different names to the two meanings ordinarily associated with each of the words. Thus it is customary to distinguish between *conceptual* space, in which at ordinary velocities Euclid's theorems hold approximately true and in which the two rails of a track 'really' remain parallel, and *perceptual* space, which means the spatial experiences we actually have, which the painter may try to represent on canvas, and according to which the railway tracks come together in the distance and there is a 'horizon' where heaven and earth meet. Similarly, in conceptual time 'the present' is a mathematical point without duration, which could never possibly therefore be experienced; whereas perceptual time is, as already suggested, a continual moving present.

In general, such words as 'being,' 'nothing,' 'God,' 'idea,' 'existence,' 'truth' — and, of course, 'reality' — are especially prone to ambiguity in a metaphysical argument. In the case of some of these words it is not always possible to be completely clear, but there is need to distinguish their several meanings as clearly as possible lest every discussion in which they are used become vague and fruitless. When Pope Pius XI declared in a recent encyclical that birth control was "contrary to nature" he was attacked by a writer in *The New Republic*, who,

through suggesting a good definition of 'nature' in terms of modern biology, had no trouble in showing that in terms of nature thus defined the Pope's statement was false. What the critic, however, apparently did not realize was that since the Pope and he were attaching different meanings to the word 'nature' his criticism largely missed its mark. The 'nature' of anything, in thomistic philosophy, involves the fulfillment of an ideal end which in the case of man is interpreted by reason and faith to include dedication of the sexual act to the production of offspring. A more appropriate criticism of the encyclical, therefore, would have begun by making explicit its implied definition of 'nature' and then have adduced reasons for rejecting it together with the authoritarian realm of values that it implies. Again, Herbert Spencer's argument that "Empty space is unthinkable, because a thought is a thought of something" rests on the ambiguity of the distinction between 'something' and 'nothing'; and the often quoted statement, "Your God is my devil," is a reminder of how radically the word 'God' differs according to the interests, mental habits, private experiences, and values of the speaker.

On a still more abstract plane, the word 'truth' has proved immensely troublesome and philosophers have filled many books upholding this or that doctrine of what truth, in the last analysis, is. Whatever advantages such disputes may offer as intellectual exercises or as indirectly throwing light on other, more meaningful problems, it seems evident that the question as generally formulated errs in failing to take account of the various uses to which the word 'truth' must necessarily be put and the consequently various ways of establishing truth that there must necessarily be. Scientific experiment establishes certain kinds of truth, inward conviction is a sufficient and only possible way of establishing other

kinds, intellectual consistency establishes still others, while predominantly practical considerations establish a fourth kind. In everyday life we use all of these tests to some extent, thus according implicit recognition to the ambiguity of the word. Theories which in the interest of a unified doctrine try to establish some one of them as 'the only valid' test are insufficiently critical toward the necessary ambiguities of the word.

A fallacy that plays an important part in much metaphysical reasoning consists in a confusion between dialectic and *speculation*. A speculative judgment is a descriptive judgment — that is to say, a judgment of fact, a judgment whose *meaning* does not preclude the logical possibility of eventual verification — but which cannot, as it happens, be at present verified. A speculative judgment, in other words, is a judgment that would have the status of an hypothesis if there were more specific evidence to support it. It *is* either true or false, only we can't know which; whereas a judgment arrived at by genuinely dialectical method *is made* true or false by an acceptance or rejection of the meanings it expresses. Arguments about immortality often make use of this fallacy. When most people speak about a belief or disbelief in immortality they are talking about a personal immortality, a survival of the individual personality after the body's death. Immortality defined in this way is precise enough to make 'belief' in it something more than a matter of dialectic: either it is a fact that we do survive in this sense or it is a fact that we don't; though there may be no way at present of knowing. An *a priori* demonstration of immortality, however, such as the one which Plato in the *Phaedo* puts into the mouth of Socrates — that only what is dissoluble can die and only what is compound is dissoluble, whence the soul, because it is the principle of unity of the body's various functions,

cannot die and must be immortal — says nothing about the actual survival in time of a man's personality. It says only that a *principle of unity* is indestructible; and since a principle of unity is not an event that either will or will not actually be destroyed at some future time, but a concept arrived at dialectically, whose indestructibility is therefore *made* true by definition, the argument is immune from refutation only at the cost of saying nothing whatever about anyone's actual future state.

A special danger in metaphysical reasoning is found in the tendency to attach too much importance to *ideologies*. An ideology is defined by Webster as a "visionary speculation; idle theorizing; also, an impractical theory or system of theories." As used in recent philosophical discussions, however, it has come to mean an imagined picture of reality which may be very practical indeed for organizing a number of otherwise scattered details of knowledge, but which is by its nature never directly verifiable, being defined in such a way as to be either self-contradictory or inconsistent with the postulated conditions of direct verification. An ideology is, in short, an hypostatization of a methodology; and since a methodology may, for practical reasons, select and ignore elements in combinations that could not possibly be actually present together in one experience, it often turns out that ideologies are not only unverifiable but impossible even to believe in without lack of consistency. Atoms, universal Progress, and many popular notions of God are ideological. An atom is supposed to have only primary qualities, to be therefore colorless. But in any clear picture we form of an atom it obviously must have some color or it could not be visually distinguished. The real atom, then, is fundamentally different from the mental pictures that are appealed to when talking about it (as when it is likened to billiard balls), but this discrepancy

is overlooked because of the atom's being in any case too small to be actually visible however much magnified, since by the hypothesis on which it is affirmed it is too small to affect sufficiently the vibratory motions of light-waves.

Suppose someone began to talk seriously of a man seeing an atom through a microscope, or better perhaps of cutting one in half with a knife. There are a number of non-analytical people who would be quite prepared to believe that an atom could be visible to the eye or cut in this manner. But anyone at all conversant with physical conceptions would almost as soon think of killing the square root of 2 with a rook rifle as of cutting an atom in half with a knife. One's conception of an atom is reached through a process of hypothesis and analysis, and in the world of atoms there are no knives and no men to cut. If you have thought with a strong consistent mental movement, then when you have thought of your atom under the knife blade, your knife blade has itself become a cloud of swinging grouped atoms, and your microscope lens a little universe of oscillatory and vibratory molecules. If you think of the universe, thinking at the level of atoms, there is neither knife to cut, scale to weigh, nor eye to see. The universe *at that plane to which the mind of the molecular physicist descends* has none of the shapes or forms of our common life whatever.[1]

Universal progress is another such ideology — an onward and upward movement of history, which (1) could never be proved since the only evidence for it is got by making proper selections of events to be used as evidence and putting proper emphasis on them, and this selection and emphasis is in turn based on a prior belief in progress, whence the argument becomes question-begging; and (2) which could not even be consistently believed in, for progress can have some meaning only with reference to a comparatively static goal and a comparatively static stand-

[1] H. G. Wells, *First and Last Things*, pp. 39–40.

ard by which degree of nearness to the goal can be estimated, whereas the usual liberal-romantic-humanitarian view of progress rejects the notion of a goal or standard. Again, God is an ideology, or likely to be, since the symbols by which he is represented, if we forget to regard them as symbols and take them for the reality itself, are likely to consist of pictures projected into the real world which are not in the least visually similar to anything actually found there.

(1) **The fallacy of metaphysical reduction.** The fallacy consists in setting up one aspect of things or one type of experience as 'reality,' reducing all other aspects, so far as they are not simply ignored, to the status of 'mere appearance,' or interpreting them as expressions or distortions or functions or by-products of what is set up as real. Actually, of course, every situation has many aspects, and which of them is to be stressed depends on the interests at stake in making any given formulation. A man's anger may be explained by a chemist in terms of a more rapid vibration of molecules in the blood, by a physiologist in terms of an increase of oxidation and adrenalin secretion, by a psychologist in terms of the instinctive and conditioned responses that have been aroused, together with their accompanying emotions after excitation of afferent nerves by a certain stimulus, while the man himself would probably explain it in terms not of his own organism at all but of the, let us say, insolent conduct of the person who 'made him angry.' For most human purposes the last explanation is the truest, though for the technical purposes of science one of the other explanations might properly be called, in a more specialized sense, true. The fallacy of metaphysical reduction occurs when this attitude of dialectical tolerance is abandoned and some one of the explanations is set up as the 'ultimately true' one.

The fallacy takes many forms. Idealists who explain away all matter as 'nothing but' mind or ideas, and materialists who explain away mind and ideas as 'nothing but' some arrangement of physical processes, when both had originally got their notions of what is meant by mind or ideas on the one hand and by matter or physical events on the other through their contrast with each other, are alike victims of the fallacy. The 'economic materialism' of Friedrich Engels and in general of the philosophical spokesmen of Soviet Russia, which regards the individual and his individual ideals as 'merely' an effect or expression of social movements, is another example of the fallacy; and the opposite paradox known as 'solipsism' — that I alone exist and that other persons are only the ideas I have of them or the interest I take in them — would be, if anyone were to hold it seriously, another.

Or again, the fallacy may enter into discussions about value, taking here most commonly the form of a reduction of values to facts. Reduction of the values of love to the facts of sex attraction or of questions of esthetic excellence to 'mere matters of taste' are fashionable examples. A value can be regarded as a fact, of course, for it is a fact that someone or some group of people holds such a value; but the problems arising from the value itself and from the facts associated with it are fundamentally distinct. A proposition p of the form 'x is good' is not identical with another proposition q which has the form "So-and-so believes p." The former is an affirmation of value, and while it could never be finally proved to someone who chose to affirm different values it might well be discussed by dialectic, its consequences worked out, its meanings expanded. The latter proposition, on the other hand, is a statement of fact: it is either true or false, and while its truth or falsity may perhaps be difficult to determine, we nevertheless assume that it is verifiably one *or* the other

and that the evidence by which it might be established is mainly empirical in character.

The reduction of values to the factual question of the origin, whether in the history of the individual or of society, of belief in those values is sometimes called the *genetic fallacy*. Because anthropological researches have uncovered intimate relations between early religions and sex, religion is sometimes supposed to be thereby discredited. Aristotle's important principle, that "the true nature of anything can be studied best in its developed form," is too often forgotten. Mr. F. R. Earp declares, referring to Greek religion,[1] that "the only meaning we can safely ascribe to a rite is that which was assigned to it by those who performed it. . . . We cannot discover it from possible origins. Many years ago I remember hearing Miss Jane Harrison say in triumph, after tracing the origin of some local cult of Zeus: 'There! I knew that Zeus was only that old snake.' The whole fallacy of this method lies in that word 'only'."

(2) **General criticism of the fallacy.** The logical principles already discussed offer a sufficient methodology for criticizing the fallacy of metaphysical reduction. The following summary of its principal faults may, however, be added:

(i) Any argument in support of metaphysical reduction is necessarily question-begging. To prove, for example, that the soul does not exist, scientific psychology must first tacitly define existence in terms of such categories as public verifiability and membership in a causally determined series of events, and then show that in the series of events that has been constructed by reference to such categories there is no evidence that such a thing as soul exists. This, however, refutes merely the ideological aspect of what is meant by 'soul'; it does not touch the

[1] *The Way of the Greeks*, p. 87.

inner, self-evident principle of selfhood to which introspection testifies, because it *rules out* introspection — that is, it declares the results of introspection irrelevant to its method, and therefore outside its realm of discourse. But in declaring the results of introspection outside its realm of discourse science does not declare them false: it declares that from its standpoint they are *neither true nor false;* it declares its own incompetency to deal with them. Again, in Hugh Elliot's statement, "Life is a name for the physico-chemical processes peculiar to protoplasm, and when those peculiar reactions cease, life is extinct," [1] the first part of the statement is frankly a definition of the *word* 'life' in physico-chemical terms. But that definition makes the second part of the statement tautologous: it becomes equivalent to "When those peculiar reactions cease, *they* (since the word 'life' has been stated to *mean* them) are extinct." But that life as a continuation of personal consciousness is extinct, is neither affirmed nor denied; since life in this (more usual) sense of the word is admittedly not being discussed.

(ii) Not only can the exclusive reality of some one realm of discourse not be proved; it would be in any case meaningless to assert it. For by the Principle of Significant Assertion, it is required that in any genuine proposition: (*a*) the terms which the proposition relates shall each mean something, which implies that what they mean shall be distinguishable from what they do not mean, and (*b*) the meaning of each shall be distinguishable from the meaning of the other. A statement of metaphysical reduction violates both these requirements. By requirement (*a*), to say "Everything is *x*" (where *x* may stand for physico-chemical processes or ideas or God) has meaning only if *x* also has meaning. Consequently, we must conclude that either the proposition "Every-

[1] *Modern Science and Materialism*, p. 101.

thing is x" is false or 'everything' is limited to mean 'the entire realm of discourse determined by having the characteristic x.' But in that case the proposition becomes "The entire realm of discourse determined by having the characteristic x is (has the characteristic) x"; which is tautologous, violating requirement (*b*).

(iii) The fallacy can be interpreted as an unjustified extension of what in science is called the Principle of Parsimony. This means, as we saw in the last chapter, whittling down the problem to what is strictly relevant to it, and in the case of science, interpreting relevance in terms of physical categories. For science this interpretation is necessary, but since the problem of metaphysics is the problem of relating, in logical terms, the various realms of discourse to one another, metaphysics is not justified in limiting its judgments in any such way.

(iv) The positive meaning of a statement of metaphysical reduction is a statement of the terms in which a group of dominant problems, constituting a realm of discourse, is to be expressed. A given science will necessarily treat all other aspects of experience as springboards into its own realm of discourse; that is, the other aspects, when noticed at all, are noticed simply as *signs* of the presence of meanings which the science has defined as relevant. To a dentist the pain that a patient *feels* is a sign of a physical condition around the dental nerve, at which the dentist can *look*. But it would be absurd to therefore tell the patient that only the looked-at tooth is real and that the felt pain is unreal. In fact, the dentist, because he is human as well as professional, might on looking at the tooth accept the tooth's visual appearance as a sign of the pain that he infers the patient to be feeling. In the same way a behaviorist, when by introspection he is aware of himself as thinking, uses that fact as merely

a sign of some different fact, such as the vibration of his larynx, which has membership in the physiological realm of discourse to which behaviorism refers. But *applied* behaviorism — and most behaviorists are willing to make applications of their science — might validly reverse the sign-meaning relation here involved: watching another person's larynx in motion a behaviorist might, with laudable inconsistency, infer that the other person was undergoing the experience called thinking.

(v) It should be observed that metaphysical reduction is, properly speaking, *fallacious* only when the statement of reduction is interpreted as a factual or descriptive proposition. And what the above criticism amounts to is the demonstration that, except for the indirect definitive sense suggested by (iv), a descriptive proposition of this kind is not false but impossible: in spite of the verbal appearance, there is no such proposition. If, however, we interpret the metaphysical reduction in the manner recommended at the close of the preceding section, as an affirmation of value, there remains at least the possibility of justifying it on grounds to which this logical criticism may not be wholly relevant. This possibility will be kept in mind throughout the discussion in Part II, and will be more explicitly considered, in the analysis of belief in Chapter XI, and in Chapter XIII.

The following chapters will be devoted to a study of several of the most general and important realms of discourse, and the problems suggested by a metaphysical inquiry into each. This juxtaposition of diverse types of problem will offer a stimulus for applying the view of philosophy already accepted in theory: a view of philosophy as at once critical and synoptic, recognizing and making articulate the dominant categories and problems of each realm of discourse while at the same time

relating these to interests and meanings articulated from other fields of experience. Even the manner of articulation must not be too narrowly conceived. In Chapters VII–X, which deal with the sciences, the self, and society, our method must be so far as possible logical; but in approaching Chapters XI and XII, which deal with religion and esthetics, we must become critical toward even logical method itself, and inquire how far these realms can give articulate expression to meanings with which logic has only a casual acquaintance.

PART TWO
PROBLEMS

CHAPTER VII

THE WORLD OF PHYSICS

The most imposing ideologies of the modern world have grown out of the physical sciences. We shall in this chapter examine in a necessarily limited fashion their method and the account they give of *physical reality*, together with certain problems which arise when this account is mistakenly believed to be legislative for experience in general.

1. The Common-Sense World

By 'the common-sense world' is meant the world we all of us most of the time live in. It is the familiar world around us that we see, touch, feel, taste, and smell. It is the world which we know when we first begin to think; and consequently the starting point for the more complex disciplines of religion, philosophy, and science. Not unreasonably, therefore, we may suppose that religion, philosophy, and science, however far they may depart from the world of common sense, should maintain intelligible relationships to it. As we have seen it is not the given, but the given interpreted — though interpreted for the most part unconsciously and automatically.

Among the physical aspects of the common-sense world perhaps the most striking are *objects* — a countless number of separate objects: chairs, people, trees, stars, books, stones, flowers, animals, riveting machines, mountains. These objects are colored such and such a color, taste pungent or sweet or insipid, feel hard or soft, on occasion

give off smells and sounds. They are arranged spatially, near together or far apart, above, below, behind, in front of each other; they persist through time, from hour to hour or day to day or even from century to century. If there were not more or less enduring objects, life would no doubt be too complicated to live. We have to count on finding our house where we left it in the morning, and our pen still on the desk. Yet there are complex problems connected even with so apparently simple a notion as an object: for instance, what happens to objects when no one is looking at them?

These objects behave in accordance with fairly stable *laws* which hold through time. Unconsciously we have learned about many of these laws, and this knowledge too is demanded by the necessities of living: we must know how to get out of the way of falling bricks, not to walk on water, not to punch windows or try to go through closed doors.

Nevertheless, in spite of the stability manifested in objects and laws, *change* is no less striking a characteristic of the world of common sense. By change we do not mean here the ceaseless change of the contents of our consciousness, but change in the world that seems to be, somehow, outside of us. We know this change first of all in our own bodies: we grow older, mature, and die. But inorganic objects, in the same inexorable way, are subject to change: this suit is wearing out, will some day be discarded, and will gradually disintegrate; this building is being continuously worn by weather and use; the log in the fire burns and disappears. The mystery of this change, of this flickering of objects in and out of existence, is not clarified by the common-sense laws which are themselves changing, and subject to innumerable exceptions.

Change, and the lack of order and consistency among the objects and laws of the common-sense world, though

stimulating, have certain practical disadvantages; and are furthermore, from some points of view, unsatisfyingly irrational. The physical sciences set out to solve in some measure this irrationality; to order, predict, and thereby control physical events on a widely comprehensive scale. In doing so they develop the picture of a physical world far different from the familiar world around us.

2. Classical Physics

In spite of wide differences among the views of individual scientists and philosophers, from the days of Galileo until the beginning of this century there was a fairly large common body of opinion held about the nature of the physical world. In this section certain of its more important features will be outlined.

(1) **Determinism.** In Chapter V the general characteristics of scientific method were discussed. All of these apply in the development of the physical sciences. In understanding what is meant by scientific 'rationality' determinism is of particular importance. As we have seen, scientific reasoning must postulate the probability of determinism in any given instance. Classical physics, however, held to the doctrine of *universal determinism*. This was not a methodological assumption, but a theory or belief about the nature of physical reality. In accordance with this belief it was thought that the 'laws' of common sense which are so evidently partial, and to which so many exceptions occur, could be discovered to be dependent upon a limited number of universal laws to which there were no exceptions. We have already studied the methods by which such laws are supposed to be investigated.

(2) **The principle of identity.** One of the fundamental — perhaps the most fundamental — criteria of rationality

in the physical sciences is what has sometimes been called the principle of identity. Just what is meant by this principle will become clear only by observing its influence in shaping the primary laws and concepts of the physical sciences. It was summed up in the ancient world by the phrase *Ex nihilo fit nihil* ("Out of nothing, nothing can come."), and in more modern times by such phrases as "All change is transformation." A disturbing feature of the common-sense world we found to be 'creation,' the coming into and going out of existence. Scientific reason seeks to remove this disturbance by considering creation an 'illusion,' and explaining change as no more than the *transformation* of what was already there. Since change and genuine creation are the most obvious characteristics of the common-sense world, it is evident that the application of this principle will involve us in subtle and devious complexities.

(3) **Quality and quantity.** In organizing experience one of the primary distinctions we make is that between quality and quantity. What is meant by quality is suggested roughly by the question, "What kind of?"; quantity, by the question, "How much of?". A symphony is a different kind of thing from a glass of water; a taste, from a color; hot, from cold. These are qualitative differences. But two pounds of lead are the same kind of thing as one pound of lead; the difference here is quantitative. For common sense the distinction often blurs: we are likely to think of scarlet as 'more red' than pink (quantitatively different); but purple we sometimes think of as a quantitatively distinguished red, sometimes as a (qualitatively) different color.

In some sense or other all experiences are qualitatively different. Scarlet, red, pink, purple, if we emphasize a qualitative approach, are all undoubtedly different colors. Qualities, such as red, do recur in experience, and we say

that we are seeing 'the same color,' but experience during the interval has changed, however slightly, the qualitative context in which the red again is found. Nevertheless, for the purposes of science, quantity has an inestimable advantage over quality: quantity admits completely of mathematical handling, and mathematics are the most powerful method of scientific reason. It is not true, as is sometimes thought, that mathematics can do nothing with qualitative differences. Qualities can be arranged in *series*, and modern mathematics has developed ingenious ways of dealing with series. Without knowing anything about the physical theory of acoustics, a musician can order the sounds he hears in a series of tones each one of which is 'lower' or 'higher' than any other; or a painter his colors. With such an arrangement of sounds or colors great symphonies and paintings might be produced; but, each color and sound remaining essentially different in the series, the knowledge of these arrangements, even when refined by abstract mathematical devices, would be bulky and unwieldy, incapable of easy communication, and dependent largely upon the accuracy of individual perception. It is the kind of knowledge an artist must have, but in which the scientist is only indirectly interested.

In the case of sound the scientist correlates these qualitative differences with the motions of waves in the air. *All* sounds can then be studied as fundamentally 'the same': that is, they differ only quantitatively — in the length, frequency, and the other *measurable* differences in the air waves. Thus one sound can be thought of as 'twice' another, or as 'compounded' of two other sounds; and, in general, all sounds can be mathematically related in all conceivable ways. *Qualitative differences are thus gradually ruled out of physical reality.* And one of the difficult philosophical problems which arise from

the physical sciences becomes the study of the relation between qualitative differences and quantitative differences.

In the shift from quality to quantity the influence of the principle of identity and the principle of simplicity (see p. 136) should be observed: for a world filled with countless essentially differing qualities is substituted one with a smaller and smaller number of qualitative differences quantitatively intra-related. Though the beginnings of this shift are to be found in Greek and Roman science, the Aristotelian science, which was the leading system in Europe until the Renaissance, was fundamentally qualitative. Quantity, of course, has no meaning apart from *some* qualitative differentiation, but on the whole the tendency of modern science has been consistently away from quality toward quantity. In this century, the notion of quantity, which was as we shall see attached vaguely to notions of weight or bulk, has completed its assimilation to mathematics; and instead of characterizing contemporary physical science as 'quantitative' we may more accurately use the less colorful adjective 'metric' (capable of being dealt with by mathematics). From this point of view, the tendency of modern science may be thought of as toward the expression of all physical reality in terms of 'metric variations.' [1]

(**4**) **Space.** One of the governing ideals of physics is to make its world independent of the individual peculiarities of the observer. Whatever elements of experience are

[1] This is the modern equivalent of the doctrines founded by the brilliant though historically somewhat mythical Greek thinker, Pythagoras. Pythagoras, who lived in the sixth century B.C., is credited with the first proof of the geometrical theorem equating the square on the hypotenuse of a right triangle to the sum of the squares on the other two sides, and with the discovery of certain of the laws of harmonic relations. His followers, who combined curiously a mystically religious way of life and eager scientific investigation, taught that "All things are number." This belief, strange as it may at first sound, seems to be close to the metaphysical basis of modern science.

due to my own individual situation, to the acuteness or dullness of my 'sense perception,' to where I happen to be or what I am doing, to my emotions, attitudes, and interests — no matter how vivid or valuable these elements may be, are ruled out of physical reality, which thus aims to be a 'public' world, a world accessible to any observer whatever if he takes the right way to reach it. For this reason the physical world is often called *objective,* in contrast to the *subjective* world in which are to be found individual peculiarities. This meaning of 'objective' should, however, be kept clear from other meanings, from for instance the more generalized meaning taken up in Chapters II and III; and 'subjective' in this sense should not be confused with 'purely mental.' In the present connection these terms distinguish by a kind of shorthand the aspects of experience emphasized by the physical sciences directly, from those which the physical sciences treat only indirectly.

In rudimentary experience spatial relations, according to which objects are arranged, are largely 'subjective.' Our judgments of spatial relations among objects (how far apart they are, how near us, how much above or below each other) depend upon our size, our eyesight, the clarity of the atmosphere, our profession, our general state of health and feelings. This is suggested by the terms of English spatial measurement, 'inch,' 'foot,' 'yard,' whose etymology connects them with the human body. And psychologists have studied the development of our knowledge of spatial relations, how it is connected with certain muscle feelings in the eye, with inhibited feelings of effort, etc. But so haphazard a space is hardly adequate for developed common sense, and it is useless for the purposes of science: it offends both pragmatically and theoretically. With objects so arranged one could not build buildings, bridges, or railroads; and one would be

faced with a chaotic reality. The individual experiences of spatial relations are therefore, with great and imaginative intellectual labor, gradually *structuralized* into a coherent and ordered mathematical system. For classical physics this structure is represented by a Euclidean geometry of three dimensions, a three-dimensional coördinate system accepting the familiar Euclidean 'axioms.'

Until recently it was believed self-evident that this geometry applied directly to physical reality interpreted objectively. And the usefulness of this supposition under ordinary circumstances is clear enough: even though the railway tracks seem to go together in the distance, the engineer disregards this 'appearance' when building the railway. Whether we have long or short legs, we can meet someone at a place 'a mile away,' and we can find our house 'in space' whether we are near or far sighted.

Space thus provides an infinitely extensive *framework* wherein all objects from atoms to stars find a place, an enormous box stretching indefinitely in every direction.

It was furthermore assumed by classical physics that this framework is *indifferent.* By this is meant that the laws that may be discovered hold everywhere in space; and that the 'essential properties' of bodies or objects are not changed by where they happen to be in space or how they happen to be moving through space. This assumption seemed to be necessary; for unless it were made we apparently could not be sure that what we discovered about objects and laws today would hold tomorrow, since tomorrow we shall presumably be in a 'different part' of space.

(**5**) **Ether.** The framework of space was thought to be filled with a hypothetical and mysterious substance called the ether. The ether was everywhere present in space, not only in 'empty' space but even all through apparently

solid bodies. The notion of the ether was diversely suggested by the study of light and of electricity: both light and electricity seemed to be correlated in the manner of wave motions. The ether, then, was what the wave motions were in.

(6) **Time.** In ordinary experience temporal relations are more obviously than spatial relations dependent upon the individual. Everyone has noticed the difference in the way 'time passes' when we are bored, excited, refreshed, interested, ill, doing routine tasks or meeting some novel situation. With no feeling of paradox we speak of "the longest hour I ever spent" or, coming back from a vacation, say, "The weeks passed so quickly that I seem to have been gone only since yesterday." Time of this sort, the time of the so-called 'stream of consciousness' will not do for science. The individual experiences are pooled and structuralized, and physical time is thought of as a uniform 'one-dimensional continuum.' The spatial framework, with the objects it contains, moves somehow forward uniformly in a single direction (time differing from space, each of whose three dimensions has two directions). Mathematical calculations dealing with this one-dimensional time are assumed to be independent of the observer. And this structure, too, while satisfying certain beliefs we have about the ordered nature that reality ought to have, works fairly well in practice: we can make an appointment with a friend for 3.00 o'clock and meet him then no matter what our individual experiences have been during the intervening hours.

With perhaps one exception (the law of the increase of entropy), time also is usually assumed in classical physics to be an *indifferent* framework. That is, laws are supposed to hold throughout time, or perhaps better to be outside of time. It is, in fact, only with the help of this assumption that time is measured in practice. When 'the same

thing happens' that measures 'the same time': the earth revolves on its axis and that is a day, the earth goes around the sun and that is a year.

(7) **Matter.** We have seen that the behavior of objects in the common-sense world is in several ways disordered, and in particular that they have only a partial persistence through time. They are gradually or quickly disappearing and reappearing. The refusal to imagine discontinuity in existence summed up by the principle of identity makes science try to avoid this obvious fact by explaining it away in a coherent manner. Now since there can be no doubt that many aspects of objects do appear and disappear, the only solution seems to be through the notion of an enduring fundamental substratum. This substratum, which is called *matter*, persists: the change, the creation, the disappearance are only 'apparent,' are simply transformations of the fundamental matter. Clearly matter must be in some sense qualitative, since otherwise it would have no content and would provide only a shadow explanation for experience. But science strives to reduce the qualities of matter to a minimum, and to make sure that the retained qualities admit readily of mathematical handling.

Matter is from some points of view the most familiar of all notions; but the matter of the common-sense world — objects heavy, colored, hot or cold, soft or hard, sweet or sour — would not be suitable for physics. Most aspects of common-sense matter are unable to meet the tests of permanence, scientific objectivity, and mathematical adaptability: these aspects are assigned to the subjective, 'unreal' world, and the objective world is left only the remainder. The qualities of sweetness and sourness, for instance, are rejected almost at the outset: science reflects on the variability of sense organs, how the same wine tastes quite differently when we are well and

ill, hungry and sated, how easy it is to think of a body apart from its sweetness or sourness, how difficult it is to give sweetness or sourness a publicly precise meaning apart from the presence of certain nerve endings in organisms ('taste buds'), etc. For similar reasons, almost all the familiar qualities of common-sense matter are ruled out — heat, redness, softness, and the rest of what are known as 'secondary qualities.' The presence of secondary qualities in experience is explained by connecting them causally with events in the objective, physical world.

One of the most apparent characteristics of common-sense matter is weight: most (though of course not all) objects we know have weight. Weight is a quality or property objectified from, primarily, certain kinesthetic sensations experienced when we lift or try to lift objects. It has the advantage over most other qualities of seeming to lend itself more easily to metric treatment. It is not hard to think of weights as always more, or less, of 'the same thing'; unlike, for example, colors, whose qualitative differences seem to be the most important thing about them. All objects can be compared with respect to their weight, disregarding their other properties. Weight, then, with an important modification, came to be regarded as the universal and fundamental property of matter. This modification, however, involved a radical departure from the weight of common-sense experience. It was discovered by observation and experiment that the weight of an object varied slightly between measurements taken at the equator and nearer the poles; or at sea level and at the top of a mountain. The law of gravitation suggested an explanation of this variation. By the introduction of a factor called 'the gravitational constant' a new property called *mass* could be mathematically expressed as equal to measured weight divided by the

gravitational constant for the place where the measurement was taken. It was this new property, mass, related thus only very indirectly to common-sense experience, that was held to be the universal, invariant, 'absolute' property of all matter.

The development of the concept of mass is a most interesting study in the methods of science, but one too complex to enter into here. What is important in the present context is to realize how in this development theory (conscious or unconscious), observation, and experiment worked together. Unless scientists had somehow *believed* that there was some universal, invariant property of matter they would not have known how to look for it: familiar experience, naïvely regarded, hardly suggests it. Weight, like everything else, disappears, when water evaporates, when chemical compounds are joined or separated, when metals rust, when wood burns. More refined methods of measuring weight, careful experimental technique in collecting the residues, such as gases, of chemical decomposition, suggested that this disappearance was perhaps only illusory, that we think weight disappears only because we do not observe carefully enough. But it is even more important to understand that weight, or rather mass, after experiment singled it out as perhaps the most important property of matter for scientific purposes, soon left the field of experimental generalization altogether, and became *the defining property of matter.* That is, the proposition "All matter (the content of the physical world) has weight" changed gradually from a factual proposition having a certain amount of probability on its evidence to the structural or *a priori* proposition, "All matter has mass," defining what would be considered matter: it was, for a time at least in the development of science, *necessarily* true, because anything — such as a mirage or a dream or an emotion — which did not have

mass would not have been considered matter. As such a structural proposition it was of great value in helping to clarify and direct scientific research, and to eliminate irrelevancies. It no longer depended for its truth directly on particulars, and would be abandoned only when seen to be inadequate in providing a workable category for the scientific way of handling experience.

The mass of material bodies is manifested in *inertia*, the resistance of a body to change of motion, and *gravitation*, the tendency of bodies to approach one another. But mass alone is not sufficient to make matter comprehensible, and certain other properties are added. Most of these are suggested by the discussion of space and time: they are such 'mathematical' properties as *extension* (the occupancy of space — "All matter occupies space"), *motion* (which can be thought of as a relation between space and time), and one or two others. There was usually thought to be at least one non-mathematical, 'occult' (because difficult to understand) property, *impenetrability*. These — mass, extension, motion, impenetrability — are called 'primary qualities,' and define what classical physics meant, or tried to mean, by matter.

The requirement of permanence is not yet, however, fulfilled. Defined by whatever qualities, common-sense matter does not seem to endure. Classical physics, therefore, again mingling structure and experiment, thought of matter as fundamentally *atomic*, that is consisting of extremely small discontinuous particles. The atomic theory is, though somewhat distantly, related to theories held by the Greeks as well as by Arabian and Hindu philosophers. It holds that the objects of common sense are composed of large aggregates of the small particles, or atoms, defined by the primary qualities, and that these atoms endure, no matter what seems to happen to the common-sense aggregates.

(8) **Mechanism.** In Chapter V the concept of 'cause' was discussed from a logical point of view. But this logical concept is rather more abstracted than what often seems to be meant by a 'physical cause.' The physical relation of cause and effect seems to be not simply a general connection between *a* and *b*, but to involve something more tangible that we try to refer to by 'force.' The notion of force and of active physical cause is derived from experiences familiar to everyone: experiences in which we, as active beings, bring about changes in the physical world. I will to lift my arm, and my arm rises; I push a door and it opens; I pull a rope and it comes toward me. The power or force I feel myself exerting over the physical world manifests itself, when effective, always in motion, in the increase, alteration, or decrease of the motions of physical bodies.

In classical physics this experience is structuralized to apply to the objective physical world apart from my intervention. Motion, through which force manifests itself, becomes identified with cause. The fundamental and ultimate cause of all that happens, whatever may be the appearances, is the motions of the material atoms. Not all scientists accepted this doctrine; but in so far as they did, classical physics was *mechanistic:* when any phenomenon was reduced to motion, it was 'explained.' The temperature of a body rises? this is 'because' there has been an increase in the rate of molecular vibration. A billiard ball moves? this is 'because' another billiard ball in motion has hit it and imparted its motion; fundamentally, because of the impacts of the innumerable atoms that make up the billiard balls. This sugar tastes sweet? this is 'because' the rapidly moving molecules of the sugar set the molecules composing various 'taste buds' into motion of a certain sort, and thence spring other motions along the nerves to the cerebral cortex.

(9) The conservation laws. The complete rationality of the world of classical physics was summed up in the 'conservation laws.' Many of the basic laws, not usually regarded as such, are actually conservation laws. For instance, Newton's first law of motion, which states that a body continues in a state of rest or of uniform motion in a straight line unless acted upon by some external force, is in a sense a law of the 'conservation of velocity.' Better known is the ambiguously termed law of the 'conservation of matter.' This does not apply, as we already know, to the general notion of matter, not to any of the secondary qualities, and to one only of the primary qualities. It should properly be called the law of the 'conservation of mass.' It states that the mass of any system is a constant, is the same no matter what transformations the system undergoes.

The law of the 'conservation of energy' is more complex. It is first necessary to separate the concepts of kinetic energy, the energy of motion, and potential energy, the energy (as it is sometimes called) of position. Thus in a mechanical system such as a pendulum, when the pendulum is at the bottom of its swing it is going fast and has a relatively large amount of kinetic energy. But it goes slower as it rises higher, and for a moment at the top of its swing is at rest. The conservation law states, however, that the potential energy when it is at rest exactly makes up for the loss of motion; at all times during the swing the summation of the two forms of energy is equal. But if this were true it would seem to follow that the pendulum should swing forever, which it does not. The law explains this as follows: through friction a certain amount of the mechanical energy (kinetic and potential) is *transformed* into the radiant energy, heat; the motion gradually slows down, but the total amount of energy — motion plus heat — remains

the same. Of course motion and heat cannot be compared directly, so metric equivalents for the two must be found so that one form can be equated with the other. The concept of energy is abstracted to include both motion and heat, and the law means that the total amount of energy, understood in this sense, in a system remains constant.

It is of the greatest importance to note that the conservation laws, though experiments can give them in weaker forms a certain amount of plausibility, are all structural and *a priori*. No experiment could possibly prove them. They are definitive devices for ordering the physical world, and in them we can see working both the demand for law (determinism) and even more significantly the principle of identity. To order physical phenomena according to law it would not be necessary to suppose that throughout occurrences there was *something* that remained 'the same,' that endured. Change could be as lawful as transformation. But science is not satisfied with lawful change. There must be something — velocity, mass, energy — that endures, and whose 'form' alone changes. To secure this the conservation laws are forced, it can readily be seen, to rather devious expedients. We can have no kind of direct acquaintance with velocity, mass, or energy. What, for instance, is meant by potential energy? Energy is measured by the work that gets done. But a body at rest (such as the pendulum at the top of its swing) does not work. What would have become of the energy if the body stayed at rest forever? Nevertheless, these laws help to structuralize physical reality, in what seemed to be the inevitable way. They have, furthermore, great heuristic value: if a chemist mixes elements together in a test tube, weighs the mixture and discovers the weight to be less than the sums of the weight of the individual elements before mixing, he decides

(by the law of the conservation of mass) that something *must* have escaped in gas or some other way, or that he must have made a mistake in the weighing; the law of the conservation of energy will help an engineer to design the boilers of a locomotive that must pull a train at a certain speed; if a watch stops, the first law of motion expresses our feeling that their must be a 'cause' for its stopping, the removal of which will permit the watch to run again.

(10) **Entropy.** The primary laws of physics tend, as we have seen in Chapter V, as well as in the preceding sections, to take the form of mathematical identities. The mass is always identical with the mass, the energy with the energy. Mathematical identities are logical equivalences, and reversible; they read either way. But if *all* physical laws took this form we should not only have a completely ordered reality, and change expressed throughout as transformation, but we should have eliminated even transformation. For the identities leave no room for *time*, they express no reason why anything at all should happen, or rather they give no indication that anything *does* happen, that one minute is different from the minute before.[1] Yet that this minute is different, that today is not the same as, is irrevocably other than yesterday, that things do genuinely happen, is for most people perhaps the distinguishing characteristic of experience. Time and happenings, among the primary laws of physics, are saved by the *second law of thermodynamics*. This law states that there is one entity, which

[1] The conclusion from the principle of identity that nothing does happen, that reality is self-identical, was accepted by the Greek philosopher, Parmenides of Elea. Though he taught that strictly nothing more could be said than "Being is," he seems to have visualized being, or reality, as a motionless, undifferentiated sphere. Strange as this doctrine may seem at first acquaintance, the logical process which brought Parmenides to its statement is analogous to that involved in modern science. (Cf. the metric continuum, 'finite but unbounded,' of the relativists.)

is called *entropy*, that does not remain the same, that is *continually increasing*.[1]

The concept of 'entropy,' when generalized for all types of physical modification, is too complex for elementary treatment. We can however trace its sources, as usual, in ordinary experience. The 'axiom,' "Heat cannot pass from a cold body to a hot body" (Claudius) seems obvious to common sense. If two blocks of iron, one of which has a temperature of 50 degrees and the other, 150 degrees, are placed contiguous to each other, we should expect (and our expectation would be verified by experiment as it is based on observation) that if any change occurred the hotter block would get cooler and the cooler block, hotter; not that the hot block would get still hotter and the cooler still cooler. This expectation may be related to more general characteristics of heat, energy, and 'work': heat is a form of energy, and energy is manifested through work that is done — work taking the form of the lifting of material bodies, the production of change of motion in material bodies, in short of making things happen. But high temperature *alone* will not do work; work can be done only when there is a *difference* of temperature. A locomotive runs not merely because the temperature inside the boiler is high, but because it is *higher* than the temperature outside the boiler. The axiom stated above gets extended in the second law of thermodynamics to the principle that in any system the temperature tends to reach an equilibrium, so that, so far as the system itself is concerned, no more work can be done. This principle is connected with a still more generalized law that all

[1] This is not the form which the law took when first stated. The word 'entropy' did not appear for some time. But since entropy is so frequently referred to in current discussions, it seems advisable to mention it here. In passing it may be noted that increase of entropy is the basis for talk about the 'running down of the universe,' and in general for remarks about the distant reaches of time.

forms of energy tend to be dissipated into heat (through, for instance, friction, oxidation, etc.). We thus reach the view that in any physical system the total amount of energy is becoming less and less available to do work, to make anything happen. This view might seem to be in conflict with the law of the Conservation of Energy, but conflict is avoided in mechanistic theory by regarding the second law of thermodynamics as *statistical.* Heat is treated as the vibration of small particles, and the law deals with the *average* velocity of these particles rather than the *ratio* between their velocities: it is not the energy which decreases, but the availability of the energy to do anything.

It will be seen that this principle gives a 'direction to time.' Laws which when looked at mathematically are equivalences, are not reversible when applied to physical phenomena because in physical phenomena the later moment is distinguished from the earlier by a decrease in the availability of energy (an increase of entropy). So far as the principle is capable of any experimental verification, it applies to limited physical systems considered in isolation from other physical systems. But many scientists at the present time extend the principle (quite unwarrantedly from a purely scientific point of view) to the universe 'in general,' and thus land themselves in a baffling and insoluble group of questions prominent in newspapers, magazines, and the popularized books on physics: about the above mentioned running down of the universe, about how energy became available in the beginning, and the like.

To sum up briefly the picture of physical reality derived from classical physics: There is a three-dimensional spatial framework advancing uniformly through a one dimensional time. In this framework are a countless

number of eternal changeless particles defined by the primary qualities. These particles are in motion, acted upon by a small number of forces in accordance with a limited number of laws which, whether or not exactly the ones formulated, are certain and without exception: that is, the physical universe is causally determined — or, as it is often phrased, 'Nature is uniform.'

3. Contemporary Physics

During the nineteenth century the inadequacies of the theoretical structure of classical physics became more and more apparent, and in the first years of this century it was thrown over. Unfortunately the new physics is so extremely complex, and so bound up with advanced mathematics, that it is falsified greatly when put into ordinary words. Only a brief and vague attempt, therefore, will be made to outline some of the changes which are involved.

Classical physics, as we have seen, grew rather directly out of common sense; it structuralized observations most of which could have been made by men unaided by exact instruments whenever their attitude toward experience led them to this kind of interpretation. But during the nineteenth century there were developed many extraordinary instruments of investigation, such as high power microscopes and telescopes, precise balances, the many devices through which electrical phenomena are studied, etc. There were also made discoveries of entirely new types of phenomena: electricity itself, new chemical elements, X-rays, radio-active minerals. In a sense, what these new instruments and new phenomena brought in were *genuinely new aspects of experience.* It is not therefore surprising that the classical structure, which grew up when these aspects were unknown, should have proved inadequate to provide for them. Classical physics

was not thereby proved false; it was merely proved inapplicable to these extensions of experience, and can now be looked upon as a special case of the new physics, holding within definite limitations.

(1) Some of the more glaring anomalies that became more clearly recognized in classical physics may be outlined as follows:

(i) The *mechanical* physical theories which have been treated above seemed to have no place for electrical phenomena, careful study of which began in the early nineteenth century. This left a gap which offended the ideal of mathematical unity and simplicity.

(ii) The ideal physical atom, defined by the primary qualities, did not seem to fit in with the atom as studied by chemists. The chemical theory of atoms treated many different kinds of atom, defined by a great variety of properties.

(iii) We have seen that an 'ether' was supposed in which traveled light 'waves.' A wave theory of the propagation of electricity also made use of an ether. But the supposed necessities of explanation required the assignment of directly contradictory properties to the ether. The ether, in fact, became a dumping ground for left-overs that would not fit into the classical scheme, and a theoretical scandal.

(iv) The study of X-rays, radioactive substances, and certain chemical experiments, suggested difficulties in all traditional theories of the atom.

(v) There was no way of explaining certain peculiarities in the motion of the fastest moving planet, Mercury, around the sun. Its motion as observed was not the motion it should have had as deduced from the Newtonian theory of gravitation.

(vi) There was no way of explaining the negative result of the Michelson-Morley experiment. This experiment

was devised to determine the velocity of the earth through the ether. *If*, as classical theory demanded, the ether occupied all space and the earth was moving through it, and *if* light was a wave motion through the ether, *then* there would be a difference in the velocities of light rays measured in different directions at the same time (as in measuring water waves in a flowing river). Though the Michelson-Morley experiment could have measured a difference exceedingly small when compared to the velocities in question, no difference at all was found.

(vii) There was no way of explaining the indirectly observed behavior of particles moving at great velocities: e.g. the Beta particles emitted by radioactive substances. For instance, their mass seemed to increase, which was contrary to the classical theory of mass that we have taken up.

(2) **The electrical theory of matter.** Some of these anomalies were explained, and a much greater degree of theoretic unity was secured, through what was at first called the electrical theory of matter. This was introduced by Rutherford and Bohr during the first years of this century, though it had been suggested many years before. It holds that the atom is not the fundamental physical unit, but is itself composed of still smaller particles. Just how these smaller particles should be thought of is not at all clear. At first the atom was pictured as a miniature solar system, consisting of a positive charge of electricity (the proton) in the center, with negative charges (electrons) whirling around it. This rather pleasingly imaginative ideology was succeeded by a long succession of theories such as the 'ring theory' and the 'jelly theory.' At the present time many scientists have abandoned the attempt to picture the interior of atoms, and content themselves with a purely metric treatment. The fundamental unit is a 'quantum,' sometimes considered a

quantum of energy, sometimes simply a 'probability function.' 'Quantum transitions' — the physical behavior of the quanta — are approached through advanced mathematics.

It is sometimes said that the 'break-up of the atom' involves the abandonment of 'matter' as a fundamental concept of the physical world. This, however, is a question of verbal usage. If by matter we *mean* the classical mechanical atom, matter is now 'reduced' to other units. But this is a somewhat arbitrary definition: the mechanical atom as conceived by nineteenth-century physicists is a comparatively new arrival, whereas theories of matter have been put forward since the beginnings of reflective thought. If we define matter, as has been suggested, logically, as the hypothetical enduring physical substratum, the new theories are simply changing the physical content that we symbolize by the word. The philosophic and metaphysical problems connected with the notion of matter remain, contrary to general opinion, pretty much the same.

The new treatment of matter, it will be seen, provides at least the possibility of unifying electrical and mechanical theory, of reconciling physical and chemical atomism (all the various atoms being alike reduceable to metrically different quantum transitions), and of explaining X-rays and radio-activity.

(3) **The theory of relativity.** Others of these anomalies have been partially cleared up by developments in what is called the theory of relativity. Relativity is chiefly associated with Einstein, but contributions to it have been made by almost all the leading contemporary scientists, and its formulation was made possible by experiments carried out in the last century, and above all by advances in theoretic mathematics made by such men as Minkowski, Riemann, Lorentz, and Fitzgerald. It should be

understood that much of the reason for the general acceptance of relativity by physicists is not related to experimental difficulties, but to the elegance of its mathematical reasoning, to its conformity to the *a priori* requirements of factual hypotheses that were discussed in Chapter V. Through the relativity equations a small number of successful predictions dealing with physical events have been made that were not possible through the classical equations, but it is fair to say that these are a minor consideration.

The name 'relativity' is in many ways most unfortunate. The theory of relativity does indeed hold that the metric units of classical physics are, in a special sense, relative; but it sets out to establish *units that will not be*, in this sense, relative. What made this possible was the recognition of certain assumptions of classical physics *as assumptions*. This in turn made possible the introduction of new assumptions; and both steps were dependent on a mathematics powerful enough to handle the new concepts.

The fundamental metric units of classical physics were *length* (through which space was measured), *time*, and *mass*. It was assumed that these units were objective and 'absolute' in the sense of being independent of the 'frame of reference.' By 'frame of reference' is meant the system of coördinate axes in terms of which measurements are stated. To take a simple example, it means nothing to say that a person is 'ten miles away'; to define the person's position, we must include a statement of where the ten miles are away from, and in what direction. Thus we shall define the frame of reference in terms of which our measurement gets physical meaning. This was of course recognized by classical physics: in fact Copernican astronomy was simply the recognition that a frame of reference treating the sun as at rest was

more convenient than one in which the earth was treated as at rest. But classical physics assumed further that once you had found out your length (ten miles) in terms of any frame of reference, this was an objective measurement for *all* frames of reference. This assumption is included in what was called in the last section the 'indifference' of space. The same assumption applied to time: if it was determined from any point of view that two things happened an hour apart, this time measurement was good for all points of view. Of course an observer on a distant star might never think of measuring in hours (which are connected with the rotation of the earth), but if he did and if he could observe terrestial motions accurately and if he made suitable allowances for the velocity of light (if he were making his observations by light waves), he could calculate in hours with the help of a simple mathematical transformation. And mass, the unit in terms of which matter is measured, was likewise held to be objective, for any particle the same for all frames of reference.

These assumptions are bound up with the structuralization of space and time as distinct from each other. The theory of relativity holds, however, that from the standpoint of objective physical reality, space and time may be treated as different aspects of *one continuum* (which is sometimes referred to as space-time). The important corollary from this is that what is treated as space and what is treated as time depend (within certain limits) on the frame of reference in terms of which measurements are made. A mile measured from one frame of reference may not be 'the same length' as a mile measured from another frame of reference; an hour not 'the same time'; amount of mass not the same amount.

The view seems at first paradoxical, and it may be asked why, if there is this relativity of space and time, it was

not noticed before the twentieth century. To this it may be replied that relativity has only a very distant relation to the world of common sense, and is concerned not with the relativity of the spatial and temporal aspects of familiar experience, but with the mathematical relativity of the physical space and time of classical physics. And with them only when the frames of reference concerned are moving with enormous relative velocity, velocities not encountered in ordinary experience. Such velocities *are* found, we saw, when studying Beta particles, velocities relative to the frame of reference adopted by the experimenter, that is the earth. And what is interpreted as the measured mass of Beta particles does behave as may be deduced from the theory of relativity: that is, the mass seems to be greater than if the particles were at rest or moving slowly.

How little difference relativity makes at normal velocities is suggested by the mathematical factor which appears in many of the relativity equations: $\sqrt{1 - \frac{v^2}{c^2}}$. c represents the velocity of light in empty space. Almost all physical measurements are made with the help of light waves (that is, we watch what is going on, through a telescope, microscope, test-tube, or whatever it may be — in fact, 'observe' is often treated as if synonymous with 'see'). Relativity assumes that the velocity of light in empty space, as measured from a frame of reference at rest relative to the source of the light, is a *constant*, and this velocity becomes in relativity physics a fundamental physical unit, replacing ordinary units of length, or time (velocity of course is a *combination* of space and time — a space-time unit). Now in the equation, v represents the relative velocity of whatever is being measured. But the velocity of light is 186,284 miles per second. Nothing we ordinarily deal with goes more than a mile or two per

minute, and very few things at that speed. $(\frac{1}{3}\frac{1}{0})^2$ over $(186{,}284)^2$ is a quantity so very small that it would never be noticed in even the most exact experiments; and the whole factor $\sqrt{1 - \frac{v^2}{c^2}}$ becomes simply 1 and does not affect the results, since anything multiplied or divided by 1 remains the same.

It will be observed that the negative result of the Michelson-Morley experiment follows from the assumptions of relativity. It should not however be inferred that the assumptions are wholly question-begging for that reason. Necessarily they are partly so; but they relate satisfactorily other phenomena than those included in the Michelson-Morley experiment; the laws of classical physics can be mathematically deduced from the relativity equations, sometimes with corrections that seem experimentally justified; and the relativity assumptions have been advanced in a dialectically persuasive manner.

Now, though the theory of relativity does not necessitate so great a change in ordinary physical laws as is sometimes supposed, it does require a complete renovation of the *picture* of physical reality supposedly based on classical physics. For neither space units nor time units can any longer be thought of as 'objective.' But with separate space and time units, 'objects,' as usually understood and as understood in classical physics, go also. An object is something whose spatial aspects can be abstracted from time, which has a 'position' in space apart from its position in time. A classical physicist could think of a slice of space taken at an instant in time, in which would be found a countless number of objects (atoms). But according to the theory of relativity, position in space has no objective physical meaning apart from position in time, nor has the notion of space at an instant (that is, the usual notion of 'simultaneity'). We

must not think in terms of (spatial) length units and time units, but in space-time units. With the help of a powerful instrument of mathematical analysis, the *tensor calculus*, this can be done; and when it is done the theory of relativity transcends relativity and sets up a new objectivity. Instead of objects situated in space and acted upon through time, the relativist thinks of *events* occurring in space-time (the continuum), separated by *intervals*. The analysis of these events and intervals into spatial points and temporal instants depends upon the frame of reference employed, and thus does not meet the tests of physical objectivity. But the intervals, thanks to the tensor, are the same for all frames of reference. The basic unit becomes a ray of light in empty space: the interval along such a ray is defined as zero interval.

The physical world of the relativists is far less picturesque than the world of classical physics. In fact the more cautious relativists are content to give their conclusions in mathematical form, and abandon the attempt to make them imaginatively satisfactory to common sense. Substantial objects give way to events, feet and seconds to intervals. Space, time, and the ether as well, are replaced by the metric continuum. The startling properties of the ether, the pull of gravity, force, even mass, become no more than metric variations of the continuum. This of course is the extreme relativist position, suggested by Einstein in a remark during a speech he delivered in 1930: "After 3000 years of human thinking space [i.e. the continuum] remains the sole theoretical reality." It is a clear recognition of the mathematical ideal, and completes the de-anthropomorphization of physical reality begun during the Renaissance. The ideal is still, and doubtless will remain, hypothetical. At the present time, efforts are being made to bring about a theoretic conciliation between the new theories of matter and energy and the

theory of relativity, as well as to provide more comfortably for electro-magnetic phenomena in the continuum (Einstein admitted in 1931 his dissatisfaction with the effort he made toward the latter in 1929 by a paper on "The Initiary Field Theory").

(4) **The principle of indeterminism.** In Chapter V we saw that scientific laws approached the form of either invariant causal generalities or exact statements of probability. The latter form was called statistical, chiefly because laws in this form are discovered, with the help of mathematics, through statistical analysis. Classical physics was causally deterministic; and a causal determinism supposes that all events are connected as instances of general laws of the first form. Whether or not the known laws were exactly the right ones was a matter for further investigation; but in any case it was held that *there were such laws*, and that it was merely a question of knowing enough. If anyone knew enough about physical phenomena, he would know the small number of invariant laws by which phenomena were connected, and could predict the whole future and the whole past from an instantaneous observation. Classical physics was also, for the most part, mechanistic (see p. 214), though mechanism and determinism might very well be separated. Determinism can be looked upon as a methodological postulate, a logical device useful in scientific study; and mechanism as a particular form of causal theory.

The new theories of matter are more or less obviously an abandonment of strict mechanism: cause is interpreted in terms of electricity or more generally of energy rather than of mechanical motion of atomic particles. But what is no doubt more important in the light of its possible metaphysical influences, the new theories have also brought about an abandonment of determinism. This has come from within physics itself, and has nothing to do

with the criticism which philosophy has recurringly directed against determinism. For determinism physicists substitute what is often called *the principle of indeterminism;* and the whole notion of cause tends to disappear into the notion of *probability*.

Like 'cause,' the notion of 'probability' may be traced to sources in common-sense experience. It is connected with pragmatic requirements guiding the successful business of living, with easily recognized feelings we have about the way things happen. "Last night the moon had a golden ring; tonight no moon we see" — and we shall probably therefore have a storm, so we had better get the ship ready for it. Most gamblers have a highly developed attitude toward the intricacies of probability. As in the case of causal attitudes, the automatic genesis of probability attitudes may be traced psychologically to the frequency of past associations: if *a* and *b* have usually occurred together, they *probably* will again. Black clouds and rain usually have gone together and they probably will this time, though this time may of course be an exception. Most airplane passengers are safe, and probably on this trip I shall be; though I may, of course, not be. With the help of mathematics judgments of probability are structuralized and made objective, are removed from dependence upon the strength of the feelings of certainty or the gambling spirit an individual observer may have. So far as scientific procedure is concerned there is no great difference whether the achieved results are taken for universal causal laws or statistical probabilities. But though cause and probability have related sources in familiar experience, probability is a more sophisticated notion, marking an advance in disillusion. Like the theory of relativity, the principle of indeterminism is an advanced step in the mathematicizing of experience; a further de-anthropomorphization of

physical reality leaving it still more difficult to grasp imaginatively, to picture in firm and adequate symbols.

To have decided that the classical laws dealing with gravitation, gases, electricity, chemical compounds, friction, etc., express merely very high probabilities about what might happen would have been disconcerting enough, at least to certain types of mind. Practically, of course, there is little difference between extremely high probability and certainty. If a 'universal' connection holds with only one possible exception out of many million instances that probability is high enough for all practical requirements. I sail to Europe knowing that there is a small probability that the boat may sink, but it is too small to affect my actions. If I think about it I am confident that the ceiling will not fall on me as I sit writing; though I realize there is a minute probability that it may. If it did fall, and if I lived to reflect on what had happened, I should not conclude that my knowledge of the physical world had been shattered, but rather that my knowledge was of a kind that gave high probabilities about connections between some events: from many points of view there is no reason to expect any other kind of factual knowledge. But, as has been pointed out, classical physics took for granted that there were *some* certain and universal laws without exceptions connecting physical events, at least theoretically discoverable; or if not discoverable, at least theoretically 'there.' But the principle of indeterminism rules out even this possibility, holding not only that our known laws are not absolute causal determinations, but that there is no physical meaning in absolute causal determination. If it is asked how we have been able to formulate laws seeming to hold fairly generally, this is explained as follows: the laws hold not because they express anything fundamental in the physical world, but because they are actually statistical approxi-

mations derived from the behavior of large aggregates. They deal with observable bodies which are made up of countless numbers of electrons and protons, or quanta. The intra-atomic quantum transitions are undetermined and lawless (that is, governed only by the 'laws of chance'), but their statistical behavior approximates lawfulness, just as insurance statistics can approximate exactness in dealing with large numbers of people while telling nothing about what happens to any single individual. Of course the behavior of quanta cannot be *completely* undetermined, or not even statistics dealing with it would have any validity; that is, the possibilities must be limited (cf. Chap. V, pp. 156–8). But, within these limitations, not only do we know no laws exactly describing what happens, but according to the principle of indeterminism there are no such laws to be known.

4. The Problem of Reality

From the beginnings of reflective thought men have been occupied with the allied questions, "What is reality?" "What is being?" "What, fundamentally, *is?*" In Chapter VI we have considered these questions in general, how they are actually many different questions, how difficult it is to understand them, and how in their statement lurk systematic and elusive ambiguities. Affirmations about reality have arisen from widely different fields of discourse, from magic, religion, logic, social behavior, etc. But in modern times the problem of reality has been bound up in a special manner with the physical sciences, and it is with this alliance that the present section is to deal.

In the preceding sections we have indifferently referred to 'physical reality,' 'the physical world,' 'the objective world' (or simply 'the objective'). By all these phrases

has been meant no more than this: those aspects of experience with which the physical sciences deal; and by 'the subjective,' simply those aspects with which the physical sciences do not deal. Just what the former aspects are is not something, of course, that was articulately decided by the founders of modern science; they have been gradually clarified and more sharply defined by the progress of the physical sciences themselves. But what we have now to analyze is not 'the physical' or 'the objective' taken as categories defining the subject matter of the physical sciences, but ideologies growing out of the physical sciences and making use of some such assertion as "The physical world is *the real world*," or "Reality is physical" — the substitution of the adjective *real* for the convenient methodological adjective *objective*. These statements are peculiarly complex at the present time for the following among other reasons: The physical world, whose general characteristics have been described, is from the standpoint of the world of common sense a very strange and unfamiliar place. Its content — electrons, protons, photons, intervals, continuum — are amazingly unlike the seemingly solid and easily understandable objects which we meet in ordinary experience. This comfortable, firm chair I sit on dissolves into erratically vibrating indefinitely small concentrations of electricity, or energy, almost into mathematical equations, that red pillow into curious waves or mere spheres of probability. This disparity, in the light of our analysis of the approach, methods, and requirements of physical science, should not appear so surprising; it might in fact appear to be the inevitable and natural result. The disparity has, nevertheless, served to make the problem puzzling and obscure.

It should be observed that the problem of reality is a genuinely metaphysical, not simply a physical or scientific

problem. The statement that the physical world is the real world, though it arises out of a particular realm of discourse, is on the surface at least a statement about the whole of experience, and the issue cannot be prejudged by taking for granted that it is to be settled from within physics itself. No matter how far physics 'advances,' the nature of consciousness enables us, if we wish to, still to investigate critically the context within which any statement based on physics is relevant. What we are now interested in, therefore, is *not* to speculate about possible discoveries that physical science may some day make. Many people derive a great deal of emotional satisfaction from such speculation, and it has a minor value in suggesting lines of possible scientific research — though the history of science can teach us how arbitrary it is. Speculation is made up of factual or descriptive propositions; it differs from legitimate scientific hypotheses in that the evidence upon which it is based is insufficient to lend more than a very small probability to the propositions. But the problem of reality is a *critical* or dialectical problem, and our analysis should be independent of the particular factual content of the propositions now accepted by science. Our endeavor should be to discover the meaning or rather the meanings of the problem of reality, here in so far as it is related to the physical sciences.

(1) **Emotive and pragmatic meanings.** To the great increase of intellectual confusion, scientists, philosophers, and people generally have seldom recognized how largely the problem of the real is emotive. The adjective 'real' and the noun 'reality,' like 'true,' 'truth,' 'God,' 'vital,' 'significant,' etc., are words packed with compelling emotional content. They confer honor and approbation on what they are applied to, like titles such as 'Sir' or 'Prince.' To affirm or to deny that the physical world is the real world is, then, to express an emotive attitude

toward experience in general. As suggested above, the character of the physical world as science now presents it to us makes this affirmation or denial at present particularly disturbing.

To understand this more fully we may contrast our physical world, or 'nature' as it is often called, with the physical world, the 'nature' of the Middle Ages. We have several times remarked how science has steadily 'de-anthropomorphized' the physical world; it has, that is, gradually ruled out man with his most familiar and intimate concerns from nature. Very early in the process there went conscious purpose, love, hope, desire. Then the 'secondary qualities' and with them objects as common sense knows them, objects as in most contexts they interest us, with their colors, smells, and textures. Finally we are left with the world of contemporary physics, defined almost wholly by abstract mathematical properties. The physical world of the Middle Ages presents a striking contrast. In the first place the earth was the firm and stable center. At no great distance (when compared with the immeasurable light years of modern astronomy) the moon, the sun, and the planets revolved within their allotted 'spheres.' Beyond them was the sphere of the fixed stars, and enclosing them all and the source of their motion, was the Primum Mobile, the limit of the universe of space and time, a universe limited, complete, and harmonious, like a well executed work of art. In this universe Man occupied a central and dramatic position. He was the meeting place of matter (his body) and spirit (his soul). Far from being indifferent to him, the whole physical world was in a sense the stage on which he was to work out the drama of his own salvation. This world was not an impersonal aggregate of electrons behaving in accordance with complex mathematical equations; it represented a graded hierarchy of *values*, sustained

throughout by the active creative force of God, the knowledge of whom was man's final aim. The great epic of the Middle Ages, Dante's *Divine Comedy*, ends with the line, "The Love which moves the Sun and the other stars." Thus man's place in the universe was integral and organic. But in the world of modern science man seems to be an accident, lost in the immensities of space-time, flourishing painfully on the meagre planet of a second-rate star. Or, in any case, a feeling that this is the situation seems to result from identifying the physical world as the *real* world: if it is real, then nearly everything that is important to man, the values that he cherishes, his desires and fears, even what he seems to see and feel, are unreal. By a process of verbal association, unreal is linked with illusory, trivial, not important. And we find that the 'reality' of the physical world is no longer a matter of describing or defining, but a question of emotional adjustment.

The emotional adjustment proceeds in two directions. In one there is the group who state that the physical world is the real world, and who derive emotive satisfaction from "courageously facing the facts" (or perhaps in a paradoxically comforting despair: the logical foundation is the same) and at the same time cherishing what are after all our 'illusions.' Prominent among this group is the English philosopher, Bertrand Russell, from whose essay *A Free Man's Worship* we may illustrate the attitude:

> That Man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; that no fire, no heroism, no intensity of thought and feeling, can preserve an individual life beyond the grave; that all the labor of the ages, all the devotion, all the inspiration, all the noonday brightness of human

genius, are destined to extinction in the vast death of the solar system, and that the whole temple of Man's achievement must inevitably be buried beneath the debris of a universe in ruins — all these things, if not quite beyond dispute, are yet so nearly certain, that no philosophy which rejects them can hope to stand. Only within the scaffolding of these truths, only on the firm foundation of unyielding despair, can the soul's habitation henceforth be safely built.[1]

This passage is interesting, in spite of its lumbering rhetoric, in that it is the expression of a man who knows a great deal about modern science. But running through all modern literature we find emotive reverberations of views of 'reality' springing from the picture of the physical world. The statement that "The physical world is the real world" is taken as the equivalent of "The aspects of experience dealt with by the physical sciences are the most important, the most significant, the most revealing of the nature of things," by which last is meant more or less "That by which one is emotively most stirred." Widely different attitudes of course result: Russell is defiant; poets are frequently in despair; the average man, if he thinks about it, is generally somewhat bewildered.

On the other hand, there is a group that denies the reality of the physical world. Quite apart from what descriptive meaning this denial might have (which we shall consider shortly), its emotive meaning is equivalent to a rejection of the values associated with the attitude which has just been outlined. The physical world is not important; we must seek 'reality' not through science, but through 'intuition,' art, or religion: in what these reveal to us lie the possibilities of adjusting ourselves to experience, and discovering the good life.

Linked with the emotive meanings of 'real' are what may be called 'pragmatic meanings.' From this point

[1] *Mysticism and Logic*, pp. 47–48.

of view, to call the physical world the real world is a statement of active policy, an attempt to give direction to practical efforts. It is equivalent to some such underlying ideas as the following: modern science is the greatest achievement of man. Through it he has progressed more during three hundred years than in all the preceding millennia. Let us therefore focus our activities on widening the scope and application of science. And let us leave behind religion, metaphysics, nonscientific 'ethics,' which are incompatible with the spirit of science, and which are all vain imaginings, superstition, and outworn folly.

Writers often are not fully conscious of the emotive and pragmatic aspects of the problem of the real. Yet without recognizing these clearly we are unable to understand what they are saying when they discuss reality. Affirmations of reality are never wholly the kinds of proposition they seem to be, nor can they be argued about with any possibility of adequate verification. They are largely expressions of attitudes, metaphysical analogues of artisic or moral preference.[1]

(2) **Dogmatic (reductive) materialism.** On p. 214 we considered briefly mechanism as a theory of physical causation. As such it is to be judged, of course, as would be any other scientific hypothesis. But mechanism, removed from its proper realm of discourse, forms the basis of a metaphysical ideology which may be called 'dogmatic materialism.' Materialism states not merely that the basic physical cause of phenomena is the atoms in motion, but generally that the atoms in motion are the real, that "Reality is the atoms in motion."

Materialism is a very ancient doctrine, and it has been stated in various forms from early times in Western

[1] Cf. Chapter II, pp. 58–60, Chapter III, pp. 95–97, Chapter VI, pp. 185 and 196, Chapter VIII, pp. 254 and 297, and particularly Chapter XI, for analyses of this 'metaphysical ambiguity' in different contexts.

thought. In fragments of the Greek philosopher Democritus we find it quite explicit:

> There are two kinds of knowledge: real knowledge and obscure knowledge. To obscure knowledge belong all things of sight, sound, odor, taste, and touch; real knowledge is distinct from this. . . . We perceive nothing true in what concerns the thing itself, unless it is that which is modified from the point of view of the position of the body and the things which fall upon or resist us. . . . Sweet and bitter, heat and cold, and color are only opinions; there is nothing true but atoms and the void.

The prestige of Aristotelian philosophy and science, however, kept materialism underground during the Christian Era until after the Renaissance, when the authority of Aristotle gave way before the newer physical theories. In the seventeenth century materialism was revived, outstandingly by the philosopher Thomas Hobbes. As typical of his doctrine we may quote from the first chapter of *Leviathan:*

> All which qualities [colour, sound, odour, savour, heat, feeling, etc.] called *sensible*, are in the object that causeth them, but so many several motions of the matter, by which it presseth our organs diversely. Neither in us that are pressed, are they any thing else, but divers motions; (for motion, produceth nothing but motion).

Materialism became more influential during the latter part of the eighteenth century, and particularly during the nineteenth century, when the physical sciences were in the midst of their most spectacular progress.

When stated in its extreme form, namely that everything is nothing but the atoms in motion, materialism need not be taken very seriously. As soon as we understand what we are talking about this is seen to be no more than a verbal confusion. It is doubtful that meanings are ever perfectly clear; but we know well enough

what we mean when we talk about the sweet taste of, say, sugar; and we know, perhaps less well but nevertheless adequately enough, what we mean by atoms in motion; to say that the sweet taste and the moving atoms are *the same thing*, are *identical*, is manifestly nonsense. Of course no one could have maintained such a position seriously without being deceived by the words that were being used. The position must be re-interpreted either as a re-definition of the sweet taste in terms of atomic motion rather than of familiar sensation, or in some such manner as the following: the moving atoms are the cause of, or the invariable accompaniment of, or the sufficient condition of, or the necessary condition of, the sweet taste of the sugar. This re-interpretation will show that materialism is an elliptical and shorthand way of saying something much more complicated than the words by which it is expressed at first suggest. What these complications are we shall in succeeding sections of this chapter make some effort to disentangle.

During the last generation materialism as the name for an accredited philosophic doctrine has been generally dropped. The disappearance has been due, however, to the already noted ambiguity in the concept of 'matter.' The new physics, we have seen, no longer accepts the mechanical atom defined by the 'primary qualities' as the fundamental physical unit. If 'matter' is defined as the mechanical atom, then the abandonment of the mechanical atom involves the abandonment of materialism: not 'matter,' but electrical charges or energy quanta are now held to be the fundamental physical units. However, such a definition is arbitrary, and avoids issues underlying materialistic doctrines. Matter is a concept much more ancient than Newtonian physics, and the mechanical atom is only one of many specific contents that have been given it. In Section 2 matter was treated not restrictedly as the

mechanical atom, but more generally as the hypothetical substratum enduring throughout the process of physical transformation. Viewed in this way, the electronic theory or the quantum theory has nothing whatever to do with the philosophic doctrine of materialism. Materialism which is a type of those metaphysical reductions discussed in Chapter VI neither stands nor falls with the atom: when quantum transitions are substituted for atoms the specific terms of the reduction are varied, but the form of the reasoning by which this is done remains the same, and equally fallacious. Throughout this book 'materialism' refers not to the interpretation of experience in terms of atoms in motion, but to *the reduction of experience to whatever basic units happen to be accepted by the physical sciences.*

(3) **Fictionalism.** In opposition to doctrinaire materialism there have been offered various doctrines denying the reality of the physical world. In general they maintain that the whole theoretical apparatus of the physical sciences, atoms, electrons, quanta, space-time, energy, waves, and the rest, are 'unreal,' are mere imaginative devices by which the mind meets the chaos of the given. Many arguments can be brought forward which seem to support such a view, such as: all our 'knowledge' of electrons, ether, radiant waves, etc. is and always will be indirect — they are not amenable to 'direct observation'; *different* theoretic structures (different geometries, different conceptions of electrons) serve equally well to correlate the same events; the world of physics is colorless, soundless, touchless, etc., but all we 'know' has color, sound, feel; the given is not broken up into points, objects, instants, events, but is a continuous flux and change — we only imagine the breaks for practical convenience, and after imagining them discover that change and motion can no longer be made intelligible; a genetic

account of knowledge shows that first we have the given, and then we correlate it artificially by common-sense and scientific devices; the physical account leaves out the most striking and intuitively certain aspects of reality.

Criticism of this sort is of great use in breaking down the dogmatic nonsense of reductive materialism; and further, in emphasizing fresh modes of analysis; and perhaps most of all in helping to clarify *what is meant* by calling the physical world real. But in advocating the opposed extreme, 'fictionalism' also loses itself in verbal confusions. The physical sciences are too well established to be dangerously shaken when words like 'unreal' and 'fiction' are flung at them. To say that science is not knowledge and that the subject matter of science is not real is merely to re-define knowledge and real in a manner that excludes the results of some of man's most considerable intellectual efforts.

(**4**) **The pseudo-dilemma.** We seem to be faced with the initial premise of a formal dilemma: "The physical world either is or is not real" (. . . is either real or unreal). If this were indeed the case, if in this proposition 'real' and 'not real' were genuine logical contradictories, we should be forced to at least the formal decision that one or the other of the alternatives must be true. But logical contradictories are seldom found outside of a purely symbolic logic. In concrete discussions, particularly when words so slippery as 'real' are being used, numerous and elusive ambiguities always enter in. 'Real' is a single *word*, but it is a countless number of *symbols*. It is quite possible to hold that the physical world is both real and unreal, because what we mean by that is that it is real *in one sense*, and unreal *in some other*. More generally, *whatever* is real in one sense is unreal in some other; and likewise, whatever is unreal in one sense is real in some other.

Further consideration of the words 'real' and 'is' will bring this out more clearly. Suppose, for example, that someone tells me, "*Water is really nothing but* H_2O." What am I to understand as the meaning of this proposition? When I sit down at dinner I find before me a glass filled with what I call 'water.' It is a liquid, almost colorless and almost tasteless; it can be taken into my body with great ease through my mouth, and has the property, when taken, of quenching — that is, putting an end to — a vivid experience I know of as 'thirst.' Does this proposition assert that I am drinking not this liquid which has just been described but two gases combined in a certain proportion, both of which are made up of an indefinite number of electrons and protons arranged spatio-temporally in a complex manner? Obviously not. Now one thing that the proposition undoubtedly does mean is something of this sort: *if* certain operations were performed to the liquid before me, if for instance salt were mixed with it and negative and positive electric terminals were immersed in it, *then* two gases would be given off, one at each terminal, identifiable as hydrogen and oxygen; the amounts of them would be in a definite proportion, and the more of them that was given off, the less of the original water would be left; further operations could be carried on with these gases, they could be weighed, experiment combined with indirect reasoning could indicate their electronic structure, they could be compared with other 'elements,' etc. In short, the proposition is the tacit prediction of possible future sequences of experience; these sequences in most cases will not be verified, but they are potentially at least verifiable. The proposition summarizes the results which a chemist's analysis might obtain.

For me, as a diner, the water before me is correctly defined as clear, tasteless, potable, thirst-quenching, and

this complex is the 'real water' — what might be called 'nutritively real water.' For the chemist functioning as chemist water is correctly defined as 'H_2O,' and this chemical compound is the 'real water' — the 'chemically (or physically) real water.' An adverbial modifier must always be understood before the adjective 'real.' Thus there are in a sense *two* waters; but they are of course related. For the chemist, my water is a group of *symbols* whose *meaning* is H_2O, and as symbols he calls them (the taste, color, thirst-quenching properties) 'unreal'; but for me, when I am dining, the chemist's water is likewise a group of symbols, in their turn unreal, whose meaning is my real water that I drink. We shall return later to other possible relations between the two waters.

It is not surprising that we should be confused about just what it means for electrons to be real, or simply 'to be' ('to be' and 'to be real' are often used synonymously). Our notions of what it is for something to be or to be real are built up first from crude common-sense experience. Something 'is' which we can see, touch, kick, get hit by, taste, etc. We can have no contact of this sort with electrons. That does not mean that electrons are not real; but it does mean that their reality is of a different sort from that of the things we see and touch. We have already seen that we do not have 'direct knowledge' of anything; there are no 'pure sensations'; sensations are always exhibited in a pattern of relations; our knowledge always goes beyond the immediately given to link it with what is not given. We come back to our room and find a letter on the desk. We infer at once, if we think about it, that someone has written the letter, that someone has been in the room and placed it on the desk. We get certain complex results in certain experiments. Our inferences from these, we call 'electrons'; in this way we close in the gaps in our knowledge. We

do not mean (as would be the case with the person who left the letter) that given the proper conditions we should be able to *see* electrons, which has nothing to do with their 'reality,' but rather that if we carry on certain other experiments certain other definite results will follow (certain 'rays,' for example, will go through iron); and, further, that with the help of electrons the whole theoretical structure of the physical sciences will be more complete and harmonious. The failure to distinguish kinds of reality leads to statements which, if not correctly understood, are very foolish. When we are hit by something, scientists tell us, we are being 'bombarded by molecules.' But such a description of the experience of 'being hit' is valid only within the highly specialized realm of discourse of chemistry (and physics — at the present time the two overlap), and is inappropriate and irrelevant on most occasions. We are hit by bricks and fists. Molecules are not something that hit us: they are the summing up and coördination of inferences drawn from involved experimental researches with delicate balances and high power microscopes, and if they are to be understood for what they are, they must be understood as such.

(5) **Appearance and reality.** The problem of the real is often approached by emphasizing a distinction between 'appearance' and 'reality.' The sweater appears red in sunlight, gray in green light, purple in blue light; it feels smooth to normal hands, rough to chapped hands; what is the 'real' sweater? The stick half immersed in clear water appears bent, but is 'really' straight. The railway tracks appear to converge in the distance, but are 'really' parallel. The blood flowing from a cut appears to be a homogeneous red liquid, but a microscope shows that it is 'really' an agglomeration of countless minute cells. The black coffee appears to change color to light brown when

cream is poured into it, but the photo-spectroscope discloses that the 'real' color remains the same.

We are now in a better position to understand what is meant by this division into appearance and reality: reality is being used in a special and limited sense, and to discard certain elements of each experience as appearance is the same as to say that they are unreal *in that sense.* Nowadays the real object or the real aspects of the experience in question usually means what is revealed by advanced chemical or physical analysis. This may be thought of as a particular application of a distinction between *substance* and *accidents.* In considering the stick that appears bent when half immersed, and straight when out of the water altogether, we nevertheless seem forced to think of it as the same self-identical stick throughout. This identity can be expressed as the stick's 'substance,' which is its 'principle of identity,' the unifying sameness underlying the variable qualities and properties. These qualities and properties, the color, shape, hardness, etc., which do not remain uniform, can be known as the 'accidents.'

Generalized, substance and accident are logico-metaphysical notions, independent of specific content. Substance is not any specific thing, which can be singled out and pointed to, but the principle of identity revealed by the logical analysis of *any* thing. Now the physical sciences brought about a corrupting re-interpretation of this analysis: corrupting in the sense that without a clear recognition of the process, the realm of discourse was shifted. 'Substance' gradually became equivalent to 'matter' and 'matter' to the particular units (atoms, electrons) that science accepted as basic. 'Accidents' became equivalent to 'ideas' or 'impressions' or 'sensations' 'in the mind.' The 'real' object becomes the group of electrons, physical waves, etc.; and the variable ap-

pearances are the mental ideas or images these cause in us by acting on our sense organs. Thus, it is argued, can be explained the seemingly great disparity between appearance and reality.

(6) **Functional identity.** The notion of substance has during the past two centuries undergone much destructive criticism, a large part of which is not thoroughly justified. It is one of many natural human efforts to make change intelligible, to explain an identity persisting through the change with which we seem to be faced. But 'substantial identity' is attacked on the grounds that even if there were an enduring substance, we could not know it. This point was ably developed by Bishop George Berkeley, in the early eighteenth century, who insisted we know only what were called above the appearances. This conclusion, however, rests on an ambiguity in 'know' (as well as on the shift from substance to physical units). If by 'know,' we mean 'have a sensation of' in the sense that we 'know' a color or a sound, it is certainly true that we could never know substance — any more than we could know electrons, light waves, or mathematical relations. But knowledge in a more extended sense, though it is conditioned throughout by sense data, is by no means confined to the bare recording of sensation. We know in a variety of ways, in the way we know objects, in the way we know the missing premises of a logical argument, in the way we infer the causal agent of some event, in the way we predict eclipses, etc. And no one maintains that substance is something we know as we know, for instance, objects. Substance is a notion derived from the *logical analysis* of objects.

Nevertheless, the attack on substantial identity helps to avoid a danger: holding to a notion of substance, we tend to interpret everything we know, in any way, as 'appearance,' as only a symbol referring to something

else that we do not know, which is the reality. There is no objection to this, if it is understood properly; it is another way of saying that our knowledge always goes beyond the immediately given, that the meaning of any conscious situation is always linked with other situations, and that our knowledge is never complete. But if this is misunderstood as implying that the 'reality' is not only not wholly known, but *unknowable*, it is simply a form of words. To talk about a reality that lies outside of experience altogether, outside even the possibilities of experience, is to talk nonsense.

To avoid confusion, therefore, it might be well to borrow from mathematics, and substitute for substantial identity the notion of 'functional identity.' Consider a mathematical function (a polynomial in x):

$$\phi\,(x) = 2x^2 - 3x + 1.$$

Suppose that someone should ask me, "What is *the* exact value of this function?" What could I answer? Obviously there is no answer when the question is put in this way. The function will have *any* numerical value, depending upon what value is substituted for x: 0 when x is 1 or $\frac{1}{2}$; 1 when x is 0 or $\frac{3}{2}$; 2 when x is $\frac{3}{4} \pm \frac{1}{4}\sqrt{17}$, etc. But is it necessary from this 'relativity' of the value of the function to conclude that it has no 'identity'? Certainly not. Its identity consists in just the fact that its values are related to values of x in a particular and unique way, rather than in any other. If we compare it with the function,

$$\psi\,(x) = x^2 - 5x + 4,$$

we shall find that this new function will also have any numerical value, but for different values of x: 0 when x is 4 or 1; 1 when x is $\frac{5}{2} \pm \frac{1}{2}\sqrt{13}$; 2 when x is $\frac{5}{2} \pm \frac{1}{2}\sqrt{17}$, etc. The identity of each of these functions is to be found not in their possession of one unalterable value, but in

the fact that each represents a unique total set of relations among all the possible values.

Functional identity will clarify the appearance and reality difficulty. In the case of the sweater: to ensure sufficient intelligibility in experience, it is not necessary to think of one unalterable (and for that very reason unknowable) 'real' color somehow substantially enduring. The 'real' color is the whole pattern of relations among the various actual and possible experiences. We *call* the sweater red, but that is for convenience, because ordinarily, in sunlight, to normal eyes, it 'looks red'; but part of what we mean by calling it red is that it will look gray in green light, etc. In the same way, part of what we mean when we call a stick *straight* is that it will *look crooked* when half immersed in water. The 'appearance' is *real* enough from its own point of view; it is indeed an undeniable fact; but we do not know the 'real' stick until we know how the appearance is related to other possible appearances — among which the physico-chemical analysis of the stick is to be included.

Both the black coffee and the brown coffee look the same through a photo-spectroscope: we see, as a matter of fact, in both cases a complete 'spectrum,' all the colors of the rainbow. Do we conclude from this that the 'real' color of the coffee remains the same? We do not; we try to make clear what we are thinking about. Now as a matter of fact, *none* of the colors is real from the standpoint of physical science. They all are symbols referring to a complex theoretical structure which alone is physically real. That structure is not anything that I am *ever* going to see, since it has no color, and I can see only what has color. In the coffee which I am about to drink the change in color is real enough; and by observing it I know when the coffee is in a proper state to be drunk. This common-sense object, the coffee I am about to drink, is easily

identifiable (as are most common-sense objects) — by color, smell, etc. — but its behavior is somewhat erratic: I cannot tell easily whether it is good coffee, how hot it is, how it is related to other things. The objects into which physics and chemistry analyze it (molecules, 'light waves,' etc.) are extremely difficult to identify, but are, in compensation, much more orderly in their behavior, and more coherently related to many other things. But both the common-sense object and the physical object have their own appropriate reality, one of which I know by being a coffee drinker, and the other by being a scientist.

(7) **The real as definitive.** Much of the positive criticism contained in the preceding sections is a corollary of the definition of 'real' given in Chapter VI. This may be re-stated as follows: *Within any given realm of discourse, the 'real' is the basic category which defines the limits of that realm of discourse.*

It must not be thought that the limits are defined in the way that words are defined in a dictionary. A dictionary definition is an arbitrary and merely verbal matter, serving occasional practical convenience. We learn definitions by using them. We understand what 'man' means not by hearing such words as 'vertebrate, mammal, two-legged, etc.,' but by knowing men, and the more we know about men, the richer and more inclusive will be our definition. A definition is not something we can formulate adequately at the outset of a study, but only at the end; or rather, since no study ends, tentatively as we go along, and changing when a change is called for.

In this way is built up our conception of the physically real. When science began it was not sufficiently coherent to display a definite category of the real. But as it develops, as it becomes a more and more extensive and harmonious structure, that very development teaches what is meant by the physically real. For an event to

be physically real it must take its place in an ordered spatio-temporal system, it must be coherently related to other physical events, it must be susceptible to mathematical analysis, it must be capable of being subsumed under general laws, etc. Thus we can say that dreams, hallucinations, the 'space' we see in a mirror image, God, luck, value are *physically unreal:* they do not conform to the definitive requirements of physical reality. This does not prevent them from being extremely vivid and among the most important and influential of our experiences; it merely states that the type of analysis made use of by the physical sciences is inappropriate to them; that either they are ruled out of physical science altogether, or physical science will consider only those aspects of them which can be made to conform to its requirements — science might make use of them, but only as symbols pointing to physical reality.

But from some other point of view these unreal (physically unreal) events will be real: the dream or the hallucination is a real event for the psychoanalyst, God for the mystic. Indeed, a psychologist of certain schools might rule out all physical reality as psychologically *unreal,* and interpret it in terms of 'mental events' or 'ideas' which for him, as psychologist, would be the genuinely real.

Each realm of discourse thus postulates the reality of its constituent meanings, and in fact could hardly do otherwise. Of course the boundaries are never exact, and are always changing; even mathematics and physics, the most coherent and elaborate realms of discourse, are not yet, nor will they be, clearly defined. And the various realms of discourse are related to each other: but that relation is not one of reduction. To 'reduce' one type of meaning to another is not to explain it, but to eliminate it. Often this is useful, and even advisable; but what is done should be recognized.

Materialism — not only dogmatic but as well the modified forms of materialism — is guilty of just such a reduction, without the recognition that it is a reduction. At present 'real' is often used as if synonymous with 'physically real.' For this there is some justification. The realm of the physical is so extensive, so influential a part of our lives; and, moreover, our knowledge of it is fitted into so ordered and harmonious a system; that, for convenience, we may if we wish say that real *means* simply physically real. But we run a great danger in doing so. We get mixed up with the emotive, directive, and evaluative meanings of 'real' by forgetting that the adverb 'physically' is always to be understood before the 'real.' And we tend to restrict our analyses to the one type exemplified by the physical sciences, and thereby to neglect other kinds of analyses revealing aspects of experience quite as legitimate as the physical and often more appropriate and more valuable. By 'explaining' what happens in physical terms we gain the immense advantages of order, lawfulness, and the type of control that enables us to build bridges, automobiles, radios. But physical terms explain non-physical aspects of experience only by *explaining them away*. That is why it is so foolish to suppose that science will ever 'prove' or 'disprove' God, free will, beauty, luck, consciousness. *We know in advance* that these things have no place in physical science; science can bring them within its field only by *eliminating* their non-scientific features.

To suppose the existence of free phenomena entirely detached from the domination of law and from our prevision in no way assails the principle of science. Nor is it contrary to its conclusions, for determinism being a fundamental postulate of science and science limiting in advance its activity to what is capable of being foreseen, it is certain that, whatever results may come of it, they can teach us nothing about what, by pre-

vious agreement, has been omitted from the domain of our investigations.[1]

Again, we rule out the freshness and surprise, which is an inescapable element of experience. And, still more striking, we do not consider the *individual particular as such*, for science deals only with particulars as members of a class, as instances of a generality, in the measure that particulars can be brought under laws. But this obscures their character as this unique particular rather than some other, with which science has no concern, yet which may be all-important from some other point of view — for, for instance, a poet or an artist. Likewise an ethical or religious discussion, when reduced to physical terms, is no longer genuinely about ethics or religion. This does not mean that science may not throw light on ethics and religion; nor does it necessarily mean that a non-physical analysis will *conflict* with physical analysis. The point is only that other kinds of analysis are possible, if we wish to make them.

[1] Émile Meyerson, *Identity and Reality*, p. 26.

CHAPTER VIII

THE WORLD OF LIVING THINGS

In biology, as in physics, many of the basic terms are much less clear than at first sight they seem to be. 'Life,' 'evolution,' 'adaptation,' 'teleology,' 'mechanism,' 'vitalism,' 'organism,' 'heredity,' 'natural selection' have such various meanings that the probability of a clear discussion about genuine issues is small. This is clearly true when the discussion is among laymen; but it is true also in the writings of scientists and philosophers:

> The conflict of opinions in biology has become marked by the watchwords, vitalism and mechanism. As is true in all such instances, a great danger arises, that a complex of many things of most diverse character, is often named according to one of many properties by which it may be determined. In fact we see that a well-known investigator calls himself a mechanist while the mechanists think of him as a vitalist.[1]

The reasons for these ambiguities include those that make obscure any complex matter. But in treating the problems connected with life there are certain factors of particular importance.

(i) The first of these is the emotive meanings attached to the notion of 'life.' We have seen the troubles these brought about when dealing with physical reality. But in dealing with life they are even more insistent. Life is one of the most intimate of all aspects of reality, bound up with all that we take to be of greatest value.

[1] Wilhelm Ostwald, *The Relations of Biology and the Neighboring Sciences.*

I am *alive*, and few things that I can say seem to be more important than this. And one day I shall be *dead*, not alive. Toward the meaning of life and of death, questions about the nature of life, we cannot be dispassionate and impersonal. Nor is there any reason to suppose that we ought to be. No one would argue, whatever were his scientific conclusions, that we ought to have the same *attitude* toward what is living and what is not living, or toward plants and toward men. But in the interests of intellectual clarity we should make an effort to separate the emotions and the attitudes from the scientific and the critical discussion.

(ii) Again, there is the fact that problems of life are bound up with the dogmas of authoritarian religions. Various questions of the immortality of individual or collective life and of the first creation of life are answered in many religions through revelation, authority, and tradition. Here, again, there is no reason why we should not, if we choose, accept answers given on these grounds; but we must try to separate these grounds from scientific and philosophic reasoning. In some cases there is a real conflict between the answers given by science and by religion, but often the answers are not to the same questions, properly understood.

(iii) But there is a third source of confusion. Biology, which is the realm of discourse supposed to give us the facts about life, is comparatively recent as a science in the sense that science is now generally understood. The study of life has gone on since the beginning of thought, but until the nineteenth century it was in large part description and classification. There are an incalculable number of different forms of organisms; and the immense work (which is not yet nearly complete) of observing, collecting, and arranging in some sort of order these forms so that reference would be facilitated had to be carried a

good distance before a more conscious science could begin. The above mentioned emotive and religious factors also hindered the beginnings of a genuine biological science. As a consequence the realm of discourse of biology is by no means so clearly defined as those of logic, mathematics, astronomy, physics, or chemistry. Its limits are more vague and its fundamental terms in doubt. As a result, a critical or philosophic discussion arising from biology cannot be as precise as we might wish.

There are many philosophic problems suggested by reflection on living things and life, of which we shall be able to analyze only a few. What seems to be one, and one of the most important, stands out at once. I know a great many living things, differing greatly among themselves, but all seeming to have something in common; and in this they seem to be distinguished from the many other things that are not living. What is this difference, which we know as 'life,' that the one set has and the other does not have? Is it a 'genuine' difference, or only an 'appearance'?

To common sense, this problem seems to be unambiguous; but on analysis it is less clear. The reason for this is that it is in fact many problems. People sometimes suppose that they make the problem clearer by asking: "Are living organisms 'fundamentally' or 'radically' or 'essentially' or 'really' different from non-living things?" But of the speciousness of such emotively satisfying adverbs we are already sufficiently aware. What shall we regard as a 'fundamental' or an 'essential' difference?

In part at least the problem is one of classification. This much is unquestionable: *From some points of view* (remaining for the present within the realm of common sense) organisms are not different from material objects — that is, we may legitimately classify them together.

For instance, both, as we know them in common sense, have a place in the spatio-temporal order; both have mass, and behave, at least for the most part, in accordance with gravitation (though birds fly); both offer resistance to touch; etc. But from other (common-sense) points of view, organisms are undoubtedly different from material objects — cannot be classified with them. For instance, they move around 'by themselves,' grow, die, have offspring, eat. However we are later to interpret organisms, these are facts we have to start with. The issue, therefore, evidently does not lie at this level of discourse; or if it does it is purely verbal, since we can give either answer depending on what facts we emphasize.

Let us see, then, how a biologist states the problem:

> So the first question is whether . . . there are irreducible peculiarities in vital activities — peculiarities which cannot be adequately accounted for in terms of physico-chemical or ideally mechanical description? Or is the usually admitted incompleteness of the physico-chemical description of, let us say, a reflex action merely temporary, and likely soon to disappear?
>
> The second question is a little different. Of the movements of the heavenly bodies Gravitational Astronomy gives mechanical descriptions which are practically exhaustive and almost perfectly useful. Now supposing there were available a complete mechanical account of, say, the opening of a Yucca flower, would that be all that is wanted in Biology? Would light have been thrown, for instance, on the fact that only one Yucca flower opens on each plant each evening, that the flowers begin to open when the Yucca moths begin to emerge from their cocoons, that the life of the flower and the life of the moth are closely bound up together, so that the one without the other is not made perfect? The Yucca flower and the Yucca moth are organisms with a history; they have come to work into one another's hands. Are their adaptive relations only different in degree from the dynamical relations between Earth and Moon, or must we admit that the answers to distinctively biological

questions do not follow from even a complete ledger (were that available) of the chemical and physical transactions? [1]

Thompson tries to make the issue more precise by centering it around the relations between the physico-chemical sciences and biology, and thus removing it to realms of discourse more exact than common sense. His first question might be summed up as asking, "Are physical explanations of vital phenomena exhaustively possible?" and the second as asking, "Whether or not possible, are physical explanations wholly relevant to the kind of questions which the biologist, properly speaking, must ask?" The second question is critical or dialectical, in the sense defined in Chapter VI; the first might seem to be speculative, in the sense that either an affirmative or a negative answer, on the basis of the evidence we have at present, would have no more than a slight probability; but it will be seen that both speculative and critical aspects are included. To both these questions an extreme *mechanist* would answer Yes, and an extreme *vitalist*, No. It is, however, quite possible to discriminate between the two questions, and answer, for instance, Yes or Perhaps to the first, and No to the second.

The problem as thus conceived deals with the autonomy of biology as a science; and to begin with we shall accept this formulation, though we shall see that it too is actually several problems. But the problem might be stated in a radically different manner. It might be seen to involve the question, "What is a science?" And it might be argued by another kind of vitalist that *if* our conception of science is drawn from mathematics and the physical sciences, then biology is and should be only partially a science; or *if* biology is in this sense a science, then biology is not fitted to deal with all the problems of living things

[1] J. Arthur Thompson, *The System of Animate Nature*, Vol. I, p. 109.

and life as we know them. We shall however postpone discussion of this argument.

We shall also for the time being restrict ourselves to the individual organism, and leave for the last section the relationships among the various kinds of organisms (*phylogeny*). But before going on we must introduce certain terms which, though rough, will serve to fix certain characteristics of living things more adequately than is done by common sense. In the first place all except the lowest organisms (the Protista) are built up out of one or more *cells*. These cells, consisting of nucleus and surrounding protoplasm, are of many different kinds, sizes, chemical content, etc. The development of an individual organism (the individual morphogenesis) always starts from a single cell, the 'egg' (the organism may consist only of one cell). From this cell, under proper conditions, which usually include fertilization by another cell called a spermatozoön, the organism develops by a process of cleavage (one cell splitting into two) and differentiation (one group of cells becoming the type to make up one 'organ,' another group another organ — stomach, nerves, skin, bones, whatever it may be). Now it is difficult to state general characteristics of organisms without tacitly answering our problems by the very words that are used, since vitalists and mechanists are likely to use quite different words. Let us therefore accept them tentatively. E. S. Russell, a vitalist, calls the "deeper manifestations of life" "development, differentiation of structure and function, and functional adaptation." [1] C. Lloyd Morgan, who is a vitalist of a special sort, gives as characteristic biological events: "cell-division and cell-differentiation, chromosome-partition and distribution, the reappearance in offspring of characters like those in the parent or parents" (*op. cit.*). Wilhelm Ostwald,

[1] Quoted by C. Lloyd Morgan, "Biology" in *Evolution*.

who might have been called a critical mechanist (he was not, for that matter, a biologist), says: "Biology is that science which treats of those chemical objects which have a stationary condition of energy, that is, of nourishment and reproduction" (*op. cit.*). The notion of a 'stationary condition of energy' is of great importance. What it means is this: In burning, for instance, a candle uses up 'energy.' It will burn so long as it has wax and there is surrounding oxygen. In living, presumably, organisms use up energy. But every organism now in the world is quite different from a candle in that it is part of an energy transformation system which has been burning (literally burning in the chemical sense, that is, 'oxidizing') as far back as the limits of observation and inference extend — there is an unbroken continuity of living cells. The ability to maintain such a stationary condition of energy is a striking and quite precise categorial distinction and means of classification. Jacques Loeb, who was an extreme mechanist, defined the difference as follows:

> Living organisms have the peculiarity of developing and reproducing themselves automatically, and it is this automatic character of reproduction and development which differentiates them for the time being from machines made of inanimate matter.[1]

In any discussion of problems of life as they are related to the sciences, it is necessary to keep in mind at least a few of these elementary notions to prevent the analysis from becoming an abstract verbal exercise. Indeed, without a fairly thorough knowledge of biology an analysis inevitably must remain somewhat superficial.

[1] *The Chemical Character of the Process of Fertilization and its Bearing upon the Theory of Life Phenomena.*

1. Biology and the Physical Sciences

The opposition between mechanism and vitalism conceived as a question of the relation between biology as a science and the physical sciences may be separated into three related problems: (1) "Should biology accept the postulate of determinism?" (2) "What are the fundamental terms in biology?" (3) "Can biology be reduced to the physical sciences?"

(1) The postulate of determinism. We have had in the last three chapters more than one occasion to refer to the postulate of determinism. By some writers the opposition between mechanism and vitalism is interpreted as the acceptance or rejection of this postulate for biology. It is easy to understand the vitalist's attitude on this point. Complicated organisms do seem at least in some of their activities to be 'free'; that is, some of their behavior seems to be unpredictable or undetermined. If I hold a brick in my hand and relax my muscles the brick will undoubtedly fall; if I punch someone on the jaw he may run away or he may punch back — I can't be sure beforehand. If I turn a switch that sends an electric current through a resistance coil, the coil will get hot; if I walk through a field in which there is a wild bull, the bull may or may not attack me.

Now there is no doubt that many of the actions of organisms are not completely determined in accordance with laws that we know of at present. But the state of our knowledge is not what the postulate of determinism is talking about. Moreover, the question is not whether the organism 'really is' in all respects determined. It is, first of all, a question of *method:* the assumption that in any given instance the event that is being studied is *probably* connected with some other event in some uniform manner. There is no reason why biology *must* accept this

postulate, nor even why science in general must accept it. But it is generally held that all sciences, so far as they are genuinely sciences, should accept it. Anyone may object to this; but it serves a great advantage in defining more clearly both the possibilities and limitations of science.

Responsible biologists, both vitalists and mechanists, do accept the postulate:

> In any branch of knowledge which practical necessities have separated from others, and which science now tries to study methodically, there occur general sequences in phenomena, general orders of events. This uniformity is revealed only gradually, but as soon as it has shown itself, even in the least degree, the investigator seizes upon it. He now devotes himself chiefly, or even exclusively, to the generalities in the sequences of all changes. He is convinced that there must be a sort of most general and at the same time of most universal connection about all occurrences. This most universal connection has to be found out; at least it will be the ideal that will accompany the inquiring mind during its researches. The 'law of nature' is the ideal I am speaking about, an ideal which is nothing less than one of the postulates of the possibility of science at all.[1]

> The problem of a scientific investigator can always be reduced to two tasks; the first, to determine the independent variables of the phenomena which he has under investigation, and secondly, to find the formula which allows him to calculate the value of the function for every value of the variable.[2]

We may say therefore that if this general meaning of 'science' is accepted, the issue between mechanism and vitalism is settled in this sense: biology, *to the extent to which it is a science*, will postulate probable determinism; and, theoretically, it will deal only with those aspects of

[1] H. A. E. Driesch, *The Science and Philosophy of the Organism*, p. 8.
[2] Jacques Loeb, *The Recent Development of Biology*.

organisms which can be brought under general laws. However, it might still be asked, even granted the postulate methodologically, is it genuinely descriptive of 'the nature of things' — in this case, of organisms? It will certainly be descriptive of what science studies, for any other possibility is ruled out.

(i) This question has already been answered in general. The postulate is genuinely descriptive at least to the extent that experience does in fact lend itself, within limits, to the kind of interpretation it demands. But on any plausible account such interpretation must neglect elements of experience whose reality, from another point of view, cannot be denied.

(ii) A criticism from within science itself is suggested by the last chapter. Physical laws do not hold exactly, even when applied to inanimate objects. This is often explained as due to the 'human equation' in experimental observation, and overcome by the setting of 'limits of error.' But the explanation, it is evident, begs the question, and fails to recognize the large structural element in all scientific propositions. This criticism, which holds when inanimate objects are in question, is at least equally valid and probably more so when the physical realm is extended to include the organic.

(iii) The postulate of determinism applies only *to any given instance.* The postulate of a universal determinism, in which everything is lawfully related to everything else, is not necessary to science, and is contrary to the nature of scientific method. Suppose, for example, that a scientist is taking up a specific problem connected with chemical events occurring in 'respiration.' If anyone should argue that the oxygenation of the blood is not connected with anything according to some general law, this would be a speculative judgment, and might be disproved by subsequent investigation (it has been at least partially

disproved). In like manner any other specific indeterministic answer might be partially disproved. But the study of oxygenation is possible only if the scientist definitely *limits* his investigation, disregarding what consciously or unconsciously he treats as 'irrelevancies.' There is an endless number of things that oxygenation logically might be connected with — including the experimenter's health, emotions, the weather, the influence of the spiral nebulas, the velocity of light, and anything else — but fruitful investigation is possible only if it is assumed that there are only a few things among which the actual connection is to be sought. Scientific laws always assume a qualificative 'Other things being equal'; they abstract and isolate a problem to make it precise. Thus, though any specific application of indeterminism may be disproved by subsequent investigation, indeterminism in general can never be disproved. And this is not simply because of the inevitable limitations of our scientific knowledge, but because determinism in general would not mean anything more than a vague emotion:

— In supposing the absolute determination of everything . . . the world appears to us a solid block rigorously determined in every detail, by every particular detail. This is the point of view which the encyclopaedists loved to develop. "The universe for one who could encompass it from a single point of view would only be, if it is permitted to say so, a unique fact and a great truth," wrote d'Alembert. "The absolute independence of a single fact," said Diderot, "is incompatible with the idea of the whole." In the universe thus conceived it becomes indifferent whether we wish to determine the future by the present or, on the contrary, the present by the future. But we are absolutely in ignorance whether in reality the universe does constitute such a block. If it exists, our mind does not permit us to know it; in order to perceive we are obliged contrariwise to break it up into isolated phenomena, and in order to act we are also forced to believe that it does not exist, that the

course of the world is not determined in advance, and that we are free to influence it.[1]

(2) **The fundamental terms in biology.** Granted, for the moment, the postulate of determinism interpreted in this manner, a second question arises: To what kind of terms does this determinism apply? The answer to this question is the first task of a scientific investigator as stated above by Loeb: "to determine the independent variables of the phenomena which he has under investigation." From this point of view, the opposition between mechanism and vitalism may be re-interpreted. The mechanist argues that the terms are ultimately physico-chemical:

> We may, therefore, say that it is now proved beyond all doubt that the variables in the chemical processes in living organisms are identical with those with which the chemist has to deal in the laboratory.[2]

The chemical terms would ultimately be interpreted, in theory, as complexes of electrons and protons, or some other basic physical units. The vitalist argues, on the other hand, that the behavior of living things can be explained only with the help of terms differing essentially from those used by physics and chemistry. Specifically, he asserts the existence of a 'life force,' or 'entelechy' manifested only in living things and distinguishing them from things that are not living.

> No kind of causality based upon the constellations of single physical and chemical acts can account for organic individual development; this development is not to be explained by any hypothesis about configuration of physical and chemical agents. Therefore, there must be some thing else which is to be regarded as the sufficient reason of individual form-production. We now have got the answer to our question, what our constant E [the

[1] Émile Meyerson, *op. cit.*, p. 315. [2] Loeb, *op. cit.*

entelechy or life force] consists in. It is not the resulting action of a constellation. It is not only a short expression for a more complicated state of affairs, it expresses *a true element of nature*. Life, at least morphogenesis, is not a specialized arrangement of inorganic events; biology, therefore, is not applied physics and chemistry: life is something apart, and biology is an independent science.[1]

It might seem that this problem is quite distinct from the first; but as a matter of fact this is not the case, as we may see by examining what is involved by the deterministic postulate, and what is meant by 'force.'

What will the scientist take for the variables in his equations (the terms in his laws)? With what units will he deal? Now the organism as a whole will not be his variable or unit. The reason for this is obvious: the organism as a whole is not determined, that is, cannot, if taken as a unit, be subsumed under any general laws. Certain vague correlations which are sometimes called 'laws' can be made about the behavior of the organism as a whole: all living things oxidize, all except one-celled organisms 'die,' all 'adapt' themselves in some sense to their environment. But these correlations are not at all exact. They do not tell when and under what circumstances an organism dies, how, exactly, it will adapt itself, just how the oxidation takes place. Nor will it do much good to restrict the laws to a particular 'species.' We can say, for instance, not only that all men oxidize and die, but that they all feel sexual desire, all want material comforts, all are burned by hot bodies, etc. But these 'laws' too are extremely vague and inexact.

To get exact laws, therefore, one of two things must be done: We may take as our unit some wider term which is a whole of which the individual organisms are parts. This is the method of statistical generalization. Approxi-

[1] Driesch, *op. cit.*, p. 105.

mately correct laws can be stated about the generalized abstraction 'man living in the United States' — when 'he' will die, marry, be ill, commit suicide, murder, etc. — and the vagaries of individual 'men' may be disregarded. Or we may, on the contrary, analyze the individual organism into parts, take these parts as our variables, and discover more exact laws holding among them. This is the usual method of science, and, if science is to approximate exact laws, the inevitable method. The organism is analyzed into 'organs' — kidney, liver, heart, brain, intestines. These new units are much more determined than the organism as a whole: food goes into the stomach, the various processes of digestion go on one after the other in a fairly exact sequence, under normal conditions. The organs are analyzed into cells; the cells into complex molecules, the molecules into atoms, the atoms into electron-proton aggregates. (However, according to the principle of indeterminism discussed in the last chapter, at this extreme we again meet units not subject to 'law,' which we get around by the help of the first, or statistical method.) The large scale, more or less haphazard activities of the whole organism are now seen as an orderly sequence of small scale events. The marvelous development from the single cell to the complex, differentiated mature organism, and all its subsequent activities, are broken up into innumerable isolated events related in a regular manner only to other events in their immediate spatio-temporal neighborhood.

Nevertheless, what happens in the development of an organism is on any account almost fantastically complex. So, even accepting this method of analysis, may we conclude with the vitalist that to account for what happens a vital force must be brought in, which is not operative in the case of (apparently simpler, though themselves sufficiently complex) inorganic events? Suppose that we

assume such a force, and try to imagine how the reasoning of a scientist would proceed. A mechanist objects to the idea of a separate 'vital force' on the grounds that it is a 'mysterious' 'unknowable' something that he can't handle in his laboratories. But this objection rests on a partial misunderstanding. *Any* force, from the standpoint of observation and experiment, is mysterious and unknowable. "When we deal with matter in the concrete, force does not, strictly speaking, enter into the question. . ."[1]

We observe and experiment with events that happen; force is an abstraction inferred from what happens. It can be interpreted as an explanation of 'why' these events have happened; but the scientist does not need to consider it more than a summing up of certain metric aspects of what has in fact happened. A physical body in motion is accelerated; the 'amount' of acceleration measures the mechanical force expended, and such a measurement is the nearest the scientist can get to the 'observation' of force.

A great many different kinds of events seem to be happening, and they seem to display different kinds of forces and energies, mechanical, electrical, chemical, radiant, etc. But science seeks for the lawful in what happens. It discovers certain lawful correlations in, say, electrical, mechanical, and thermic phenomena. But as soon as correlations are discovered within each of these three classes, it becomes possible as we saw in Chapter VII to correlate the three with each other, to subsume the three separate 'forces' that are manifested under a wider concept of 'energy,' and to formulate the principle of the conservation of energy. No 'qualitative' equality between forces and energies is needed to have a force fit into

[1] Darcy W. Thompson, *On Growth and Form*. Thompson is an advocate of mathematical methods in biology, though philosophically he is critical toward mechanism.

the principle of the conservation of energy. The energy of heat is measured with the help of a thermometer using as a unit the raising of a certain volume of a certain substance a certain number of 'degrees' (making a liquid rise a certain amount in the thermometer). Mechanical force is measured by the change in velocity of a body of unit mass. The two seem to be very different concepts. But as soon as we have reduced each individually to mathematical order, we can equate them with the help of a mathematical 'transformation formula.' It is still permissible to think of heat, mechanical force, and electricity from one point of view as different forces; but science, restricting itself to their metric properties, treats all three as simply forms of the abstracted concept of energy.

There are events that happen in the development of organisms that do not happen elsewhere. These may at first be thought of as manifestations of a vital force. But as soon as mathematical laws covering them are sufficiently known, just as heat, mechanical force, and electricity are assimilated to each other, so will it be possible to subsume (mathematically) vital force under the concept of energy, and to postulate the conservation of energy to apply to vital force. Since, even thus interpreted, the particular organization of physico-chemical units found in organisms does not occur among inorganic phenomena, life may still be thought of as a unique 'function' in the sense developed in Chapter VII; but science may, for its purposes, treat the difference between vital force and other forces and energies as metric only.

The assimilation of 'unique' organic phenomena to general chemistry, and thence, in theory, to physics, has already been many times illustrated during the history of experimental biology and physiology. For instance, certain chemical reactions (e.g. oxidation and certain processes in digestion) take place at much lower tempera-

tures in living things than in the laboratory. The vitalist may argue that this is one of the concrete manifestations of 'vital force.' But the mechanist 'solves' it by the 'discovery' of *enzymes*. Very little is known about enzymes; in fact about the only thing that is certainly 'known' is that their presence will enable a chemical reaction to take place at lower temperatures than ordinarily, though the enzymes themselves do not, apparently, undergo any change in chemical composition during the reaction. This is a property of what are called *catalysts*, and inorganic catalysts are known. The chemist therefore considers that he has explained enzymes physically by classifying them as one type of catalyst. Enzymes have been found only in organisms; but if we start from mechanistic postulates we should not be surprised to end up by explaining things mechanistically.

For a practicing biologist the preceding theoretic discussion is somewhat academic. Whatever may be the theoretic advantages of regarding the organism as ultimately a bundle of electrons, the practical advantages are absolutely nil, as everyone recognizes. No one has anything to do with electrons except a few specialized scientists working in intricately equipped physical laboratories. We have to deal in larger, rougher, and perhaps from theory vaguer units to get anywhere. When we bet on a horse race we might be sure to win if we knew the electronic composition of all the starters, and all the external forces affecting it; but actually we rely on details more amenable to observation. An extreme mechanist counters these practical necessities by reference to a theoretic future when our knowledge will be complete, or nearly so. But this is scarcely justified. The probability that we shall ever be able to write down mathematical equations covering the makeup of a dog or a man is too

slight to take seriously. We may think of this as a comment on the limitations of man, but it may be equally well a comment on the universe.

In perusing a book of popular science or materialistic philosophy . . ., one gains the impression that the mechanical theory is a logical conception, complete and finished, directly applicable if not to the totality, at least to the great majority of natural phenomena. But looking more closely it is easy to see that this is an illusion. That all the phenomena of organic matter should be explained by those of inorganic matter has always been postulated by a great number of thinkers. . . . But in reality these are simple postulates, and every impartial observer is obliged to recognize that, if some progress has been made in this direction . . . what has been done is extremely little compared to what remains to be done. Indeed, one can scarcely discover in modern physiological doctrines the faintest traces of mechanical explanation. Let us reflect: here are two germs between which the most minute microscopic examination is incapable of finding the slightest difference; and yet one is the germ of a man and the other the germ of a cat. . . . But even in inorganic science is there not much that is illogical? [1]

In biological research there are peculiar difficulties, and this fact is not without importance in estimating the controversy between mechanists and vitalists.

The experimenter in the inorganic fields of nature is not hampered by the specificity of composite objects: he 'makes' all the combinations he wants. . . . The biologist is not able to 'make' specific forms of life, as the physicist has made red rays, or as the chemist has made a certain compound of carbon. . . . The biologist is dependent on the *specificity* of living objects as they occur in nature.

A few instances may show what great inconveniences may

[1] Meyerson, *op. cit.*, pp. 63, 64. The statement that "one can scarcely discover in modern physiological doctrines the faintest traces of mechanical explanation" was hardly justified when Meyerson wrote it, and is certainly not now. But it is still more true than many theoretical mechanists recognize.

hence arise to impede practical biological research. We later on shall have to deal with experiments on very young embryos: parts of the germ will have to be destroyed in order to study what will happen with the rest. Now, almost all germs are surrounded by a membrane: this membrane has to be detached before any operation is possible. But what are we to do if it is not possible to remove the membrane without killing the embryo? . . . in experiments on physiology proper or functional physiology: one kind of animals survives the operations; the other kind does not, and therefore, for merely extrinsic reasons, the investigations have to be restricted to the first, though the second might have given important results.[1]

Driesch is here referring to experiments on which some relatively exact work has been done. But there are innumerable others in which exactness has not been approached. It would be unwise to state too closely limits beyond which experimenters cannot go. Experimenters display a remarkable ingenuity in surpassing limits through indirect methods of observation. A piece of the sun cannot be put in a test tube for chemical analysis; but analogies from the study of the spectrum of sunlight enable inferences to be drawn about what chemical elements are to be found in the sun. Likewise indirect methods are found for studying living things. But inferences too abstractly indirect lead often to conclusions that seem rather fantastic when put against the evidence on which they are supposedly based.

(3) The reduction of biology to the physical sciences. Let us, still accepting a method for biology derived from the method of the physical sciences, ask from a more general point of view whether the mechanist is justified in stating that biology may be reduced to the physical sciences, or the vitalist in denying that this is possible. The problem here separates into three problems.

[1] Driesch, *op. cit.*, pp. 3, 4.

(i) The first — will living things behave in accordance with the laws of the physical sciences? — is already answered. So far as the method is postulated, science will strictly speaking deal only with those aspects of their behavior which do so behave.

(ii) Second, we may consider what might be called 'the order of knowledge.' How, in the conscious progress of our knowledge, do we learn about living things? The answer is clear enough. Whatever we may later infer, we first know living things as common-sense specific individual wholes. Anything we know about cells or chemical elements or atoms or electrons that 'make them up' comes later, in the same way that we know the common-sense water that we drink before we know the hydrogen and oxygen into which it may later be analyzed. And in this sense biology is autonomous, and cannot be reduced to the physical sciences.

(iii) The mechanist might, however, argue that the reduction means something quite different from this; not that we know physics and chemistry first, but that, *if* our knowledge were complete enough, we could *deduce* biology from physics. This view fails to recognize what has been called 'the contingency of the actual.'

Logic and mathematics form the basic discipline of science, and no individual science will 'violate' their laws. But granted this it does not follow that we can deduce anything about the content of particular sciences from logic and mathematics. They merely delimit abstract possibilities. We can be sure now and forever that 2 plus 2 equals 4. This, however, guarantees nothing outside of mathematics. From the knowledge of this alone we could not be sure even that we should ever meet with 2 units and 2 other units to be added together. Much less could we know what particular kind of units they would be. The actual physical world (what the physical sciences

study) is in no sense 'given' in however complete a mathematics. From the standpoint of mathematics, that this earth, that sun, those stars, these trees, minerals, people, should be is an irreducible mystery. It is more difficult to summarize the content of physics as at present understood. Roughly, physics may be said to study the conditions of energy transformation. But even treating living things simply as physical machines capable of transforming energy, there is nothing in physics from which may be deduced the pure fact that there are *such* machines. From the standpoint of physical science this fact is *contingent:* things just happen to be the way they are. Biology studies *such* machines, such particular systems of energy transformation, which are not the same as the machines which are 'not living.' Even if the variables in the biologist's equations are regarded as ultimately electrons and protons, the functions of these variables which the biologist studies form a unique and autonomous class.

2. Is Biology a Science?

Consciously and unconsciously modern science has from the beginning accepted mathematics as both foundation and ideal. All the early scientists were great mathematicians. The astronomy of Copernicus and Kepler was a direct application of Euclidean geometry and the theory of conic sections. Galileo, the founder of modern physics, wrote that "Nature's great book is written in mathematical language." Physics, after Newton's synthesis, became the 'type' science. The method of the physical sciences came to be accepted as the method for all sciences. In the last section we have accepted this method for science, and have studied within these limits the relation of biology to other sciences. We have now to ask an entirely different question: If biology is reflective knowl-

edge about living things, is it wholly a science? Or, put in another way, if biology is a science, then does not our idea of science have to be expanded to include other than mathematical and physical methods?

The question here has nothing to do with inevitable limitations of human knowledge. Granted the farthest possible extension in the physical knowledge of living things, would that tell us all about them there is to know? Are there not other ways that are legitimate of knowing living things? And the question is not one of our 'ideas' and 'feelings,' but of an objective reality. This is perhaps the fundamental issue between mechanists and vitalists. When the vitalist tacitly assumes 'physical' methods, his arguments are speculative and might some day be disproved. But this new issue is critical; no amount of factual knowledge can settle it; and in asserting the validity of other than physical ways of knowing living things the vitalist is entirely right. Other than physical methods can, it is true, be rejected, but not disproved. It is also true that other methods will not lead to exact laws that can be mathematically expressed; but why, it may be asked, should they? There is no reason to think that amenability to exact laws is the *only* test of reality; it simply limits what we shall, on certain occasions, call real.

(1) **The Whole.** In arithmetic the whole *is* the sum of its parts. It is *by definition* identical with the sum of the parts; 2 is simply a more convenient way of writing 1 plus 1 — the change is merely a sign change.

But this is not true of experience in general. In fact we may say that a genuine whole is never merely the sum of its parts. If this sounds at first confusing we need only reflect that when we think in terms of wholes we are not regarding them as sums at all. The two notions are reciprocal; 'whole' and 'part' get meaning only through

each other; and an absolute whole or absolute part is a merely logical limit. But it must be understood that a 'whole' is not just a shorthand reference to an aggregate of parts; it is a different way of looking at things.

Among the things that we know, wholeness is outstandingly displayed by living organisms, particularly by organisms of some complexity. The last phrase need not disturb us by suggesting that we shall be led to logical absurdities by trying to draw an exact line between what shows wholeness and what does not. Anything may be thought of as a whole; the solar system as a whole is different from a number of material bodies wandering around the heavens. Infusoria and other one-celled organisms show wholeness. But analysis from the point of view of wholeness becomes more and more relevant to organisms of increasing complexity; knowledge which neglects it becomes less and less adequate to problems which we may, if we wish to, raise.

The physical sciences have no technique for the discussion of wholeness. To obtain exact laws they must analyze big objects into little objects, large scale events into a succession of small scale events. And this is just where biology differs from the physical sciences: these little objects and small scale events, for the biologist, get their typical biological meaning only because they are parts of a whole. The biologists who do not recognize this are those like Loeb who might more accurately be called chemists using organisms as subjects for chemical analysis. Perhaps, in theory, the development from a single cell to, say, a mature cat might be analyzed as an orderly series of minute physical events; but the physical series will never disclose the fact — as undoubted and objective a fact as any minute physical event — that the development produces one whole specific individual. The knowledge of the physico-chemical events is certainly of

great value to the biologist; in any organic activity innumerable physico-chemical events occur; but the biological meaning emerges only when they are seen to be interrelated as dynamic functions of the one organism, as parts to a whole.

> Let us admit — though we must realize that there are many biologists who do not admit it — that, whether subject to what I may call emergence or not, there is here a kind of substantial unity that characterizes the going-together, within an organism, of diverse events no less special in kind. In other words there is here something different from anything we observe in the inorganic world.[1]

We do not have to follow Morgan in maintaining an absolute discontinuity from the inorganic; but we must follow him in realizing how much more relevant is this specific wholeness in the case of organisms. Someone cuts me in the hand with a knife, and within a few seconds innumerable events occur. The muscles of my arm contract, withdrawing my hand; adrenalin is secreted, changing the chemical composition of my blood, and raising throughout my body muscular vigilance and tone; my heart beats faster, I breathe more rapidly; phagocytes rush from all over the blood stream to the cut, where infectious germs may be present; the pupils of my eyes contract, etc. But none of these events can be fully understood unless it is realized that they are all parts of a functionally related activity of me, one specific individual.

(2) **Teleology.** We all understand what it is to have an aim in view and then to take steps to actualize it. We have the conscious intention of buying a pair of shoes, and we go to a shoe store and buy them. We want to be a good golf player, so we take lessons, watch experts, and practice. We wish to be respected in our community, and

[1] C. Lloyd Morgan, *op. cit.*

therefore we conform to its more important customs. In these experiences we discover a relationship not taken account of by the physical sciences: the relation of *means* to *end*. There are two characteristics of this relation distinguishing it from the relation of physical causality: the present is in a sense determined by the future — the end, which lies in the future, guides what we do in the present; but the particular means do not seem to be determined — the end of becoming respected might be reached by various means, and does not dictate the particular details of our life. In philosophy the relation of means to end is called *teleological* or *telic* (from the Greek word τέλος meaning 'end').

We first get our knowledge of this relation from our own conscious purposing. Later we may structuralize it, and apply it as a method of analyzing experience in general. We may then eliminate the idea of conscious purposing, as when, for instance, we might say that the 'end' of an acorn is to become an oak tree. Many events that occur in the development of living things seem to be pre-eminently teleological. The cell differentiation and structural differentiation all seem to come about as subsidiary to some end. The heart is developed to pump blood through veins and arteries; lungs to oxidize the blood; stomach and intestines to digest food; spinal cord and brain to sort nervous impulses; legs to move with; eyes to see with, etc. Moreover, when development is thwarted in one direction, it will take place in another, so that the original end will be served. Certain plants, for instance, build up their cells from certain groups of chemical elements. They will build up the cells in the same way even when the elements are differently combined in the soil where they grow; and it has been found that in some cases they will utilize other elements when the usual ones are not found in their environment. A heart

with leaky valves will pump faster and harder; a blind man develops super normal hearing and tactual sensitivity; a young tree transplanted to drier soil will send down deeper roots to where moisture may remain during the summer.

Teleological analysis takes account in some measure of the whole, in a way that physical analysis cannot. It discloses among organic events not a mere succession in time but an interrelatedness in which each part functions as means toward some end related to the whole organism. The examples given above will illustrate the relation. The examples in books on biology are innumerable. We may select a few from J. A. Thompson:

> When eels migrate to spawning grounds; . . . when a dog hides an unfinished bone in a very unusual place; when Lord Avebury's dog Van goes to its box and brings out and arranges the letters T–A–E; when rooks take fresh-water mussels to a great height and let them fall on the shingle beneath so that they are broken; when a mother weasel, accompanied by one of her offspring, about to be overtaken on the links, seizes the youngster in her mouth, dashes on ahead, and lays it in a sandy hole; when beavers cut a canal right through a large island in a river; when mares, some past foaling, unite to lift up between them a number of foals on the occasion of a great flood. . . . In the making of the Vertebrate eye, an outgrowth from the brain forms the retinal cup, an independent ingrowth from the skin forms the lens, some mesoderm cells migrate into the interior to form the vitreous humour, others combine to form the protective envelope, and so on.[1]

Organic teleology is often summed up under the vague and somewhat doubtful concept of 'adaptation.'

During the Middle Ages all science was partly teleological, and an end for all reality was somehow in the consciousness of God. At the Renaissance physical science

[1] *Op. cit.*

threw out teleological explanations; the law of gravity made it no longer necessary to think of water 'seeking its own level.' But biology has remained, still remains, stubbornly teleological. An extreme mechanist denies teleology; but his denial rests in part at least on a misunderstanding. In the first place it is worth noting that almost all biology at the present time is in fact teleological; and teleology has thus a 'pragmatic sanction.' But the mechanist regards teleological explanations as simply rough preliminaries, to be replaced gradually by physical explanations. There is no prospect that his goal will ever be actually reached, but that is not the central error: teleology can never be *disproved* by mechanism; it is not contradictory to physics and chemistry; it is *another and different method of analysis, and may always be employed if we wish to employ it.* When the mechanist objects that it reads our conscious purposing into nature and is thus 'anthropomorphic,' two replies can be made: why should it not be anthropomorphic? and, more specifically, so is any method — and why should the structuralization of sight and muscular movements around the eye that provides the content of relativity physics be more validly applied to reality than the structuralization of conscious ends?

It is important to understand that there is no necessary contradiction between teleological and causal analysis. We may describe breathing as a series of physical events; we may also relate these events as parts of one activity aiding the preservation of the whole organism; each approach throws light on the other. But for the biologist the teleological problem is *dominant;* he will wish to extend his physical knowledge as far as possible, but in the end for the light it will throw on his own problems, which are not the same as those of the physicist. True, when physical explanations are found for occurrences among

non-living things, such as light rays and falling bodies, we no longer consider teleological explanations necessary — though they are still possible. But it is difficult to believe that this will happen in biology, for the reason that complex physical explanations become less and less relevant to the dominant problems that face us in the activity of living things. This is easy to realize: A group of homing pigeons were taken from their nests, put in a cage covered with a black cloth, carried several hundred miles in a ship, and released. Half of them flew back to their nests. Suppose (which is impossible) a complete account of this were given as a series of successive physical events. But what, after all, would be known? Far from telling us everything about what had happened, it would have omitted the most outstanding fact of all, a teleological fact: that the birds flew home to their nests. We may conclude, with Darcy Thompson, that "like warp and woof, mechanism and teleology are interwoven together, and we must not cleave to the one and despise the other; for their union is rooted 'in the very nature of totality'."

(3) **Non-logical aspects.** The attack on a mechanistic biological science as a means for gaining knowledge of living things has been carried much further than has yet been suggested. For there are many writers, among whom Bergson is best known, who believe that discursive reason is powerless to give us any knowledge at all of life. For this we must rely on the immediate consciousness of ourselves as alive, and on 'intuition,' "the kind of *intellectual sympathy* by which one places oneself within an object in order to coincide with what is unique in it and consequently inexpressible" (*An Introduction to Metaphysics*, p. 7). This view, carried to its extreme, leads to 'biological ideologies.' *Duration*, the essence of change itself, the *élan vital* or creative life force, which intuition reveals to us, is held to be the only real, and the whole world

of science but its shadow derivatives. This reduction is as unacceptable as any other; what science tells us about is certainly one aspect of the real, and many think it is the most important. But, in a modified form, Bergson's approach is an excellent corrective to the mechanistic reduction. This is particularly true in our knowledge of ourselves and other human beings. Here physical explanations tend to become unusually irrelevant and often very silly.

Take the case of sight (which Bergson uses). Seeing can be partly 'explained' as a series of the most amazingly complex physical events: light waves hitting my eye, being turned upside down in the lens, being focused on curious rods at the back of my eye, setting up molecular disturbances in the optical nerve, upsetting the physical balance throughout certain parts of the cerebral cortex, etc. But I also know sight in an entirely different way: I simply open my eyes and see, one simple direct immediate activity. There is no question here of correlating the physical events and my seeing: the correlation would not mean anything. Correlation is possible only when the things to be correlated can be reduced to units between which mathematical relations can be established. But there are no units for the simple act of my seeing. Or again, in the case of what we mean by 'intelligence' or 'personality.' If we choose to *define* intelligence as reaction time to specific stimuli or personality as verifiable glandular content, then perhaps a correlation would be possible between them and physico-chemical changes. But these are laboratory notions of intelligence and personality, and nothing like what we know in ourselves or in intimate friends. Some vague correlations are possible, such as between high blood pressure and nervousness, indigestion and irritability, sexual repression and moral intolerance; but no more, again for the obvious

reason that it would not mean anything. The physico-chemical information is sometimes very interesting, and may prove useful; but good novels often have more to tell us about what we ordinarily mean by intelligence and personality than the most complete scientific textbook.

This criticism may be emphasized by contrasting two quotations, both allegedly dealing with two inescapable facts: life and death.

[Pierre, with other Russians, has been led out to be shot by the French, who are retreating from Moscow. They are to be shot in couples, and the first two couples have already fallen, though Pierre has turned his eyes away.] Then No. 5 was led out alone. Pierre was so terror-stricken that he failed to understand that he and the rest were reprieved; that they had only been brought out to see the execution of these five. The young workman started back as the soldiers touched him, and clung to Pierre; Pierre with a shudder, released himself from the grasp of the poor wretch who could not stand alone; they seized him by the arms, and dragged him along. He was shrieking with all his might; but when he was tied to the post he was silent, as if he understood that cries were useless, or hoped perhaps that he might yet be saved.

Pierre's curiosity was stronger than his horror; this time he did not turn away or shut his eyes. The excitement he felt, and which was shared by the crowd, had reached an acute pitch. The victim had recovered himself; he buttoned up his coat, rubbed his bare feet one on the other, and arranged the knot of the bandage for his eyes himself; when he was tied to the post he drew himself up and stood straight on his feet, without losing his nerve again. A word of command was given, no doubt, and twelve muskets fired in obedience to it, but afterwards Pierre could never remember having heard them; he saw the man suddenly double up, blood spurted from two wounds, the cords yielded under the weight of the body, the head drooped and the legs gave way, so that the dying man hung in a curiously distorted posture. No one held him up. Those who stood nearest to him had turned pale, and the old moustachioed

soldier's lip quivered as he untied the cords. The body fell in a heap; the soldiers clutched it clumsily, dragged it away and pushed it into the trench. They looked like criminals themselves, hurriedly hiding the traces of a murder.

Pierre glanced in. He could see the body of the workman with the knees drawn up to the head, and one shoulder higher than the other; that shoulder slowly rose and fell with convulsive jerks — but they were already throwing on shovelfuls of earth, forming a heap that covered him. One of the soldiers called to Pierre angrily; he did not hear him, but stood rooted to the spot. When the trench was filled up, another word of command was given. Pierre was led back slowly to his place, the soldiers faced half right about, and slowly marched past the stake. The twenty-four soldiers whose guns had been fired, fell in as the files went by them — all but one, a young boy, as pale as death, who remained, without moving from the spot by the side of the grave where he had stood to fire; his shako had fallen back on to the nape of his neck, and his musket was reversed: he staggered like a drunken man, swaying backwards and forwards to save himself from falling. An old sergeant ran towards him, seized him by the shoulder, and pulled him back to his place. The crowd slowly dispersed; every one hanging his head in silence.

"That will teach them, those rascally incendiaries," said a Frenchman, and Pierre looked round to see who had spoken. It was a soldier, evidently trying to reconcile himself to the deed he had just done; but he did not finish his sentence, and went off with a dejected air.[1]

Scientifically, however, life begins (in the case of the sea-urchin and possibly in general) with the acceleration of the rate of oxidation in the egg, and this acceleration begins after the destruction of its cortical layer. Life of warm-blooded animals — man included — ends with the cessation of oxidation in the body. As soon as oxidations have ceased for some time, the surface films of the cells, if they contain enough water and if the temperature is sufficiently high, become permeable for

[1] Tolstoi, *War and Peace.*

bacteria, and the body is destroyed by micro-organisms. The problem of the beginning and end of individual life is physico-chemically clear. It is, therefore, unwarranted to continue the statement that in addition to the acceleration of oxidations the beginning of individual life is determined by the entrance of a metaphysical 'life principle' into the egg; and that death is determined, aside from the cessation of oxidations, by the departure of this 'principle' from the body. In the case of the evaporation of water we are satisfied with the explanation given by the kinetic theory of gases and do not demand that — to repeat a well-known jest of Huxley — the disappearance of the 'aquosity' be also taken into consideration.[1]

Both these passages are supposedly accounts of life and death. But even if Loeb's were complete in terms of electrons or some such unit, what from it would we know about? We would certainly know a great deal about electrons, but life and death would have quite disappeared.

3. Evolution

So far the discussion has centered around the individual organism. There is, however, another group of biological questions which takes up the relations among the different kinds of organisms. It is these that are referred to by the theory of evolution. The critical and philosophic problems of evolution are not, however, dissimilar to those of the individual organism, and they will be treated in less detail.

The concept of evolution is disturbingly vague and fruitful analysis of it is difficult. Often it is so extended as to mean little more than that things succeed each other in time, and are not in all respects the same now as they once were — an observation which is not illuminating. We shall begin therefore by narrowing down the

[1] Loeb, *The Mechanistic Conception of Life.*

problem to that of biological evolution, which deals chiefly with the possible interrelatedness of living things on the earth. This, in turn, is usually approached through the problem of the *Origin of Species*, which is, in fact, the title of Darwin's famous book. The most casual observation shows us on the earth innumerable different kinds of living things; in fact each organism of any complexity is different from every other. Nevertheless, organisms seem to suggest more or less obvious groupings: there are, for instance, many varieties of men, but they all seem to fit into a general class 'man'; and in the same way, dogs, horses, trout, rattle-snakes, roses, elm trees, echinoderms, amoebas, etc. These more general classes are called 'species'; and in most species there are many 'varieties.' Species can be subsumed under still more general classes ('genera,' 'families,' etc.) according to various principles of differentiation — mammals and marsupials, vertebrates and invertebrates, plants and animals. Now a primary question that biology asks is whether these classifications, particularly according to species, mark simply convenient ways of arranging our knowledge, or genuine discontinuities in nature.

As we have seen an individual organism always develops from a single cell; but this cell was once *part of* another organism whose individual development occurred earlier in time. This holds without exception, within the limits of observation. There is thus a real material continuity connecting any now living organism with a line of ancestors stretching back indefinitely in time. The question, then, might be put in this way: Are all the direct line ancestors of a given organism belonging to a given species of that same species? To ordinary observation, the answer would certainly seem to be yes. A man and a woman always have a human child, a dog and a bitch a puppy, a fertilized rose seed develops into another rose.

Crossing of species either does not produce offspring, or produces hybrids that are usually sterile.

(1) This common-sense answer was generally accepted until the nineteenth century. The *origin* of species was explained by the first chapter of *Genesis*. *Genesis* states that at one time God created *ex nihilo* a male and female member of each species and that these were the ancestors of all the specific varieties that have populated the earth. *Genesis*, that is, accepts the discontinuity of species. Today comparatively few educated people accept literally the account in *Genesis*. This change is not due wholly to the strength of the factual evidence against *Genesis*, but in some measure to a weakening of general belief in divine Revelation (here through the Bible) and in a conscious Creator who now and then takes an active interest in the universe — though in its turn the factual evidence has contributed to the weakened belief in Revelation and an active Creator. Science does not admit this belief into its reasonings, and has built up substantial arguments in favor of evolution (specific continuity) as opposed to the form of explanation in *Genesis*. Some of the leading arguments may be summarized as follows:

(i) *Paleontology*. Geology suggests that much land and many mountains have been built up in layers by slow deposit on the bottom of seas and lakes. A relative time sequence can be established with the help of these layers. In them are found curious imprints and sometimes actual structures which are interpreted as the remains of organisms which lived when or just before the layer was being formed. Certain facts seem to emerge: many organisms were evidently unlike any now on the earth; there is in some cases a kind of gradual series or development through time — such as from the small five-toed *eohippus* to later organisms more and more nearly like the modern horse.

(ii) *Geographical distribution*. Geology suggests that

what are now separate islands, or mainland and neighboring islands, were once continuous stretches of land. In such cases, varieties of the same species differ more from one now isolated place to what was formerly connected with it than within the place.

(iii) *Anatomical and physiological analogy.* There are certain analogies in structure and function between members of different species — for example, man and ape.

(iv) *Embryology.* In development the embryo of a complex organism goes through stages having certain analogies with the general development of organisms suggested by (i).

(v) *Vestigial organs.* In certain organisms there are organs which are apparently of no use to the organism, but which might possibly have been of some use to a hypothetical unlike ancestor.

(vi) *Stock and plant breeding.* By suitable cross and selective breeding, animals and plants can be produced differing considerably from previously known varieties.

(vii) *Controlled experiment.* The more exact stage in the study of evolution was begun in the late nineteenth century when Hugo De Vries revived controlled experiments such as had been made some use of by Lamarck and Mendel. Considerable specific modification has been brought about under conditions admitting a good deal of precision.

How much does this evidence prove? About the continuity of species, which is the point at issue, in spite of the intrinsic interest of the evidence, it proves very little; though it does lend specific continuity some probability. Taken individually, each argument is weak and can be effectively countered. Argument (i) gives a high probability to the proposition that organisms showing a vague general development have successively occupied the earth, some remaining, and some disappearing. But, by

itself, it gives no probability to the proposition that this involved specific continuity. Argument (iii), by itself, is destroyed as soon as differences, which are as numerous, instead of similarities, are emphasized. Argument (iv) treats the human embryo as a microcosmic analogue of the biological universe; but when the analogy is pressed the actual succession of forms in the developing embryo is not the same as the succession inferred from (i). Argument (v) is made doubtful by the fact that concrete evidence of the existence of hypothetical ancestors to whom the vestigial organs might have been actually useful is very scarce. Arguments (vi) and (vii), do, however, take away much of the *a priori* implausibility once thought to surround the notion of the alterability of species. And when the arguments are taken together, the situation is altered: for evolution has at least some plausibility with reference to the facts pointed out by all of them; whereas no other hypothesis yet thought of, except for creative acts by God, which are scientifically inadmissible, covers them all. Except for evolution, it is necessary to have a separate explanation for each group of evidence, and this is contrary to the scientific requirement of simplicity.

There is no doubt that the arguments for evolution seem more convincing than a strict logical analysis will justify. This is partly because of the acceptance at the present time of two postulates which we have met in other connections: (*a*) the belief in the general continuity and interrelatedness of nature, which involves the belief that changes (which, for science, are not 'real changes,' but transformations) occur gradually, by small steps; (*b*) the scientific rejection of creation *ex nihilo*. It might seem that these two postulates are hardly more than empirical generalizations, thoroughly demonstrated by ordinary observation. But in fact this is not the case. We *interpret*

experience to make it conform with them. True enough, if we keep close watch over a process of development, such as the growth of a child, we see that the change is gradual. We generalize this by analogy; if we meet a man who has the same name as a child we knew fifteen years before, we infer that the same gradual, continuous process has gone on. There is less evidence against creation *ex nihilo;* from a naïve point of view things might seem to be continually created and destroyed; but here too we always find an interpretation that provides for their previous and future existence. These two postulates give an *a priori* credibility to the theory of evolution; they make it somewhat probable without any proof whatsoever. This might be interpreted in several ways: either such types of reasoning are unconsciously forced on us by the character of reality; or we unconsciously force them; or perhaps they are part of what may be called the 'thought-form' of our age. They are connected with the mathematical view of reality we all, at least as scientists, tend to have. The notion of a mature cat suddenly springing into existence we find rationally inadmissible; but by spreading the creation out over many million years, it becomes less repulsive. To a limited extent almost all men have accepted these postulates in modified forms. It is sometimes overlooked that few of the opponents of evolution doubt the common ancestry of man. Yet this is no more than probable. There are certainly vast differences between African pygmies and high-caste Hindus and Chinese mandarins and Australian Bushmen and blue-eyed Nordics, and these cannot be accounted for at all directly by anything we have been able to observe.

The truth is that the hypothesis of evolution is not an exact scientific theory comparable to many theories in physics and chemistry. It is a somewhat vague notion, moderately convincing when left vague, but full of mys-

teries when we try to make it precise. Biologists try to avoid the difficulty this indicates by distinguishing between the *fact* of evolution, which they consider highly probable, and the *means* of evolution, about which they confess they know little. This distinction is rather sophistical, but accepting it, and accepting, for the purposes of discussion, the fact of evolution, we may consider a few of the problems it suggests. Because of the vagueness, it is impossible to separate clearly speculative from critical problems, but for convenience we shall attempt to separate those that are primarily speculative from those primarily critical.

(2) **Speculative problems.** (i) *The unity of life.* Have all the forms of life living now and having lived on the earth one common life-ancestry, presumably from a single original one-celled organism, or are there several lines of descent? The reasoning made use of by evolution seems to suggest a single original, but any speculation on this point is and will always be so tenuous that no answer can have more than a very small probability. One-celled organisms leave no record in the rocks and this is the only even indirect approach to factual evidence. We have to go on, therefore, only dialectical elaboration, and our answer will no doubt be dictated by general beliefs about the universe.

(ii) *The origin of life.* If we grant that all organisms descend from one or more single-celled living organisms, we may still ask where these come from? To this there seem to be three possible answers, only two of which are admissible by science:

(*a*) Life evolved from the non-living. This is partly a critical question, and will be referred to later. Some light might be thrown on this answer by the manufacture of life in a laboratory; though this would not necessarily prove that life had originally begun in the laboratory manner.

(*b*) Arrhenius, a chemist and biologist, suggested that life was, like the basic physical units, an eternal element of the universe, wandering here and there throughout inter-stellar space. One germ of life struck the earth at a time and in a place suitable for its development. Both this and (*a*), it will be observed, throw out any question of 'absolute' origin, following the general method of science.

(*c*) God or some other supernatural agent created life *ex nihilo* at a particular time in the earth's history.

(iii) *The direction of evolution.* This problem (its normative aspects) is partly critical, and will be returned to. But it is also speculative: does the evidence suggest any direction in which evolution is moving? We need not here think of any final goal, but simply the direction in which it has moved. The early writers on evolution, who had few facts to go on and consequently more imaginative freedom, thought they could point out a definite direction. Contemporary biologists, with more facts and soberer judgment, are more cautious. But is there anything that can be said with some degree of probability?

If we remain sufficiently vague, it can be said that there has been during the course of evolution an increase in complexity. At least, this much is true: that if life started with one-celled organisms, there are now organisms much more complex from any point of view. But when we become more precise we discover that we have no proper standard of complexity, and that, using any standard, the development has not been uniform. Fish now extinct were anatomically far more complex than many if not all existing fish. It is hard to see that the hoof of the horse is more complex than the five toes of the eohippus, from which presumably the horse developed. Many of the prehistoric giant reptiles seem to have been more complex than present reptiles. A more exact standard has been

sought in complexity of the nervous system, and this leads to some definite conclusions. Men and apes, who have the most complex nervous systems, are comparatively late comers, and the line here is rather more direct. A related standard is 'functional differentiation' — the development of different organs to do separate functions once done by the same organ. Increase of functional differentiation usually means increase of neural complexity as well as more complex behavior, and these do provide, in very general terms, a partial standard for direction, but the development has not been at all in a straight line.

A most general concept to describe the direction of evolution has been sought in *adaptation:* development is always toward increased 'adaptation to environment.' This concept is useful in suggesting ways of studying specific examples of organic development; but on analysis it proves to be as vague as the others. What can be meant by increased or better adaptation? There is the disconcerting fact that the one-celled organisms, the first comers, are still here with apparently no change, as well as many intermediate species, though countless other species have disappeared. Does increased adaptation mean longer life? But parrots, elephants, turtles have longer lives than man, who arrived later, and one-celled organisms are in a sense immortal. Does it mean ability to meet unexpected environmental situations? But the ways in which different sorts of organisms react are often incommensurate — there is no adequate basis for comparison between the stylized life of bees or ants and the haphazard life of men.

The view accepted by most contemporary biologists is that there are many different lines of evolution, carried through in many directions. Along each, adaptation can provide a rough standard; sometimes the line is successful, and continues; sometimes not, and dies out.

(iv) *Continuous variation or abrupt mutation.* The question here is whether the change from species to species has taken place by a series of minute modifications or by sudden leaps (mutations). Darwin held the first view, according to which each of the great changes we can observe from one species to a presumably later species may be resolved into an indefinite number of small changes. It is supported by a certain amount of evidence, such as the horse ancestry already mentioned. But most contemporary biologists have abandoned it. It leaves too many inexplicable gaps. There is not only the well known failure to discover fossil remains of the so-called 'missing links,' but the more glaring fact of the comparative stability of existing species and the often great distances between them. This issue has a direct bearing on the critical problems of evolution: for a large scale mutation is a change of the organism *as a whole*, and as such irrational in a mechanistic account.

(v) *The future of man.* Does evolution give any evidence about what is to happen to the human race? It suggests that human life has been present on the earth a very small time compared with the time life has been present. It gives no support to the view that man is the 'end,' the final goal of the process of development. It suggests that if the line of evolution reached by man continues, man will be in the future considerably modified. This last conclusion is sometimes thought to prophesy a 'super-man' of the distant future. But from the point of view of men's present ideals and desires the being to be evolved might well be inferior to contemporary man. Biologically man is far from a success. He is subject to the ravages of many diseases that do not affect other species; there is some evidence that insects, parasites, and germs will destroy his means of nutrition; he deliberately multiplies his own troubles, which other species

do not seem to do; he is inventing more efficacious ways of destroying his own species without being prodigally fertile as are other self-destroying species. In fact biological evidence might suggest that the line of evolution of which man is the most recent product is proved by man to be so unsuccessful that with man it will be allowed to die out.

(3) **Critical problems.** (i) *Categories to be used.* There are two obvious requisites for any theory of evolution: that there should be variations, and that these variations should be inheritable. There are many theories, and as in the case of theories about the individual organism, they can be roughly divided into mechanistic and vitalistic theories, though as before many different things can be meant by these two. Darwin began the mechanistic approach, setting up the principle he called *natural selection*, and which his follower, Herbert Spencer, ideologized into the *survival of the fittest.* Spencer's phrase is unfortunate, for he misinterpreted it to mean the survival of the best or the most valuable, with which science, properly speaking, is not concerned. By natural selection is meant that in the 'struggle for existence' those organisms best fitted to exist, best adapted to their environment, will win out; the others will be killed off, by the better fitted or by their own inability to meet natural conditions (weather, food situation, etc.), and will not be able to reproduce. It is easy to see, however, that natural selection is a tautology: the survival of the fittest means simply "the survival of the fittest to survive" or, "those who survive do survive." The importance of the principle is to suggest looking for the specific factors which do in fact make for survival.

In any case, natural selection does not provide for the appearance of new factors, but only for selection among those already present. Darwin observed that in the mem-

bers of each species there is a *continuous variation* (each individual is slightly different from every other); these variations were by 'chance'; and among them he believed that selection took place. It has been shown, however, that continuous variation probably cancels out; so in its place, theory has substituted small chance mutations, which are inheritable.

The Darwinian concepts are rough, and not suitable for a developed science. Common sense may speak of a bird inheriting the ability to build nests, or a vertebrate its complicated eye; but a rigid carrying out of the mechanistic position demands more precision. The material bond of continuity between one organism and the next is the single fertilized egg cell; and therefore the physical structure accounting for the whole development of the organism must be found in this cell. Consequently, any change that is to be transmitted to a succeeding organism must result in a physico-chemical modification of the germ cell. Some experimental work has been done along these lines: certain experiments, for instance, suggest that ultra-violet rays tend to promote small chance mutations in certain plants and insects. But very little is known or even guessed at about exactly what physico-chemical factors, whether environmental or intra-organic, bring about inheritable modifications.

Criticism of the mechanistic treatment of evolution would be much the same as the general criticism of mechanism already given, and need not be repeated. On the basis of present evidence the inadequacy of any mechanistic explanations so far devised is apparent; and many vitalists believe that there is already sufficient evidence to show that even from a factual point of view no mechanistic explanation *could* be adequate. The evidence for large scale mutations has already been referred to: these, involving considerable modifications throughout

the organism as well as great changes in individual morphogenesis, cannot, apparently, be analyzed into a series of small changes. They require emphasis on the organism as a whole and on teleological analysis, which lies outside the possibilities of physical science. Vitalists, therefore, extend the notion of an *élan vital* or entelechy from the individual organism to life in general. The non-physical *élan vital*, making use of physical elements for its own purposes, is the ultimate reality back of the evolutionary process. Teleological considerations, as well as 'perception' and 'consciousness,' are brought in as factors helping to explain evolutionary development — though often, as with Bergson's *élan vital*, no consciousness in the usual sense is implied.

> They [the deeper manifestations of life] may be regarded as directly analogous to behaviour-responses for the reason that they show the same objective characteristics, namely the 'whole-action' of the organism, active tendency or striving towards an end, and adaptibility to circumstances . . . no hypothesis as to the inner experience of the cognitive is implied, and in particular it is unnecessary to assume any actual conscious willing of response with foresight of the end.[1]

> Can any zoologist who deals with birds and mammals (to go no lower), either in the routine of their daily life, or in the history of evolutionary advance, disregard the part played by their 'powers of perception,' their 'intelligence,' and so forth.[2]

But once again, no matter how the speculative matters should be settled, the critical question still remains: Even if true, how relevant is a mechanistic explanation to certain aspects of life in general, and particularly of the 'higher forms' of life? Bergson's *élan vital* may from this point of view be interpreted as the assertion of the greater *value* of what is alive. The intuition, through

[1] Russell, quoted by Morgan, *op. cit.* [2] Morgan, *ibid.*

intellectual sympathy, of the life force, is knowledge of 'reality' because it is knowledge of what is most valuable, what is obscured or sterilized by the methods of science. Another aspect of the same critical problem has been stressed by the theories of *emergent evolution*. They all maintain that during the course of evolution what is genuinely new has appeared: life itself, sensation and perception, conscious purpose, intelligence. This may be thought to mean not so much that scientific method may not be theoretically true throughout, but that during the course of evolution there have appeared organisms to whose typical and unique activities it is less and less relevant; that other than physical ways of knowing must be brought in if we are to understand living things, and preëminently, man.

(ii) *Cosmic evolution.* Organic evolution is often treated as but one comparatively brief episode in a universal 'cosmic evolution.' Here earlier large scale events include the 'birth' of the sun, the production of the planets, of their satellites, the cooling down of the earth; and later events include the completion of organic evolution on the earth, which is to become unfit for life, the running down of the solar system, etc. In both directions the process tapers off into numerical immensities. But it is clear that if we speak of cosmic 'evolution' the word 'evolution' has been stretched so far beyond its biological connotations (which are at least comprehensibly precise) that only a misguided good will can make us think we are talking about 'the same thing.' The analogy between the birth of the solar system or of a new kind of atom and the birth of a man is by grace of a metaphor so strained as to be devoid of any but an emotive content.

(iii) *Evolution and man.* We have already discussed what evidence evolution gives about man's future biological history. But there remain other critical problems,

such as the relation of evolution and the ideologies based on it to man's conception of himself, and the evaluation of the evolutionary process — whether we are to regard it as a progress or a regress. It is difficult to know what it means to say that evolution is a progress; progress implies some kind of goal by which the progress can be measured, and no biological evidence gives the slightest indication of what the goal of evolution may be, if there is any goal — which biology makes appear more than doubtful. There is not the slightest evidence that man is the goal of evolution, or even, as has been pointed out, that a 'superman' is the goal. Nevertheless, man is one of the latest products of evolution, and for this reason we do tend to feel that evolution up to now has been a progress because it has managed to develop us. This feeling, however, does not refer to progress in any physical sense, but rather in terms of value: what we hold to be of value in the universe is primarily associated with the conscious life of human beings, and this is a late product of evolution. But these values, because they are from the evolutionary standpoint so recent and so transitory, seem somehow to diminish in importance. This is due, as was suggested in the last chapter, in part to a confusion of categories — big numbers need not regulate the structure of value judgments — but there can be no doubt that this has been an effect of the spread of evolutionary theories. Man no longer appears issuing from the hand of God; even if, in the end, God is responsible, he seems to have taken less direct and personal interest in man's creation. Man finds himself both more alone in and more opposed to the rest of the universe, and at the same time more inextricably and relentlessly bound up with its history, for which he is the briefest of episodes.

CHAPTER IX

THE SELF

The pursuance of future ends and the choice of means for their attainment are thus the mark and criterion of the presence of mentality in a phenomenon. . . . We impute no mentality to sticks and stones, because they never seem to move for *the sake of* anything, but always when pushed, and then indifferently and with no sign of choice. So unhesitatingly we call them senseless.[1]

This is doubtless a good working distinction. But as we have seen in the last chapter, there is no sharp line between where teleological categories can be applied and where they cannot. Logically and abstractly, both a causal and a telic interpretation are possible for any phenomenon. To be sure, in some phenomena — notably in organisms — a causal explanation would be hopelessly complicated. Complicatedness alone, however, would not justify a telic interpretation. It would mean merely that our 'explanations' (provided our problem were one of fact) would have to be statistical and approximate, instead of applying more directly to individual events. Telic explanations are introduced not merely because the situation to be explained is complicated but because our problem about it is telic.

Now we can accept, and in the biology of lower organic forms we *do* accept, a telic analysis as relevant without necessarily attributing 'mind' ('mentality' — James) to the object we are analyzing. Unless, of course, we *define* 'mind' to mean the telic aspect of things. But in that case

[1] William James, *Psychology*. Vol. I, p. 8.

we must differentiate conscious minds from telic situations where the only consciousness we suppose to be present is our own or someone else's consciousness of the objects in question; the objects themselves not being supposed to be conscious of anything. This difference is all-important to us as humans, and we should beware of theories that in the interest of logical simplicity try to explain it away. As we saw in Chapter VI, to 'explain away' is always to do so from a single point of view and with reference to a single standard of what is real. Dialectically this always enables us to assert another point of view — another standard of reality — from which the thing that is being explained away became worth talking about in the first place.

In the present chapter the point of view from which we start is individual consciousness. This can be explained away by a variety of expedients: by behaviorists, as reducible to physiological responses; by psychoanalysts, as rationalizations of and censors to various 'unconscious' impulses whose character is largely unknown but is at least partly sexual; by some modern philosophers of the 'neo-realist' school, as the focus for a certain grouping of universal qualities; by pantheists, as a fragmentary part of God's nature. We shall consider such doctrines and others for whatever light they may throw on the nature of consciousness, but our central problem here will be individual consciousness, and not reflexes nor God nor any other dialectically related entity.

Referring to myself as a conscious individual I use the word 'I.' This word is in one respect quite unique: it has an entirely different reference for every person who uses it. The problem of individual consciousness can be stated as the problem of what, in each person's case, it means to be an 'I' or an 'ego.'

Sometimes the problem is put differently (and more

loosely): *Have* I a 'mind'? *Have* I a soul? Such questions give rise to hopeless confusion unless before trying to answer them we try to straighten out the tangled meanings of such words as 'mind,' 'soul,' 'consciousness.' These questions are misleading, and involve us in needless dialectical quibbling. For whatever answer we give to a question like "Have I a soul?" there is one question left over as an irreducible remainder: What do I mean by this 'I' that I am inquiring about? For I cannot doubt that there is an 'I,' without contradiction; at least 'I' doubt.

It has been maintained (by Russell and others) that the use of 'I' is merely a necessity of grammar, imposed by the subject-predicate form of the English and cognate languages; that instead of saying "*I* feel warm" it would be more correct to say, There is a quality of *warm*, connected with certain perceptions, memory images, kinesthetic, emotional, and perhaps cerebral tendencies which, given an adequate linguistic equipment, I might specify, and which are what differentiate the quality *warm* as 'I feel it' from the same quality grouped differently, or as we say, 'felt by someone else.' It can be pointed out, however, that such a position is simply one possible answer to our question and does not deny the question's legitimacy. All it tries to deny is one orthodox answer to the question, according to which the 'I' is a soul-substance having such qualities as independence of the body, immortality, and a special relation to God. We shall examine this orthodox answer in the course of the historical survey of the problem, which follows.

To approach the problem of individual consciousness chiefly through a historical survey is a departure from the method employed in the two previous chapters. But it is necessary to keep in mind that western philosophy has a history, a more or less continuous tradition; and that, as was pointed out in Chapter I, many of its prob-

lems, in spite of changing verbal appearances, have remained throughout fundamentally the same. Consequently it is somewhat artificial to analyze basic notions only from a supposedly 'modern' point of view, only as they appear today in fashionably accepted doctrines. Indeed, we cannot fully understand what philosophical problems now mean without knowing them as developed through the general philosophic tradition. And often we can become critical toward the contemporary prejudices that inevitably condition our own ways of thinking only by examining these prejudices against a background of others by which we are no longer so intimately bound.

1. Historical Preliminary

(1) **Primitive.** The conception of the soul most usual in savage societies has these characteristics: first, it is attributed not only to humans but to many animals and what we would call inanimate things as well; second, it is conceived as something material — that is as something occupying space, though perhaps insensible to touch and only intermittently sensible to vision.

As the savage commonly explains the processes of inanimate nature by supposing that they are produced by living beings working in or behind the phenomena, so he explains the phenomena of life itself. If an animal lives and moves, it can only be, he thinks, because there is a little animal inside which moves it: if a man lives and moves, it can only be because he has a little man or animal inside who moves him. The animal inside the animal, the man inside the man, is the soul.[1]

Often, however, it is regarded simply as breath, probably on the double ground that the dead stop breathing, which suggests that it was their breathing (i.e. air, wind) which animated them while alive, and that ghosts (that is,

[1] J. G. Frazer, *The Golden Bough*, 1 vol. ed., p. 178.

souls of the dead, for which there is plenty of evidence: for one thing, they appear to men in dreams) have the same tenuous, untouchable quality as air. At any rate the close relation of the notions of soul and breath are testified by etymological similarities in many languages: πνεῦμα, ψυχή, *Geist*, *anima* (= breath, soul), *spirit* (from *spirare*).

Death means a departure of the soul, whatever its nature, from the body, and many of the rites connected with dying are intended either to prevent this departure or to speed the soul on its way with fit ceremony.

The soul is commonly supposed to escape by the natural openings of the body, especially the mouth and nostrils. Hence in Celebes they sometimes fasten fish-hooks to a sick man's nose, navel, and feet, so that if his soul should try to escape it may be hooked and held fast. . . . When any one yawns in their presence the Hindoos always snap their thumbs, believing that this will hinder the soul from issuing through the open mouth. . . . On the other hand, the Itonamas of South America seal up the eyes, nose, and mouth of a dying person, in case his ghost should get out and carry off others; and for a similar reason the people of Nias, who fear the spirits of the recently deceased and identify them with the breath, seek to confine the vagrant soul in its earthly tabernacle by bunging up the nose or tying up the jaws of the corpse. . . .[1]

The Santals tell how a man fell asleep, and growing very thirsty, his soul, in the form of a lizard, left his body and entered a pitcher of water to drink. Just then the owner of the pitcher happened to cover it; so the soul could not return to the body and the man died. While his friends were preparing to burn the body some one uncovered the pitcher to get water. The lizard thus escaped and returned to the body, which immediately revived; so the man rose up and asked his friends why they were weeping. They told him they thought he was dead and were about to burn his body. He said he had been down a well to

[1] Frazer, *ibid.*, p. 180.

get water, but had found it hard to get out and had just returned. So they saw it all.[1]

Sometimes again, the soul is identified with a man's shadow. In which case, it should not be trampled on or struck or stabbed, or the man will grow ill. If it is separated from his body the man will die.

In the island of Wetar there are magicians who can make a man ill by stabbing his shadow with a pike or hacking it with a sword. After Sankara had destroyed the Buddhists in India, it is said that he journeyed to Nepaul, where he had some difference of opinion with the Grand Lama. To prove his supernatural powers, he soared into the air. But as he mounted up the Grand Lama, perceiving his shadow swaying and wavering on the ground, struck his knife into it and down fell Sankara and broke his neck.[2]

(2) Early Greek versions of the soul. (i) *Physical theories.* Anaximenes, who died about 520 B.C., retained the primitive notion of the soul as air, and expanded it into the rudiments of a metaphysical theory. "Our soul because it is of air, is in each of us a principle of union; so, too, breath or air contains the whole world." It will be noted that although Anaximenes' conception of the soul is primitively material, it nevertheless serves as a model for the world, not the world for it. The Greeks tended to be humanists and to see human qualities everywhere; hence Anaximenes thinks of the world as a living thing, subject even to birth and death; hence wants it to breathe, to be filled with the vital principle, breath or air, that motivates humans.

The doctrine of Democritus was more deliberately materialistic. The nature of the soul follows as a corollary of the alleged nature of the physical world. All reality is reducible to atoms hurtling about in an infinite void,

[1] *Ibid.*, p. 182. [2] *Ibid.*, pp. 189–190.

and qualitative differences are reducible to geometric differences in the shapes, arrangements, and positions of the atoms. The soul is made of round, smooth, very subtile and mobile atoms, the same as those from which fire is made.

Vision, usually held to be the most important of our senses, is explained as follows. Objects give off δείκελα (simulacra) of themselves, which keep the specific characteristics of the objects from which they are given off. They act like stamps on the air between the object and the eye, and impressions left on the air are reflected by the eye as by a mirror. Thought is a wholly internal movement of the images reflected inward (as sensations) by the process just described.

(ii) *Pythagoreanism.* The doctrine of the soul held by Pythagoras and his followers has two chief aspects: the one a refinement of the primitive notion of the soul as something *within* the body and therefore in a sense spatial, the other a more advanced notion of the soul as nothing that takes up space at all, but as a harmony of the body.

(*a*) The body (σῶμα) is a tomb (σῆμα), wherein the soul is imprisoned for past faults. Usually no attempt is made by the Pythagoreans to describe more minutely what the journeying soul is composed of, though, according to Aristotle, "some of them declared soul to be tiny particles in the air." Cebes, in Plato's *Phaedo*, speaking as a Pythagorean, says the soul weaves several mortal bodies for itself in succession, at length wearing itself out in the process, and dying before the last of its garments has perished.

(*b*) The soul is a *harmony* of the body. The body is like a lyre, stretched by contraries, and if the tension is increased or relaxed too much the soul dies. This is a kind of metaphysication of the Greek doctrine of the Mean. Aristotle refers to this same view in the *De Anima:*

"They declare the soul to be a kind of harmony; and by harmony they mean a blending and combining of opposites; and the body is composed of opposites." Aristotle, however, criticized this view as too passive, since, he argued, the soul is a cause of motion, whereas harmony does not cause motion; and he further pointed out that not all bodily functions are in mutual harmony — harmony is an attribute of an excellent state, namely health, whether of soul or of body.

(3) **Plato.** The two aspects of the Pythagorean doctrine are not consistent. The soul is regarded both as an enduring, perhaps immortal, *substance* that has taken up temporary residence in the body, and as a *harmony*, that is to say a mere functional result of the body's working. This latter conception would mean that the soul has no existence apart from the body, and is certainly not immortal.

It might be said that the harmony in a tuned lyre is something unseen, and incorporeal, and perfectly beautiful, and divine, while the lyre and its strings are corporeal, and with the nature of bodies, and compounded, and earthly, and akin to the mortal. Now suppose that, when the lyre is broken and the strings are cut or snapped, a man were to press the same argument that you have used, and were to say that the harmony cannot have perished, and that it must still exist: for it cannot possibly be that the lyre and the strings, with their mortal nature, continue to exist, though those strings have been broken, while the harmony, which is of the same nature as the divine and the immortal, and akin to them, has perished, and perished before the mortal lyre. He would say that the harmony itself must still exist somewhere, and that the wood and the strings will rot away before anything happens to it. And I think, Socrates, that you too must be aware that many of us believe the soul to be most probably a mixture and harmony of the elements by which our body is, as it were, strung and held together, such as heat and cold, and dry and wet, and the like, when they are

mixed together well and in due proportion. Now if the soul is a harmony, it is clear that, when the body is relaxed out of porportion, or overstrung by disease or other evils, the soul, though most divine, must perish at once, like other harmonies of sound and of all works of art, while what remains of each body must remain for a long time, until it be burnt or rotted away. What then shall we say to a man who asserts that the soul, being a mixture of the elements of the body, perishes first, at what is called death? [1]

In this same dialogue, the *Phaedo*, Socrates replies that the soul cannot be regarded as merely a harmony of the body. The soul is dynamic; it rules over and is not simply the result or accompaniment of bodily activities. Socrates supports his argument by examples of how the soul opposes bodily passions and appetites, how it lords it over bodily activities, "sometimes severely, and with a painful discipline, such as gymnastic and medicine, and sometimes lightly." The soul is not "capable of being led by the passions of the body," but is "their lord, being herself far too divine a thing to be like a harmony." And on the ground that the soul is thus independent of the body, he concludes that it is immortal.

In a considerably later dialogue Plato gives a more positive argument for the soul's independence of the body, and consequently for its immortality. The speakers are Cleinias a Cretan, and an Athenian Stranger.

Ath. And what is the definition of that which is named 'soul'? Can we conceive of any other than that which has been already given — the motion which is self-moved?

Cl. You mean to say that the essence which is defined as the self-moved is identical with that which we call soul?

Ath. Yes; and if this is true, do we still maintain that there is anything wanting in the proof that the soul is the first origin and moving power of all that is, or has been, or will be, and their

[1] Simmias, a Pythagorean, in Plato's *Phaedo*, Church's tr., 85E–86D.

contraries, when she has been clearly shown to be the source of change and motion in all things?

Cl. Certainly not; the soul as being the source of motion, has been most satisfactorily shown to be the oldest of all things.

Ath. And is not that motion which takes place in another, or by reason of another, but never has any self-moving power at all, being in truth the change of an inanimate body, to be reckoned in the second degree, or in any lower degree which you may prefer?

Cl. Very true.

Ath. Then we are right, and speak the most perfect and absolute truth, when we say that the soul is prior to the body, and that the body is second and comes afterwards, and is born to obey the soul which is the ruler? [1]

The actual constitution of the soul is, because of the soul's fundamentally social nature, to be found reflected (and more readily visible) in the structure of society, which Plato supposed to be in this respect an image of the individuals composing it. Sometimes Plato speaks of the soul as a duality, sometimes as a trinity. The latter notion is correlated in the *Republic* with the threefold division of the Athenian city-state into citizenry at large, rulers, and militia. Similarly the soul has (i) an appetitive principle or 'part,' which proceeds from the nature of the body and aims at pleasure, and thus is always fluctuating or even desirous of contrary things at the same moment; (ii) reason, or a rational 'part,' which reflects on the appetites and combats them if necessary, which aims at the intelligible and true and knows the *forms* of things — i.e. can abstract from sensuous particulars and so understand general relations; (iii) an impulsive nature, a kind of spontaneous, creative energy in the soul, the dynamic aspect of us, which working with reason gives it power to control and redirect the appetites.

[1] *Laws*, 896A–C, Jowett's first translation.

These should be regarded not as three separate parts of the soul — though it is true that Plato sometimes speaks as if they were. Their interrelation is shown best in another Platonic dialogue, the *Symposium*, where 'Love' is the name given to the dynamic inner urge. 'Love' is there called a god, just as Socrates' private inner urge was personified as a *δαίμων* or demigod. In the generality of men Love associates itself with the ordinary appetites, and its object will be tasty food, good looking women, wealth, comforts. But these things are, Socrates says in Book VII of the *Republic*, like the shadows on a wall, where we cannot see the real bodies that cast the shadows. Thanks to the dynamic character of this inner *δαίμων*, however, there comes in some persons' lives a time when they feel impelled to turn away from superficial delights and probe more deeply into the reality that they suspect lies behind such appearances. When this is done they no longer care about the shadows; their *δαίμων* leads them towards the intelligible forms. And it is noteworthy that Socrates' *δαίμων* or inner urge (deified) was so thoroughly educated to serve the interests of reason that it acted always as an 'inner check,' dissuading but never confusing. The importance of the *θυμός* (the word used for the third part of the soul as given above, the 'impulsive nature') is seen in the fact that it also is called a *δαίμων*, and that the word for happiness — 'that which all men desire' — is *εὐδαιμονία*. *εὐδαιμονία* may be translated in an expanded form as 'a healthy working of the soul.' The *Republic* suggests that this consists in giving each function and activity its due, in having them work together harmoniously under the general leadership of reason.

(4) **Aristotle.** Aristotle did not accept the Pythagorean-Platonic way of regarding the soul as something wholly separable from the body and capable of taking up an

abode in the body. He argued that this doctrine arbitrarily attached a soul to a body without showing how, or by virtue of what bodily characteristic, this was possible. The association is more intimate, for through it the soul acts and the body is acted on, the soul moves and the body is moved. We cannot know what kind of a thing a soul is without knowing about the body of which it is the soul. He concluded that the soul is "the *form* of a natural body having a capacity for life." This kind of form he called an *entelechy*, literally "having the τέλος or 'end' within itself"; the soul is the entelechy of the body.

Through this definition Aristotle avoided any sharp dualism between soul and body, between mind and the objects known by mind. In sense-perception the sensuous faculty of the soul is *potentially* what the sense-object is *actually*, and in being acted on by the sense-object is made similar to it. And just as the sensuous faculty is to sense-objects, so is the mind (*nous*), the intellectual aspect of the soul, to thought-of objects. The mind is capable of receiving the 'form' of the object of thought, is potentially like the form, though not identical with it. But, since the mind thinks all things, it must be unmixed with any of them, for by intruding its own form the mind would hinder and obstruct what is other than it and would not be able to think all things. The aspect of the soul called mind, the part that thinks and abstracts, therefore, is simply a *capacity*, and has no actuality before it does in fact think.

From this Aristotle concluded that the mind or *nous*, unlike the sensuous faculty of the soul, ought not to be thought of as mixed with the body. It possesses no specific quality, like cold or warm, and no organs, as does the sensuous faculty, and again unlike the sensuous faculty, is therefore separable from the body. Nevertheless, the intellect is not wholly independent of sense, for intelligible forms — abstract meanings and properties — do not have

an existence independent of sense-objects. "Without perception a man would neither learn nor understand anything, and when he thinks, he must think by means of an image; and images are like perceptions except that they lack material substance."

(5) **St. Thomas Aquinas.** The Christian doctrine of the soul was summed up for the Middle Ages in the philosophy of St. Thomas Aquinas. It was based partly on the Platonic doctrine, as interpreted by St. Augustine, but chiefly on Aristotle, though it was given a rigidity which Aristotle might have hesitated to recognize. Consciousness testifies to the *existence* and the *permanence* of the soul, to the fact *that* the soul is, though consciousness does not make unequivocally clear *what* the soul is, as is suggested by the variety of opinions about its nature. The existence of the soul is disclosed through its activities; and the soul's permanence through our consciousness of personal identity persisting in spite of changes. In order to harmonize the unity of the soul with the varied character of its functionings (nutrition, movement, sense perception, knowledge by abstraction, will) it is interpreted as having various 'faculties,' or specifically human intrinsic powers of action. But these have, though 'natural' to man, in the first place a merely potential existence; and it is only through their exercise that the faculties and hence the soul itself can become known. "The human intellect has within itself the power of understanding, but not of being understood except in so far as it is in a state of activity."

As did Aristotle, Aquinas insisted on the intimate union of soul and body; the soul was the 'form' of the body, and a man, a human person, was a soul-body. The individual body is the principle of differentiation — that is, it differentiates one man from another, for, as Aristotle said, his soul must be fitted to his body: the fact that he has

such and such a body determines that he shall have such and such a soul. However, for Aquinas the soul is not, as with Aristotle, merely the 'actual working' of the body, but something created by God and united to the embryo when the embryo has reached a stage of development sufficient to characterize it as human.

Sense-knowledge and sense-desires have their seat in the organism which, being material, is extended and divisible and therefore perishable. But likewise in the case of abstract knowledge, scientific judgment and reasoning, willing of the good in general and free choice in particular, the soul is still bound to the organism, as is shown by such evidence as that a disease may prevent the use of reason and thus diminish or destroy freedom. "There is nothing in the mind that was not first in the senses; except the mind itself." Nevertheless, the soul in essence is not dependent upon the body, as is proved by the ability of thought to transcend spatio-temporal limitation.

This ability of the soul demonstrates its *spirituality*. The material for its abstractions is drawn through the body, but through them it transcends matter. And being spiritual, the soul has no quantitative or material parts; it is *simple*, and the simplicity of the soul means the absence of internal composition. Because of its simplicity, the soul must be *immortal*, for only the extended and divisible are subject to dissolution and death. The body is extended and divisible, and therefore dies, but the soul has neither of these characteristics. Consequently it survives bodily disintegration, and could be annihilated only by a direct act of God.

2. The Cartesian Dualism

The philosophy of René Descartes (1596–1650) stood midway between the medieval conceptions and the modern

scientific conceptions. It must be understood with reference to the procedure of physical science, the foundations of which were being laid during Descartes' lifetime — and which was in fact considerably affected by Descartes himself. Like the medieval philosophers Descartes accepted the distinction between substance and attributes. Substance is that which is permanent and unchanging and which 'has' attributes and thus is the essential condition of their changing. On the other hand, the need of applying mathematical method to the physical world meant getting rid of the 'specific natures' with which medieval opinion endowed all material objects. The only qualities that Descartes allowed to the material world were the mathematical qualities of figure, size, and motion, all of which could be handled by exact mathematical methods. These are summed up under the more general quality of *extension*, which they all imply and which is therefore declared to be the essential attribute of matter (cf. Chapter VII). This means that if other — i.e. non-mathematical — qualities are to be declared in some sense real, and if to be real a quality must inhere in some substance, and if these do not inhere in material substance, another substance must be postulated in which they can (and therefore do) inhere. This other substance is mind, whose essential quality is expressed in the activity of *thinking;* and the secondary (non-mathematical) qualities can then be explained as some among the ideas that are the objects of this thinking. We see, then, the curious way in which the very precision with which Descartes defined the physical world was partly responsible for his arriving at the notion of a mind wholly distinct from it.

But mind is not merely a repository for qualities that do not fit into a precisely defined material world. It has a more positive justification as well. Partly, no doubt, Descartes was led to establish its independence of body

by the fact that he accepted orthodox Christian theology, with its belief in the immortality of the soul. But that, at any rate, was not his main acknowledged justification. He preferred to rest the independence of mind on a logical argument. The argument in outline is this. I can doubt, if I choose, that the 'presentations' of sense really represent what they seem to. For often in dreams I have had similar presentations, which turned out later to be illusions. But there is one thing I cannot doubt: namely my own existence. For the very act of doubting anything implies that I exist in order to doubt it. For to doubt is to think (*cogitare*) and since thinking is an attribute, which therefore requires a substance for it to inhere in, there must be a substance whose essence it is to think, and which is proved to exist by my (= its) very act of trying to doubt it. Descartes said it this way: "Cogito ergo sum." "So that it must, in fine, be maintained, all things being maturely and carefully considered, that this declaration 'I am,' 'I exist,' is necessarily true each time it is expressed by me, or conceived in my mind." [1]

Mind defined as above bears little relation to the primitive notion of soul, as something nebulously material residing *in* the body. Only body, for Descartes, has spatial extension; mind has no spatial characteristics at all; hence it cannot be 'in' anything. It follows —

that there is a vast difference between mind and body, in respect that body, from its nature, is always divisible, and that mind is entirely indivisible. For in truth, when I consider the mind, that is, when I consider myself in so far only as I am a thinking being, I can distinguish in myself no parts, but I very clearly discern that I am somewhat absolutely one and entire; and although the whole mind seems to be united to the whole body, yet when a foot, an arm, or any other part is cut off, I am conscious that nothing has been taken from my mind; nor can the

[1] *Meditation* II.

faculties of willing, perceiving, conceiving, etc., properly be called its parts, for it is the same mind that is exercised all entire in willing, in perceiving, and in conceiving, etc. But quite the opposite holds in corporeal or extended things; for I cannot imagine any one of them how small soever it may be, which I cannot easily sunder in thought, and which, therefore, I do not know to be divisible.[1]

Still, mind and body are not only separate in essence but, as experience unquestionably affirms, closely connected in fact. Their connection is twofold: (i) *epistemological:* the mind knows the body, and the outer world through the body; (ii) *dynamic:* the mind can to some degree control the body, and the outer world through it.

(i) How can a mind, being distinct from body and from the material world, have true knowledge of matter? This question, which in this form arises for the first time only when mind and body have been sharply severed from each other, is called the epistemological question. Descartes' answer is in terms of a theory known as the doctrine of *representative perception.* The mind, whenever it is conscious, has many ideas constantly flitting before it: shapes, colors, ideas of number, of persons, etc. Some of these ideas are true copies of the characters of the material world, others not. How can we know which are which? Descartes answers with his criteria of 'clarity and distinctness.' Whatever properties I clearly and distinctly conceive to be in the world must really be there, for God does not deceive; and my mistakes about the physical world come from allowing my rational judgment, my clear and distinct conceptions, to be smudged by the unchecked activity of my will — for which I, a free agent, and not God, am responsible. Now the mathematical properties of bodies are those that I clearly conceive to belong to them, therefore they do. Thus the Cartesian view is of

[1] *Meditation* VI.

a mind which has as its objects a great variety of presentations and ideas, and among these it is able by its powers of criticism to separate out those ideas which have to do with spatial extension, and by virtue of their 'clarity' — which to Descartes meant their tractability to scientific procedure, to declare that they are true copies of qualities in the external material world.

(ii) But mind is not merely passive. It not only knows, it performs. How can this be, if the world of matter runs on its own independent mathematical laws? By those laws, which Descartes interpreted mechanistically, the possible cause of a change in material things must be some other material event — the imparting of motion through the impact of one bit of matter on another. Descartes answered: (*a*) that mind, by willing, cannot increase or decrease the total amount of motion in the material world but can change its direction; (*b*) that the way mind acts is through the pineal gland of the brain where it is able to affect the 'animal spirits' (believed to be a kind of vapor given off by the blood — and since vaporous, not quite so material, apparently, as the rest of the body, and therefore not so difficult to affect directly), and these animal spirits in turn act on the muscles.

There is an evident weakness in the above alleged relationships between soul and body. From the difficulty involved in each relationship there arose after Descartes, respectively the two traditions of 'subjective idealism' or (better) *subjectivism*, and *materialism*. (As we saw in Chapter VII, materialism need not imply a matter defined in the Cartesian way, as something spatially extended and not-further-analysable.) (i) Starting with the doctrine of representative perception as our basis we can become skeptical of our ability ever to know whether our perceptions — however clear and distinct, however geometrical rather than diversely qualitative —

truly represent an outer world. This line of thought was taken up by Bishop Berkeley, and influenced the development both of modern idealism and of some forms of modern pragmatism. (ii) Again, starting with the material side of Descartes' dualism — the extended world of matter — we can regard mind as so essentially different from matter and so irrelevant to the point of view for which the strictly geometrical world of Descartes is important, that it can be either reduced to a mere epiphenomenon, dependent on the body but not in turn effective in directing the body, or even chased out of the cosmic scheme altogether and declared not to 'exist.' These two developments will be taken up in reversed order in the following two sections. Each, it will be seen, is from a more naturalistic point of view, a decidedly artificial kind of philosophy.

3. Man a Machine

The scientific motive behind Descartes' philosophy was to get a conception of the physical world in which only those elements would be judged physical (Descartes said 'material') which were explainable in terms of matter in motion. With the advance of modern science this motive, whatever the faults of its formulation in Descartes' philosophy, became an important basis of many later philosophical systems. But Descartes' compromise in the interests of man's free will could not be accepted. 'Amount of motion' as something distinct from *direction* of motion is a concept whose validity becomes dubious when motion is recognized to be relative both in direction and amount (i.e. velocity) to a chosen standard of reference. In the eighteenth and nineteenth centuries *force* was taken as a more primary concept than motion, and force is manifested not only by a change in 'amount' but also by a change in the direction of motion. Furthermore,

the paradoxical naïvety of the notion of a pseudo-material connection between mind and body through the pineal gland, or in any similar fashion, was at once apparent. Hence, from the effort to complete the Cartesian purified defining of the physical, there arose several ways of dealing with mind — which had, somehow, to be taken into account.

(1) **Parallelism.** The first way is to accept both matter and mind as equally 'real' but each as explainable (adequately and thoroughly explainable) in its own terms. Benedict de Spinoza (1632–1677) carried this out. Two of the axioms on which Spinoza's main work, the *Ethics*, is established are: Axiom 4, "The knowledge of an effect depends on and involves the knowledge of cause," and Axiom 5, "Things which have nothing in common cannot be understood, the one by means of the other . . ."; whence Proposition 3 (Book I), "Things which have nothing in common cannot be the one the cause of the other." It follows that body and mind, being different in essence, cannot interact. Physical nature is determined strictly by physical laws. Mind is determined strictly by mental laws. But since both 'extension' and 'thought,' as Spinoza calls them, are necessary expressions of the logical order of the Universe (attributes of an absolutely infinite God, or Substance) there is an exact one-to-one relation, or parallelism, between whatever happens in the physical world and what happens among mental phenomena.

The purely logical parallelism of Spinoza was put in a more concrete, temporal form by his successor Gottfried Wilhelm Leibniz (1646–1716). There are according to Leibniz three ways in which to account for an apparent case of causality between two events: (i) that one of the events acts on the other, (ii) that a third thing acts on both, (iii) that the things in which the events occur have

been originally made so that when the one event occurs the other also occurs. To illustrate, he points out three ways in which a pair of clocks might be kept always synchronous: (i) their mechanisms might be interlocked, (ii) there might be an infinitely careful timekeeper who watched over them and saw to it that at every moment they were exactly synchronized, (iii) there might have been an infinitely skillful clockmaker who originally made and adjusted the clocks with such precision that, though not connected, they stayed always together. Applying the analogy to the problem of the relation between body and mind we get: (i) *interactionism*, accepted by Descartes in the case of man, (ii) *occasionalism*, the doctrine held by Arnold Geulincx (1625–1669) and Nicolas Malebranche (1638–1715), asserting that God is present upon every occasion of a bodily or a mental event, producing them both in a perfect harmony, (iii) *parallelism*, according to which God is the perfect clockmaker, who has so made the world, both mind and matter, that it carries out his designs without a hitch. This third view was the one accepted by Leibniz. The mind seems to perceive as a result of something being done to the body; the body seems to move as a result of the mind's desire, decision, willing. But actually their harmonious working is the result not of causal interaction but of God's originally complete foresight in creating the mathematic of the double world.

The trouble with parallelism is first that the mathematical metaphor is in an important respect misleading and second that too much *ex post facto* rationalizing is necessary in order to theoretically establish mind as coextensive with matter.

(i) The misleadingness of the metaphor is evident, for whether we speak of mind and body as parallel or synchronous or exactly correlated we are speaking as if

each were an organization of units, each unit of a certain kind in the one organization being always found coupled with a unit of a certain kind in the other. But, as the comparison (p. 282) between sight as a series of physical events and sight as a conscious awareness showed, on the mental side it does not seem possible to get any such units. Thus, while the physical counterpart of pleasure can be broken up into units of blood-pressure, of glandular discharge, of muscular activity, etc., the pleasures themselves *as we enjoy them* do not appear as merely different combinations of homogeneous mental units. They differ from one another *in quality*, and while on analysis we can dissociate *some* of the differing elements in each, no account of the original felt pleasure is even approximated by breaking it up into hypothetical undifferentiated units. Indeed, it was just because physical units alone could be measured accurately and were therefore alone amenable to scientific method that Descartes established the psycho-physical dualism in the form we have seen. Having established it on these grounds it is hard to see how any but a very loose sort of relation could hold between the mathematically exact units of which neural activity consists and the relatively vague aspects into which a conscious experience falls even upon the most careful analysis.

Bergson, in an analysis of the ideas implicit in parallelism, has brought out this difficulty. He begins by showing how we come to relate the mind to the brain, and how, therefore, if we believe everything in the universe to be mathematically calculable, we come to suppose that "the brain, from which the action is started, contains the equivalent of perception, memory and even thought itself. . . ." He goes on:

> There is the idea that all that is required, in order to pass from the idealist standpoint of *image-presentation* to the realist

standpoint of *thing in itself*, is to substitute for the pictorial presented image that same image reduced to a colourless design and to the mathematical relations of its parts to one another. Hypnotized, so to speak, by the void which our mental power of abstraction is creating, we accept the suggestion that some, I know not what, marvellous significance is inherent in the mere motion of material points in space, that is to say, in an impoverished perception. . . .

Lastly, there is the idea that if two wholes are solidary, each part of the one is solidary with a definite part of the other. And so . . . we conclude that to any fraction whatsoever of the state of consciousness there corresponds a definite part of the cerebral state, and then that one of the two terms can be substituted for the other. As though we had the right to extend to the detail of the parts, thus supposing them to be related each to each, what has only been observed or inferred of the two wholes, and so convert a relation of solidarity into a relation of equivalent to equivalent! The presence or absence of a screw may decide whether or not a machine will work: does it follow that each part of the screw corresponds to a particular part of the machine, and that the equivalent of the machine is the screw? The relation of the cerebral state to the idea or presentation may very well be that of the screw to the machine, that is, of the part to the whole.[1]

(ii) Even if the notion of an exact parallelism were not misleading and inapplicable to consciousness as we know it — that is, even if it had some kind of a clear, specifiable meaning — there would still be some doubt that it is factually true. For it declares not only that for every mental event there is a corresponding physical event (this might be accepted), but also that for every physical event there is a corresponding mental event; and this, according to ordinary beliefs about the world, seems far from likely. It is more usual to suppose that mental events occur only when the physical events are of a highly

[1] *Mind-Energy*, pp. 252–254.

organic character involving brain activity in a developed animal. If this were true there could be no universal parallelism in the way meant by either Spinoza or Leibniz. Physical events in the brain would (as Spinoza and Leibniz admitted) have to be explained by other physical events; but if mental events occurred only with brain events and not with physical events of a more elementary sort, it would seem necessary to reject parallelism and explain mind as a result merely of brain events, for *ex hypothesi* there would be no continuously connected mental events to explain it in terms of.

Leibniz got around both these objections, as he supposed, by an acceptance of what we should today call 'unconscious' or 'subconscious' mental events. This was accepted as a corollary of his doctrine of 'monads.' The monad is a center of force, and all physical motion whether organic or inorganic is but its external spatial manifestation. Now every monad is 'mental' in the sense that it enjoys both perception and desire, though perception and desire may be unconscious or subconscious. To be sure, 'perception' and 'desire' are generally used today to *mean* conscious perception, but there is no point in quarrelling about terms. The notion of the subconscious is of course an extension of usual, immediate experience, just as molecules or God or any other explanation, scientific or religious, must be. But just as, accepting one set of premises, molecules are a necessary extension of experience in order to make experience orderly, and the same is true of God if we begin with another set of premises; so for Leibniz, beginning with the propositions (1) that mind is radically different from and so wholly independent of matter and hence to be explained in terms of mind alone, and (2) that the final explanation must at all costs be rationally adequate, the acceptance of the reality of the subconscious was inevitable. For we are

conscious of hearing the ocean but not of hearing each wave, yet the noise of the ocean is composed of the individual noises made by each wave. Again, we are conscious of desiring a pleasurable dinner but not conscious of desiring each element of the dinner that would make up its pleasurableness. In either case, therefore, the elementary perceptions or desires of which the conscious perception or conscious desire is formed are subconscious.

(2) **Epiphenomenism.** The difficulties of parallelism from the point of view of ordinary common sense are evident. If it is abandoned and if we still start with the notion of a physical world as bequeathed by Descartes, it is no longer possible to regard matter and mind as on an equal footing. For mind now has the double disadvantage already referred to. First, it appears together with, not all physical motions, but only such as occur in a certain way in the brain. Brain activity must thus be regarded as a *sine qua non* of consciousness, and consciousness as a by-product, an accidental result or accompaniment, an *epiphenomenon* of brain activity. The best known exponents of this view were several philosopher-scientists of half a century ago, like Thomas Huxley, who combined an acceptance of strict scientific, theoretically mechanistic, principles for the physical world with an agnostic attitude towards the nature of consciousness and towards the relation of consciousness to its physical conditions.

> Granted that a definite thought, and a definite molecular action in the brain, occur simultaneously. . . . They appear together but we do not know why. Were our minds and senses so expanded, strengthened, and illuminated as to enable us to see and feel the very molecules of the brain; were we capable of following all their motions, all their groupings, all their electric discharges, if such there be; and were we intimately acquainted

with the corresponding states of thought and feeling, we should be as far as ever from the solution of the problem, "How are these physical processes connected with the facts of consciousness?" [1]

Thus, while consciousness is a secondary phenomenon and while *the fact of its appearance* is conditioned and explained by a certain kind of brain activity, its *character* is essentially different from physical data; it is not composed of commensurate units; and so from a scientific point of view it is something mysterious, unexplainable and even indescribable.

(3) **Pure materialism.** From denying the causal efficacy of consciousness it is only one further step to evading the problems that arise about it by denying its existence, identifying it with the cerebral processes that have been accepted as its physical cause. We saw in Chapter VI the dangerous frequency with which writers untrained in metaphysical reasoning confuse the two relations of *cause* and *identity*. An example of this pertaining to our present problem is found in such a statement as the following:

> What *is* a state of consciousness? The untrained mind will, of course, immediately hypostatize it, and call it a *thing*. Let us, however, call it a process, and instead of regarding it as a thing and shadowy accompaniment of certain cerebral processes, let us boldly identify it with those processes, and say that it is one and the same. Immediately all difficulties vanish. You affirm that you move your arm by an act of will; I affirm that you move it by a cerebral process. We are both right; for the act of will *is* the cerebral process itself.[2]

It is possible to agree with Elliot about regarding the mind as a process rather than a thing, without nevertheless

[1] Tyndall, *Fragments of Science*, p. 420.
[2] Hugh Elliot, *Modern Science and Materialism*, p. 122.

identifying it with a cerebral process. For Elliot makes quite clear that by a cerebral process he means definitely localized physical movements in the head, which, "if reduced to their last chemical analysis, would be resolved, like all other chemical processes, into the motion of atoms." One further passage will indicate just what sort of picture-thinking Elliot is indulging in when he thus reduces consciousness:

> This transmission [of motion through the brain and other parts of the human nervous system] may be compared to the passage of an impulse down a line of billiard-balls in contact with one another. If we strike the ball at one end of the line in the direction of the centre of the adjacent ball, the impulse will be conveyed down the line till it reaches the ball at the remote end. . . . Comparing the balls now to the physiological units of a nerve, we see that the process is analogous in the two instances. In both cases, a stimulus delivered at one end sets up a wave which travels down the line and delivers its effects at the remote end.[1]

(4) **Behaviorism.** Behaviorism is a special form of materialism derived from the technique adopted in modern laboratory psychology for certain types of problems. Its most widely known exponent in this country has been John B. Watson, whose doctrine is expounded best in his book *Psychology from the Standpoint of a Behaviorist.* Watson makes clear at the outset that he is not accepting the epiphenomenist's compromise. In his exposition,

> the reader will find no discussion of consciousness and no reference to such terms as sensation, perception, attention, will, image and the like. These terms are in good repute, but I have found that I can get along without them both in carrying out investigations and in presenting psychology as a system to my students. I frankly do not know what they mean, nor do I believe that anyone else can use them consistently.[2]

[1] Hugh Elliot, *Modern Science and Materialism*, p. 111.

[2] Watson, *op. cit.*, p. xii.

On the other hand, being more interested in the applicability of his theories to actual experimentation than in purely theoretic dissociation of subject-matter into supposedly ultimate units, he does not concern himself, except by one or two passing references, with the billiard-ball ideology of a writer like Hugh Elliot, based on a methodology drawn from physics rather than psychology. Watson makes frequent reference to physiology and certain branches of medicine, but seldom to physics or physical chemistry.

The problem of the behaviorist, then, is distinct from that of the introspectionist on the one hand and of the physicist and chemist on the other.

> Behavioristic psychology attempts to formulate, through systematic observation and experiment, the generalizations, laws and principles which underly man's behavior. When a human being acts — does something with arms, legs or vocal cords — there must be an invariable group of antecedents serving as a 'cause' of the act. For this group of antecedents the term situation or stimulus is a convenient term. When an individual is placed face to face with some situation — a fire, a menacing animal or human, a change in fortune — he will do something, even if he only stands still or faints. Psychology is thus confronted immediately with two problems — the one of predicting the probable causal situation or stimulus giving rise to the response; the other, given the situation, of predicting the probable response.[1]

'Stimulus' is used to mean a group of physical events — rays of light, gaseous particles affecting the membrane of the nose, radiant stimuli calling out temperature response, movements of muscles and activity in the glands, etc.; 'situation' is spoken of when the factors are more complex, as in the social world. The first type of problem, predicting the probable situation giving rise to a response,

[1] *Ibid.*, p. 5.

might ask why men go to war or leave their wives or elect stupid public officials; the second type, predicting the response when the situation is given, might ask what effect on individuals a change of government might have, whether a man would do better or worse work if called down by his employer, etc.

If 'stimulus' and 'situation' are nothing more than organizations of physical events the same is true of their sought-for effects on human individuals. The effects are sought only in terms of physical behavior. A man may be regarded as always 'behaving' in some way or other, overtly or implicitly. When a man is not overtly acting, when he is sitting still and 'just thinking' he is really as active as if, to use Watson's analogy, he were playing tennis. But the activity is in the muscles associated with speech: chiefly the laryngeal and tongue muscles. "Implicit language habits," well or ill carried on according to past training, they finally issue in overt action. Accordingly while the behaviorist may unguardedly speak of 'emotions' or 'thinking' he is professionally committed to using these words in a strictly technical sense, meaning special organizations of physical activities in special parts of the body. "An emotion," for instance, "is an hereditary 'pattern-reaction' involving profound changes of the bodily mechanism as a whole, but particularly of the visceral and glandular systems." "The term thinking ought to be made to cover generally all implicit language activity and other activity substitutable for language activity." [1]

A good deal of the discussion aroused by the word 'behaviorism' and the supposed consequences of the doctrine is confused and futile owing to a grave ambiguity in the word. It stands both for a *method* and for a *metaphysic*. Let us examine both these aspects.

(i) *Behavioristic method.* So far as the word 'behavior-

[1] Watson, *ibid.*, pp. 225, 356.

ism' stands for a method it is a scientific method, capable of dealing therefore only with scientific problems, that is, with relations between physical events. We have seen in the above quotations that Watson admits this. Since this is so, it is evident that there is an important sense in which consciousness does not 'exist' for behaviorism. It does not exist *for the problem posited by behavioristic psychology*. This is, as a matter of fact, a somewhat colloquial use of 'exist,' as when a man says "Women don't exist for me," meaning, thereby, as a rule, that he is not interested in them. It would be more literal to say that for the psychologist's problem as Watson has defined it, all facts of experience save purely physical ones are *irrelevant*, irrelevant because the problem does not ask about them. Indeed, many physical facts are likewise irrelevant to it — molecular movement, the equations of relativity physics, the succession of geological strata — though, doubtless because Watson was long ago 'conditioned' to have a respect for physical sciences, he does not call these 'unreal.' That many facts should be irrelevant to ('unreal' for) a problem is not surprising: unless the scope of a problem were limited it would be no problem at all but only an emotionally rhetorical question such as "What is Life all about?" or "What does It All mean?" To many problems, even scientific problems, about human beings, a behavioristic analysis is irrelevant. For example, How long would it take a man leaping from the top of the Empire State Building to reach the ground? would be a question purely for physics. Behavioristic psychology might ask the question, What events had happened that might serve as an 'explanation' of the man's behavior in so leaping? Beyond either of these problems there are many more that might be asked but that would not fall within the province of either physics or behavioristic psychology: e.g. What was the man think-

ing about when he leapt? Or again, Did he or did he not by leaping evade an obligation to support or protect his family? These problems are irrelevant to the behaviorist's problem, and so answers to these problems must be 'unreal' from the point of view of his problem. It is of course permissible for the behaviorist to restrict his problem in this way. It may even be permissible to enlarge the traditional notion of 'psychology' in order to classify behavioristic method as a branch of it. But it is manifestly absurd to forget the extremely technical character of a science which limits itself to observing, experimenting on, and generalizing the relations among purely physical events, whether they occur in the brain, larynx, viscera, muscles, or external world.

The behaviorist argues that his method is superior to other methods of dealing with human beings because it achieves objective (= public) verification and control over the subject-matter. "'States of consciousness' . . . are not objectively verifiable and for that reason can never become data for science." In limiting his subject-matter to data that are public and controllable the behaviorist does indeed pursue the prevailing trend in modern science. It follows then, if we accept the modern definition of science, that the behaviorist is more strictly a scientist, a 'better' scientist, than psychologists of other schools. For while conscious states are somewhat sharable, somewhat controllable, they lack the quality that makes physical activities publicly verifiable and controllable to the highest degree — the quality, namely, of amenability to mathematics. But it does not follow that the behaviorist's method is a better way of dealing with human beings, for it may be seriously doubted whether *dominant* human problems can be dealt with by scientific method. Take an example already referred to, which is used by Watson: If a man is doing his job poorly what effect *on his work*,

the behaviorist might ask, would a reprimand have? The way he works is a publicly observable side of him, and whether he works better or worse after the reprimand is something which, given a standard of 'good work,' any interested observer can find out. But how will he *feel* when reprimanded? That is something which only he can know at all adequately, and which we as observers can only guess; indeed, even he may be partly deceived about his own feelings. Feelings, desires, thoughts — these are not describable with the mathematical accuracy with which, given adequate instruments, an electrical stimulus or a tongue vibration or a muscular effort or a visceral discharge is measurable. If we begin, therefore, with the postulate that our results must have mathematical accuracy it follows inevitably that we must in the end leave feelings, desires, and thoughts out of our calculations. But leaving them out does not prevent their constituting extremely important problems of their own.

As for control, suppose that someone were undergoing an emergency operation for appendicitis, without an anesthetic. He knows, and any friends of his who may be watching his muscular contortions and listening to his groans know how much he is suffering. But the surgeon who is operating does not think of the suffering. If he did he would feel compassion, his hands would tremble, and he would doubtless cut in the wrong places. At such a moment he must be a strict behaviorist, and for him the contortions and groans are but symptoms of some bodily condition to be corrected. But why, if that were all, correct? Why should one bodily condition be better or worse than another? We might answer in terms of physical efficiency and the ability to perform work, but even if the patient were conclusively dying we should still feel constrained to relieve his suffering so far as we were able; and, from an individual's own standpoint, the most per-

fect (objectively verifiable) efficiency would hardly be acceptable if it were accompanied by continuous pain. Or do we aid another person because his contortions and groans trouble *us?* Hardly, for we could avoid that by stuffing his mouth and tying his wrists, or most effectively by shooting him. The bare, unqualified motions of viscera are not what the sufferer and we desire so earnestly to escape. Our interest in the unseen mathematics of the neural and glandular systems, which we know only by hearsay and diagrams, is at best technical. What we desire to escape is the pain and suffering and discomfort, themselves not movements but perhaps caused by and causing movements, something not measurable, not wholly controllable and public, yet incontrovertibly real.

(ii) *Behavioristic metaphysics.* In examining the behaviorist's method we have already by implication touched on his metaphysic. In evaluating his method with reference to experience as a whole, as he does in denying consciousness to exist in any sense at all, he is making a metaphysical judgment. That Watson is not even consistent in his metaphysical judgments is evident from the following passages from another of his books, *The Ways of Behaviorism.*

> Thought then is a form of general bodily activity just as simple (or just as complex) as tennis playing. The only difference is that we use the muscles of our throat, larynx, and chest instead of the muscles of our arms, legs, and trunk.[1]

But elsewhere in the same book thought is described as something very different from movement, something that can *know* movements and devise explanations for them:

> The 'will,' the 'intellect,' 'pure reason,' — they never had a chance: they are kept busy finding specious 'explanations' for the ways our guts make us behave.[2]

[1] p. 84. [2] p. 60.

Such inconsistencies are not accidental, and are the price one pays for disregarding the Principle of Significant Assertion. To say, "Thought is bodily activity of the muscles of larynx and chest" is merely to use the word 'thought' in an unaccustomed way; not to answer any of the problems about thought as we are conscious of it. And if consciousness is declared not to exist, then since consciousness must have some meaning in order to be used in a significant statement, we must (if we are saying anything at all) be using the word 'exist' in a restricted sense — exist *for the behaviorist's problem*, or exist *in the public space-and-time world* — so that from the class of 'things that exist' consciousness is excluded by the manner of defining 'existence.'

A curious, apparently unwitting substantiation of the distinction is given by an experiment performed by Dr. K. S. Lashley. Dr. Lashley is himself a behaviorist and much referred to by Watson, who quotes this experiment and supposes it to illustrate and confirm his own standpoint. Lashley constructed a delicate apparatus for recording tongue movements in two dimensions. These produced on a smoked drum certain tracings when the patient whispered a sentence. The patient was then told *to think the same thing* without 'overt movements,' that is, without making sounds. This produced a markedly similar tracing, differing only in amplitude. But if after whispering the sentence the patient was given other work to do and later asked to think the sentence, there was no apparent resemblance between the two tracings. "This," Watson comments, "is not an argument against our point if we recall how varied is the nomenclature of the larynx and the throat. We can write the same word by a dozen different combinations in the holding of the pen. We can speak or think the same word by many different combinations." But what, we might ask, is meant by

'the same word'? What was the patient told to do when he was told to 'think the same sentence'? If thinking is physical movement he did not do as he was told, for the observable movements were admittedly different. Yet Watson admits the patient was thinking the same words, though by different actual movement combinations. How, in terms of Watson's metaphysic, could the words be the same yet different? While Watson gives no clear reply, his position, to judge from various passages, seems to be that for two different larynx-tongue-chest movements to 'mean the same thing' is for them to eventuate in the two groups of responses which, considered as wholes, shall be identical. But what evidence is there that on two occasions when a patient is told to 'think the same thing' the two resultant totalities of organized responses will be identical? Not only is there no evidence that they will; we *know* that they will not, for in the experiment at least one of the responses was admittedly dissimilar in the two cases. And while a delicate instrument is needed to detect the dissimilarity of tongue vibrations, ordinary experience is enough to establish dissimilarities of a more striking and overt sort. The behaviorist's only recourse is then to declare that the patient *could not* have been thinking the same thing, because thinking (or the 'meaning' of thinking) *is* the total set of responses, and these total sets do differ. But this, obviously, is sheer question-begging, and deprives the phrase 'to think the same thing' of all specifiable meaning.

4. Subjectivism

We have seen that to deny the existence of consciousness is possible only by a kind of scientific metaphor limiting the meaning of 'existence'; complete denial reduces to a meaningless statement. And on the other

hand, there are grave difficulties in trying to express a relation between the brain and the consciousness which appears to depend on the brain's functioning. Epiphenomenism traduces, in the interests of an unverifiably airtight mechanism, the directly palpable fact of experience that our feelings, thoughts, decisions do somehow effect changes in the physical world. Interactionism affirms a causal interrelationship of mind and body, which contradicts the more confined causal postulate on which science bases its definition of, and dealings with, the physical world. Parallelism affirms a strictness and minuteness of relation between mind and body that the very definition of mind, as contradistinguished from body, makes meaningless. And all three of these doctrines err alike by committing what might be called a fallacy of redundancy. They are obliged to count some aspects of things twice over. The blue-green of the sea need be counted only once since it is merely a 'mental' not a 'physical' quality. But the size and calculable motion of the sea are at once something that has membership in the physical world and also, so far as it becomes an object of knowledge, in the mind. There is, to be sure, no *a priori* reason why the mind should not be a reflector, casting an image, variously distorted, of the mathematical qualities that make up a physical world and lending in the process of reflection enough of its own nature to give the reflected objects their qualitative appearances. This is the view, stemming from Descartes, that is called the doctrine of representative perception. The simile of reflector is not capricious; it is really the image on which the appeal of such doctrines, if we analyze it, is based. A mirror if tinted and bent will supply original colors and shapes to the figures it reflects; why cannot the mind be like this, though rich enough to supply many other qualities of sound, feeling, goodness and beauty as well? The analogy

is persuasive until it is recognized to be faulty in one essential respect. The mirrored image and its corporeal prototype are both things we can directly perceive. We can visually recognize them as two distinct entities, we can visually compare them and so determine what qualities are present in the original and what qualities are both added (the new tint, the new shape) and taken away (the old color and shape, and the touchableness) by the mirror. But in the supposed relation of an unperceived thing-in-itself to the perception we have 'of it' there is no such possibility of comparison. By hypothesis the supposed original is perceptible only through its representative in the observer's mind. Whence it is logically impossible that the observer should ever be able to verify correspondences and dissimilarities between copy and original, or even that the original exists. Its existence and the likeness to it of the perceived image can never be more than a matter of faith.

George Berkeley, Bishop of Cloyne (1685–1753) saw the point of this objection, and preferring, as a bishop, to conserve his faith for more spiritual matters he denied that the physical world, as distinct from ideas of it, can exist. Though the position seems paradoxical it was a logical outcome of the artificial distinction between material objects and mental states that Descartes' analysis had imposed. Once the distinction is hypostatized the question of how mind can know what kind of thing lies across the chasm can be answered only by faith (in the impossibility of God's deceiving us: Descartes) or by agnosticism (Berkeley). And agnosticism toward such a question as this, since the very nature of the question made a verifiable answer impossible, was, Berkeley declared, equivalent to a denial that matter exists.

20. In short, if there were external bodies, it is impossible we should ever come to know it; and if there were not, we might

have the very same reasons to think there were that we have now. Suppose — what no one can deny possible — an intelligence without the help of external bodies, to be affected with the same train of sensations or ideas that you are, imprinted in the same order and with like vividness in his mind. I ask whether that intelligence hath not all the reason to believe the existence of corporeal substances, represented by his ideas, and exciting them in his mind, that you can possibly have for believing the same thing? Of this there can be no question — which one consideration were enough to make any reasonable person suspect the strength of whatever arguments he may think himself to have, for the existence of bodies without the mind.

24. . . . It is very obvious, upon the least inquiry into our thoughts, to know whether it is possible for us to understand what is meant by the *absolute existence of sensible objects in themselves, or without the mind.* To me it is evident those words mark out either a direct contradiction, or else nothing at all. And to convince others of this, I know no readier or fairer way than to entreat they would calmly attend to their own thoughts; and if by this attention the emptiness or repugnancy of those expressions does appear, surely nothing more is requisite for the conviction. It is on this therefore that I insist, to wit, that the absolute existence of unthinking things are words without a meaning, or which include a contradiction.[1]

This conclusion does not contravene the postulates of science or the fair degree of order in the common-sense world out of which such postulates are derived. Such order is merely transferred. Its seat is in ideas, not in things-in-themselves. And since ideas as you or I (finite individuals) get them are not entirely orderly, Berkeley distinguishes between their orderly aspects (ideas of Sense, which "are more strong, lively, and distinct than those of the imagination; they have likewise a steadiness, order, and coherence, and are not excited at random, as those which are the effects of human wills often are, but in a

[1] *A Treatise Concerning the Principles of Human Knowledge.*

regular train or series, the admirable connection whereof sufficiently testifies the wisdom and benevolence of its Author." §30.) and the varia (described as ideas dependent on my own will). The 'laws of nature' Berkeley accepts but changes their essential reference; we learn them by experience, that is to say by attending to our ideas; they express merely "that such and such ideas are attended with such and such other ideas, in the ordinary course of things."

(5) **Psychoanalysis.** The various contemporary methods and doctrines known loosely as psychoanalysis and associated chiefly with Freud and Jung may be thought of as a modern development of subjectivism. Psychoanalysis, however, is not as a rule expanded into a universal metaphysic. The problem of psychoanalysis is not the relation of mind to the physical world, though it does include the relation of human mind to human body. Psychoanalysis begins in a technique, allied to the 'confessional' of many religions, for dealing with the human personality, particularly with pathological mental conditions. The emphasis is not, as with the behaviorists, on the overt activity of the organism, but on introspection; the technique is organized to aid the mind in knowing more completely itself, and bodily behavior is interpreted as an external expression of mental complexities. Freud begins by noticing that the mind or personality can hardly be summed up by the ideas we happen to be consciously aware of. At any one time the field of our consciousness is obviously much restricted compared with what it might potentially include, the countless remembered past experiences we might become aware of if the situation called for it. This latent, potential aspect of our mental life Freud calls the *preconscious*. But to the conscious and the preconscious Freud adds his distinctive contribution, the notion of the *unconscious*. We are not,

under ordinary circumstances, even potentially aware of the ideas and mental processes in the unconscious, because they are in a state of *repression*, held back by a force or resistance which is called the *censor*. Nevertheless, though we are not aware of them, the mental processes of the unconscious produce on our minds all the effects of conscious ideas; they are in fact the basis of our personality and character, of our *self*. Freud believes that the existence of the unconscious is proved by the psychoanalysts' successful treatment of pathological conditions. The makeup of the unconscious is largely determined during infancy and early childhood (according to Jung it is partly inherited, is in fact partly a 'collective unconscious' shared by the whole human race), when for various reasons certain unwelcome ideas and emotions are forced back into the unconscious and kept there by the censor. From then on they manifest themselves indirectly in the content of our dreams, our nervous and emotional peculiarities and phobias, habits of thought, 'complexes,' aphasia, amnesia, sometimes in a type of paralysis known as hysteria, etc. But through the psychoanalytic technique, which consists chiefly of the interpretation of dream 'symbols,' hypnosis, and winning the patient to habits of lengthy uncontrolled introspection, the censor occasionally lets down the bars. When this happens, the idea is brought from the unconscious into the conscious; and when it enters the conscious, when, that is, we become aware of what was formerly repressed, the pathological symptoms disappear.

The doctrinal aspect of psychoanalysis has been subjected to considerable criticism, from the behaviorists, but further from many scientists and philosophers, particularly from those who accept materialistic postulates. The criticism centers in an attack on the 'existence' of the unconscious; how, it is asked, can we know that an

unconscious mind exists when the only ideas and mental processes we know are those we are conscious of? This criticism, however, rests partly on an ambiguity in the verb 'know.' In a more restricted sense, where 'know' means be more or less directly conscious of, we clearly know nothing about the unconscious, and it is meaningless to talk of ideas existing in it. But every ideology, through inferences of various indirect kinds, extends immediate consciousness. The unconscious is, it is true, an ideology, but it is an ideology that seems to throw, within limits, light on what we mean by mind and personality and character. To demonstrate this it is not necessary to adduce the therapeutic achievements of pychoanalysts, many of which are questionable; the conceptions of psychoanalysis have filtered through to people generally, and though they are often distorted, familiar experience daily shows their application to the knowledge of ourselves and those around us. The use of psychoanalysis made by some of the most brilliant novelists of this century is well known and convincing. The unconscious has no place in the space-and-time world of the behaviorists, but it is quite proper to speak of its existence with reference to the very real problems it is related to, if we understand clearly what we are saying.

5. Toward Sanity

Berkeley's theological conclusions are not so acceptable, today, but they are an important reminder that the Cartesian dualism can fall into absurdity on either side. Berkeleianism is less absurd than materialism because it does not need to leave things out — it need merely reorient. But Berkeley's reorientation is too stilted and unalluring, pointing the way, once God is dropped out, to solipsism. The same reasoning that gets rid of the external material things-in-themselves, carried further,

denies every sort of objectivity, not only to matter, but to God, other persons, and anything else as well, and leaves us in the end only the bare consciousness at this present moment as real.

Once the original hypostasis of the mind-matter distinction is accepted, it is hard to see how, if we are consistent, one or the other extreme, materialistic or subjectivistic, can be avoided. There is a therefore commendable tendency recently to reject the original hypostasis. This tendency may be discovered even within the physical sciences. Physicists and astronomers, such as Eddington and Jeans, noticing that the concepts of relativity physics and the quantum theory have lost something of the hard and fast character physical concepts had in Descartes' time, are trying to close in the gap between mind and matter with the aid of the tensor calculus and Hamiltonian functions. This, however, leads nowhere: there is still a dualism between what scientific method can deal with and what it cannot and strictly speaking does not try to. And there will always be such a dualism, for science can remain mathematically definite only at the cost of disregarding the mathematically indefinite. The problem of redintegration is not a scientific but a philosophical one. And the preliminary to its solution is, granted the dualism, to keep it methodological and to refuse to hypostatize it into an ultimate bifurcation of reality.

The traditional gulf between physical and psychological research, accordingly, exists only for the habitual stereotyped method of observation. A color is a physical object as long as we consider its dependence upon its luminous source, upon other colors, upon heat, upon space, and so forth. Regarding, however, its dependence upon the retina it becomes a psychological object, a sensation. Not the subject, but the direction of our investigation, is different in the two domains.[1]

[1] Ernst Mach, *Contributions to the Analysis of Sensations*, pp. 14–15.

Another expression of this same type of solution may be found in the following quotations from the psychologist, Wolfgang Köhler.

But how can I say that a 'chair,' for example, is an 'objective experience' if I must admit that it depends upon certain processes in my organism? Does not the chair become 'subjective' then? It does and it does not. At this very moment the meaning of our terms has changed. In the last paragraphs 'objective' has denoted a certain experienced property which some parts of my direct experience, in contrast to other experiences, possess *as such* (exactly as they have size, color, hardness, and so forth); the term 'subjective' in this paragraph means their genetic dependence upon my physical organism. 'Subjectivity,' in this latter meaning, is not itself a directly experienced property, but a relationship which we ascribe to 'objective' experiences after we have learnt to regard them as the outcome of organic processes and, therefore, as distinct from the physical reality external to the physical organism. . . . The simple truth is that some of the experiences depending upon processes in my physical organism have the character of 'objectivity,' whereas others, depending upon other processes in the same organism, have a 'subjective' character, this contrast being something altogether indifferent to the *genetic* 'subjectivity' of *both* types of processes and experiences, as depending upon the physical organism. After this, I hope that no misunderstanding of the term 'objective experience' will be possible. When I talk about 'a chair,' the chair of my everyday life is meant and not some 'subjective phenomenon' to be observed perhaps by highly trained introspectionists, but utterly unknown to me.

On the other hand, we have seen that we cannot identify the chair of 'objective experience' with the chair as a part of the physicist's world. Under these circumstances, the world of direct experience being the first I had, and since all that I know about the physical world being inferred later on from the properties of the experienced world, how can I deny this experienced world which, for me, is the only basis upon which I can continue to guess about physical realities? No one can

prevent me from thinking, if I choose, that after all the physical world may be the more important and more essential one. But even then I must confess that the other world has existed first and always *for me*, and that I still can see no other way of discovering the properties of physical reality but by observing 'objective experiences' and drawing my conclusions about the physical world from them. With future progress of physiology I may become able to discover even the nervous processes underlying my 'observing' and 'guessing' and so be able to give a physical theory of these events. But even then, since the world of physiology is part of the physical world and *as such* is not directly accessible to me, any progress whatever along this line will depend upon my observing what I call a body or a nervous system as parts of 'direct experience.' [1]

We may conclude with some degree of assurance that it is unwise to either reason away the notion of mind or divorce it completely from matter. And this conclusion will help to give some positive content to what we mean by our *selves*. It would be foolish to try to make too exact an analysis, or to suppose that any analysis would be at all exhaustive. We may, however, as a tentative beginning, review certain prominent characteristics of a self or a person.

(1) **Awareness of objects.** A self is aware of various differentiated objects. These objects need not be 'spatial'; they include not merely the spatially arranged physical world, but as well the meanings found in social intercourse, mathematics, art, religion, etc. Moreover, the awareness of objects does not mean that the objects are something quite apart from self. Theoretically I can regard anything intelligible as an object; and also, if occasion arises, from another point of view as part of 'me.' This is clearly seen in the case of my own body, and of ideas that 'just come to me.' My body is usually part

[1] *Gestalt Psychology*, pp. 24–26.

of the me that is aware; but at other times, when for instance I might examine a splinter in one of my fingers, it becomes partially at least an object of which I am aware.

(2) **Self-consciousness.** Self-consciousness does not mean a consciousness of self as a logical abstraction wholly separate from everything else. If we try by introspection to search out a static, unchanging 'me,' we are sure to be disappointed, as (1) suggests. Self-knowledge comes through the knowledge of what is not-self; we know ourselves through the objects of which we are aware, just as we recognize *objects* through their relation to ourselves. This is part of what Aristotle and Aquinas meant by saying that "The human intellect has within itself the power of understanding, but not of being understood except in so far as it is in a state of activity." And more positively I am, by memory, conscious of myself as enduring through time.

> To retain what no longer is, to anticipate what as yet is not, — these are the primary functions of consciousness. For consciousness there is no present, if the present be a mathematical instant. An instant is the purely theoretical limit which separates the past from the future. It may, in the strict sense, be conceived, it is never perceived. When we think we have seized hold of it, it is already far away. What we actually perceive is a certain span of duration composed of two parts — our immediate past and our imminent future: leaning and bending forward is the characteristic attitude of a conscious being.[1]

In me, what I have been, what I am, and what I shall be are inextricably linked together in a whole which, though made perhaps from elements that are not distinctively mine, is a unique function of these elements. And with this uniqueness there runs through experience, not dividing experience into two separated parts but displayed

[1] Bergson, *Mind-Energy*, pp. 8–9.

in all experience (except, on some accounts, in the mystic and esthetic), the opposition between self and not-self resulting in what C. I. Lewis calls "that loneliness which is the fate of self-conscious beings."

(3) **Partial self-determination.** The traditional free-will controversy is made up of many elements. 'Free' is misleading, for we must ask, Free from what? Everything is free from something, nothing from everything. The *doctrine* of free-will, opposed to determinism, seems to mean primarily "free from natural law," and is therefore just as emotional a doctrine as we have already seen dogmatic materialism to be, though it is a needed reaction against dogmatic materialism. If scientific naturalism asserted that all events are under the sway of a rigidly determined *single* set of laws (atomic, electronic or whatever they might be), and under a set of laws stated definitely enough to make all events of any kind deducible from them, the doctrine of free-will might be no more than the rejoinder of a man who, exercising his freedom and having discernment enough to know in what sense he is free (a sense in which atoms play no part), protests against an unverified contradiction of a palpable fact — the fact that he is able, on certain occasions, to choose from among two or more alternatives of which he is conscious.

As we have seen, however, scientific naturalism need not be monistic; it can accept different methods and different realms of discourse even within 'science,' and it can remain silent about matters which are not scientific. If we take an empirical view of science we can also take one of the 'self' and its powers. To call the self (or the will) 'free' ought not to mean free of matter, of physical forces in general. This would look like a special form of the Cartesian dualism, or even of Manicheanism, which regarded matter as something evil to be risen above.

But there is no reason or necessity for supposing that our activities contradict physical laws and physical forces. We can be free only of this or that particular physical law or force. And the fact that we are still dependent on other forces does not make us puppets: there is no evidence that the whole universe runs like a single interlocked set of cogwheels. The task of a *person*, then, is first to get to know himself well enough to find out just what forces (environmental, previously contracted habits, chemical changes in the body, etc.) *are* affecting his behavior and to what extent he can get free of any particular set of them. To forget that we can (sometimes) get free of particular physical influences, despairing simply because of the possibility that another analysis would show that in getting free of them we are influenced by others, is mere bowing to an irrelevant ideology. And, second, a *person* can consider the use to which he shall put the partial freedom he is able to attain.

(4) **The integration of self.** The use to which freedom shall be put, considered together with (2) the knowledge of the self as enduring, brings out a further characteristic of the self, a moral characteristic, and as such to be discussed in the following chapter. For the alternatives among which we may choose are not mere indifferent isolated particulars; they may be related and subordinated to a more integrated conception of our self as something more than a succession of conscious events. My choice *now* may take its place in a structure which is in some sense independent of now, this present moment during which I am choosing. Through this integration, I, as a self, as more than a sum of discrete events causally interrelated, am a whole, an organically unified moral being, with a unique identity — not to be reduced to any mathematical relations — as a person.

(5) **The self as social.** I know not only myself but other selves as well. It is sometimes argued that we cannot know other selves except through a belief, an unreasoned faith. We see other bodies like ours, acting somewhat as we do, and infer by analogy the existence of other persons. This argument is partly a matter of definition: we do not know in others some static logical abstraction of a self; but neither do we in ourselves. And in any case, whether or not the belief in the existence of other persons is fully justified, it is a belief we all share. It is also worth noting that only through other persons, whose existence is tacitly postulated, do we come to know very much about our own selves. The necessities of living demand social coöperation; and beyond practical cooperation, we have no clear ideas of what we are until we observe what other people think of us, until we have *personal* relationships — friendship, love, enmity. And toward other persons we have feelings not only of detached interest, as we have in the case of material objects, but of insistent moral obligation. If we have some knowledge of ourselves, and if the development of that knowledge depends in considerable measure on other persons, it is rather arbitrary, after the event, to throw over the other persons in the interests of misplaced logical precision.

These two last characteristics of the self are preëminently moral characteristics. As such they provide a transition to the problems of moral value, which constitute the subject-matter of the chapter to follow.

CHAPTER X

MORAL VALUES

1. The Moral Realm of Discourse

> Morality is a subject that interests above all others: We fancy the peace of society to be at stake in every decision concerning it; and 'tis evident, that this concern must make our speculations appear more real and solid, than where the subject is, in a great measure, indifferent to us. What affects us, we conclude, can never be a chimera; and as our passion is engag'd on the one side or the other, we naturally think that the question lies within human comprehension; which, in other cases of this nature, we are apt to entertain some doubt of. — David Hume, *A Treatise of Human Nature*, III, i, 1.

These words of Hume are a reminder of the inevitable familiarity of moral problems. A man, unless he happens to be a physicist or biologist, may ignore as much as he pleases the technical problems that occur in those fields. But moral problems touch us more closely. At almost any time we may be confronted with a situation in which a moral choice has to be made; and whoever is conscious of being so confronted has no way of wholly escaping the situation. To close one's eyes to the situation, to maintain a policy of indifference toward it, is in these circumstances as much a matter of moral choice as any other solution would be, and as capable of being judged by moral standards. If a friend in distress appeals to me for a loan that it is within my power to give him, my decision to ignore the appeal would be no less a moral decision than if I performed some positive act such as

giving him the money or kicking him downstairs. The very nature of the situation has given rise to a *forced*, i.e., not avoidable, issue; since to do nothing about the situation is itself one of the important alternatives to which the situation has given rise. Forced moral issues of one kind or another are frequent in daily life, and their frequency testifies to the genuineness of the moral realm of discourse.

It will be observed that the word 'moral' is here used as definitive of a moral realm of discourse, not in the more particular sense of conforming to this or that moral code. Both uses are current and the word suffers a consequent ambiguity. (In fact, the word as used colloquially in Anglo-Saxon countries has a third and even more special meaning: calling someone 'immoral' is often the equivalent of calling him sexually promiscuous.) The ambiguity need offer no serious difficulty, however, for a distinction between the word's two main meanings is easy to draw. In the one sense it defines the questions which as 'moral philosophers' we are asking, in the other it characterizes from some one point of view a set of answers that may be given to the questions. In the one sense it refers to a type of situation in which reflective human beings often do as a matter of fact find themselves; in the other, to a type of choice that may be made or of action involving choice that may be performed, arising out of such a situation. When 'moral' is used in the first sense its contradictory is 'unmoral' or 'non-moral' rather than 'immoral.' Thus we do not call entropy or the square root of minus two immoral. We say instead that they are non-moral types of meaning: that is, they have no essential relation to problems that are characteristically moral. They stand outside, therefore, the subject-matter of 'moral philosophy,' or, as it is also called, *ethics*.

The ethical realm of discourse will be characterized at

greater length in Section 3. The first thing to recognize, however, is that there is such a realm of discourse and that to deny its autonomy is to commit another form of the fallacy of metaphysical reduction. One meaning that helps to define it uniquely is the notion of obligation, expressed in the literal usage of the verb 'ought.'

> In every system of morality, which I have hitherto met with, I have always remark'd, that the author proceeds for some time in the ordinary way of reasoning, and establishes the being of a God, or makes observations concerning human affairs; when of a sudden I am surpriz'd to find, that instead of the usual copulations of propositions, *is*, and *is not*, I meet with no proposition that is not connected with an *ought*, or an *ought not*. This change is imperceptible; but is, however, of the last consequence. For as this *ought*, or *ought not*, expresses some new relation or affirmation, 'tis necessary that it shou'd be observ'd and explain'd; and at the same time that a reason should be given, for what seems altogether inconceivable, how this new relation can be a deduction from others, which are entirely different from it.[1]

Hume is here affirming the autonomy of the moral realm and in his last sentence protesting against the attempts that are sometimes made to consider a proposition of moral value as merely a corollary of propositions of other kinds.

In studying ethics we must be on guard against interpreting propositions of moral value as logically deducible from premises belonging to factual realms of discourse: in other words, against committing the fallacy of metaphysical reduction with respect to the category of moral value. The most frequent form that the fallacy takes in the moral realm is a reduction of value-propositions to propositions of fact. This type of reduction is easy to commit, inasmuch as human activity, to which a prop-

[1] Hume, *loc. cit.*

osition of moral value must somehow directly or indirectly refer, is at once a natural fact, capable therefore of 'explanation' in terms of any one of several sciences, and at the same time a possible subject of evaluation, and sometimes of choice. It is in the latter aspects that it fits into the moral realm of discourse, as will be more fully explained in Section 3; and the autonomy of this moral realm is evident from the reflection that whatever 'causes,' in terms of one science or another, may be assigned to a human act, the act may be evaluated and, when in our power to choose, chosen by reference to principles that may be not in the least derived from these conditions. To avoid confusion it will be best to refer to human activity regarded from the standpoint of any of the descriptive sciences, as *behavior;* when regarded from the standpoint of the moral judgments that can be made about it, as *conduct.* All conduct is also, from another point of view, behavior, but not all behavior can be regarded as conduct, for not all of it is of a sort to which moral judgments can be intelligibly applied. The fallacy of reduction, applied to the moral realm, takes most often the form of interpreting conduct as merely some kind of behavior and hence regarding the problems and categories of the one as simply makeshift forms of those proper to the other.

But if we must guard against reducing ethics to the status of a descriptive science, it is equally important to avoid supposing that it can be fruitfully studied with no reference to neighboring realms. In declaring the autonomy of a realm of discourse we are not declaring its complete separation from other realms. Realms of discourse do not exist in a logical vacuum: they can have meaning only if their terms and propositions are understood against a background built from other phases of experience. Accordingly, such studies as biology, anthropology, eco-

nomics, law, and psychology (to name some of the most important), though not to be confused with the subject-matter of moral philosophy, are decidedly important for the moral philosopher to understand and take into account as supplying information on which moral choices may be more wisely made and moral delusions more aptly escaped. We shall next consider, therefore, several of these contributory fields, both for the positive contributions they make to ethical study and in order to clarify the manner in which ethics may be declared autonomous with respect to each of them.

2. Moral Values and Cognate Realms of Fact

(1) The facts of social life. One group of facts which can never be wholly irrelevant to any applicable moral theory is that found by studying the customs of society. Indeed, the very word 'moral' is derived from the Latin word *mores*, meaning customs, and for at least a great deal of our thinking in this field morality continues to mean adherence to some custom or other. While a blanket identification of the two is not admissible philosophically, yet the custom-basis of morality is too important a fact to be lightly dismissed. Everyone of us takes his first steps in morality under the guidance and constraint of a social nucleus which has energetic preferences for making us one kind of person rather than another. One of the first discoveries of every infant is that some things are 'good' and some are 'bad,' that under pain of a variety of penalties he must do the good and avoid the bad, and that goodness and badness are not qualities into which skeptical inquiry is generally tolerated. Clearly society has no alternative to enforcing its customs or traditions in this fashion. For a number of years the growing child will not be able to understand the more

rational objections that might be offered against putting everything he can get his hands on into his mouth or playing with matches, against losing his temper and eating harmful foods; a little later, against cheating at games and playing truant from school. Thus it is largely true, as T. H. Green has said, that a man cannot make a conscience for himself: that he always needs a society to make it for him.

Among other reasons why he needs a society is the fact that even after he has reached years of maturity he has innumerable decisions to make about which he has neither time to reflect nor opportunity for providing himself with necessary information. Consider how useful it is to know whom to offer tips, and in what amount — tips that are allowed for in adjusting scales of wages, and are therefore really owed. Anyone who has travelled abroad must have got into embarrassing situations through not knowing that there many more people than in the United States should be tipped. Often the existence of a rule, and not the content of it, is what matters. In England traffic keeps to the left, in the United States to the right; which custom is in force makes no difference, but if there were not one or the other, traffic would soon be stopped. Only by having a number of quite conventional regulations do we succeed in doing anything or understanding each other at all, and people who make a fetish of unconventionality enhance the difficulty of most things they set out to do.

In more important matters, an individual rarely has the data upon which to decide about the wisdom or folly of departing from the rule. Rules concerning the relation of the sexes, for example, which appear at first sight unjust or meaningless, are seldom without some rationale or ground, and the individual who breaks them is likely to incur results as unwelcome as they may be unexpected.

Even the double standard of morality, which at first appears to lack any general justification whatever, is closely related to the different rôles of men and women in procreation, and their unequal economic status. And the socio-economic confusion that would have resulted from too casual adultery in most societies that have so far flourished is sufficiently evident.

At the same time, though the greater part of our activities are thus, and justifiably, governed by customs which we accept without prolonged criticism, a conviction of the absoluteness of any particular moral code does not often survive an acquaintance with the astonishing variety of codes discovered as we pass from one country to another, from one age to another. There is practically no act which has not been morally approved somewhere, and morally detested somewhere else. It is a great sign of parochialism to suppose that only the things sanctioned by custom in, let us say, England during the Victorian era are truly 'moral'—to realize the moral status of at least the early decades of that era one need only think of the labor conditions. Every country has a set of customs depending upon a vast number of conditions, social, political, economic, religious; and the gravity of a breach of any of them may range from practically nothing to a degree of seriousness for which death is thought the only fitting punishment. Consider, for example, taking interest on money, and disbelief in God, as these were regarded in the Middle Ages, and as they are regarded today in, respectively, the United States and Russia.

In short, it is hard to take seriously a claim to finality made for the details of any code, however widely accepted, and imposed by whatever authority. The function of any such code is to act as an indispensable starting-point in the moral life of an individual; its constant value as guide to him is one thing, its actual embodiment of a fully rounded,

intelligible account of the good life, of a tenable system of moral values, is quite another. Admitting with Plato that goodness in the individual depends upon goodness in the state, and with Aristotle that anyone not by nature a member of a state is either a beast or a god, it must still be kept in mind that there has never been a perfectly good state, and that all public opinion of which there is any record reveals under philosophical analysis inconsistencies and imperfections. We may indeed say that so long as the individual remains at the stage of unquestioning acceptance of the standards of his age and place, he has not passed beyond custom to morality: though not necessarily *immoral*, he has yet to reach moral maturity.

In recent times prehistoric anthropology, the study of the customs and civilizations of early man, has offered additional evidence for the considerable dependence of individual standards on the *mores* of some social group. The more basic moral principles, in support of which we now can adduce rational arguments — public honesty, some kind of restrictions in matters of sex, respect for human life and property, etc. — appear to have had in most cases distinctly *un*rational origins. They were ordinarily enforced by, or even identified with, the two very important institutions of ritual and taboo. Ritual works not by command or prohibition but by forming habits, by getting the individual into a rhythmic harmony, both bodily and emotional, with the other members of his tribe. Various acts, such as dancing, public prayers and processions, meaningless except to one for whom they have become an habitual social expression, are executed, often to music or rhythmic drum beats or shouts and cries by the participants, so that the ritual, by being performed under conditions that appeal profoundly to the emotions, tends at once to develop habits of acting in unison with one's fellows and to enforce these habits by a set

of strong feeling-associations. As ritual thus forms customs, taboo, which might be regarded as the negative side of primitive morality while ritual is the positive side, is a more specific means for preserving them. A taboo is a ban, invested with a peculiar and awful sanction, on certain kinds of socially prohibited conduct: very often on a dishonored member of the tribe, in which case it prohibits all contact either with him or with his footsteps or shadow; or on some event or locality that is regarded as sacred to the activity of spirits. By means of these two complementary agencies, ritual and taboo, the customs of the tribe become a 'second nature' to each of its members. Even to say that the customs were thus *enforced* is likely to be misleading; the ritual and taboo *were* the customs, and it is only at a much later stage of civilization that a distinction between the customs and their means of enforcement could be clearly made.

Important as ritual and taboo undoubtedly were in the *formation* of our habitual ways of acting, as *causes* of the types of judgment we make in determining our conduct, an understanding of their importance does not force us to deny the autonomy of the moral realm of discourse. The confusion between the cause of a moral judgment and the present content of that judgment is a form of what was called in Chapter VI the *genetic fallacy*. That it is a fallacy may readily be seen, for the reference of a moral judgment is not to a type of meaning which can be exhaustively defined by historic causes. Furthermore, whenever an anthropologist tells us that a moral decision we habitually make is based on a tribal taboo whose origin may be, from our present standpoint, unsavory, we may become critical toward our moral decision. We shall be able to judge how much our making of it depends on automatic acceptance, and how much it is suited to the actual moral situations in which we find ourselves.

We may then accept the decision in spite of its unsavory origin, which need not bother us any more than the unsavory origin of truffles, if we happen to like truffles; or we may reject it. Thus, far from breaking down ethical autonomy, anthropological research has the opposite effect since it enables us to become more freely critical toward our own ways of thinking.

(2) **The facts of modern science.** It is generally agreed that modern science has radically changed our way of regarding the universe and thus indirectly our way of regarding man's status in it and obligations to it. To a living universe one may without absurdity acknowledge obligations; to a dead one obligations must appear meaningless. In the following chapter we shall consider on its own merits the scientific world-view and whether the evidences drawn from the sciences are sufficient to justify it. At this point, since it is the moral realm we are considering, we must recognize that even if the scientific world-view is admitted to be true, man's power to make moral choices and appeal to moral standards is not thereby diminished. Believing in electrons instead of angels may diminish (or increase) his interest in the universe, and change his feelings about it; but the essence of moral choice lies in man's power to become critical toward beliefs, interests, and feelings. Hence, while a shift from a religious to a scientific view of the universe may do much to *persuade* men to revise some of their moral principles, it can do nothing to *prove* such principles wrong. Even so highly civilized a maxim as "Be in all things moderate," which is usually traced to Aristotle in the Western world and to Confucius in the East, had at least one of its roots in the early Greek belief that the gods are jealous of a man who commits the sin of ὕβρις ('pride') in trying to be their equal. That we no longer believe, as a rule, in the Greek picture of a universe peopled by jealous deities does

not prohibit us from accepting the principle of moderation as good for its own sake. The realm of discourse in terms of which the universe may be described and that in terms of which moral principles may be significantly postulated ought not to be confused.

If physics has appeared to reduce man's stature in terms of space, biology, in offering the hypothesis of evolution, has appeared to many to do so in terms of time. In Chapter VIII some of the gaps in the hypothesis were shown, as well as some of the irrationalities of the popular ideology to which it has given rise. Much of the public opposition to the hypothesis, however, has been not on the ground of inadequate evidence or ideological irrationality (since neither of these objections has ever seemed of great importance to the generality of men), but on the grounds that it conflicted with certain doctrines of revealed religion and that it deprived man of his natural dignity as lord of all creation, and even, by reducing him to the level of animals, of his moral autonomy. Opposed to this more orthodox attempt to make the postulates of morality depend on an anti-evolutionistic biology, there is another group, of which Herbert Spencer was for a long time the most eminent, which commits the even stranger fallacy of supposing that from the hypothesis of evolution the leading principles of morality can be deduced as corollaries. The argument is roughly that since it is better to be a man than one of the simpler organisms from which man is supposedly descended, the process by which this 'descent' has taken place is a good and man's highest obligation is to continue his upward journey by incorporating in his personal life the principles that have been at work in the evolutionary process.

This reduction was easier for Spencer than it would be for a biologist today, since he believed that evolution has gone on in a straight line under the guidance of

increased 'adaptation,' by which he meant chiefly increase of complexity, of functional differentiation and correlation. Responsible biologists, as was pointed out in Chapter VIII, no longer believe in a straight line evolution. But in any case Spencer's confusion of morality with presumed biological facts is unjustified. An increase of complexity for man usually means changes in social institutions, and these are scarcely comparable to for instance the increased physiological complexity that might have occurred in the development from a lizard to a bird. And it is always possible to ask whether increased complexity, or any other evolutionary 'advance,' is good. Man's biological future may, as we have seen, destroy the possibilities of those values he now accepts; but speculation about future facts of this kind does not prevent him from now accepting those values. It is certainly true that biology has helped to reveal to man his own nature, and thereby has given him the opportunity of ordering his moral choices more wisely; but it has not provided, nor can it provide, a definitive standard from which his specific choices may be deduced.

(3) **The facts of psychology.** The field of psychology has a special relation to ethics. Being more closely related to ethics (for moral judgments and decisions, whatever their outward reference, may also be regarded as facts in the individual's mental life) it cannot be readily discarded; but having a less clearly definable subject-matter than the other sciences just mentioned, the precise nature of the relation must vary according to the particular set of psychological theories that may be from time to time upheld.

One psychological doctrine of particular influence in the history of ethics has been *psychological hedonism*, the doctrine that every man seeks naturally to secure his own greatest pleasure and to avoid pain, and that all his

conscious activities must therefore be interpreted as intended to lead somehow, directly or indirectly, to this end. Although this doctrine appears to be at variance with the manifest fact that persons do sometimes renounce pleasures and freely accept pains, the words 'pleasure' and 'pain' are sufficiently vague that by making the proper shifts in their meaning the doctrine can be kept true. Thus Bernard de Mandeville writes: "There is no merit in saving an innocent babe ready to drop into the fire; the action is neither good nor bad, and what benefit soever the infant received, we only obliged ourselves; for to have seen it fall and not striven to hinder it, would have caused a pain, which self-preservation caused us to prevent." In other words, the doctrine can be accepted only by letting 'pain' *mean* the motive behind whatever behavior is actually avoided, and 'pleasure' the motive behind whatever behavior is actually chosen. A murderer who plots a dastardly crime, a martyr who goes willingly to the stake, a mathematician who works over a difficult theorem, a ne'er-do-well who spends the day loafing — each of them is pursuing, so far as he can determine it, his own greatest pleasure and striving to avoid pain; because pleasure and pain are defined in such a way as to make the statement true of all of them. But to use pleasure and pain so loosely is to turn them into question-begging words, and the statement that the attainment of one and the avoidance of the other is the foundation of every human action becomes a pseudo-statement, since it violates the principle of significant assertion. Undoubtedly pleasure and avoidance of pain, whether for oneself or others, can be and often are objects of moral choice. It is even possible to accept them as the highest of moral ends, and this is the distinguishing postulate of the doctrine known as *ethical hedonism*. The main point for a critical inquiry to establish is that

psychological hedonism and ethical hedonism are doctrines referring to entirely distinct sets of problems, and neither one therefore is deducible from the other. In fact, if both were to use the word 'pleasure' in the same sense they would be mutually inconsistent. If it were absolutely true that pleasure *in some determinant form*, such as intellectual activity or physical lust or social service, is always as a matter of fact chosen whenever its attainment is possible, that fact, far from supporting the ethical doctrine that such a pleasure *ought* to be chosen, would make the question of 'ought' meaningless. If we are made in such a way that we cannot choose not to do a thing, it adds nothing to say that we *ought* to do it. Obviously, however, if psychological hedonism were stated in terms of any particular kind of pleasure and pain it would be, though meaningful, demonstrably untrue. It retains, therefore, its persuasiveness and appearance of truth only by keeping its principal terms so inexact that they can be successfully neither affirmed nor denied.

Psychological hedonism is, to be sure, of less prominence in psychology today than formerly. 'Pleasure' is recognized as an all too unanalytical concept for solving any genuine problems. But the fallacy of supposing that psychological generalizations (or pseudo-generalizations) are capable of solving moral problems is still current. In particular the Freudian psychology, with its emphasis on the sex element in human interests and the restrictions imposed by the 'censor' on our natural libidos, has been used indiscriminately in a good deal of contemporary ethical discussion. Even if the Freudian emphasis were justified as a descriptive explanation of how we behave, it could still not furnish ethics with any coercive standard of conduct. Toward the facts of psychoanalysis, as toward facts drawn from any of the descriptive sciences, ethics is critical. So far as a situation is genuinely moral, facts

cannot legislate for it. They become rather the *materials* out of which, consciously reflected on, the moral choice can be made.

3. Postulates of the Moral Realm

Since the moral realm is to be distinguished from related realms that administer to without fully determining its meanings, it is important to formulate the postulates in terms of which the moral realm is defined. In seeking the postulates of any realm of discourse we must be careful to include only those *primary* propositions that are *essential* to it. By 'primary' is meant that the postulates must be underived with respect to the realm of discourse to which they belong; by 'essential' that they must be propositions whose denial would rule out the realm of discourse as meaningless. In a realm of discourse such as ethics it is hardly to be expected that there will be the same unanimity about postulates or about the use of terms as in a subject like mathematics. As arithmetic must accept certain basic terms without definition, such as *one*, so too must ethics accept *good* and *bad*, or some synonymous pair of terms in this rôle. But with a difference: whereas the terms of arithmetic are related to one another by strictly numerical differences, the terms of ethics are related organically. They grow up together and acquire meaning from one another in the actual process of reasoning or discussion. Consequently an analysis of the field of ethics into primary terms and postulates is an artificial approach. We do not normally think about moral problems in any such way, and the only justification for the analysis is that by it the nature and limits of the field of ethics and the kind of reasoning that ethical problems require are clarified. In other words, the postulates of the moral realm are not descriptive summations.

They are the presuppositions that are implicit in our thinking about moral problems and that distinguish problems genuinely moral from other problems often confused with them.

Postulate (i). *Some things* (motives, acts, or states of being) *are better* (*and therefore if within our power more choiceworthy*) *than others.* So far as the necessity and primacy of the postulate is concerned it does not matter whether we consider the reference of the moral judgment as focussed on motives, acts, or effects brought about by the performance of acts. At any rate, either human acts or something related to human acts as cause or effect are being evaluated. The postulate acquires meaning through the familiar fact that we are able to imagine and therefore to compare. In making a moral judgment we must be able to contrast a remembered or imagined state of affairs with either the present actual situation or with another remembered or imagined state of affairs, and the contrast must be in terms of the question: Which, according to some standard or other, is better?

Postulate (ii). *Some things are, at least limitedly, within our power to choose.* What this postulate says is that Postulate (i) is sometimes applicable. The moral good is not a wholly passive good; it involves an *ought.* An 'ought' in turn implies some degree of freedom in the person on whom the obligation is imposed. There is no meaning in saying that we *ought* to obey the law of gravitation since (in one obvious sense) this is something we cannot choose but do. It is only so far as an act lies within our power to choose or reject that there is meaning in the proposition, We ought to perform it. Postulates (i) and (ii) taken together define the important notion of *moral choice.*

Postulate (iii). *It is possible to determine the present choice by reference to an ideal standard.* By 'ideal standard'

is meant one that is not subject to the whims of the moment, one that objectifies moral choice by making it *responsible.* This postulate refers to the moral aspect of the fourth characteristic of the self discussed in the last chapter, 'the integration of self.' It affirms the possibility of organizing our moral life by relation to a structure that goes beyond any given present, by which we might, for example, judge *bad* an act which we nevertheless performed — a judgment that would be meaningless unless this postulate were implicitly accepted. The standard need not be any recognized moral code; it might be simply our own developed conception of our self.

To rate something is precisely to preserve it, in a way of decree, from the caprices of personal appreciation; it is to give it a right over oneself, and thereby the cogency of law. Value is nothing else than the legalization of a wish. If I judge it proper to act always in such a way as to respect a certain principle, my judgment can be analysed as follows: I have first given consent to the principle which seems to me to sum up and define my craving for the good; then, in the same movement, I have made this principle into a law, in order to guarantee me against myself.[1]

A moral self, in this sense of the word, need not of course be conventionally moral at all. A man may heed all the conventions that society imposes without fulfilling an essential condition determining a moral self: the ideal standards by which he acts must be his own; it must be *his* craving for the good that they sum up and define. They may, of course, be in accord with the *mores* of the social group of which he is a member; in fact, they will always be so to some, generally to a large extent. But the important thing, and what makes a person a moral self rather than a social automaton is that he is critically

[1] Ramon Fernandez, "A Humanist Theory of Value," *The Criterion,* Jan. 1930, p. 241.

aware of the ideal standards as defining what he has freely chosen as his *own* good. He will thus recognize *obligations*, but they will be obligations the principle of which has been freely accepted.

Postulate (iv). *It is possible to subordinate my individual desires and choices to a concept of what is good for some social group of which I conceive myself to be a member.* This is the postulate underlying the social aspect of morality. Taken with the three preceding postulates it helps to define *social responsibility*, or what it means to be a *socially moral self*. As a matter of fact, it is only by a logical abstraction that we can talk of a moral self whose moral character is not in some way or other socially directed. Attempts, such as that of de Mandeville in the above quoted passage, to interpret all acts of apparent altruism as merely subtle or roundabout ways of gaining some selfish end are evident examples of the reductive fallacy which this fourth postulate opposes. On the other hand, the social group to which the subordination of choices is made is nearly always determinate and therefore limited. Even though we are willing to recognize (at least in theory) some minimum obligation to all sentient creatures — such as the avoidance of causing them unnecessary suffering (when we stop to think about it) — there is at any rate a great difference between the kind and degree of obligation we can feel toward sentient or even human beings in general and the more positive obligations we feel toward persons with whom we have some common tie.

4. Problems of the Moral Realm

(1) Structuralization of the good. Among the goods toward which we may direct our conduct, some are obviously more important than others. It is mildly good

to have a lemon fizz on a hot afternoon or to receive courteous treatment from people with whom we are doing business, but we are not much disturbed if such goods do not materialize. On the other hand, according to most accounts, it is a major good to have generally excellent health; and most people would consider long continued ill health, whatever might be its indirect spiritual benefits, a major bad. The latter, more important goods may be called *dominant;* and the less important, *subordinate.* The distinction between them is emphasized by the fact that we are ready to abandon, on occasion, subordinate goods, particularly if by the abandonment some dominant good is made more accessible — as we might give up going to the theatre for a season in order to pay a dentist who, we imagine, will aid us in preserving health; but we do not give up dominant goods unless either ungovernable circumstances or the prior claim of some other dominant good forces us to. And when our moral choice lies between two dominant goods, not both of which we can attain, as in the nature of things must sometimes happen, we are faced with the most difficult of moral situations.

Allied to this distinction, though not identical with it, is the important and familiar distinction between *ends* and *means*. The relation between them is a shifting one, as a moment's reflection will show. Every action can be regarded, with reference to some other action, as an end; moreover, every end both requires means for its achievement and is in its turn a means to further ends. A subway ride, which we should probably not take if we could be miraculously transported to our destination, is itself the end of our walk to the station, and the means of getting to work; through work we may make money for a trip to Europe. The trip to Europe may be an aspect of more general ends, such as an increase of acquaintance with forms of social organization, a knowledge of painting,

or an avoidance of Prohibition. But acquaintance with social organizations will enable the traveller, when he returns, to see in a new light and more penetratingly the characteristics of American life; and a knowledge of painting may, if nothing else, make him more sensitive to the beauty of nature and of human beings. Ends and means are laced together, and there is probably no end, however lofty, that might not in some circumstances and from some point of view be a means; nor any means that might not sometime be regarded as an end.

An instance of the interchangeability of ends and means is found in the relation between one's work and one's leisure. We often tend to think of this as a process of alternate work and play, of doing something that we do not want to do in order to get the money to pay for what we do want to do. Means and end are here looked on as sharply distinct: the means an irksome necessity with which we should only too gladly dispense if we could. A critical reflection will show how doubtful this is in many cases. If we are interested in work only for the money it will bring, it is not likely in the long run to bring much, since what is felt as drudgery will be done perfunctorily, and in some degree negligently. We may for a time nerve ourselves to its performance, but in the end our energies are bound to ebb, and the performance of our duties to deteriorate. To be interested in a business or profession is the first condition for success in it, a condition which suggests that the work is for us an end as well as a means.

But despite the interrelatedness of ends and means, it is evident that some things are good primarily or even almost wholly as means and not as ends. Money, for example, is certainly the goal that inspires a great number of human actions, but except to one who is pathologically avaricious, money is not primarily a good in itself but

good for what it can provide: food, clothing, houses, automobiles, leisure, freedom from anxiety, power, social acceptability. Money, therefore, except to a miser, is primarily an *extrinsic*, not an *intrinsic* good. Other examples of extrinsic goods would be (for most persons) setting-up exercises, a ride on a crowded subway, a dose of castor oil. Each of these can be from some points of view an end: we go to the druggist's as a means toward getting the castor oil. But it is not as ends that they are good. If castor oil were not known to have certain beneficial properties most persons would certainly not choose to drink it; its value, therefore, is extrinsic. Hearing a symphony or reading poetry, on the other hand, so far as these acts were done for the enjoyment they gave and not for some ulterior end, would be predominantly intrinsic goods. They would of course be means as well as ends, since they would not be wholly without consequences, but since their principal justification lies in themselves or in the actual intelligent enjoyment of them, not in some quite separate effect, the good we find in them is intrinsic.

Now since we can recognize a number of acts or situations as intrinsically good, there might seem to be some common characteristic that they all share, by virtue of which they can be so described. A mathematician may find intrinsic goodness in the solving of a complicated equation, an explorer in the sheer adventure of coming on untracked land, a mother in the welfare of her brood, a lover of music in an expertly conducted performance of a Brahms symphony, a mystic in the intuition of God. What is it that these diverse situations have in common, to which we refer when we judge them each intrinsically excellent? Or, as philosophers have sometimes asked the question, what is the Supreme Good?

Without ourselves attempting a final answer to so haz-

ardous a question we may examine a few of the answers that have been offered. Against the varieties of ethical monism to which such attempts lead, it has been argued that a single formulation of what is good is out of the question; that there is no reason to accept the ideology of a moral pyramid with extrinsic goods at the base and a single Supreme Good at the apex; and that, finally, any attempt to state a single final Good appears to lead inevitably to one of two results: either it is stated in such vague terms that with a certain amount of ingenuity on the part of the applicant it can be applied to any action or situation whatever; or it is so abstract as to lose all contact with the concrete actions and situations that make up our everyday lives. An abstraction, shorn of all content, may be an end to argue about but it can hardly be one to live toward. Nevertheless, an alleged final Good, if accepted, may provide a kind of regulative ideal by which we can direct particular choices, and thereby integrate our lives.

(2) **Pleasure vs. asceticism.** The doctrine accepting pleasure as the highest good has already been referred to as ethical hedonism, and has been separated from the psychological theory of hedonism. Psychological hedonism may be rejected without detriment to ethical hedonism, which asserts not that pleasure is the only thing we do want but that it is the only thing we ought to want. Ethical hedonism may be individualistic or social, according as the pleasure of each individual or the pleasure of the social aggregate is emphasized. The latter type is known as utilitarianism, and is a modern development of hedonism, coincident with the growth of political democracy.

According to hedonism the essential moral problem is always to decide which of several proposed courses of action offers the greatest surplus of pleasure over pain.

In the most thorough-going of the hedonists, Bentham, this involves an actual calculus, an estimation in definite pleasure-units of the amount of pleasure to be gained by a given course of action, and a similar estimate of the amount of pain. After all the prospective courses of action have been thus measured the decision, the moral decision, goes automatically in favor of that which shows the largest pleasure-balance or the smallest pain-balance. However, neither Bentham nor anyone else has shown how the unit which forms the basis of the whole procedure is to be found, and it is obvious that no such unit is possible. No experience is more familiar than that of discovering something highly pleasurable in anticipation to be a disappointment when had. It is often quite impossible to tell which of two pleasures, enjoyed in immediate succession, is more pleasant, and to tell how pleasurable anything will be for which we are planning a year or a decade in advance is totally impossible. There is no quantitative basis for comparing pleasures, for the most striking thing about them is their qualitative differences — differences such as exist between the 'pleasures' of looking at a picture, of playing a fast game of tennis, of making love, of writing a book. We may be fairly sure that we should enjoy inheriting a million dollars, and be pained at being sent to the electric chair; but the notion of finding an exact measure of either feeling, as we can measure the boiling point of water, or enumerate the population of New York, is preposterous to the point of absurdity, and no one has ever attempted to do it.

Hedonism, however, does not stand or fall with the hedonistic calculus, though some such calculus would be necessary for its exact application. Such a writer as Mill interprets hedonism through a belief that for the most part human laws and institutions record the ascertained

effects of actions upon human happiness, effects which cannot be discovered with anything like mathematical precision, but which can in the long run and on the whole be assigned a definite value. Murder, rape and arson are so generally bad in their effects; honesty, candor, kindliness, justice so nearly always good, that it is not necessary to resort to any calculation of pleasure and pain when they are in question. The fact need not be disputed, but Mill, by admitting that pleasures differ in quality implicitly admits also that the reduction of the good to pleasure cannot be made. The whole value of pleasure as a conception by which ethical good can be measured lies in making the conception quantitative only. Mill's ethics in its final form is like an economics which attempts to give an exhaustive valuation of all things in dollars and cents, and then adds, as an afterthought, that some dollars are better than others.

The dilemma of hedonism has already been suggested. If pleasure is to stand for something definite, and thus be meaningful, it must mean something fairly close to physical pleasure. We may say, not with absolute precision but with reasonable accuracy, that it is less pleasant to be stung by a bee than to eat a well prepared meal, to sleep on the floor than on a soft bed, and so on. 'A good time' in a vague sense is also understandable: we prefer to spend our vacation travelling in Switzerland than to spend it reading proof for the telephone directory. But the expression 'a good time' is grossly inadequate for the satisfaction we find in hearing that a parent or child, desperately ill, has passed the crisis of the disease and is recovering; and to apply it to a scientist who allows himself to be infected with a dangerous disease in order to test the effectiveness of a new antitoxin, or the martyr who prefers death to the betrayal of his religion, is grotesque. In order to make hedonism applicable

to cases such as these we must define pleasure as 'whatever satisfies any desire,' and it then becomes, as we have seen, question-begging. From the general formula of hedonism no specific consequences can be drawn, and it is not therefore a genuine hypothesis.

If, on the other hand, we keep to the more restricted meaning of pleasure, the consequences of hedonism are definite enough, but not of a kind that honorable or reasonable beings could accept. They constitute the philosophy of the ruthless voluptuary, whose definition of pleasure has at least the merit of specificity. And if pleasure in a sufficiently specific sense is accepted as an end, it is beside the point to argue that the degrading and selfish consequences of this acceptance will be tempered by our 'finer feelings,' by a sensitiveness to other people's opinions, or by those natural sympathies whereby we tend to avoid actions hurtful or offensive to others because their pain is painful to us too. For it is a familiar fact that 'finer feelings' and social sympathies are easily blunted, and that it is perfectly possible to set out systematically to become completely callous. By so doing we could attain a frame of mind in which no obstacle to any wish of ours existed except the penalties of law and of public opinion, and even these would be deterrents only in so far as our technique of evasion was imperfect. The best man morally would then be the voluptuary who was also versed in dissimulation. Hedonists, however, have not as a rule been willing to accept this corollary.

In short, the fallacy of extreme hedonism lies in a mistaken notion of what pleasure is. Pleasure is not an independent organic activity that can be sought divorced from any other; it is rather the accompaniment of many diverse activities. Pleasure *in vacuo* would seem desirable to almost no one; it is the activities pleasure accompanies that we do often seek. In fact if the pleasure rather than

the activity is the conscious end, we are seldom successful in gaining it. Hedonistic philosophers have generally recognized this, and it is a not too remarkable fact that many of the best known hedonists, in the details of their theories and in their personal lives, have been anything but seekers after pleasure in the usual sense of the word. Epicurus and his followers, popularly associated with libertine indulgence, were wont to seek the simplest and most frugal of pleasures. The utilitarians, Bentham and Mill, were primarily social reformers; and their advocacy of hedonism was largely in the interests of a standard which could give point to their arguments for improving the condition of the working classes. While these and similar examples have contributed toward making hedonistic doctrines morally respectable, they show more clearly than ever the grave ambiguity of the doctrine.

Opposed in its theoretical formulation to hedonism is *asceticism*, the doctrine whose ideal is complete self-abnegation, with especial reference to the denial of all the 'pleasures of the senses.' Asceticism has never been accepted so generally or so thoroughly in the West as in the East. In some branches of the Hindu religion asceticism utilizes a system of self-discipline called Yoga which attempts to procure for its practitioners a general indifference to physical pleasures, to make them superior to discomfort and pain, to free them from the material requirements which they feel to be so heavy a drag on the things of the spirit. The final goal of spiritual development is to cast off *Maya*, the veil of illusion which is the physical universe, and attain *Nirvana*, absorption in the infinite Being with complete loss of personal identity. In the West some degree of asceticism has been associated from the beginning with Christianity, and it is summed up in the vow of poverty, chastity, and obedience taken by novitiates in many religious orders, as well as more

strikingly in the bodily disciplining of early saints and hermits. In western asceticism, however, self-denial has usually been not the final end but a means to a more complete realization of self in the knowledge of God, in a Beatific Vision.

(3) **Self and society.** Many ethical theorists treat morality as predominantly a social matter, as a question of the individual's obligations to his fellow men. This, as we have seen, is but one part of morality; an individual has also his obligation to his own 'moral self' in the sense defined by Postulate (iii). The ideal of asceticism is un-social, and perhaps actually anti-social inasmuch as the ascetic contributes nothing materially (though from a religious point of view it may be that he contributes something spiritually) to social welfare. And there are other un-social ideals, as for example certain forms of what may be called 'the esthetic ideal,' manifested in the 'Art for Art's sake' movement of the 1890's, and in the contemporary surrealist movement centered in Paris. Moral problems for the surrealist are solely an affair of the individual. It is simply a social accident that he happens to be in such and such a society in such and such a time and place. His moral business is to realize his own possibilities.

Ascetics and surrealists are generally looked on as idiosyncratic and even pathological. It is however necessary for a critical ethics to make clear that their moral attitude points to a genuine and important problem, a problem that is at the present time more insistent and capable of more articulate formulation than under the more closely unified social conditions of most past civilizations. This problem used to be referred to through an opposition between *egoism* and *altruism*. Critical examination will demonstrate that egoism or altruism as a moral ideal, if carried to an extreme, is self-contradictory: egoism, because the notion of an isolated self is empty, and be-

cause, for at least most people, not only is coöperation necessary to life, but many of the highest goods, such as friendship and love, involve other people; and altruism, because if it is blessed only to give, we do an indirect wrong by making others receive, and because, in the theoretically ideal society, there will be no one to receive since all will be only giving. Nevertheless a real opposition remains: between what might be called a personalistic ideal, finding value in the development of one's self together with those who are for one truly *persons* — that is, family, friends, and intimate associates; and a social ideal, finding value in efforts directed toward the good of 'society,' that is toward the good of what, though its ultimate referents are human beings, is necessarily an abstraction from the point of view of the individual.

Not unnaturally, most moral virtues that have been mainly emphasized by ethical writers — justice, truthfulness, patriotism, liberality, obedience, respect for human life and private property, etc. — are either primarily social in their reference or are treated primarily from a social point of view (an individual of course might hold to an ideal of truthfulness quite apart from the social effects of lying). Indeed, acts in accordance with these virtues have often been allegedly 'proved' morally good by showing the pernicious social effects that would result from the failure to observe them, as for example the impossibility of communication and consequently of cooperation that would follow if people did not try to tell the truth. But such reasoning neglects the prior question already stated of how far the individual ought to identify his own good with the good for society. Specific manifestations of the difficulty are frequent enough. For instance, should I, if I am able, contribute in money, time, labor, or however it may be, to unemployment relief funds if to do so means taking away goods (even

though these goods may be 'luxuries' such as music and the theater) from myself and my family? On the one side is the almost universally recognized obligation to alleviate the suffering of conscious beings, particularly apparent in this case since the possession of material goods is never due wholly to individual efforts, but is usually in chief part made possible by the society in which the individual finds himself. On the other there are the skeptical possibilities of doubting whether society ever progresses no matter what an individual does, whether anyone really can 'do good' to society, and whether, if one can, the society in which the individual finds himself is worth preserving; and further the more general question whether the individual should allow an obligation to the abstraction 'society' to take precedence over the personal goods that might be more certainly obtained by un-social activities. The acceptance of one set of obligations leads toward a narrow selfishness and social anarchy; the other, toward a sentimental humanitarianism or the worship of an inhuman 'state.' Whatever may be our decision as to adopting a generally social or un-social ideal, it is certain that most social virtues need re-formulation after philosophical examination. Justice, patriotism, respect for property, in spite of the nobility that may seem to surround them when contemplated in the abstract, become with great ease coverings for the oppression of the weak, the furthering of private and predatory interests, the systematic deception of the great part of society. If a critical ethics is to accept them, it can do so only after prolonged analysis.

More positively anti-social, at least in its implications, is the ideal of power, the most famous spokesman for which was Friedrich Nietzsche. For Nietzsche the truly moral man is the Superman, who makes his will effective over

others, and whose ideal is realization of what Nietzsche calls 'the will to power.' 'Honor,' in the specific sense in which it is part of the code of the gentleman, the nobleman, but not of the person in low station, may be said to be equivalent to the will to power, and the code based upon it is described as 'master morality,' as distinct from 'slave morality,' the morality of the herd. In slave morality such qualities as pity, humility, self-sacrifice are regarded as virtues; Nietzsche considers them, on the contrary, artful but contemptible devices by which the weak enslave the strong. They are servile qualities, opposed to everything noble, and a man capable of a really valuable life will reject and despise them. But when Nietszche said "Be hard!" the person to whom the hardness was to be applied was in the first instance one's self. Softness of fibre, in one's self no less than in others, was the principal object of his diatribes, and it may be said that he considered the conquest of one's own self even more important than that of others. But Nietzsche was less a consistent philosopher than a seer or a prophet, and many of his utterances are panegyrics upon the man who simply wants something violently and will take it, no matter who stands in his way.

The cult of power may take other forms, and is probably much less widely expressed than it would be if there were no need for camouflage. All those who feel that it is disgraceful to be weak or subordinate, that it is not only a fact but a desirable fact that the powerless should go to the wall and the strong survive and enjoy the earth and the fruits thereof, are sharers in this view. The reluctance of politicians to go out of office and of everyone who occupies a position of authority to relinquish it, are examples, and so is the widespread conviction that the successful man is he who gains control of public affairs. The desire to direct the destinies of other people, and if not exactly

to push them about like automatons, at least to play a part, and an important part, in their destinies is a master passion with many persons, and there is probably no one to whom it is altogether unknown.

Any too specific formulation of the ideal of power meets the same logical difficulty that we found in discussing the ideal of pleasure. What is to be considered true power? Physical power is supremely effective in a boxing ring, but does not count for much on Wall Street. Money in most countries brings a very real power of one sort, but how is it to be compared with the power of, say, Stalin? Or of Ghandi? The unnoticed power of American publicity agents who choose to remain anonymous probably influences many more men than force of arms or speeches of politicians. And a priest, dedicated to ideals of self-abnegation, may yet be the chief force in determining the conduct of his parishioners. Like pleasure, to remain an acceptable ideal, the concept of power must be so extended as to become question-begging, to become synonymous with the whole notion of a moral life.

The ideal of power, though anti-social in the sense that it may involve a disregard of the moral values held by others, is nevertheless not un-social, for concrete manifestations of power require other people to make them possible. A purely solipsistic ideal, we have already noted, is artificial. The individual does as a matter of fact exist in a society, in communion with other men, and he is unable to realize his own possibilities, whether individualistic or altruistic, without them.

Opposed both to the anti-social doctrine of Nietzsche and to the more or less un-social cults of complete self-abnegation, have been numerous attempts to delineate more positively the individual's obligations to society. One attempt, which may serve for illustration, was made by the late F. H. Bradley in his well-known essay, *My*

Station and its Duties.[1] According to Bradley a man's moral life is primarily and chiefly a matter of discharging the functions assigned him by his position in society, more particularly the organized society known as the 'state.' As against hedonism this has (so the argument runs) the advantage that it makes morality look outward, consider duties as something definitely *there*, and not as derivative from something subjective, from calculations of either one's own or other people's pleasure. Such calculations are of necessity highly fallible, since they involve an estimate of what I myself, or still worse what other persons will find agreeable at some time, perhaps years hence. Planning to get a job done, or doing what is obviously necessary at the moment, though these things may be difficult, are comparatively definite and do not involve the reference to my own and others' feelings which, in any doubtful issue, hedonism makes the essential matter in the problem. As against mere obedience to law, whether moral or political, Bradley's standard is concrete: instead of a general maxim to apply, we have a specific rôle to play, a function to discharge. For instance: the specific form taken by any one of the recognized virtues is dependent upon the individual's place in the community. Courage in the soldier is a matter of defending the country against armed attack: it requires of him that he meet an enemy on the battlefield, but not that he stay in a pestilence-ridden city, or criticize the policy of the government; courage in a physician requires the former, in a political scientist or journalist it may require that he do the latter. A policeman is expected to prevent an attempted holdup, but the casual passer-by may go about his business under such circumstances without incurring the reproach of cowardice.

[1] Essay V in *Ethical Studies*. The doctrine is similar in fundamental respects to the one outlined by Plato in Book IV of the *Republic*.

What would be extravagance for one with a family to support might be simple indulgence or harmless recreation for one with no encumbrances. The total set of duties attaching to an occupation and a total set of circumstances are the starting-point for everyone's moral obligations: they furnish him with the actual content of his moral will, and are his chief rule of guidance in doubtful cases.

Such a view is essentially aristocratic; it depends upon a class-differentiation in society, and there follows from it the corollary that the highest goods are attainable only by a select few. This suggests what must be a fundamental problem for any social morality: if, as seems inevitable from the nature of the physical and social environment, many goods are possible of attainment only by a small percentage of men at the cost of their exclusion from the majority, are we to admit into our moral judgments the class distinction this implies, or are we to reformulate moral theory in such a way as to postulate as dominant goods only what are in some manner accessible to all? To illustrate by a crude example: if it is good to have wealth, large country estates, and leisure for social amenities and intellectual and artistic contemplation, and if as seems probable the nature of things will not permit these to be possessed in suitable amounts by everybody, is it better that a few should enjoy them at the expense of the rest, or should society be levelled off so that the material benefits they represent may be equitably distributed, and the general level raised, however slightly, at the expense of the few? Communism, the social doctrine most conspicuous at the present time, chooses the latter alternative. It is interesting to observe that the choice between these two opposed social ideals, a choice which is in some measure *forced* by contemporary economic and political conditions, did not become prominent until

somewhat recently. And this partly for an obvious reason: practically all literate men and consequently practically all those who wrote books on moral philosophy were formerly attached directly or indirectly to the aristocratic leisure class. And formerly, also, the class structure was taken for granted, and entered, therefore, automatically into the details of any moral philosophy. The increase of literacy and the advance of democratic and communistic ideologies has forced ethical theorists to become critical toward class problems, and to realize that a socio-moral structure based on a proletarian viewpoint might embody ideals far different from those traditionally accepted.

(4) **The sanctions of morality.** The concluding paragraphs of the last section suggest a further problem that any social morality must face. Put in its lowest terms, the problem may be stated, "Why be good?" It should be observed, however, that for the morally mature individual, as individual, this problem does not arise. He is at liberty to accept with no exterior sanction a self-integration based on his own conception of his enduring moral self. The problem now to be considered is, therefore, not strictly a moral one. For the moral realm of discourse, the good is defined, by Postulate (i), as worthy of choice, and this definition must be accepted to make moral discussion intelligible. The present question is one of social causes: withdrawing from the moral realm of discourse, what causal factors determine men's social activities? For unfortunately the choices resulting from moral ideals accepted by an individual often bring about actions which hinder other individuals in the pursuit of their own ideals. Consequently, the problem of the sanction of morality is for society acute and inevitable. Why should I be honest in business if by clever dishonesty I can make more money? Why should I tell the truth if it is

materially profitable for me to lie? Why should a city plan streets and subways for future generations when this means additional heavy taxes on its living inhabitants? Why should we worry about the economic misfortunes of coal-miners? Why should we build at our expense comfortable homes for the aged and insane?

In large measure these questions are answered for us by social habit. We act, somewhat clumsily perhaps, for the welfare of society because we have absorbed automatically from our parents, from the books and newspapers we read, from the preachers we hear, from the politicians and public relations counsels who govern us, a set of rules designed to promote such action. This strong force of *social inertia* tending to the preservation of social obligations has been hypostatized by certain writers as a 'group mind.' Whatever may be the value of such an ideology, the group mind has certainly no such close organization as the mind of an individual. Moreover, there is unmistakable evidence that today in most countries any unity of social sentiment is being reduced to a smaller and smaller remainder. In Aristotle's time, and particularly in Greece before Aristotle, the existence of a group mind which took care of the sanctions of social morality was at least comprehensible. The inhabitants of each small Greek city-state were bound together by a unified social tradition which they all shared, and which they accepted for the most part without question. If nearly everyone in a society is agreed about what is right no further sanction is needed.

But in contemporary industrial civilization the problem of moral sanction is peculiar in two ways. First, modern conditions appear to be promoting, in many directions, a consciousness of an opposition between the individual and society, a consciousness that has perhaps never before been realized to any comparable extent. Ironically

enough, such increased feelings of opposition occur at the very time when, due to the complicated organization of our economic life and the excessive specialization of most important social functions, we are more dependent than ever on the social organization. Without the relatively orderly functioning of a gigantic social machine of which hardly anyone is acquainted with more than a few cogs, the dweller in a modern city would be quite helpless. Nevertheless, side by side with the individual's increased *actual* dependence on society, his ability to dissociate himself *in theory* has been increased. It has become easier than formerly for even a comparatively unimaginative man to dissociate himself from any given social group, and at least one important reason for this is that nowadays each of us tends to consider himself a member of several different, sometimes conflicting groups. As Professor Perry has said:

> There is no individual who does not belong to something, and the average individual belongs to a great variety of intersecting groups, in each of which he has a different status and plays a different part. The activities incident to this multiple membership make up the larger part of a man's life, and the whole of his obituary. Unorganized social groups have also shown a tendency to increase in number, variety, volume, and importance. There have always been crowds; but whereas close physical proximity was once their necessary condition, modern facilities for communication, publicity, and transportation, together with the wide diffusion of literacy, have made it possible for crowd influences to overcome distance and to act upon the individual almost continuously.[1]

As a result of this situation individuals tend to become — not of course independent of social influences, since to react against one social tendency is most of the time to do so under the influence of some other — but less willing

[1] Ralph Barton Perry, *General Theory of Value*, p. 401.

to acknowledge any preëmptive obligation to a commonly shared social end.

The other peculiarity of the problem of moral sanction as it has to be formulated — at least as it has to be publicly formulated — today is its secular character. A secular morality, separated from any of the religious world-views that originally gave substance to moral codes, while not a new thing, has lately achieved a widespread prominence never before known. How strong such a morality can be is still an open question, for history offers no clear analogy by which to judge. A large number of persons today take for granted that morality both can and must get along without religion. That *some* kind of morality will be found as long as men continue to live in society is of course true: is, in fact, a tautology. But what the character of a purely secular morality is likely to become as the moral habits built up on the foundations of religion abandon their support, no one can confidently say. To be sure, religious beliefs cannot be resuscitated at will merely for their supposed utilitarian benefits. A religion whose value is *primarily* utilitarian is no honest or even effective religion. But the traditional relation between morality and religion suggests at least the importance of examining, on independent grounds, the validity of religious belief. To this we now turn.

CHAPTER XI

RELIGION

1. What a Philosophy of Religion Can Do

A philosophical inquiry into religion is faced with a special difficulty. A philosophy of the sciences or of morality deals with a subject-matter that is admitted to exist, and the principal concern of its inquiries is to determine the character and limitations of the subject-matter in question, its distinctive language, its initial postulates and their corollaries, and its relation to other realms of discourse. A philosophy of religion must have, with respect to the subject-matter of religion, a similar critical task to perform. But with this difference: that whereas nearly everyone accepts the problems of science and the problems of morality as fundamentally valid, though formulating them in a diversity of ways and giving various answers to them, the problems of religion, in anything like its traditional sense, have become suspect. Some of the reasons for this situation will be presently examined, but that the situation is actual few will deny.

Philosophical criticism cannot be employed on a given subject-matter when the nature of that subject-matter is a closed book to the critic. In the cases of science and morality it is hardly possible to be wholly ignorant of their subject-matters, for there arise every day countless situations where decisions of some kind have to be made; and to make a reflective decision always implies some knowledge of what effects may be expected to follow from our acts (which is rudimentary science) and some choice

of one effect rather than another (which is rudimentary morality). Science and morality are thus in some form inseparable from the daily life of everyone. It may be admitted, of course, that for many persons religion is equally indispensable. But there is a large, and it may be growing number of persons at the present time who find religion an unnecessary appendage to their reflective life. Religion, they hold, is a body of obsolete superstitions which the methods of modern science are progressively dispersing; and so far as it is anything more than that it is a body of moral precepts, such as the Ten Commandments and the teachings of the Sermon on the Mount, which could be redrafted in a saner and more workable form if detached from the air of supernatural authority with which religion invests them.

So far as this position is given a theoretical formulation it becomes a metaphysical judgment and its limitations can be established dialectically as readily as those of any other metaphysical judgment. To formulate clearly a non-religious attitude is to say, by implication, something about the nature and possibilities of religion. But in many cases the opposition to religion is not primarily intellectual. It is due often in large part to lack of a religious temperament, to lack of acquaintance with any distinctively religious experience, and to a general, perhaps inarticulate feeling that religion as a mode of feeling and living is hopelessly far off from the insistent actualities of the contemporary everyday world. Where that situation exists philosophy is powerless. It is not the business of philosophy to 'sell' religion. Nor could it do so, in any genuine sense, if it would. Just as colors have to be seen and sounds heard, to give an empirical content to a dialectical justification of the reality of secondary qualities, so religion has to be felt and accepted as at least a living problem before a philosophical examination of its

claims can be more than a put up job. The limitations of a non-religious viewpoint and therefore the *a priori possibility* of religion can be established by dialectic, but dialectic can give no positive content to religion nor be a substitute for an experience and acceptance of religion itself. At best, it can establish a right of way for the validity of religious experiences when these are independently had, by showing *a priori* in what sense it is impossible to prove them false. An inquiry of this kind, into the *a priori* validity of religion, is the primary task of a philosophy of religion.

2. Religious and Scientific World-Views

In upholding the validity of religion we evidently mean to do more than assert the bare existence of religious experience. To assert only that would be to assert nothing at all. An experience testifies to some state of affairs beyond itself, and to ask whether an experience is valid is to ask not whether the experience somehow exists but whether what it testifies is true. If a believer were to declare that he has undergone an experience of communion with God, no one, unless wishing to impugn his veracity, would find any point in denying that he had undergone an experience. The important question would be not whether the experience had existed, but whether it really meant what it had seemed to mean. To inquire into the truth of religion, in other words, is not simply to inquire into the actuality of certain subjective states of mind, but to inquire into the truth of the *religious world-view*. Naturally, it would be a mistake to suppose that all religions have upheld the same world-view. This, as anyone with a smattering of history knows, is not the case. Nevertheless, for all their diversity, the various religious world-views must be alike in some respects, and if they are not the word 'religion' is sheer equivocation.

Now what the various religious world-views have in common is a belief in the universe as in some way expressing a cosmic drama of living forces; and opposed to this there stands a world-view that has of late been seriously challenging it and that may be called the *scientific world-view*, which pictures the universe in terms of minute material particles or of units of electricity or of quanta of energy. Fundamentally the issue lies between belief in a living universe and belief in a dead one; between a universe in which there is a possibility of communion with a divine person or persons of a *supernatural* order and deliverance through that communion, and a universe in which, as Russell has said, "blind to good and evil, reckless of destruction, omnipotent matter rolls on its relentless way." It is safe to say that during the last couple of centuries the latter view has gained in prestige, and it is of interest to consider why this has been the case.

For one thing, science has been able to perform miracles. Skyscrapers and television inevitably impress people who live in a world transformed by them, and the success of science in creating these monsters has given prestige to the scientific world-view. The prestige-giving power of miracles is no new thing; religion formerly benefited by it as science does today. In neither case does there appear to be any strict logical connection between the pragmatic value of a method and the philosophical truth of a world-view. That God proved he was in his heaven by drying up the Red Sea was never at any time sufficient proof that all was right with the world; nor does the uncanny precision with which modern astronomers can predict eclipses prove that God has fallen out of his heaven. But while no implicative relation is present, the persuasiveness of such arguments is strong. "A world-view must be true if it can enable its believers to

perform miracles like that!" — some such unexpressed argument appears to have underlain both the older faiths and the modern. Now if the argument is accepted at all it at any rate works both ways, unless one is predisposed, as many today are, to accept none of the miracles of religion as true. Such a refusal would ordinarily be justified by appealing to the organized structure of scientific theories, and hence would be question-begging if made a ground for accepting exclusively the scientific world-view, since the scientific world-view consists in accepting the structures that grow out of science as the only true ones. But in any case miracles offer no logical support to any one world-view rather than any other. They serve merely as propaganda, and propaganda should have no place in a critical inquiry. The truth of one's profoundest visions ought not to be staked on such melodramatic tests.

A second group of arguments, also not entirely relevant, in favor of a scientific world-view are moral ones. The issue of science vs. religion has got sometimes identified with the issue of enlightenment, liberalism, progress vs. obscurantism, dogma, reaction. The identification has acquired a certain popularity during approximately the last century and a half, and its meaning is worth considering. Partly, it must be admitted, to call a man illiberal and reactionary is a result of finding his views too drastically out of line with our own or with the more advanced tendencies of a given age. That is to say, we attach these epithets not to the manner in which a man believes anything, not to the temper of mind and awareness of difficulties with which he approaches a believing of it (both of which are hard to determine), but to the particular proposition or doctrine that is the object of his belief. And, in this sense, to call science enlightened is merely to call it fashionable, and to call religion dog-

matic is simply to declare it out of vogue among the 'leaders of thought' of the day. Often, however, the critics of religion do have in mind much more than a contrast between belief-objects. It is the scientific *temper*, progressive and ready to change its hypotheses at the beck and call of 'new evidence' that they admire; whereas the relative conservatism of religion, the tendency to resist changes of doctrine, is considered an evil. So far as the question concerns only the moral desirability of a philosophical progressivism, it can be quickly answered. A great many persons take for granted without close examination that a liberal attitude, defined as one that shifts its center of gravity as often as buffetted by veering winds of doctrine, is good. The assumption is partly a matter of moral preference and partly a guess about the probable good effect of change on society. The assumed connection between unrestricted liberalism and the welfare of society was questioned at the end of the last chapter. To some degree the connection is made plausible by the question-beggingly favorable connotations of 'liberalism'; but putting aside emotive adhesions of the word, when liberalism is made synonymous with centrifugality, with lack of constancy to a group of socially accepted first principles of conduct and belief, it is doubtful whether society can endure indefinitely long under its banner. At least the ability of society to do so has never been proved, and the supposition that a willingness on the part of everybody to give up any and all beliefs as these are challenged by the influx of new scientific evidence, may be suspected in its extremer forms of being no more than a dogma of 'liberalism.'

Both the pragmatic and the moral argument, then, in the forms just given, must be regarded as superficial and irrelevant in determining the issue between a scientific and a religious world-view.

It is useless to judge a religion from the point of view of the politician or the social reformer. We shall never create a living religion merely as a means to an end, a way out of our practical difficulties. For the religious view of life is the opposite to the utilitarian. It regards the world and life *sub specie aeternitatis*. It is only by accepting the religious point of view, by regarding religion as an end in itself and not as a means to something else, that we can discuss religious problems profitably.[1]

What every candid reasoner feels to be at the core of the matter is the question of truth: not which world-view enables its adherents to perform more striking miracles or gain more of the world's riches, nor even which has the better effect on individuals and on society. So far as possible the question of philosophical 'truth' ought to be distinguished from both these subsidiary questions. If a world-view is on more pertinent grounds accepted as true, then if it will not work miracles we can borrow our technical methodologies from elsewhere and demarcate, as does Bergson, 'truth' from the useful fictions that constitute the ideology of science. Or if a world-view appears intrinsically true but its propagation hazardous to the welfare or even the continuance of society — this possibility is generally ruled out *a priori* by liberals but it is evident that a critical approach to the problem cannot afford to overlook it — we can then follow the suggestion given by Plato in the *Republic*, and distinguish between the education to be reserved for the intelligent few who are to rule the state and the 'noble lies' which in the interests of the state's perpetuation are to be disseminated among everybody in early childhood. But a genuine philosopher, if only to be enabled to make these distinctions clearly, will wish not to be himself deluded. And it is therefore necessary to pass beyond moral and

[1] *Essays in Order*. Christopher Dawson, "Christianity and the New Age," p. 172.

pragmatic considerations and estimate the more important and more central attack that science has made on the religious world-view: that its doctrines are not useless or immoral but *false*, being based on faulty evidence or on no valid evidence at all or even more flatly contradicting an array of evidence adducible by scientific method.

Two of science's chief attacks may be summarized as follows:

(i) Religious explanations of events are contrary to scientific evidence. At best, they violate the Principle of Parsimony. This is illustrated by the famous story about Laplace, who, when Napoleon had finished reading his account of the origin of the solar system and had objected that there was no mention in it of God, replied "Sire, I have no need of that hypothesis." But further, many traditional religious explanations definitely contradict scientific evidence of some probability. The account for instance of the creation of the world and its inhabitants as given in the first chapters of *Genesis* is incompatible with the accepted conclusions of astronomy geology, and biology. Doctrines like the Incarnation, Transubstantiation, personal immortality, and — most important of all, because common to normal religions generally — the existence of a God or gods, are being deprived by science of positive content, and often seem to be kept up merely because they refer to hidden crannies of experience that science has not yet penetrated. They are being pushed further and further from the ordinary course of our lives, until it is becoming difficult not only to believe in them, but even to have any notion of what they could mean.

(ii) And if science cannot accept religious explanations as plausible or as consistent with its own explanations, it offers besides hypotheses of its own to account for the

phases of experience of which the religious world-view is claimed to be an extension. 'Religious experiences' are dismissed as a complex state of neural and glandular activity; or, avoiding the physiological reduction, perhaps by a Freudian explanation in terms of 'escape' and 'compensation' complexes due to the peculiar workings of the unconscious. As opposed to this, "the kernel of the scientific outlook," Bertrand Russell has said, "is the refusal to regard our own desires, tastes, and interests as affording a key to the understanding of the world."[1]

As a result of this situation and these arguments many suppose at the present time that it is impossible for an intelligent contemporary to believe in the religious world-view as traditionally defined. Yet because of the many values which religion has offered — humility, fraternity, substantiation of ideals, solution of cosmic loneliness — they do not like to see religion wholly lost. Hence both from the side of religion and from the side of science we see many attempts today at compromise.

3. Current Attempts at Compromise

(1) **From the side of science.** Strictly speaking, since science is a fairly determinate realm of discourse and limited to specifiable types of meaning, *it* cannot compromise with religion nor embrace religion nor even utter significant propositions, true or false, about religion. Science is in essence neither religious nor irreligious, but non-religious. The types of meaning that constitute religion are entirely outside its realm of discourse. Therefore even if there were a God or gods, he or they would not be scientifically discoverable. Whatever divine manifestations might occur, only those aspects of them that fitted into scientific categories — namely, only the publicly

[1] "Science and Culture," *Mysticism and Logic*, p. 42.

observable aspects — would be regarded by science as 'valid observations,' and these would be observed not as manifestations of divine agency but as physical events to be somehow subsumed under the abstract structures of the sciences. That is to say, if the effect of divine agency were merely something private, like mystical illumination or 'the peace that passeth understanding,' it would not in its private character be recognized by science as a legitimate datum for the building of scientific hypotheses; whereas if such agency were effective in bringing about changes in the actual course of physical events, it is only qua physical changes having a place in a causal nexus, not as expressions of divinity, that science could legitimately recognize them. Nevertheless, since scientists are not necessarily good dialecticians — not necessarily expert, that is to say, at recognizing the boundaries of science — there have been attempts made from time to time by scientists to show that a concept of God is implied in the truths of science. But recalling the limitations of the scientific realm of discourse, this alleged implication can be shown only by committing one of two fallacies: either God is reduced to an identity with the organized totality of scientific 'laws' (or, more broadly, to the logical aspect of things generally), which reduces the statement "God exists" to a badly expressed tautology; or a more definite, though not usually adequate, notion of deity is upheld at the expense of confusing scientific with non-scientific categories. The reduction of God to the logical basis of all being, as in the philosophy of Spinoza, or to a substantial identity with all physical nature, as in the doctrine of *pantheism*, does to be sure define God in such a way as to put his existence beyond the power of refutation; but it does so only at the cost of dropping from the notion all recognizable and distinctively religious, as opposed to purely logical, meaning.

Defined in this way, therefore, the question of God's existence is not so much religious as partly logical (a question of how the word 'God' is to be used) and partly metaphysical (a question of how much emphasis to give to the logical as opposed to the ineffable, irrational, and paradoxical aspects of things). What is of greater specific interest are the attempts sometimes made by scientists to formulate, in the terms, as they suppose, of their science, more specific notions of a God. We shall consider three of the more prominent of such attempts.

(i) *God as First Cause.* The group of physical events that are now occurring must have their adequate explanation in physical events preceding them, and those in still earlier physical events, and those in still earlier. But what adequate explanation can be offered for the whole causal nexus? It must have been started by God.

This argument, even if valid, would evidently not prove much. It offers no evidence that God is at the present time a living reality nor that he still manifests himself in human experience nor that he can be communed with. It names him as merely the original begetter of everything. The resultant position, that God once started the universe going but that he perhaps no longer takes a hand in its affairs, is called *deism;* and it is difficult to see just why, in terms of man's religious needs, the position is worth arguing for. But more important than its questionable utility is the fallacious reasoning on which it rests. What it does is to make of God a name to gloss over the paradox of supposing an absolute beginning of things. But how did God begin? It is replied, he has existed from eternity. Why, then, not assign this capacity for existing from eternity to the causal nexus itself? If meaningless applied to it, it is meaningless applied to God. The fallacy may be shown more clearly by stating the criticism in the form of a dilemma. *Either* the God

who is postulated as a first term in the causal nexus is himself a physical event or combination of physical events, *or* he is not. If he *is*, then by the very postulate that required us to postulate him in the first place (namely, that every physical event must have a physical cause) a prior cause is required to explain him, and so on. If he *is not*, then by the same postulate it was wrong ever to postulate him as a first term in the nexus. Being not physical he cannot be a member of any causal nexus accepted by physical science, nor can he be legitimately appealed to by science as an explanation for anything that happens in the physical world.[1]

(ii) In general, the fallacy of the argument from 'first cause' is that it offers an answer to a question that cannot be significantly even asked. An absolute beginning is an irrational notion, for every beginning that we know and can understand rationally is a beginning of something against a background of things that do not at that moment begin. A beginning, in other words, must be a beginning *in time*, and since time cannot be defined except in terms of relations between events, a beginning in time must be an event that has at least one other event as its predecessor. Recognition of the paradox of an absolute beginning has made the argument from 'first cause' less common today, and scientists are on the whole more disposed to use a variant form of it, by which God is held to be not an unimaginably ancient cause of the beginning of all things but the present cause of specific beginnings and small deviations observable in the causal nexus today. In recent science, as Chapter VII has pointed out, the

[1] It should be noticed that the scholastic argument in alleged proof of God's existence, developed during the Middle Ages, does not commit this fallacy. It is avoided by the *ad hoc* attribution of a unique relation between God and the universe — *creation*, which is not to be identified with the relation of physical causality. We are, however, here concerned with arguments drawn from the physical sciences. And it may be remarked that it is extremely difficult to re-formulate this scholastic argument in currently acceptable language.

notion of the entire physical universe as a complete mechanism, self-explanatory and free from the disturbances of unexplained events, has been quietly discarded, and its place taken by the notion of a universe in which fortuitous individual events may happen, though they happen seldom, and general 'laws' may be built up by estimating the probabilities in any given situation of enough events occurring in an orderly way to make the exceptions practically inefficacious. This change in the physicist's ideology is, as already shown, primarily a change in manner of analysis: instead of seeking a 'sufficient reason' for individual events at the cost of making a large number of 'corrections' to account for their sometimes unforeseen behavior, it applies the principle to statistical groups. But it is always possible to ask the question, How are variations within the groups to be explained? It is sometimes replied that science does not properly concern itself with questions of this kind, that it does not explain, it merely describes. This, it should by now be evident, is a misstatement of the case: science does explain, since it fits its data into one kind of intelligible structure by seeking a sufficient reason for them. But a 'sufficient reason' for science, whether in terms of relations between individual events or relations between statistical groups, must always be sought among the general type of meanings that science uses. Consequently, when Professor R. A. Millikan declared recently before a congress of scientists, according to the press, that the creation of hydrogen atoms out of cosmic rays in interstellar space was evidence that God was "still on the job," he was palpably confusing the meanings proper to his science with those borrowed from another realm. If there is evidence that hydrogen atoms are being created in the manner described, science may legitimately 'explain' this phenomenon by fitting it into either of two types of structure: it may regard the

'creation' (coming-to-be) of hydrogen atoms as in every case having a sufficient explanation in some set of physical events with which it is related by some as yet undiscovered 'law,' or it may accept the coming-to-be of hydrogen atoms as events the frequency of whose occurrence in a given situation is to be noted and correlated with some other variable in as accurate a mathematical relation as possible. Neither of these (both properly scientific) types of explanation is an equivalent, or anything like an equivalent, for what from a religious point of view is generally called 'God'; and the introduction of the word can only lead to a confusion of categories.

(iii) *The teleological argument.* In its crudest form this argument states that the laws of nature imply a lawgiver. This is a play on the word 'law' and does not deceive many scientists. A more persuasive form of the argument, however, finds the adaptations in the world, chiefly of organisms to environment, an evidence that there must be a God who is omniscient adapter. The two foregoing arguments are suggested primarily by physics, but this one occurs through a use of the categories of biology. It misuses them, however. When telic categories — end and means, and adaptation of means to end — are used properly in biology they have a purely positivistic meaning with no implication of personhood or conscious purpose; and so far as biology inquires further into the nature of adaptation it can do so only by relating telic categories to the categories of other sciences — as to chemistry, in the chemical analysis of tropisms, and to statistics, as in Darwin's explanation of partial adaptations to their environment discoverable in organisms by reference to the principle of natural selection.

In general, such arguments as these are vitiated by the failure of those who offer them to understand both the

proper limits of the realm of scientific meanings and the nature of religion as it is accepted by those who are religious. The terms and categories of science can never imply the terms or categories or experiences of religion, and any attempt to make them do so is to confuse the two realms of discourse. What the scientific world-picture does imply, to anyone intelligent enough to sense its limitations as a world-picture, is the *possibility* of alternative world-pictures, the possibility of other modes of interpreting experience. This much is evident from the general principles of dialectic, laid down in Chapter VI. Science cannot, however, prescribe the positive character of such alternative world-pictures, and more particularly it cannot prescribe that such world-pictures are to be looked for as mere extensions of its own categories. Dialectic can merely, as has repeatedly been pointed out, establish *a priori* possibilities; and it must be left to the actual having of other forms of positive experience to furnish the content of those possibilities.

(2) **From the side of religion.** There is also another direction in which a compromise between the realms of science and religion is aimed at. Not only is it proposed to extend the categories of science; it is proposed much more frequently to diminish the usual scope of religion. There is a sense, doubtless, in which during the past half-century the scope of religion has diminished a great deal of its own accord. It is easy to see that religion has no longer the degree and extent of social influence it had in the thirteenth century, or even in the seventeenth. But we are considering here not the shifting fortunes of religion as a social institution, but the theoretical question of how much of a function, in the face of the modern scientific world-view, religion can validly claim to perform. One of the answers to this question has been to suggest a kind of merger between religion and science, a partnership

whereby it should be the function of science to direct our beliefs about the nature of things and the function of religion to administer to states of soul and give 'meaning and value to life.' Such a compromise has been frequently suggested of late, and there is at least this much to be said for it: that *if* the only valid beliefs are those established by scientific method, then either religion must be reduced to this secondary function or be dropped out of our modern universe altogether. Why it should not be dropped, why the word should be retained when its original meaning has been dissipated, is not always made clear; but those who offer the compromise seem to act on the recognition that religion, whatever its inadequacies and mistakes, has had during its period of full bloom an importance for men and societies, in giving them a vision and a principle of centripetality, for which no ample substitute has been found. In the past (so their argument runs) religion has offered both a doctrine or system of beliefs and a way of living, and through them has given a meaning and value to life; nowadays, however, many of religion's earlier beliefs, such as a six-day creation and a geographically located Hell, have been proved beyond reasonable doubt false; while others, such as the existence of a personal God and the fact of personal immortality, have been rendered improbable by the best evidence that science can muster; wherefore the obvious solution is to effect a division of labor by assigning beliefs to the charge of science and 'meaning and value' to the charge of religion. Or stated otherwise: religion has formerly performed the dual service of providing an explanation for things and organizing the spiritual needs of man; but since science has shown a superior ability to do the former, let us accept our world-picture from science and our spiritual quickening from religion.

Now this apparent compromise is, if thought about

clearly, a complete selling out by religion to science. Religion has by this arrangement nothing distinctive left to do. For the kind of emotional satisfaction that religion traditionally gave was an attitude tied up with certain beliefs about the nature of things. There are, of course, many forms of emotional satisfaction that are not religious in character. But the distinguishing character of the religious emotion is that it depends on and takes its nature from an awareness of the divine, or personal, character of the universe, from a feeling of union or at least of communication between the self and this divine presence, and from a submission to it and a feeling of humility before it. A distinctively religious emotion, in short, depends on belief, or on an ability to acquire belief, and would lose its actual character if the belief were lacking. In other words, while the world-picture offered by a religion is not the whole of that religion it is an indispensable part of it in the sense that if the world-picture were lacking, religion would be nothing more than "morality tinged with emotion." Matthew Arnold, indeed, has defined it in this way, but since, as Irving Babbitt has pointed out in reply, all genuine morality is in some way tinged with emotion, religion appears to have become, if the proposed compromise is accepted, a superfluous term. For religion is not the kind of thing whose elements can be severed and apportioned at random. When religion flourishes they are organically related; each depends for its meaning largely on the others. Separated from belief, it is at least questionable whether the remaining elements of religion would retain anything like their original natures. Ritual without beliefs to give it meaning could be, and has recently been, justified on the ground that it organizes a person's emotions and orients his activities from day to day; but it would be at best a sort of spiritual calisthenics and would certainly not

'mean the same thing' for the practitioner as a ritual expressive of religious beliefs. "Religion, as a mere sentiment," Cardinal Newman wrote in his *Apologia*, "is to me a dream and a mockery. As well can there be filial love without the fact of a father, as devotion without the fact of a Supreme Being." The public morality and private meditation, of which religion has been supposedly a safeguard, might go on by habit for a time without the beliefs that formerly backed them up, but their continued endurance would be at least doubtful. It is a persistent dogma of 'liberalism' to suppose that they will endure indefinitely by their own strength, but the claim wants proof, and it is at least a fertile thesis that the weakened recognition of public duties and the diminished tendency to private heart-searchings which seem to characterize human conduct today, are in part due to the loss of a unified world-view that once oriented those activities.

No such attempts at compromise can sidetrack the main issue between science and religion today. The issue lies between a materialistic world-view, as defined in Chapter VII — that is, an acceptance of scientific categories as adequate to answer our most searching questions about the nature of things — and a personalistic world-view, which accepts the categories of personhood and value as essential and irreducible ingredients in any recognizable or satisfactorily intelligible characterization of reality. Our modern passion for giant mergers should not predispose us to the dogma that science and religion can be merged on any such terms as those suggested without, in effect, an abandonment of most that is distinctive about the latter. One way in which an intelligible and moderately unbiassed reconciliation can be sought is by a closer examination of the nature of religious belief and of its differences from the kind of belief we call scientific, and on this basis to reconsider the question,

at a more analytic level, of how far religion and science are reconcilable.

4. The Nature of Belief

The traditional philosophic approach to the problem of belief has been ordinarily through an analysis of the proposition or doctrine that is believed, or of the state of affairs that is 'believed.' This aspect of a belief-situation may be called the *belief-object.* So commonly is this emphasis adopted that the word 'belief' itself is widely accepted as synonymous with the belief-object. Belief, in this sense, can be characterized by the adjectives *true* and *false;* and since true and false are from one point of view logical contradictories, it is taken for granted that a given belief must be either true or false, or true in some specifiable respects and false in others, but when sufficiently analyzed not both true and false in the same respects. 'Belief' is sometimes used, however, to denote the process or manner of believing, as in the prayer "Lord, I believe, help Thou mine unbelief!" where the primary emphasis is evidently on the state of mind of the believer. This subjective aspect of belief — the process or state of believing — may be called the *belief-attitude.* It is clear that the question 'what it means to believe' or the nature of the belief-attitude, is logically prior to the question 'whether the belief is true,' to the truth-value of the belief-object. Attempts to declare a belief true or false before determining in what sense the belief is being held are permissible in an artificial realm of discourse like logic, mathematics, or the sciences, where a given definition of truth is agreed on for all that is relevant to that realm; but when extended to questions concerning human experience in general, such attempts are likely to be very much beside the point. The more

profound questions of life cannot be settled by definition. There remains, after all definitions have been granted, the question, What possibilities of experience lie outside the realm of discourse so defined and to what further realities do they testify? Now there is among human beings a group of related attitudes to which the word 'belief' or 'believing' is generally applied, and it is these, as opposed to the objects pertinent to some one of them, that ought first to be examined. The examination has been often enough undertaken from Freudian, behaviorist, pragmatic, and other partisan standpoints, but each of these gives a one-sided and unsatisfactory account of the complex totality of mental attitudes that we sum up under the word 'believe.'

Without pretending to a complete account of the state of mind we call believing, there do seem to be at least four discernible meanings. Belief may mean:

(i) Concentration on the belief-object and an absence of other belief-objects tending to dissipate the concentration. Interpreting this meaning in the most elementary way, I believe in the presence of whatever I am actually experiencing. So far as I am actually experiencing it, it is impossible for me to do otherwise. To be sure, I can, and often do, withhold belief from some usual interpretation of the experience, which at other times when doubt was not present I might refer to as part of the experience itself. I might, for instance, be looking at the light thrown by a distant ship, and then in the midst of looking begin to doubt that what I am seeing is really a ship, and wonder whether it may not be a bright star just above the horizon. Or I might doubt whether there was any physical object there at all; whether I might not be deluded in supposing I saw anything. These questions, however, represent dissociations of the original experience, and do not challenge the fact that what I am directly conscious of I must

necessarily believe in. All that such dissociations do is change somewhat the character of what I am directly conscious of. Prior to the questioning doubts about what my experience signified I was directly aware — in the usual manner of speaking — of a ship's light, and consequently I believed it to be there in the sense that I accepted it without question. But after the possibility had occurred to me that it was no ship's light but a star, the uncritical part of my belief became limited to simply 'a light,' and even though I still preferred the hypothesis of ship's light to the hypothesis of star, and no matter how much better established the former hypothesis might have become, my belief in it was no longer naïve, but had developed into belief of the second type.

(ii) Secondly, belief may mean factual belief; that is, belief that some specific event has occurred, is occurring, or will occur. It is not always easy, of course, to draw a line between Types (i) and (ii). The general principle, however, is that we believe according to Type (ii) when we accept as true something more than the ineluctably given. But this 'something more' must be further characterized, to distinguish the present type of belief from Type (iii). If the event is specific there must be a set of conditions under which its occurrence could be verified. These conditions may be impossible of realization, which would mean that the occurrence of the believed-in event would not be actually verifiable. But we can in imagination project ourselves into an intelligible situation where verification would be possible, and our belief can be interpreted as an expectancy that if we were in that situation we would have direct verification of the event as occurring. It is a characteristic of beliefs of this sort that, adequately analyzed, they must be either true or false and not both; for the expectation in which they consist would be, under the imagined condition,

either fulfilled or disappointed. A belief that it will rain next Wednesday, that Washington crossed the Delaware, that Mars is inhabited, that the world was created in six days, that my companion is enjoying his dinner, that my consciousness will continue after the death of my body — these beliefs are by nature necessarily either true or false, though except in the case of the first we have either no means or only indirect means of determining which. Even so widely accepted a belief as that Washington crossed the Delaware is not susceptible of verification in the same way as my belief that it will rain next Wednesday. The evidence for it is circumstantial; for its supposed occurrence is a thing of the past, and we can have direct acquaintance only with its presumed effects, such as written accounts of it. In believing that my companion is enjoying his dinner my evidence is again but circumstantial: here the belief-object is another person's state of mind, and our evidence must be found in his words, gestures, and facial expressions. Nevertheless, these instances of belief have one thing in common. There is for each of them an imaginable, though often not realizable, situation in which if the belief were true an expected specific experience would be had, and if in such a situation the expectation were not fulfilled the believer would recognize that his belief had been false.

(iii) Again, belief may mean acceptance of something as organizing experience or some phase of experience and orienting the believer with respect to it. The atom, the electron, man a machine, vital force, the soul, universal progress, and God are important examples of this type of belief. None of these notions is of a kind that we could imagine being directly and adequately verified under any conditions whatever, for we are unable to say what the nature of the conditions would have to be. We would not know in terms of what kind of experience to expect

the verification, hence could not recognize it if (*per impossible*) it were to occur. Atoms have only primary qualities: we could never therefore see them, for we see only what is colored. Direct evidence for man as a complete mechanism would require an infinite intelligence to understand it, an intelligence capable of tracing out to infinity the causal nexus leading from every one of a man's actions: such an intelligence, however, is so far removed from anything we have ever known that only by grace of metaphor can it be called an intelligence at all. Universal progress could be directly known only by an intelligence capable of grasping past, present, and future history with equal immediacy and of comparing these by reference to a standard not defined in terms of any one of them: such an intelligence is again hopelessly removed from us. Notions like these have already been named ideologies — unverifiable but at the same time irrefutable hypostatizations of method. This does not mean they are false, but only that they become false if made a synonym for all Reality. In their proper sphere they are 'regulative ideas.' As such they may, of course, be believed in, or even accepted as necessary beliefs, by anyone who attaches overwhelming importance to the method of which they are projections.

Now my soul (or self), other people's souls (or selves) and the existence of a God (or gods) are similar extensions of experience, and to believe in any of them is to believe according to Sense (iii).

As from a multitude of instinctive perceptions, acting in particular instances, of something beyond the senses, we generalize the notion of an external world, and then picture that world in and according to those particular phenomena from which we started, so from the perceptive power which identifies the intimations of conscience with the reverberations or echoes (so to say) of an external admonition, we proceed on to the

notion of a Supreme Ruler and judge, and then again we image Him and His attributes in those recurring intimations, out of which, as mental phenomena, our recognition of His existence was originally gained.[1]

(iv) Belief *in* something, as both emotional and active — that is to say, moral — allegiance to it. To 'believe in' a friend or to 'believe in' a social ideal that the believer is helping to push forward are beliefs of this type. It is evident that a belief of this type will often have the same belief-objects as a corresponding belief of Type (iii). The friend or the social ideal are not given allegiance for no reason at all. In some way our belief about the friend's character and the nature of the social ideal organize some of the experiences — primarily feelings and in the second case needs of action, but partly also some of the perceptions — of the believer. His allegiance to them may be regarded as the emotive or subjective aspect of the way he believes in them in Sense (iii).

What light does the foregoing analysis of belief throw on the issue between belief in a scientific and belief in a religious world-view? Belief here is evidently not used in Sense (i), for at the level of uncritical acceptance there is no possibility of discriminating, and to mistake one's immediate unreflective apprehensions for religious realities is a worthless sort of obscurantism. Nor can we believe in a scientific or religious world-view in Sense (ii), though certain factual beliefs will play a part in each of the world-views. But factual beliefs do not clash when they belong strictly to different realms of discourse. Thus, the religious world-view includes a factual belief in the existence of consciousness in the universe at large, and the scientific world-view challenges this belief; but the challenge does not come from any accredited factual be-

[1] Newman, *Essay in Aid of a Grammar of Assent*, p. 104.

lief sponsored by science, because the factual beliefs within the realm of science, since they do not employ the same terms as the factual beliefs entertained by religion, cannot by any possibility contradict them, they can merely assert facts of a generically different kind. A belief that a conscious deity or deities exist is not contradicted by a belief that a lightning flash will be followed by thunder, any more than the belief that I as a conscious self exist is contradicted by a belief that under certain conditions my body can be decomposed into a number of chemical elements. What challenges a belief in a conscious deity is precisely what challenges a belief in the reality of my own consciousness: not any factual beliefs within the realm of science but the method of the scientific world-view together with its integrating principle that there are no realities except those expressible in terms of physical categories.

It is to the third meaning of belief, then, (and the fourth in that it gives an emotional and pragmatic content to the intellectual acceptances of Type (iii)) that we must turn for an understanding of what the conflict between science and religion most profoundly means. The issue has already been stated in terms of the two world-views themselves; we may now offer a restatement in terms of what it means to 'believe in' either of them. To 'believe in' the scientific world-view is to accept naturalistic categories such as space, time, number, cause, and adaptation as a sufficient means of integrating our experiences, and therefore as alone 'real.' To 'believe in' the religious world-view, on the other hand, is to accept the categories of personhood and divinity (whether applied to one God or several) as the most important categories for integrating our experiences and orienting ourselves with respect to them, and therefore as the most fundamentally real. The issue between science and religion thus becomes an issue

between opposed allegiances, intellectual, emotive, and moral; an issue, therefore, for which coercive proof or disproof on either side is dialectically impossible.

We may now return to the scientific objections to a religious world-view mentioned in Section 2 and consider whether in view of the foregoing analysis of belief their validity in turn may be criticized. Laplace's remark, "Sire, I have no need of that hypothesis," gives the whole matter away. It tells us nothing about God, which was the hypothesis he had no need of; it tells us only something we already knew about the method of science — that it has no use for hypotheses that are not formulated in terms of its own realm of discourse. By this application of the Principle of Parsimony nineteenth century science supposed it had justified atheism. But now in the twentieth century the attempt to use that principle as used in science, for the extra-scientific purpose of defining reality has reached a *reductio ad absurdum* in the behaviorist's denial of mind, consciousness, human personhood. Thus, amusingly enough, an indirect effect of dogmatic behaviorism has been to knock the props out from under nineteenth century atheism. For what it shows is that if the scientific method is carried through consistently it leaves no room not only for God but for human persons and indeed for everything else that is not strictly expressible in terms of relations between physical events. We are told nothing about the nature of persons nor of God nor of reality, but only about the nature of science. A materialistic Total Synthesis is simply a misapplication of the scientific principle of parsimony to an attempted definition of reality at large. Science cannot properly say that God does not exist, but only that, like human consciousnesses and values and all kinds of ephemeral qualities, God has no place in the theoretical structure

built up by science. This tells us, about God, only that we cannot go to science for a knowledge of him.

But secondly, it is objected that even if we step outside of strictly scientific categories and admit the existence of other conscious beings, there are no disembodied persons. Consciousness depends on the brain and nervous system and exists therefore only where there is a live functioning human organism. To this it may be replied that while there seems to be good evidence of important connections between consciousness and specific activities of a physical organism, it is impossible that science should ever state exactly what that connection is. An exact correlation between two series can be stated only when both series are reducible to homogeneous units; but it is just because consciousness as we directly experience it is not so reducible that science ignores it and considers instead the activities of the body. Any attempt to prove the complete dependence of consciousness on neural activity is question-begging. We do not first believe other persons to be conscious because of the analogy of their bodies to our own — still less because their brains (which we have doubtless never seen) are functioning in a manner like ours. This is merely a later justification. We know them first simply through communion with them, as a child might equally well commune with a variety of other objects which adults have agreed to consider insentient. What conclusive argument then can be offered against attaching objective validity to the experience of communing with God?

It is replied, such communion is explainable neurologically. Of course it is. So is communion with other human persons, yet we believe them real; so is belief in anything — in the existence of a stone or in the truth of a mathematical equation. So is a belief in materialism itself. If the fact that believing is neurologically con-

ditioned is brought in, then all beliefs must be treated as activities of the body of the believer and the problem of the truth of belief-objects would have to be dropped. But since this physiological explanation is itself an object of belief, that reduction is manifestly absurd. Still, the objector might continue, a religious experience is conditioned by a greater degree of visceral disturbance than belief in the existence of a stone which I see or in the truth of a mathematical equation. In these latter the activity is mainly laryngeal (movements in the throat and head) together, in the case of the stone, with a disturbance of the visual organs. But what *a priori* ground is there for ascribing objective truth to the experiences generated by larynx and optical nerve and not to those generated by viscera? The only evident ground is pragmatic. Optical nerves and larynxes work more in unison and the resultant experiences are more readily communicable, and can thus achieve a more standardized and workable objectivity. And this may be one reason why the core of religion seems often to be mystical; people's viscera do not work in unison, and the resulting experiences are in essence incommunicable. Perhaps religions flourish when, through an established ritual, such a unison is more nearly approached. Today, and periodically, genuine religion is in large measure driven to solitude. But whether public or private, the physiological conditions of believing do not explain the belief-object away.

The demonstration of the possibility of disembodied consciousness does not of course prove that there is in fact disembodied consciousness. In many religions the disembodied consciousness referred to is only that of a God or gods of a wholly supernatural order; but others contain also a belief in human immortality. The question of human immortality is often obscured by a series of metaphors. 'Deathless reputation' may be one kind of

immortality, and one that certain individuals have apparently achieved — though it is hardly correct to say that *individuals* have achieved it. The hope for enduring reputation may have sustained them in carrying out their plans while they were living; but for them it could have no more meaning after they were dead. If immortality means only continued reputation, then, it is not a doctrine that says something about individual human beings, but merely one that points to a social fact about certain habits of thought — the respect for spectacular historical characters — which seem to be fairly stable over a considerable period of time. Nor, from the standpoint of the individual, is the so-called 'immortality of the germ-plasm' more than a doubtful metaphor. It amounts to the endurance of something physical, which by the principle of the conservation of mass is in any case postulated of the elements of the entire organism; and a certain sympathy, while alive, with one's imagined descendants. For the individual, immortality must mean an immortality of the *self*, and the self must remain a self, that is, must continue to possess the major characteristics of a self discussed at the end of Chapter IX. And especially, it must include conscious memory, without which it would be meaningless to say that the same self endured. Belief in immortality thus differs generically from belief in God through being primarily of Type (ii), a factual belief. There is a specific imaginable situation in which, if immortality is true, we shall be able to specifically verify it. But the belief in immortality has an unusual status: for if it is false, we shall not, even imaginably, be able to verify its falsity.

5. The Attributes of Divinity

There has been established only the logical possibility of a religious world-view. Granted the possibility, dia-

lectic has not, and cannot of itself give any definite content to religion, nor establish the truth of one or another particular religion. And, in general, no purely rational method is sufficient. All particular religions have been based, however indirectly, at least partially on the form of non-rational intuition called 'mystic' — if not in the case of individual believers, then through the founders, who are often identified with the divine in the mystery of Incarnation. But this raises the serious though not surprising difficulty that non-rational intuitions often conflict. Writing, from the analysis of the individual mystic, about what warrant of truth mystic intuition confers, William James declares:

(1) Mystical states, when well developed, usually are, and have the right to be, absolutely authoritative over the individuals to whom they come.

(2) No authority emanates from them which should make it a duty for those who stand outside of them to accept their revelations uncritically.

(3) They break down the authority of the non-mystical or rationalistic consciousness, based upon the understanding and the senses alone. They show it to be only one kind of consciousness. They open out the possibility of other orders of truth, in which, so far as anything in us vitally responds to them, we may freely continue to have faith.[1]

Thus, though mystic intuition may be a satisfactory basis for the religions of single individuals, it alone cannot provide sufficient content for a religion extended to large social groups; and, indeed, many individuals find a religion based solely on intuition, because of its non-rational character, and because of the undependability of mystic experiences and even in most cases the impossibility of achieving them, inadequate to their religious needs. Consequently organized religions have always codified

[1] *Varieties of Religious Experience*, pp. 422–3.

intuitions in a systematic body of ritual, and dogmatic theology more or less rational in character. For many people, as a result, religion becomes an automatic acceptance of beliefs handed down by parents and social environment generally; and is thus removed from critical discussion. But the ritual, and the intellectual tradition of the religion, become in their turn aids to the individual in approaching communion with the divine.

Nevertheless, there has never been a literally world religion, never one accepted even by a majority of men. And, however much religions may resemble each other in the general nature of the attitudes which they assert toward reality, their specific beliefs have differed. Is there, for example, one God, or many gods? The development of what we call civilization seems often to tend toward monism, in other fields as well as religion; but historically polytheistic religions have been as prominent, and from some points of view might seem better able to explain the diversity of experience. Traditional Christianity has to some extent been a compromise with polytheism. God has been actively opposed by another at least near-God, Satan; and the doctrines of the Trinity and the Communion of Saints are hardly straightforward monotheism.

And many of the other than numerical alleged attributes of divinity are impossible to understand rationally. This, as we have seen, is true also of the fundamental terms in any realm of discourse, but we notice the difficulty more in the case of God, who is presumably a person, than in the case of electrons or transcendental numbers. Omniscience, infiniteness, omnipotence, these are attributes not simply of such a nature that we cannot grasp them imaginatively; they seem, through the lack of any limitation that they imply, to contradict the very notion we have of a self or a person, which gets meaning pre-

cisely through limitation. It is not an accident that those who accept the religious attitude must at times pray: "I thank thee, O Father! Lord of heaven and earth, that thou hast hid these things from the wise and prudent, and hast revealed them unto babes" (*Luke X*, 21).

Again, as to the moral attributes of divinity. The religious problem suggested by the undeniable presence of evil in the world has usually been thought to involve a reconciliation of evil with the being of a good God. But there is a prior question, namely whether the divine is, according to any standards we may form, good. There can be no *a priori* certainty that if there is a God he is necessarily good. If he were not, it is sometimes said, we should not worship him. But this does not seem to follow. Historically, subjects have often approximated worship of sovereigns — Nero, Ivan the Terrible, Napoleon — who were anything but good from the subjects' standards. The moral irregularities of the Greek gods are not to be explained away as expressions of the Greeks' own sensual natures: in pre-Periclean Greece, the worshippers viewed their gods as at a quite different moral level from themselves. And granted divine goodness, existing evil must as a rule be explained — whether by assigning it to man's wanton free will or the intractability of matter — only in something of the same way that an experimental deviation from the conservation of mass is explained: because it *must* be explained, because the postulate requires it.

There is little that we can prove. And perhaps the chief result of an inquiry into the nature of religion, as of any other philosophical inquiry, is to show us how very little we know, and are likely to know. Intellectual humility is not so much the beginning as the end of knowledge.

CHAPTER XII

THE ESTHETIC EXPERIENCE

Running through the life of individual human beings, and the known history of the human race, is what is sometimes called 'the esthetic experience.' This type of experience is associated with things of 'natural beauty' — mountains, sunsets, lakes, starry nights; but particularly with 'works of art' — music, statues, paintings, poems. In the former, only one person is involved, unless we accept the view that God is personally responsible for the beauty of nature. In the latter another person or other persons (the artist or artists) has intervened. It is, however, unwise to limit the esthetic experience too definitely to things that have been, by custom or authority, labelled 'beautiful.' It is a mistake to suppose that the esthetic experience is sharply separated from 'life'; it may result through a re-grouping of almost any elements of experience, however familiar, on ordinary occasions, these may be. Most people have from time to time what may be termed rudimentary esthetic experiences; and in its more developed forms the esthetic experience has been regarded as among the highest of those ends which we may both seek and achieve. As in the case of religion, however, philosophy cannot give any content to the esthetic, though it may establish its *a priori* validity, and suggest something of its relation to the rest of experience.

We may begin by considering, roughly, the recognizable characteristics of experience as it approaches the esthetic. In this we do not have to rely solely on our own direct

knowledge; poets, artists, and critics have left careful and sensitive records. First, we may say that the value of an esthetic experience is *intrinsic;* this is by definition, however we may later, in whatever terms, come to interpret it.

No voice from some sublimer world hath ever
To sage or poet these responses given —
Therefore the names of Demon, Ghost, and Heaven,
Remain the records of their vain endeavour,
Frail spells — whose uttered charm might not avail to sever,
From all we hear and all we see,
Doubt, chance, and mutability.
Thy light alone — like mist o'er mountains driven,
Or music by the night-wind sent
Through strings of some still instrument,
Or moonlight on a midnight stream,
Gives grace and truth to life's unquiet dream.[1]

That is, the esthetic experience needs no exterior justification; we do not require that it should lead to other desirable results outside itself, as we should in the case of brushing our teeth or working as a clerk in an office; it is a self-contained end. Of course this does not mean that in fact the esthetic experience does not lead to other desirable results, which is a question for another and a different kind of investigation. Hearing a symphony may make us a better conversationalist, may have a good physiological effect, may increase our general sensitivity and emotional balance; but the esthetic significance is to be found *within* the hearing of the symphony, in spite of the perhaps great importance of the subsidiary effects. In this the esthetic experience resembles the mystical experience. But the reference of the mystical experience is always beyond sense, a denial of the senses, a nothingness from the point of view of the senses; whereas the

[1] Shelley, *Hymn to Intellectual Beauty.*

esthetic experience is always bound up with the senses, always through the senses.

Further, there is usually noted the detachment and objectivity of the esthetic experience, and this is no doubt connected with what Aristotle called a catharsis, or purging of the emotions. Even in the most elementary esthetic experience this detachment may be discovered; when the mind rests, even casually, on a 'beautiful object,' we feel a momentary quieting of restlessness and desire, a loss of the acute consciousness of self which accompanies so many of our activities.

> *Here* the bleak mount,
> The bare bleak mountain speckled thin with sheep;
> Grey clouds, that shadowing spot the sunny fields;
> And river, now with bushy rocks o'er-brow'd,
> Now winding bright and full, with naked banks;
> And seats, and lawns, the Abbey and the wood,
> And cots, and hamlets, and faint city-spire;
> The Channel *there*, the Islands and white sails,
> Dim coasts, and cloud-like hills, and shoreless Ocean —
> It seem'd like Omnipresence! God, methought,
> Had built him there a Temple: the whole World
> Seem'd *imag'd* in its vast circumference:
> No *wish* profan'd my overwhelméd heart.
> Blest hour! It was a luxury, — to be![1]

> Sitting on a bank,
> Weeping again the kind my father's wrack,
> This music crept by me upon the waters,
> Allaying both their fury, and my passion,
> With its sweet air: . . .[2]

Moreover, what we know through esthetic experiences (if we can properly be said to know anything through

[1] Coleridge, *Reflections on Having Left a Place of Retirement.* Italics the poet's.

[2] *The Tempest*, I, ii, 387–91.

them) does not have to fit into the elaborate external structure of most types of knowledge. Our knowledge of a physical 'fact,' for instance, must fit into the whole theoretic structure of physical knowledge, must not be logically contradictory within that structure. Esthetic experience is of course related to the rest of experience, and naturally derives its meaning in large part from these relations. Nevertheless, its esthetic validity is not dependent on the logical rigidity of its relations. This fact is responsible for a good deal of confusion: We find for example, that words in a poem, interpreted as a factual proposition, contradict accepted factual knowledge. This leads to conflicting theories: some deprecating the poem on this account, others maintaining that the poem reveals a truer truth and a more real reality, still others arguing that in reading a poem we must 'suspend' our customary beliefs, treat them as irrelevant. None of these theories, as we shall see indirectly, is necessary; though the last is no doubt the most satisfactory of the three.

1. Reductions of the Esthetic Experience

Because of the non-logical (not, it should be remarked, illogical) character of the esthetic experience, it lends itself readily to reductions of the sort we have studied in so many other connections. These reductions are aided by the difficulty of saying very much about esthetic experiences on their own plane, a difficulty which follows precisely from the fact that the value of esthetic experiences lies in their saying (whether with words, colors, sounds, shapes) what cannot otherwise be said — that is, what cannot be put into the formula language of some logically arranged realm of discourse. Thus we get more and less pretentious 'sciences' of 'esthetics.' With the help of these reductions criteria for judging art and

beauty are derived. Now each reduction, if made at all intelligently, is partly true: from one aspect of esthetic experiences or one class of esthetic experiences, the 'implications' are 'drawn out,' and a rigid system is constructed. This system will be, to a limited extent, applicable to those aspects from which it is built; but that it should be universally applicable is from the very nature of the esthetic experience impossible. In outlining some of the major reductions, therefore, there will in each case be mentioned works of art and in some cases poetry will be quoted, to illustrate the types of esthetic experience from which each may be thought to have been derived, and to which each is, within limits, relevant.

(1) **History, sociology, anthropology.** This reduction, together with (2) is ordinarily made in the teaching of literature and the arts. Art, the students are told, is 'the expression of an age'; it cannot be understood apart from the 'social background,' from the 'civilization' or 'culture' of which it is a part. Historical texts on politics, wars, governments, economics, are read along with the study of the works of art. Then, as the reduction (which is so far unassailable) deepens, art becomes a mere appendage of history and cultural reconstruction. Homer is read because he "sums up the late Minoan civilization"; the decadent Greek temples and statues of the fourth and third centuries mark the breakup of the firm city-states; Dante synthesizes the life of the Middle Ages; Chaucer —

> Ther was also a Nonne, a Prioresse,
> That of hir smyling was ful simple and coy;
> Hir gretteste ooth was but by seynt Loy;
> And she was cleped madame Eglentyne.
> Ful wel she song the service divyne,
> Entuned in hir nose ful semely;
> And Frensh she spak ful faire and fetisly,
> After the scole of Stratford atte Bowe,

For Frensh of Paris was to hir unknowe.
At mete wel y-taught was she with-alle;
She leet no morsel from hir lippes falle,
Ne wette hir fingres in hir sauce depe —[1]

was the first 'realistic' English poet, depicting faithfully the customs and people of his time; the luxuries of the Italian Renaissance cities are portrayed by the Renaissance painters; *The Waste Land* shows the collapse of Europe after the World War. This reduction is particularly appropriate to works of art on a grand scale, such as epics, or perhaps in another way great buildings. When it is made, the ability of the artist to synthesize the cultural movements of his time becomes the test of the excellence of his achievement.

(2) **Autobiography.** This reduction is also usual in the academic handling of works of art. Art 'reveals the personality' of the artist. Dante's love for Beatrice is the subject of *The Divine Comedy;* the turmoils of Michelangelo's soul are painted on the ceiling and walls of the Sistine Chapel; Shelley's trembling, ethereal confusions of spirit are his poems —

Her presence had made weak and tame
All passions, and I lived alone
In the time which is our own;
The past and future were forgot,
As they had been, and would be, not.
But soon, the guardian angel gone,
The daemon reassumed his throne
In my faint heart. I dare not speak
My thoughts, but thus disturbed and weak
I sat and saw the vessels glide
Over the ocean bright and wide,
Like spirit-wingéd chariots sent
O'er some serenest element. . . .[2]

[1] *Prologue*, ll. 119–129. [2] From *Lines Written in the Bay of Lerici.*

Wagner's love for Wesendonk is the music of *Tristan und Isolde*. This approach grows, probably, from a too exclusive preoccupation with 'romantic' art; and its inappropriateness to many works of art becomes evident from some of the studies of the soul and personality of, say, Shakespeare, made on the basis of his plays. It provides another criterion for art and beauty: the excellences of works of art are due to the excellence of the person who created them and who 'expresses' himself through them. Even natural beauty can be brought in, for it becomes an expression of the Divine Nature:

> So my friend
> Struck with deep joy may stand, as I have stood,
> Silent with swimming sense; yea, gazing round
> On the wide landscape, gaze till all doth seem
> Less gross than bodily; and of such hues
> As veil the Almighty Spirit, when yet he makes
> Spirits perceive his presence.[1]

(3) **Morality.** This reduction — by which is meant the interpretation of art in the terms of a conventional code of morality — is not much in favor at the present time, perhaps largely because conventional codes of morality have collapsed, but it has appeared and re-appeared throughout the history of esthetic criticism. According to it the artist becomes teacher, showing man through a medium more pleasing than the harsh strictures of prophets and priests what he ought to do. Sometimes, as with Plato, he is the servant of the state, whose business it is to elaborate attractive myths promoting social order. Often (as also in some dialogues of Plato) he is divinely inspired, and can teach justly on his own account.

For conclusion, I say the Philosopher teacheth, but he teacheth obscurely, so as the learned onely can vnderstande

[1] Coleridge, from *This Lime Tree Bower My Prison.*

him, that is to say, he teacheth them that are already taught; but the Poet is the foode for the tenderest stomacks, the Poet is indeed the right Popular Philosopher, whereof *Esops* tales giue good proofe: whose pretty Allegories, stealing vnder the formall tales of Beastes, make many, more beastly then Beasts, begin to heare the sound of vertue from these dumbe speakers. . . . For indeede Poetrie euer setteth vertue so out in her best cullours, making Fortune her wel-wayting hand-mayd, that one must needs be enamored of her.[1]

> Well, I will scourge those apes,
> And to these courteous eyes oppose a mirror,
> As large as is the stage whereon we act,
> Where they shall see the time's deformity
> Anatomized in every nerve, and sinew,
> With constant courage, and contempt of fear.[2]

. . . it exceeds all imagination to conceive what would have been the moral condition of the world if neither Dante, Petrarch, Boccaccio, Chaucer, Shakespeare, Calderón, Lord Bacon, nor Milton, had ever existed; if Raphael and Michael Angelo had never been born; . . . if no monuments of ancient sculpture had been handed down to us. . . . Poetry is indeed something divine. It is at once the centre and circumference of all knowledge. . . . A poet, as he is the author to others of the highest wisdom, pleasure, virtue, and glory, so he ought personally to be the happiest, the best, the wisest, and the most illustrious of men. . . . the greatest poets have been men of the most spotless virtue. . . .[3]

(4) **Metaphysics.** By this reduction is meant roughly the interpretation of art as the revealer of 'the universal,' 'the typical,' 'truth,' 'the ideal,' 'Nature,' etc. It is particularly appropiate to art which is called 'classical,' and was in fact introduced by Aristotle (with psychological doctrines), writing on Greek tragedy.

[1] Sidney, from *An Apologie for Poetrie.*
[2] Jonson, Induction to *Every Man out of His Humour.*
[3] Shelley, from *A Defence of Poetry.*

The essential distinction lies in this, that the Historian relates what has happened, and the Poet represents what might happen — what is typical. Poetry, therefore, is something more philosophic and of a higher seriousness than History; for Poetry tends rather to express what is universal, whereas History relates particular events as such.[1]

Wherever I went, I found that poetry was considered as the highest learning. . . . The business of a poet is to examine, not the individual, but the species; to remark general properties and large appearances. . . . He must divest himself of the prejudices of his age and country; he must consider right and wrong in their abstracted and invariable state; he must disregard present laws and opinions, and rise to general and transcendental truths, which will always be the same. . . . He must write as the interpreter of nature. . . .[2]

In the esthetical mode of contemplation we have . . . the knowledge of the object, not as individual thing but as Platonic Idea . . ., as pure contemplation, as sinking oneself in perception, losing oneself in the object, forgetting all individuality. . . .[3]

Verbally similar doctrines of the 'imitation of Nature' ("First follow Nature, and your judgment frame/By her just standard, which is still the same" — Pope, *An Essay on Criticism*) have continued since Aristotle, conveniently shifting their meaning as the meaning of 'Nature' shifted. And Keats' "Beauty is Truth, Truth Beauty . . ." has remained unusually amenable to critical juggling.

Two criteria for judging works of art are derived from different emphases in this reduction. The first, and more gross, is 'width of appeal,' a test elaborated by Tolstoi in his famous book on esthetics, *What is Art?* It is argued: since art expresses the general, the typical, the universal, what is fundamental and common to all men, the greatest

[1] Aristotle, *Poetics.*
[2] Johnson, *Rasselas.*
[3] Schopenhauer, *The World as Will and Idea.*

art will be valued by all men. The illicit assumptions lying back of such a quantitative standard are similar to those met with in the utilitarian conception of morality, and are too evident to need analysis. But a second standard, also quantitative, is more subtle, and has been and is accepted by many people who think about the esthetic experience. This is the 'test of time,' the appeal to the 'judgment of posterity.' The Platonic Idea, the universal, the fundamental in human nature, are not subject to the constant change of the world of becoming, are independent of time; and consequently art, whose business is with them, is likewise independent of time. Its value endures forever; and, obscured by contemporary preoccupation with temporal changes, only gradually emerges with the centuries. This view is given plausibility by the fact that what most people hold to be the greatest works of art were created a long while ago, and it seems to follow that we are making a significant statement when we say that they are great *because* they have lasted, or even that what makes them last *is* their artistic greatness.

It is undoubtedly a fact of the greatest importance for the understanding of esthetic experiences that great works of art *of a certain kind* do last. But that this *fact* should be adopted as the exclusive or even as a very significant criterion of the *value* of works of art a few moments of reflection should make us doubt. We might consider, for instance, the many works of art that have *not* lasted in spite of great contemporary value, simply because they utilized as material meanings no longer accessible to us; or the many time-tested works of art now of great value, which during intervening years were completely neglected (Homer, archaic Greek sculpture, Byzantine art). We might remember certain causes contributing to the preservation of and continued interest in many works of art: grammatical illustration (Sophocles, Horace), philological

research (Beowulf, most medieval literature), moral acceptability (Dante, Spenser, Milton), historical research and pedagogical adaptability (*passim*). Or again, we might notice the natural hesitancy of critics to make decisive judgments and their eagerness to palm them off on time. Still more strikingly, we might reflect on how verbalized and shallow a convention is most of our interest in past art; and how much (even for the intelligent, sensitive, and learned critic) we must inevitably miss of the value that works of art had to their contemporaries (outstandingly, perhaps, with religious art, primitive, Greek, or medieval). And, finally, we frame our standards of what is great art chiefly by studying those works of the past that have endured; to declare that the great works of the past have endured is therefore based on circular reasoning, and is in large part tautologous.

(5) **Technique.** The reduction of the esthetic experience to 'formal' characteristics, to the 'exploitation of a medium' has seldom extended beyond certain groups of practising artists and specialized critics. Its elementary forms are, however, to be found in ordinary methods of scanning verse, in the textbook classifications of different metres, in the triangles and pyramids into which pictures are divided, the planes and surfaces of statues, the mathematics of musical relations. Carried further, technical agility becomes the criterion of esthetic value. 'Perfect' metres, stanza forms, designs, proportions, sizes, are discovered. Lack of order, false rhymes, formlessness, discords, etc. all come to mean failure to conform to some abstractly preconceived mechanical standard, and are the most serious blemishes. The extreme of this reduction is probably near what is meant by *art pur* or 'Art for Art's sake' slogans.

(6) **Psychology.** The interpretation of the esthetic experience through various systems of psychology is one

of the most popular at the present time, and one of the most valuable — though often it seems to throw light rather on psychology than on esthetics. It possesses the advantages of inclusiveness, and is able to assimilate with some degree of plausibility all the other reductions. For the truth is that anything whatsoever may be handled from a psychological point of view: i.e., as 'ideas in the mind' or 'mental events'; or, for a behavioristic-physiological psychology, as 'conditions of the organism,' of the nervous and glandular systems. But this inclusiveness is, in the end, destructive; for it leaves us with 'nothing but' mental or neural events, and the possibilities of intelligible discourse are restricted to psychology itself.

Psychological reductions do not usually, however, go the whole way. They remain within the Cartesian dualism, postulating a 'real' world of matter or basic physical units opposed to another world of conscious events. The esthetic experience becomes, then, the stimulation of certain conscious events and a certain condition of the organism by means, ultimately, of the causal operation of events among the physical units. The esthetic experience "does not teach us anything about reality"; it simply brings about a certain state of nerves, glands, and feelings. The value of the esthetic experience results because this state is beneficial to the organism. Indeed, the esthetic experience, by this last criterion, is justified from the point of view of evolution: it is helpful for survival, and natural selection has therefore allowed it to remain.

(i) *Pleasure.* Usual forms of the psychological reduction are those which identify the beautiful with what is 'pleasing to the senses' (in the medieval formulation this was often restricted to 'pleasing to the eye'). The esthetic experience is the experience of pleasure. The general objections, mentioned in Chapter X, to the utilitarian

identification of the good and pleasure apply here equally well: either this doctrine is demonstrably false, or the meaning of 'pleasure' has been so extended that it is quite useless in a critical discussion. How can we compare the pleasure of witnessing a Shakespearean tragedy with that of witnessing a contemporary comedy of manners; or looking at a Greek statue with looking at a statue by Brancusi; or looking at a painting by Giotto with looking at a painting by Hogarth; or listening to a Mozart minuet with listening to Stravinsky's *Sacre du Printemps?* and particularly how can we compare the pleasures derived from the various arts? Moreover, though it is certainly true that what we should call pleasures of different kinds are ingredients of esthetic experiences, they are seldom the conscious end which we pursue; and though they may *accompany* the experience, they are seldom thought of until afterwards.

Nevertheless, when intelligently stated, pleasure doctrines do provide a rough working distinction that is useful in connection with certain critical problems.

> Poetry is not the proper antithesis to prose, but to science. Poetry is opposed to science, and prose to metre. The proper and immediate object of science is the acquirement, or communication, of truth; the proper and immediate object of poetry is the communication of immediate pleasure.[1]

(ii) *Emotion.* A cruder form of psychological reduction is found in the separation of 'intellect' and 'emotion,' and the belief that it is the business of art to stimulate the emotions. This doctrine is associated with 'divine madness' theories, and grows out of a preoccupation with 'romantic' works of art, especially those of the early nineteenth century. It results in a strained 'division of faculties,' and the exclusion of esthetic experiences (Greek

[1] Coleridge, *Lectures on Shakespeare.*

temples, Jonson, Pope, Bach, Uccello, etc.) that might seem, on other grounds, to be of great value.

(iii) *The esthetic emotion.* Finding difficulties in the usual pleasure and emotion reductions, some recent critics (Roger Fry and Clive Bell are the most conspicuous) have postulated in a somewhat transcendental manner a 'specific esthetic emotion,' met with in the esthetic experience, and nowhere else. "The starting-point for all systems of esthetics must be the personal experience of a peculiar emotion. The objects that provoke this emotion we call works of art. All sensitive people agree that there is a peculiar emotion provoked by works of art. . . . This emotion is called the esthetic emotion." [1] Now there is doubtless much in the esthetic experience which suggests the presence of something unique. And if we understand by 'esthetic emotion' a methodological symbol focussing our attention on esthetic problems, there is no objection. But if we isolate and hypostatize this emotion to a state divorced from all the rest of experience, there is no longer very much to talk about.

Who walked between the violet and the violet
Who walked between
The various ranks of varied green
Going in white and blue, in Mary's colour,
Talking of trivial things
In ignorance and in knowledge of eternal dolour
Who moved among the others as they walked,
Who then made strong the fountains and made fresh the springs

Made cool the dry rock and made firm the sand
In blue of larkspur, blue of Mary's colour, . . .[2]

Analysis of these lines is extremely difficult, and the experience of reading them does seem to involve an emotion

[1] Clive Bell, *Art*, pp. 6–7. Mr. Bell goes on to connect his specific emotion with a specific quality which he calls 'significant form.'

[2] T. S. Eliot, from *Ash Wednesday*.

so unique and specific as to be scarcely related to emotions we more ordinarily encounter.

(iv) *Psychoanalysis.* The various forms of psychoanalysis have suggested new 'explanations' for the esthetic experience. Art is an 'escape from reality,' from the points of view both of the artist and the spectator or reader. Life is too much for us; impulses and desires, held fast by the Censor within the veil of the unconscious, and disturbing indirectly the course of our activities, are released through art, and we thus find emotional compensation. Art is thus a form of insanity. Freud has written an illustrative interpretation of Leonardo da Vinci along these lines. Jung adds to this theory a 'collective unconscious,' an unconscious of the race, which also is released in art, and accounts for the strange recurring myths and symbols. These theories undoubtedly cover many easily discernible phenomena. Artists often have what anthropologists call 'primitive minds'; moreover they often do not get on well with other people or in managing practical affairs. Again, the novels selling best among people of small means usually deal with the rich and aristocratic; and the gratuitous satisfaction which otherwise 'moral' people get out of sexual irregularities in books or pictures is sufficiently obvious. Invalids, old maids, business 'failures,' 'repressed' people of all sorts usually give more time to both natural beauty and art than normal people do.

(v) *Synesthesis.* In an effort to group together the various psychological approaches begun by Aristotle's theory of a catharsis or purging of pity and terror through tragedy, there has recently been put forward the notion of 'synesthesis.' In theory the explanation of synesthesis should be given in physiological terms. If we think of nervous impulses divided into appetencies and aversions, we may (reducing value to physiology) say that "anything

is valuable which will satisfy an appetency without involving the frustration of some equal or *more important* [the question-begging adjective is not without interest] appetency." [1] Synesthesis is then that physiological condition of the organism in which the maximum number of appetencies are satisfied, and the minimum thwarted, thus producing a general state of equilibrium and balance. This condition the esthetic experience has the power of bringing about.

As we realise beauty [i.e. as we approach synesthesis] we become more fully ourselves the more our impulses are engaged. If, as is sometimes alleged, we are the whole complex of our impulses, this fact would explain itself. Our interest is not canalised in one direction rather than in another. It becomes ready instead to take any direction we choose. This is the explanation of that detachment so often mentioned in artistic experience.[2]

The notion, according to the authors of the book just quoted from, is related to Chinese doctrines developed in the *Chung Yung*, from which they quote.

My master the celebrated Chang says: "Having no leanings is called Chung, admitting of no change is called Yung. By Chung is denoted Equilibrium; Yung is the fixed principle regulating everything under heaven. . . .

When anger, sorrow, joy, pleasure are in being but are not manifested, the mind may be said to be in a state of Equilibrium; when the feelings are stirred and co-operate in due degree the mind may be said to be in a state of Harmony. Equilibrium is the great principle.

If both Equilibrium and Harmony exist everything will occupy its proper place and all things will be nourished and flourish.[3]

[1] I. A. Richards, *Principles of Literary Criticism*, p. 48.

[2] *The Foundations of Aesthetics*, by C. K. Ogden, I. A. Richards, and James Wood, p. 78.

[3] *Ibid.*, pp. 13–14.

Thus any strictly esthetic questions may be abandoned altogether, and taken over by psychology.

2. The Autonomy of the Esthetic Experience

All of these varied approaches should suggest that the problem of esthetic experience is not one problem with one solution, nor to be answered after the manner of a mathematical or dictionary definition, nor to be arranged in any rigid logical system. There are many problems and many possible solutions. None of these reductions is entirely *false;* indeed, the method which produces them, the emphasis upon one aspect or class of esthetic experiences, suggests that they are all fairly true with reference to the aspect or class they start from; and by ingenious enough dialectical twistings they can be made to handle any esthetic experiences. But each of them is more or less *relevant* to any given esthetic experience. Only a foolish critic would deny that the poetry of Homer and Chaucer or many of the paintings of, say Ghirlandaio or Bartolommeo, should be approached historically (through (1)); and further that for us at least much of the value of this poetry and these paintings is bound up with historical considerations — though this last changes: for a fourteenth century reader of Chaucer historical considerations were probably not important, since he could take them for granted. But with seventeenth century Cavalier lyrics, or the paintings of Masaccio or Picasso, historical considerations are relatively less important — less important *esthetically*, that is: the poems and paintings may from another point of view be important for history. Again, many poems of the English, French, and German romantics of the early nineteenth century cannot even be understood apart from a personal, autobiographical approach (2); but a personal approach to eighteenth century music or

Greek architecture or Elizabethan sonnets is a needless sentimentality, from the esthetic point of view, in spite of its possibilities from other points of view (e.g. psychological). Likewise an attitude toward conventional morality (3) is an essential element in appreciating fully the works of Jonson, Swift, Voltaire, Hogarth, Daumier; but it is a hindrance in the case of a Cézanne landscape or most Latin love poems. Again formal technique (5) is most relevant in reading *The Faerie Queene* or complex French verse forms or Horace, or looking at a Moorish arabesque or a Cubist painting; but it is less relevant for a novel or many portraits. Further, 'universal types' and 'fundamental emotions' (4) are legitimately brought into a discussion of Greek statues or Sophocles or *Everyman* or Racine or Johnson; but they are out of place in much of Donne, in Manet, in Blake.

Another confusion, supporting ideologies based on these reductions, is that between the causes or necessary conditions of works of art and esthetic value. For the production of most works of art a historic and social milieu is necessary; but the value of the work of art is not therefore based on historic and social considerations. An artist or artists is also necessary; but a bad or even uninteresting person might create a good work of art. Medieval cathedrals were built for a definite purpose — to glorify God — and their serving of this purpose was doubtless the chief reason why most people regarded them highly. If we no longer believe that they serve this purpose this does not prevent us from finding in them now esthetic value on other grounds, though it does remove certain possible elements from the esthetic experience.

There are no exact rules for relevance. We can support our opinions with dialectic; we can be as critical as lies in our power; but there are no formulas. Our knowledge

of the esthetic experience cannot come from abstract logical systems; it comes from esthetic experiences themselves; later, reflective examination may, within limits, introduce some order, but this order will not be at all of the same sort as, for instance, that of our knowledge of the physical world. And the 'reality' of esthetic experiences, the fact that they cannot be 'reduced' but only 'transformed' to other kinds of meanings, is simply the postulate that makes discussion possible.

(1) The un-sterilization of reality. In Chapter III two uses of language were distinguished, two ways in which meanings are objectified, that is made shareable. The logical use of language seeks "a set of symbols of such a nature that, granted the realm of discourse in question, each symbol will adequately communicate an invariant and conventional meaning no matter what the external context" — the context including any individual person who may happen to be using the symbols. This is the aim, in part successfully achieved, of the sciences. The poetic use of language, on the other hand, "takes words ordinarily having conventional objective meanings, and by forcing them into a new and independent structure objectifies fresh meanings." Far from being independent of context, these new meanings are inextricably bound up with the particular context (the poem) in question. In discussing the esthetic experience in general we may extend the idea of language to include sounds, colors, etc., as well as words. "The function of the artist is precisely the formulation of what has not found its way into language, i.e. any language verbal, plastic or musical." [1]

The logical use of language is dictated by the practical advantages it serves, and also by the theoretic attractiveness of the type of structure it is able to attain. The common-sense logical use is rough and somewhat sloppy;

[1] Ezra Pound in *The Criterion*, April, 1930.

in science it is elaborated and purified. But, on any account, we have already seen how much common sense and science leave out. Conventional formulas, no matter how brilliantly exact and inclusive, can contain only what will fit into conventional formulas. The rest is thrust back into a 'subjective' or 'unreal' world of 'mind,' subjective and unreal because it does not conform to the categorial requirements of physical reality. But it is just this subjective and unreal world that esthetic structure gives its own kind of objectivity and reality. If consciousness were no more than a mirror passively reflecting what went on in some strange external world, this would be hard to understand; but, as we have seen, the mind always interprets, selects from, transcends the given. What is 'known,' what we are aware of, on any particular occasion is only a small part of what might be known. The relations among elements of experience utilized by logic and science are only a minor fraction of the possible relations — 'emotive,' rhythmic, qualitative, 'plastic,' or relations due to accidents of individual history. Through a complex variety of devices art is able to objectify some among these other relations. Thence results the 'freshness' of the esthetic experience. Reading a fine poem, listening to a symphony, witnessing a tragedy, spending an hour in the Uffizi or the Louvre, we are refreshed and invigorated. Thence also the belief that the esthetic experience is the 'revelation' of some inner truth. It *is* genuinely a revelation, though not of a reality and truth necessarily superior to that revealed by science; it is a reality and truth, if we wish to use the words, of a different order, a re-grouping of meanings sometimes contradictory to science if we should judge by scientific standards — but these standards are seldom relevant. Thence, again, the frequent feeling that a portrait shows more of its subject's 'character' or 'soul' than looking at the person

(during which we fit the person into standardized contexts), and much more than the most careful photograph; or that a poet has expressed what we feel better than we ourselves could.

. . . It [the being within me] languishes in the observation by the senses of the present sterilised by the intelligence awaiting a future constructed by the will out of fragments of the past and the present from which it removes still more reality, keeping that only which serves the narrow aim of utilitarian purposes. . . . A literature which is content with 'describing things,' with offering a wretched summary of their lines and surfaces, is, in spite of its pretention to realism, the furthest from reality, the one which impoverishes us and saddens us the most, however much it may talk of glory and grandeur, for it abruptly severs communication between our present self, the past of which objects retain the essence and the future in which they encourage us to search for it again. But there is more. If reality were that sort of waste experience approximately identical in everyone, because when we say: "bad weather," "war," "cab stand," "lighted restaurant," "flower garden," everybody knows what we mean — if reality were that, no doubt a sort of cinematographic film of these things would suffice and 'style,' 'literature' isolating itself from that simple datum would be an artificial *hors d'œuvre*. But is it so in reality?[1]

In literature this un-sterilization of reality is often accomplished by *metaphor*, using the term in a most general sense. All words are originally metaphors, at least in the sense that they fuse meanings whose association is not logically necessary, but in science and ordinary conversation the metaphors are standardized. How this happens is shown in any historical dictionary, in the so-called

[1] Proust, *Time Regained*, pp. 218, 239–240, the English translation by Stephen Hudson of Marcel Proust's *Le Temps Retrouvé*. "An Afternoon Party at the House of the Princesse de Guermantes," the last chapter of this, the epilogue to Proust's novel, *A la Recherche du Temps Perdu*, is a profound study of art and artistic creation.

'semantic shifts' that the meanings of words undergo. But the once vivid metaphors in words like 'charming,' 'amazing,' 'dream,' 'applause,' 'animate,' 'telephone,' etc., are not only stale but quite forgotten. They evoke what psychologists sometimes call 'stock responses,' adjustments for which the response-pattern is already fixed in us by automatically acquired habit. It is by stock responses (which may be of all kinds, resulting in emotions, thoughts, actions, attitudes) that we ordinarily meet the exigencies of living. Bad art trades on them, stimulating them by banal and sentimental symbols (thus, in the cinema, the old grandmother, the long kiss, the expensive automobile, the waving flag) and soothing us with their familiarity. Good art does just the reverse, overturning, if we coöperate, the stock responses, and forcing us to new attitudes so unfamiliar as to be at first perhaps repellent. In poetry, the metaphorical use of words, forcing with the help of the whole esthetic structure new and unexpected meanings together, can bring this about.

O sun! thy uprise shall I see no more;
Fortune and Antony part here; even here
Do we shake hands. All come to this? The hearts
That spaniel'd me at heels, to whom I gave
Their wishes, do discandy, melt their sweets
On blossoming Caesar; and this pine is bark'd,
That overtopp'd them all. Betray'd I am.
O this false soul of Egypt! this grave charm,
Whose eyes beck'd forth my wars, and call'd them home,
Whose bosom was my crownet, my chief end,
Like a right gypsy, hath, at fast and loose,
Beguil'd me to the very heart of loss. . . .[1]

Into the metaphorical effect rhythm, metre, alliteration, assonance, rhyme, etc. enter in ways that are by no means well undersood. It is to be hoped that psychology may

[1] *Antony and Cleopatra*, IV, x, 31–43.

some day throw indirect light on their inter-relations, though methods in contemporary psychology do not give much promise.

What corresponds to metaphor in the other arts is less easily verbalized, precisely for the reason that they make use of non-verbal languages. But in them, too, we find this same fusing and objectification of meanings ordinarily either not met with or met with in very different relations. A landscape painting does not look "exactly like what we see"; it looks usually like what we do not see. Nineteenth century impressionist paintings of buildings and landscapes, for instance, look at first strange, with 'solid' colors split up into small splotches of many different colors. The painters themselves claimed that this was what we 'really' saw, which was certainly false; though it is what we may, on occasion, see, particularly if we know impressionist painting. And often the chief meanings of, for example, a sound in music are the other sounds in the same musical composition.

(2) **Contextual symbolization.** In Chapter II a distinction was made between 'ordinary signs,' which merely direct attention to their meanings (like a red light or a time-table), and 'reflexive signs,' which are themselves part of their meanings. This distinction is of fundamental importance in esthetics. For in a complex esthetic experience the signs into which it may be analyzed are more and more nearly mutually reflexive: each is part of what is meant, meaning the others, and in turn meant by them. In a Bach fugue, for instance, each sound or sequence of sounds is part of the meaning of the fugue, means the other sounds and sequences of sound, and is also meant by them. Moreover, a developed esthetic structure tends to limit the references of its interlaced meanings to *self*-reference in what may be called a 'contextual symbolization.' What the work of art means

tends more and more to be the work of art itself. Even the most superficial examination of esthetic structure will disclose this tendency: pictures are framed; poetry is written in definite 'artificial' metrical and stanzaic forms; a sculptor tries to have his statues spatially isolated from other objects. This contextual symbolization is something of what Aristotle meant by 'unity.'

> The Unity of a Plot does not consist, as some suppose, in having one man as the hero; for the number of accidents that befall the individual man is endless, and some of them cannot be reduced to unity. So, too, during the life of any one man, he performs many deeds which cannot be brought together in the form of a unified action. . . . therefore in an epic or a tragedy, the plot . . . must represent an action that is organically unified, the structural order of the incidents being such that transposing or removing any one of them will dislocate and disorganize the whole. Every part must be necessary, and in its place; for a thing whose presence or absence makes no perceptible difference is not an organic part of the whole.[1]

Deeper analysis makes the tendency more and more clear; the most powerful and insistent devices of the artist are directed toward this fixing of the context (there is no reference here to the artist's 'conscious' purpose). In painting, color, line, shadows, 'masses,' poise each other; the eye seems to be forced in certain directions and no others; as we study a painting we gradually become conscious of the most intricate harmonies and balances (whose unifying principles may be far from clear at first glance), not only in general but often carried to minute details. Each element seems finally to be 'inevitable'; any change would destroy the whole, unlike a snapshot photograph the background of which usually seems quite accidental. In poetry, there are underlying rhythms subtly varied, rhymes and 'false rhymes,' con-

[1] *Poetics*, Lane Cooper trans.

sonant and vowel sounds recurring and half-recurring, words repeated in shifted contexts. In music, themes are announced, repeated sometimes as they first occurred, sometimes with complex variations, sometimes with a change of key, or reversed, or by another instrument, tempos change to balance and contrast with each other, etc.

To some extent this contextual symbolization is present also in 'natural beauty,' though here an artist has not intervened:

> A contextual symbolization of any order is ordinarily called 'beautiful.' Beauty has always been identified with an 'ultimately significant' symbolization. In 'natural beauty' we have precisely the same affair, whether it be the beauty of an act, a vase, a sunset, or a person. A sunset, for example, is beautiful when it is discerned not merely as a happening which either 'has no meaning' or is merely a *sign* of something else such as the time of day or the approach of the supper hour. Its beauty consists in its being meant as a phase of something with which it is identified as its absolute and necessary symbol or 'expression.' Thus the sunset is reduced to something unique, consisting in phases of itself which are its contextual symbols. . . .[1]

From this there follows a conclusion that is often overlooked: as contextual symbolization is approached, factors external to the esthetic situation become less and less relevant as 'explanations' of its meaning. When someone says, "Gosh, I feel upset," if we paid any attention to the remark, our inquiries would probably be along biographical, psychological, or physiological lines. But this is less the case when Donne writes:

> Batter my heart, three person'd God; for, you
> As yet but knocke, breathe, shine, and seeke to mend;

[1] Louis Grudin, *A Primer of Aesthetics*, p. 118.

That I may rise, and stand, o'erthrow mee, 'and bend
Your force, to breake, blowe, burn and make me new.
I, like an usurpt towne, to'another due,
Labour to'admit you, but Oh, to no end,
Reason your viceroy in mee, mee should defend,
But is captiv'd, and proves weake or untrue.
Yet dearely'I love you, 'and would be loved faine,
But am betroth'd unto your enemie:
Divorce mee, 'untie, or breake that knot againe,
Take mee to you, imprison mee, for I
Except you'enthrall mee, never shall be free,
Nor ever chast, except you ravish mee.

Here the biographical, psychological, or physiological inquiries may all be *true* enough; they may even be necessary to our understanding of the poem, as a knowledge of Christian theology is certainly necessary; but they are less relevant to the esthetic discussion, which lies within the meanings objectified by the poem itself. The poem itself may, from another point of view, be an important 'case study' in analyzing Donne's personality or writing his biography, but it will then, though these are fascinating analyses on their own ground, have left its esthetic rôle. It is for this reason, no doubt, that artists object to those who want to know the 'meaning' of works of art, a question heard frequently about contemporary painting, music, sculpture, and poetry. Such critics want to interpret the work of art as a sign referring to meanings that can be put easily into conventional terms. The artist is insisting, not that his work has no meaning, but that its meaning must be sought on its own grounds.

(3) **Tradition.** Contextual symbolization is for esthetics a kind of regulative ideal, which is approached but never wholly realized. The artist gets the meanings which he is able to use as material partly from his 'private' experience, but largely from a tradition which, though

modified by the individual, is social in character. A tradition may be defined generally as any set of meanings, whether common-sense, scientific, religious, or artistic, shared by and thus mutually communicable to a group of human beings. But more restrictedly we speak of a tradition when there is a good deal of order and stability among the meanings concerned. A coherent tradition is of immeasurable value to the artist, for by it he can be more sure of what meanings his symbols will convey, and he can achieve a concise richness. He does not have to do all over again the work of his predecessors. And a more strictly artistic tradition can be built up, giving him innumerable technical devices as well as ideas and emotions that he can use for his own purposes. We can see how this operates by studying any traditional 'school,' such as that of Florentine painting or Elizabethan drama. The late Elizabethan dramatists had an established form for their plays and their verse, a whole fund of images, rhythms, 'conventions'; and Shakespeare could be so great largely because his fore-runners had done so much. But it is true that a too coherent artistic tradition, as is easy to understand, contains its own destruction. The meanings within it gradually become stereotyped, formularized, and no longer suitable for art. And the late history of Florentine painting and Elizabethan drama shows just this happening.

Nevertheless, one of the greatest difficulties which an artist has to face at the present time is the lack of any unified tradition whatsoever, and this will account for the banality of most of our art and the relative 'unintelligibility' of our good art. Each genuine artist must work for himself, and his energies are wasted. He either degrades himself to the Hollywood tradition, which is the only one widely accepted, and which provides material for most contemporary novels, plays, music, and archi-

tecture; or he becomes an individualist like Joyce, Antheil, Klee, or the surrealists; or, like Eliot, tries to find support in older traditions no longer generally accessible.

3. The Importance of the Esthetic Experience

It is thought by many people that art is a trivial matter, a dilettante amusement, not to be compared in importance with the more serious 'practical' affairs of life. This opinion is seriously and indeed dangerously mistaken. Art has always been important, quite apart from any intrinsic value; and today, because of the spread of literacy, it has demonstrably more far-reaching consequences in our lives than ever before. It is sometimes said that we have very little art, but the truth is rather that we have a great deal of bad art. And art is the most powerful of all forms of propaganda. Through the radio, the movies and their stepchildren the talkies, cheap magazines, free education and free libraries, bad art is now reaching everywhere; and, forming an insistent part of our environment from infancy, it is shaping our ideals and our desires, teaching us what to believe, how to make love and marry, what is worth while in life, what countries to make war against, what social systems to fight for. Art is, moreover, an irresponsible form of propaganda: for the most part those who are producing it wish simply to make money, and do not bother about its social effects other than those which will increase their own incomes; but even sincere artists often do not understand the ideas they handle, and their possible non-esthetic consequences. Mr. I. A. Richards writes as a psychologist:

> Underestimation of the importance of the arts is nearly always due to ignorance of the workings of the mind. Experiences such as these [esthetic experiences] into which we willingly and whole-heartedly enter, or into which we may be

enticed and inveigled, present peculiar opportunities for betrayal. They are the most formative of experiences. . . . Thus what happens here, what precise stresses, preponderances, conflicts, resolutions and interinanimations, what remote relationships between different systems of impulses arise, what before unapprehended and inexecutable connections are established, is a matter which, we see clearly, may modify all the rest of life. As a chemist's balance to a grocer's scales, so is the mind in the imaginative moment to the mind engaged in ordinary intercourse or practical affairs. The comparison will bear pressing. The results, for good or evil, of the untrammelled response are not lost to us in our usual trafficking.[1]

It does not necessarily follow, as Mr. Richards elsewhere maintains, that improvement in art will bring about improvement in civilization. The social consequences of the type of mind capable of esthetic experiences of a high order may very well be not desirable. But in any case the situation is worth thinking about. Of course from the esthetic point of view itself the social consequences do not enter in; the value lies within the experience itself, or if extended, perhaps chiefly in the increased possibilities of further esthetic experiences.

[1] *Principles of Literary Criticism*, pp. 237–8.

CHAPTER XIII

THE PHILOSOPHIC ATTITUDE

Chapter I presented a tentative outline of philosophic method. As such it was little more than an empty container; but to this the intervening chapters have given some content. We have applied our analysis to a variety of problems in many fields. We have seen how reflective examination, operating upon the vague complexities of familiar experience, selects certain aspects to emphasize. We have seen how various emphases crystallize into the more rigid structures we have called realms of discourse. We have seen, furthermore, how from these realms of discourse are built diverse and conflicting ideologies which, reversing the process, attempt to extend themselves beyond the realms of discourse from which they were formed, and which gave them intelligibility. There remains the question: can philosophy hope to group together the ideologies into a single, all-inclusive view? can philosophy attain to a genuinely synthetic vision? But to ask the question in this way is deceptive, for there are two quite different forms that a negative answer might take. The first, and more usual, would be that such a synthesis is beyond the powers of the human mind. The second, the possibility of which is sometimes neglected, would be that such a synthesis is meaningless.

There is no doubt that this synthetic vision has been, however modestly, the aim of many philosophers. For some it has been a distant and often receding goal, sustaining them in a life of contemplation unalterably opposed to the practical ideals that must inevitably govern

the lives of the generality of mankind. There have been others, however, who have thought that at least in some measure they had achieved the ideal; or perhaps rather whose followers have declared it had been achieved. First among these in the West may have been Plato and Aristotle. But their syntheses are not altogether open to us, partly because of the foreign idiom in which they wrote, partly because — especially in the case of Plato — they believed that much of philosophy could be communicated only through conversation, through the intimate and vitalizing contact of one mind with another.

The greatest synthesis of the West was made during the thirteenth century by St. Thomas Aquinas. After the breakup of the Roman Empire under the impact of the barbarians, Europe fought slowly back to order through the guidance of the Church, the only integrating principle that remained. The Platonic tradition, modified by the Alexandrian neo-Platonists, was firmly established in the Church by the prestige of St. Augustine. The Aristotelian tradition was carried on by the Arabians. Albertus Magnus, the teacher of Aquinas, taking over the form developed by the Arabian philosophers Avicenna and Averrhoes, began its assimilation to Christianity. Added to these was the moral force inherited from the Jews, and the immediate religious experiences of centuries of saints and mystics. Aquinas, mastering all the knowledge of his age, fused these four traditions in a *via media* which was thought and is still thought by many to be eternally valid. Beginning with an infinite God, the source and end of all Being, he displayed reality as an ordered hierarchy ascending in every direction from pure, formless potentiality to the final actuality of God. With his metaphysical first principles, many of them adapted from Aristotle — potentiality and actuality, essence and existence, substance and accident, analogy, unity, truth, good-

ness — he carves out the fundamental distinctions in 'what is'; and into the structure thus provided he fits theology, physics, mathematics, logic, morality, and esthetics.

Nearer our own time Benedict de Spinoza attempted another synthesis in the grand style. He shows a God who is all things, a single substance which is the whole of reality; extended not through time and not by creative activity but with the beauty of a closed, everywhere self-referring logical system. Again, in the early nineteenth century, the German philosopher G. W. F. Hegel, influenced by the growing importance assigned to change and to the history of society, tried to resolve the conflicts in philosophic theory. He viewed reality as an everlasting immanent dialectic process in which contradictories are continually reconciled, to form new oppositions. There have been, as well, many 'anti-intellectual' syntheses, such as that of Bergson, in which the fundamental reality is said to be given through intuition or immediate awareness; but these are in a sense an abandonment of rather than an attempt to answer the problem. Materialism, too, when it is considered not as a working model for science, but as a world-view, has provided its answer, picturing reality as an eternal, changeless (except quantitatively), purposeless, non-conscious aggregate of indefinitely small units.

Can we say that any of these or any other philosophy has answered our question and achieved an all-inclusive synthesis? Against the belief that any has done so, two seemingly unanswerable arguments can be advanced. First: we have studied the way in which inclusive beliefs about reality are arrived at, the dialectic procedure which finally results in considering them legislative for all of experience. But we have seen also that this very dialectic procedure which is employed can be reversed and turned against the final views to which it has led. There seems

to be no way of avoiding this. No view can contain all of itself and have any but a verbal meaning; we must accept certain presuppositions and a certain method to reach the view. However valid the structure of a philosophical doctrine may be, there is nothing whatever to *force* us to accept those presuppositions and that method. No matter how self-evident they may seem to those who accept them, experience is sufficiently complex to lend, when we shift the emphasis, plausibility to a denial or at least a limitation of their validity.

And second: when we examine the history of philosophy we find that, in fact, no one system has ever been accepted for long by a majority of those who think about such things. The historical fact does not of course prove that some one system ought not to have been accepted, but it is nevertheless a fact to consider. The thomistic synthesis has had since its formulation always a good many followers. But even within the Church, not long after the death of Aquinas, it suffered under the attack of the nominalists and retired for a couple of centuries. In the seventeenth century it was revived for a short while by the Jesuits under the leadership of Suarez, but again sank back. More recently the revival in a somewhat modified form (neo-thomism) has attained some proportions in Europe. But comparatively few thinkers outside the Church have been willing to accept it; and even many of the neo-thomists admit that a great deal of straining is necessary to assimilate modern science. Spinoza has continued to have followers; but they have been a small group, isolated from the chief intellectual tradition. Hegelianism has influenced the thinking of professional philosophers for some time; but outside of academic circles it is of interest chiefly because of Hegel's influence on Karl Marx. During the eighteenth and nineteenth centuries materialism, usually somewhat dis-

guised, attracted many European thinkers, particularly scientists, and philosophers who based their work on science; but through an intellectual accident relativity and quantum physics have thrown it over. History seems to have been anxious to vindicate the dialectic process.

These two considerations are thought by many to answer the original question by an unequivocal negative: an inclusive, synthetic view is not possible. This, however, is not necessarily the case. There are other aspects to bring in which, though they may not contradict this answer, may at least leave it in doubt. For convenience we may call a negative answer to the question *skepticism*, and an affirmative answer *dogmatism*. Now the skeptical answer suggested by the foregoing critical examination may not be conclusive for the following reason: such a critical examination may not be the appropriate way of answering it. For the issue between skepticism and dogmatism is only from one point of view an impersonal intellectual analysis; it is also a normative, a moral issue. In accepting one or the other we are accepting an attitude, a way of ordering our lives and orienting ourselves toward experience. In our answer there may be involved our moral destiny.

There is one obvious solution, namely that this and all other philosophic questions are foolishness, should be paid no attention, and if asked forgotten as quickly as possible. This is the answer that most people make, overtly or tacitly, and perhaps the one most should make. But it is not acceptable here. A philosophic discussion must postulate the worthwhileness of its questions. If this is denied, discussion becomes impossible, and there is after all nothing that can be done about it. In this book the postulate has been accepted. We may therefore ask whether philosophy has any answer to this question viewed as a choice between two attitudes.

Philosophy can with some assurance say this much: extreme skepticism and extreme dogmatism are equally unacceptable. Philosophers have a cheap device by which many of them think they can refute an extreme skepticism. They say triumphantly to the skeptic: you at least are not skeptical about your skepticism; *that* you do not doubt. This is similar to their reply to those who say that there is no absolute truth: that, the fact that there is no absolute truth, is itself one absolute truth which you admit. These are supposed to constitute a *reductio ad absurdum* of skepticism. It should not be hard to see, however, that these replies are purely verbal. They are put in a pseudo-logical form, but a flair for logic does not prevent men from talking nonsense. If we examine not the peculiarities of syntax but what skeptics mean by upholding skepticism and doubting absolute truth, we shall see that it is something far different from what dogmatists mean by asserting dogmatism and affirming absolute truth. A thoroughgoing skeptic is genuinely skeptical of the final validity of any positive method; he has no positive method in the sense of those toward which he is skeptical; but if it were demonstrated that he did have, he would likewise be skeptical toward it: that is the meaning of his skepticism. The replies either do not understand this meaning, and tacitly assume their own position, or are simply word jugglings.

Nevertheless, an extreme skepticism, such as solipsism, which has elsewhere been defined, cannot be admitted by philosophy. Skepticism may doubt *anything* which it is considering, but it cannot at once doubt *everything*. This distinction may seem like a simple sophistry, but it is not. Let us take an example: The path to wisdom, many think, is entered by "doubting the evidence of one's senses." But what can such a doubt mean? It cannot be a doubt that there is some sort of awareness. That is a simple

fact. It cannot be doubted because there is nothing about it to doubt; doubt with reference to the simple fact would have no meaning. The genuine doubt must be about what we make of this awareness, how we interpret it, how we relate it to possible other awarenesses, what theories we construct on the basis of it. It is, then, any particular interpretation or theory that the skeptic may doubt. Moreover, philosophy insists that the skeptic understand that in making any inquiry or discussing any questions, he is accepting, if only for the purpose of that inquiry, something. The skeptic, for his part, claims the right to question what he has accepted, when he wishes to.

An extreme dogmatism, likewise, cannot be admitted by philosophy. An extreme dogmatism says not only that its view is true and its vision finally synthetic; but that there is not even the possibility that it is mistaken and that some other view might be true. Philosophy insists, however, that dogmatism should recognize a certain arbitrariness in its presuppositions, certain limitations in its method — not that it should necessarily abandon them, but that it should calm its extravagances.

The logical impossibility of a complete dogmatism or complete skepticism simply shows that there is no genuine philosophical issue between these extremes. Because an unqualified absolutism in either direction is self-contradictory, a logical *surd*, it only confuses the central problem to drag either one into the arena of philosophical discussion. But between dogmatism and skepticism in more modified forms a genuine issue remains. Has philosophy anything to say about the choice between them?

The case for the modified skeptic can be put very strongly. In the first place it can be argued that intellectual honesty demands skepticism. For beings such as we are, however certain we may feel, an objective certi-

tude is impossible. Whatever position we take up another may be devised to undermine it. Whatever belief we may hold, other beliefs are logically possible, and other men have held them, as strongly as we hold ours. Why then cling to vain and impotent illusions? We thereby only delude ourselves, lulling our minds with soporifics.

There are next the claims of intellectual freedom. Dogma is authoritarian, demanding the acceptance of beliefs at secondhand from others. Thus is denied our moral and intellectual heritage, that which is our most valuable possession, which distinguishes us as men. Free inquiry alone has been responsible for any accomplishment of mankind, and is alone able to realize the highest potentialities of individual men. Unless we think what we wish, along whatever mental direction, civilization stagnates and progress is impossible.

Again, the skeptic reaches the same conclusion for both social and individual morality. Dogmatism, he points out, is of necessity accompanied by intolerance; and dogmatic intolerance has thrown mankind continually into bloody and useless wars. Only an honest skepticism which recognizes the mutual validity of opposed viewpoints can give us that tolerance through which alone we can understand our fellow men and thereby live on the same earth with them in peace and harmony. Only by a skeptical readiness to accept the new, to throw off old and outworn doctrines and customs, can we be in a position to apply the practical results of free inquiry to the solution of mankind's troubles, to the alleviation of its suffering and misery. Authority, resting on the past, on tradition, on dogma, will always oppose every innovation, will never be in a position to judge a situation on its own merits, calmly and dispassionately. And the individual, in the same way, oppressed by custom and restraint, will be sterilized and de-humanized. His will without skepti-

cism can never be free; he can never make a truly moral choice, for his deliberations will be bounded by the restrictions of his dogma. The highest forms of friendship and love will be closed to him, for he can never admit that free and open communion which is their essence; his judgment of friends, lovers, as well as of enemies, will be warped always by the presuppositions he is committed not to abandon.

To all these arguments, convincing as they may sound, convincing as they do sound to perhaps most men at the present time, the reflective dogmatist offers balancing replies. The skeptic's position, he argues, is based on a mistaken notion of the nature of man. Far from leading to skepticism, intellectual honesty will only show us clearly the limitations of man's nature, and the necessity that it imposes on him of accepting some kind of dogma. The illusion of a thorough intellectual honesty is the most impotent of illusions, based on the romantic dream of man's perfectibility; or, rather, a genuine intellectual honesty demands that, understanding our limitations, we should not delude ourselves with thinking that we can do without faith, but accept the best faith we can find. Otherwise a probably less desirable faith will lie hidden beneath the showy covering of our skepticism.

Equally illusory, the dogmatist argues, is the skeptic's intellectual freedom. For freedom has meaning only against a background of order. The skeptic is not free to use his energies productively, but, since he lacks any direction, merely to squander them. And likewise for civilization, skepticism makes progress an empty and meaningless word. Progress is possible only when there is some end to be striven for, and only a unified view of reality can posit such an end; skepticism, admitting all directions, gives meaning to none.

As for social and individual morality, the dogmatist

declares the skeptic's position to be destructive and nihilistic. Mankind can live in peace and harmony not by an attitude of uncritical tolerance but by accepting a unifying world-view that will give a firm basis for human sympathy and coöperation. Instead of promoting universal peace skepticism often appears to have the opposite effect. Removing any lasting foundations of morality, it leaves men open to whatever socially destructive whims may for a generation capture the allegiance of a group of powerful individuals. Instead of providing a system that might dictate the practical applications of scientific research, these are turned to the creation of more devastatingly destructive instruments of warfare. In peace, the ideals of tolerance and free inquiry have a disintegrating effect on the whole social order, nourishing a discontent that results finally in revolutions which, starting perhaps with noble ideals, continue long enough to see them further than ever from attainment. And in the individual, skepticism may well tend to paralyze moral and spiritual forces. The skeptic, compelled by the inner logic of his position, may be led to see the emptiness of his ideals, the vanity of any aim he may set for himself. And in the sorrows, misfortunes, and crises which all men must undergo, with no integrating principle to hold together his inner life, he may find himself with no moral support.

These, then, are two replies that might be made to our final problem. The choice between them is naturally much less simple than this brief account might indicate: partly because a person can be, and generally is, skeptical about some things and dogmatic about others; partly, too, because the intellectual traditions of an age determine, in often unsuspected ways, the possibilities of belief and doubt, of dogmatism and skepticism, for individuals brought up in them. Today, for instance, dogmatic

theologians are fewer than they were a century ago, but dogmatic materialists and dogmatic Communists are more numerous: probably the prevalence of dogmatism in some form is more nearly constant than is generally supposed. If so, the reason is apparent. Most people can inquire and control the direction of their inquiries only to a certain extent; so that in the end they must either accept some dogma (however named and however disguised) or allow their thinking to become sterile and confused through lack of an integrating principle. Yet our attitude toward any given dogma should be one of critical vigilance. Whatever the value of dogma as an integrating principle, no specific dogma has stood through all human history, or even through a considerable part of it; and a doctrine that is of great value in one age may be a symbol of reaction and obscurantism in another.

In this situation all that philosophy can do is present alternatives and establish a critical method for examining and comparing the alternatives. The philosophic method is particularly valuable when directed against dogmatisms that are current, for these, as the media through which we look at things, are themselves less easily seen. We do not need a philosophic technique to convince us of the unwarranted dogmatism of the Catholic Church's early opposition to Copernicus or of Cotton Mather's policy of witch burning or of Cromwell's destruction of works of art. But the dogmas held by 'leaders of opinion' of the present day — that religion is obsolescent, that the most important truths are to be got by experimental method, that 'liberalism' will make for the ultimate welfare of society, and countless more — these are likely to be so much a part of our casual everyday thinking that we are scarcely aware of them as dogmas. Yet by dialectical method we can challenge any one of them; and with the next swing of socially accepted beliefs it may

become fashionable to challenge them, or even paradoxical any longer to accept them. In this way philosophy turns out to be not only critical but timeless — standing apart from the accidents of changing fashions in belief that succeed one another from decade to decade and from age to age; taking sides perhaps, but always with a recognition of what acceptances and rejections a choice of dogmas involves, and of what other choices might have been made. In this way too a genuine philosophic attitude resolves partly the issue between dogmatism and skepticism, for its skepticism consists in its never losing a critical understanding of the character, implications, and alternatives of the dogmas with which it allies itself.

INDEX

Adaptation, 293.
Alternation, 108.
Altruism, 374 f.
Ambiguity 84 ff.; metaphysical, 185 f.
Analogy, 146 ff.
Anaximander, 8.
Anaximenes, 9, 305.
Appearance, *see* Reality.
Aristotle, 80, 94, 166, 310 ff., 425, 440.
Asceticism, 373 f.
Assertion, 105.
Association, 53 ff.; structural, 56 f.
Atom, 189 f., 213, 221 ff.
Axioms, 21.

Bacon, Francis, 27 f., 48, 142.
Beauty, *see* Esthetic experience, the.
Begging the question, 89, 193 ff.
Behaviorism, 17, 61, 195 f., 326 ff., 410.
Belief, 403 ff.
Bell, Clive, 430.
Bentham, Jeremy, 370.
Bergson, Henri, 281 f., 297, 321 f., 344, 448.
Berkeley, George, 28, 247, 336 ff.
Biology, ch. VIII.
Bradley, F. H., 378 ff.

Category, 178 f.
Cause, 148 ff., 229, 280; first, 395 ff.; mechanical, 214.
Change, 202, 281.
Chaucer, Geoffrey, 421 f.
Class, 75 ff.
Coleridge, S. T., 419, 423, 429.
Common sense, 201 ff., 256 f., 286 f.
Communism, 177 f., 192, 380 f.
Connotation, 75 ff.
Consciousness, 26 ff.; *see* Self.
Conservation, physical laws of, 215 ff., 268 f.
Consistency, 134 ff.
Context, 55 f., 60, 91 f.
Contingency, 273 f.
Contraction, Fitzgerald, 51.
Contradiction, 109.
Contraposition, 110.
Convergence of evidence, 135 f.
Copernicus, N., 137, 166.
Correlation, functional, 159 ff.
Crashaw, Richard, 94.
Criticism, 23 ff.
Crofts, Freeman Wills, 33 f.
Custom, and morality, 352 ff.

Dante, 236.
Darwin, Charles, 286, 295 f.
Dawson, Christopher, 391.
Definition, 74, 77 ff., 99; denotative, 78 ff.; mathematical, 81 f.; *per genus et differentiam*, 80 f.; verbal, 78.
Deism, 395 f.
Democritus, 239, 305 f.
Denotation, 75 ff.
Descartes, René, 27 f., 86, 313 ff.
Determinism, 155 ff., 261 ff.; physical, 203.
Dialectic, ch. VI; 386 f.
Dilemmas, 116 ff.
Disjunction, 108 f.
Dogmatism, 17; and skepticism, 450 ff.
Donne, John, 442.
Driesch, H. A. E., 262, 265 f., 271 f.
Dualism, 313 ff.

Earp, F. R., 193.
Eaton, R. M., 85.
Egoism, 374 f.
Einstein, 166, 228 f.; *see* Relativity.
Elaboration, rational, 45 ff.
Élan vital, 281, 297.
Eliot, T. S., 73, 430.
Elliot, Hugh, 194, 325, 326.

Energy, conservation of, 215 f., 218 f., 268 f., 317.
Entelechy, 265 f., 297, 311.
Enthymeme, 113.
Entropy, 217 ff.
Epiphenomenism, 324 f.
Epistemology, problem of, 316 ff.
Equivalence, logical, 109 f.
Equivocation, *see* Ambiguity.
Error, 38 ff.
Esthetic experience, the, ch. XII.
Ether, 208 f., 221.
Ethics, ch. X; 171 f., 176 ff.
Evolution, 285 ff.
Experimentation, 46 ff.; methods of, 151 ff.
Extension, 213.

Facts, 39 f., 129 f., 135, 405 f.
Fallacy, genetic, 193, 356 f.
Faulkner, William, 37.
Fernandez, Ramon, 364.
Fictionalism, 241 f.
Force, 214, 215 ff., 267 ff.
Frazer, J. G., 303 ff.
Free will, 345 f., 363.
Freud, S., 338 f.

Galileo, G., 10, 46 f., 166.
Generalization, 141 ff.; statistical, 161 ff., 219, 232.
Given, the, 36 ff., 143.
God, ch. XI.
Gravitation, 213.
Grudin, Louis, 441.

Hedonism, ethical, 369 ff.; psychological, 359 ff.
Hegel, G. W. F., 448.
Hobbes, Thomas, 239.
Hume, David, 348, 350.
Hypostatization, 88.
Hypotheses, 44, 129 ff.; tests of, 133 ff.

Ideas, ambiguity of, 61 ff.
Identity, functional, 247 ff.; law of, 74; principle of, 203 f., 206.
Ideology, 16 f., 189 ff., 406 f., 446.
Illusion, 39, 55.
Immortality, 312, 412 f.
Implication, 106 f.
Indefinability, 19 ff., 29, 82.
Indeterminism, 229 ff.
Induction, 142 ff.
Inertia, 213.
Interpretation, 42 ff.
Intuition, mystic, 414.

James, William, 40, 300, 414.
Johnson, Samuel, 425.
Jonson, Ben, 424.
Joyce, James, 33.
Judgment, 95.
Jung, C. G., 339.

Kant, Immanuel, 28.
Kepler, J., 161, 166.
Köhler, Wolfgang, 342 f.

Language, 15, 65 f.; two uses of, 68 ff., 435 ff.
Laplace, P. S., 392.
Lashley, K. S., 333.
Lavoisier, A., 10.
Laws, physical, ch. V.; 202, 215 ff., 229 ff., 261 ff., 266 f.
Leibniz, G. W., 319 ff., 323 f.
Lewis, C. I., 182 f.
Life, ch. VIII.
Locke, John, 28.
Loeb, Jacques, 260, 262, 265, 284.
Logic, esp. chs. III and IV.

Mach, Ernst, 341.
Mandeville, Bernard de, 360.
Mass, 211 ff., 224 ff.
Materialism, 238 ff., 318 ff., 325 f.
Mathematics, and biology, 261 ff., 266 ff., 274 ff.; and physics, ch. VII; and science generally, 137 f., 155, 159 ff., 164 ff.
Matter, 210 ff., 222 f., 314 ff.
Meaning, *passim*.
Mechanism, in biology, 258, 261 ff.; in physics, 214.
Metaphor, 27 ff., 72, 437 ff.
Metaphysical reduction, the fallacy of, 191 ff., 238 ff., 252, 272 ff., 281 f., 301, 332 ff., 350 f., 358 f., 420 ff.

Metaphysics, ch. VI; critical, 178 ff., 232 ff., 275; fallacies of, 185 ff.; systematic, 182 ff., 446 ff.
Meyerson, Émile, 149, 252 f., 264 f., 271.
Michelson-Morley experiment, 135, 221 f., 227.
Mill, John Stuart, 370 f.
Millikan, R. A., 397.
Miracles, 388 f.
Monads, 323.
Morgan, C. Lloyd, 259, 277, 297.
Mutation, 294, 296 f.

Naturalism, *see* Materialism.
Nature, 235 f.
Newman, John Henry, 402, 407 f.
Newton, Isaac, 137, 166, 173.
Nietzsche, Friedrich, 376 f.

Object, 32, 201 f.; physical, 57, 228.
Objectivity, 68 ff.; physical, 207, 210, 232 f.
Observation, 35 ff.
Ostwald, Wilhelm, 254, 259 f.

Pantheism, 394.
Parallelism, 319 ff.
Parmenides, 217.
Parsimony, principle of, 137, 195, 392, 410 f.
Particulars, 144.
Perception, doctrine of representative, 316 f.
Perry, R. B., 383.
Person, *see* Self.
Physics, ch. VII.
Picasso, P., 6.
Plato, 8, 78 f., 188 f., 307 ff.
Postulates, fundamental, 20 ff.; of analogy, 147; of determinism, 155 ff., 203 f., 261 ff., 289 f.; of ethics, 362 ff.; of induction, 143 f.
Pound, Ezra, 435.
Prediction, 139 ff., 158.
Premises, 49.
Principle of significant assertion, 95 ff. 194 f.
Probability, 130 f., 157 f., 161 ff., 230 ff.
Progress, 25, 190 f., 299.
Property, 48.
Propositions, 49 f., 93 ff.; categorical, 105; composite, 106 ff.; conjunctive, 106; factual, 50, 98, chs. V, VII, VIII; normative, 50, 98, 171 f. 185, 196, 234 ff., chs. X and XII; structural, 98 f., 212 f., 216 f., 289 f.
Proust, Marcel, 437.
Psychoanalysis, 338 ff., 361, 431.
Psychology, ch. IX.
Ptolemy, 165.
Pythagoras, 206, 306 f.

Quality, 204 f.; primary and secondary qualities, 210 ff., 314.
Quantity, 204 f.

Reality, 96 f., 170, 182 ff., 191 ff., 232 ff., 435 ff.; and appearance, 245 ff.
Realms of discourse, 15, 168 ff.
Reasoning, 33 ff.
Rebuttal, 112.
Reductio ad absurdum, 126 ff.
Relations, 50, 90 f., 99 f.; logical, 102 ff.
Relativity, 223 ff.
Relevance, 44, 55 f., 89, 131 f., 183, 243 f., 251, 253, 264, 280 f., 282 ff., 297 f., 329, 433 ff.
Religion, ch. XI.
Renouvier, Charles, 179.
Richards, I. A., 8, 432, 444 f.
Rignano, Eugenio, 46 f.
Ritual, 355 ff.
Russell, Bertrand, 72, 236 f., 393.
Russell, E. S., 259, 297.

Samples, fair, 163.
Schopenhauer, A., 425.
Science, esp. chs. V, VII, VIII; categorial limitations of, 179 ff.; contrast to philosophy, 6 ff.; world-view of, ch. XI, esp. sec. 2.
Self, the, ch. IX; 364.
Shakespeare, William, 419, 438.
Shelley, P. B., 418, 422, 424.
Sidney, Philip, 423 f.

Signs, 29 ff., 48 f., 57 ff.; reflexive, 31 f., 37, 439 f.
Simplicity, 136 ff., 206.
Skepticism, and dogmatism, 450 ff.
Society, 352 ff., 374 ff., 382 ff.
Solipsism, 340 f., 451.
Sorites, 111 f.
Soul, *see* Self.
Space, 185, 206 ff., 224 ff.
Specialization, 14 ff.
Speculation, 188 f., 234, 291 ff.
Spencer, Herbert, 187, 295, 358.
Spinoza, B. de, 168, 319, 394, 448.
Stebbing, L. Susan, 93.
Subjectivism, 317 f., 334 ff.
Substance, 246 f., 307, 314 ff.
Subsumption, 76, 80.
Syllogism, the, 111.
Symbols, 65 ff., 83; contextual, 439 ff.; invariant, 70 ff.; logical, 105 ff.
Synesthesis, 431 f.

Taboo, 355 ff.
Teleology, 277 ff., 300 f.; and God, 398.
Terms, fundamental, 19 ff.; in biology, ch. VIII, esp. 265 ff., 275 ff.; in logic, 49, 73 ff.; in physics, ch. VII.
Thales, 9.
The same thing, 60 f., 333 f.
Thomas Aquinas, 312 f., 447 f.
Thompson, Darcy W., 268, 281.
Thompson, J. Arthur, 257 f., 279.
Thought, ch. IX; 32 ff.
Time, 185, 209 f., 217, 219, 224 ff.
Tolstoi, Leo, 283 f., 425.
Tradition, in art, 442 ff.
Transformation, 204, 215 ff., 289 f.
Truth, 7 f., 25, 78, 93, 95 f., 129 ff., 157, 166 f., 187 f., 212 f., 263, 403 ff.
Tyndall, J., 324 f.

Vagueness, 85 f.
Valéry, Paul, 35.
Validity, 102.
Value, 255, 294 f., 299; autonomy of, 192; dialectic of, 175 ff.; dominant and subordinate, 366; esthetic, ch. XII; extrinsic and intrinsic, 366 ff.; moral, ch. X; *see* Propositions, normative.
Variation, 294, 296.
Verification, 51 f., 98 f., 129 ff.
Vitalism, 258, 261 ff.

Watson, John B., 326 ff.
Webster, John, 72.
Wells, H. G., 190.
Whitehead, A. N., 72.
Wholeness, 275 ff., 294.

Zeno, 90 f.