NEW METHODS OF KNOWLEDGE AND VALUE

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To Grace,
My wife and companion,
With all my heart.

A Flower, even if it is only a Daisy,
must have a Root.

ARTHUR KOESTLER, *The Act of Creation*

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INTRODUCTION

One of my teachers once told me to polish and re-polish just the first pages of a thesis: "There you have your reader; he is still eager to listen; now is the time to tell him."

Following this advice, I hasten to state quickly, in a few brief paragraphs, what this book intends to say. It is about knowledge; better yet, about the ways and means of knowledge. My concern is not to show what we know, but how we manage to acquire understanding. Thus we will look here at methods—at the bony structures of our mental bodies.

It must be admitted that conventional procedures are not enough to locate and define the human position; without them, however, nothing can be accomplished. Through recognition of methods, we will be able to find the limits of human faculties. By means of such an investigation it will become possible to throw some light into every nook within our human scope.

The objects of methodological investigations are all the other sciences, in their formal aspects. The results of this work are intended to be used by all other scientists. Encompassed by such an interaction, this book is meant for methodologists as well as for anyone concerned with knowledge. Many non-methodologists seem to be rather vague about their mental tools. Most will appreciate an orderly study about procedures and forms, past and present, with a look at the future.

With this in mind, I had planned to collect available material and to streamline it into a simple report. It at first appeared obvious that large portions of our inquiry should be easily accessible. Much of the material could be expected to be pretty old

and quite well established. However, it turned out that much in this field was very new—very much at the beginning and very much in need of development. I had to find my way into unknown lands, again and again. In this framework, the book grew into a more independent presentation, with a number of new viewpoints. I can only wish it well and hope that the reader will enjoy its company, even if he should disagree with certain attitudes and statements.

Our discussion belonged, in former ages, to "logic," a branch of philosophy that dealt with man's systematical reasoning. Today, we feel that much more than reasoning is involved, namely, perceptions, irrational elements, values, and the interrelation of all these aspects. Logic has, therefore, grown into the broader "theory of knowledge."

Good old "logic," as well as the modern "theory of knowledge," exist obviously for the purpose of assisting and serving other sciences. In this position—as a helpmate—we find the true validity of philosophy.

This book will try to be concise and precise. For this reason, the presentation shall be arranged by topics, and not in historical order. For the same reason, little attempt will be made to argue opinions against hundreds of dissenters, dead or alive.

This study of theories of knowledge can only be a result of myself. The work will resemble books of other authors as much and as little as my flesh and blood resemble theirs. I, as well as my presentation, must to some extent be individual, which means slightly different in appearances, in preferences and in dislikes.

Should the reader have time for only a few more pages, I would have to recommend the chapters on Value and on Cultural Sciences, because they study the most important areas of methods for our time and for the future. Closer to my heart, however, are the chapters on Irrational Elements and on Existentialism.

This book affirms the creed that the special disciplines of science have to be united again in bi-sociations, in an awareness of the encompassing entity of all distinctions—of all appearances, of all reality and, also, of all methods of knowledge.

Chapter I

THE NEED FOR METHODS OF KNOWLEDGE

MAN AS A WORKER, the *homo faber,* has changed the face of his earth and has altered his fate, using knowledge as a guide and devising all sorts of implements, from wheels to space craft and from hieroglyphs to the television camera.

Whenever he has functioned, our *homo faber* integrated with the *homo sapiens,* the knowing creature. It is not true that human animals merely adapted to their environment. They also formed their surroundings to conform to their goals.

A. The Need for Methods

The fantastic success of humanity has been based mainly on the trained practitioner, who uses tools, language and methods. This book is concerned with the methods that provide the form of all human knowledge. We do not intend to ask what men know, but how they go about knowledge. Our object is knowledge—its scope and its structure.

Primarily, we are concerned about methods as they are used in science. But our discussion will also go into the process of "unscientific recognition," by which we live every day and which is the underpinning of all scientific theories.

Some elementary instruction on the process of knowledge

seems to be offered in a number of universities for general consumption and not just for professional philosophers. Such material is presented in courses on logic and on scientific methods, under the Department of Philosophy, and a number of books are available which give proper introductions.[1]

I must admit that I very rarely met somebody who exposed himself to such classes or books during his college years. Apparently, students and graduates—researchers as well as practitioners—prefer to fly by the seats of their pants all their life as far as general methods are concerned.[2] Most of them seem to feel that they are not doing badly, either by sheer intuition, by trial and error, or by imitation of procedures which appear in use around them. Still, some of our "scientists" may encounter some doubts, at least now and then, and will miss a better awareness of the mechanics of intellectual skills or will fail to gain the assurance that they know all the tools that apply to certain problems which do not lend themselves to easy solutions. This is a gap the present book wants to fill. It seeks to present systematic knowledge about methods of knowledge, in easy lessons of a few hours' time.

For such an endeavor, we have to turn mainly to a special area of philosophy. Once, up to a bit more than a hundred and fifty years ago, philosophy covered all scientific fields, all natural sciences, and all so-called moral sciences. Gradually, more and more branches of philosophy grew up and moved into houses of their own. Every branch of natural science has long-ago left the apron-strings of philosophy. So have all the social sciences and most of the humanities. Psychology, for instance, one of the last children to become independent, has indeed now become so.

From an encompassing scientific coverage, philosophy has shrunk to a few remaining fields. We now find mainly ethics, aesthetics, logic and metaphysics as the sole provinces of philosophy. We also encounter the main object of our study: the "theory of knowledge."

The proper technical name for this is actually "epistemology," which combines two Greek words meaning almost the same as our vernacular "theory of knowledge." Quite a number of scien-

tists prefer the term "methodology," which refers to a body of procedures. Whichever label we use, our subject has grown at the side of logic, which is one of the oldest philosophical branches and has always covered the rules of reasoning. Theory of knowledge deals with more, namely, with a system of all interactions in observation, thought and judgment.

It must be mentioned that the consideration of values has brought about a new and separate branch of philosophy which has also adapted a foreign name. It is called "axiology," referring to axioms as the basic reduction of events in knowledge.

Since it seems best to use plain language whenever possible, we will here use mainly the terms "theories of knowledge" and "theories of values," which form the title of our discourse.

Both theories deal with structure of all branches of science, natural as well as cultural; they mean a specialized investigation of the tools of all sciences, whether they affect the physician or the lawyer or the sociologist.

All theories of knowledge and values work, as such, with the usual scientific methods, applying such methods to the object of methods. In this work, we will also endeavor to observe, describe, classify, value and arrange certain elements—more specifically, elements of procedures as they are used in all sciences or in knowledge outside of sciences.[3] We will also look for uniformities and distinctions and for interrelations of distinctions in unities.

This is a job which the other sciences can hardly do by themselves; at least, not so well. The specialists of theories of knowledge and of theories of value act in the manner of a central clearing house. All sciences feed information about their formal procedures into this center. The specialists process such data, compare them, analyse them, bring them into conceptual order, and evaluate them.

The result is an independent body of methods and procedures, a code of formal directions which feeds back to other sciences and is meant to be of use to them in the form of a service.

All this composes a lively process and not just a static system. Details and presentations are bound to grow and die according

to events, trends and insights. While meant mainly for scientists, the results of this work naturally spill into daily lives and common activities, not only indirectly through the sciences but also directly, in the form of clearer guidance for simpler endeavors.

Since the work of specialists in our theories of methods is designed to serve, it should be oriented to the needs of what we choose to call the consumer. Much still has to be done to live up to this obligation. The consumer is not interested in thousands of pages which defend every aspect against all dissenters. The consumer also does not care for a hundred qualifications and counter-exceptions which aim to take care of every possible deviation. What the consumer looks for is a usable product and a simple presentation of its uses and benefits.

Detroit is selling millions of beautiful cars every year, standardized and typed. Each of them looks good. Each is easy to handle and takes the purchaser where he wants to go. This requires, and does not exclude, competent designing and engineering. Then, there is the research and development behind the vehicles. Samples are carefully tested and there is experimental action on relevant detail, with close attention to the needs and habits of the consumer and with considerable effort to attract the market.

Our methods of knowledge should adopt similar attitudes. It seems wrong that our theories of knowledge and values remain limited to abstract research and speculation and do not care enough about applications and verifications in practical life. In our age of specialization, it may not be possible or necessary that the same people do both the theoretical work and the factual testing. Even in natural science we have theoretical physicists and experimental physicists. Albert Einstein, a theoretician, never conducted an experiment to prove his theories. But neither he nor science considered his ideas valid until some other experimenters had verified his conclusions. The theories of our methods must, likewise, be correlated to data which can be inspected, and these data must be proved before postulates deriving therefrom may be safely accepted.

Not much has been done so far to attract scientists of other branches to test or to use the methods that are offered by the

purists of theories of knowledge and values. Available procedures, whether they have to do with research or application, do not receive enough attention in the ranks of the consumers for whom they were developed. It is a vicious circle that the offered procedures do not bear factual testimony that they are workable. There is actually not enough communication and not enough public relations between customers and the manufacturers of methods.

The more such methods are used, the stronger will be the influence of the users—the other scientists—on development and research of methodology. Only through daily applications do problems of the field become apparent, inspiring further work and pointing out flaws in theories of knowledge or values. Only daily use can provide for factual verification, which is what every theory needs at every step and which is definitely needed to make science self-correcting.

Our material consists of formal methods. It would, however, be a fallacy to assume that we could neglect the contents. The formal aspects of a thing are always influenced by its substance and by the surrounding fields in which the formal substance appears. Even if we accept, with Kant, that all conceptual methods —the forms—precondition the experience of contents, we must remain aware of strong counter-influences which move contents into the forms and which give a particular shape to a particular entity.

This means that the methodologists have to acquire some understanding of the practical fields from which their formal materials come and to which the formal products have to feed back. A lively interaction will have to be established for mutual benefit and for verification of results in methodological work.

To gain such an interaction, the methodologist will have to acquire a certain basic familiarity with the needs and aspects of the serviced fields, even if this "substantial knowledge" may remain rather sketchy. To some extent, in other words, our methodologists will have to leave their ivory towers and move out into the fields.

One of such steps should be that every researcher of methods should make it a rule to consult an affected expert before he

releases statements or opinions which are grounded in another area of research. It should not happen, as it still does, that books about methodology appear in print with expressions about legal principles which are patently wrong and could have been checked by a chat with a professor of the law school in the same university.

Established patterns should indicate possibilities for methodologists. It could be suggested that a law school, for instance, in the same university at which a theorist of knowledge is accredited, install a short course on methods of knowledge and values, adjusted to the legal situation.

Above all, theorists should start to do their research and to write their theses in teamwork with scientists in other fields. Here, the methodological aspects should be established in close co-operation with the experts of the substance, each checking the other and using the other's findings.

It will be necessary, as a preparation for such a new order, that our theories be presented in a language which can easily be absorbed by other specialists, whose co-operation will be needed and who should be attracted to use in their work that which methodology has to offer.

This book seeks to contribute to such an approach. The shift of emphasis to the market place should be of benefit for everybody: for the consumer and for the producer; and even for the quality of the product.

B. *What is "Knowledge"?*

We should, by now, ask what our word "knowledge" actually covers in terms of a generally accepted meaning. Our whole book is, after all, discussing certain formal aspects of this entity.

Almost all modern specialists of the theories of knowledge—the "epistemologists"—avoid a definition. Apparently, they consider human understanding as an atomic event which cannot be broken down any further and neither requires nor permits any further precision. It seems to be taken for granted that everybody is sufficiently aware of the reference and that everybody is simply interested in a discussion of working relations.

Such an attitude fits into the trend of modern science, namely, not to bother what, for instance, electricity really is—nobody can be reasonably sure of this anyhow and you should not ask questions which cannot be answered. Modern science likes to leave such investigations alone; it chooses rather to learn the manifestations and effects of electricity. Science limits itself to safe ground, as far as possible, and wants to know more about less, considering only small areas which permit it to gain control and to make predictions. It is easier to see how things work and what they do under certain conditions than to know what they actually are.

Still, it seems strange to begin our discussion with the statement that we do not know what knowing is. We will, therefore, at least try to narrow our subject down a bit. We will find, then, that knowledge is obviously a relation between a knower and the known, between a subject and an object. This means that some relation exists between internal reactions or actions and an external event—even if this externity may be a secondary level of the observing subject himself. Man, who is a part of the physical world, observes his interaction with his surroundings in a scheme that makes a sensible and self-containing picture.

In such a broad interaction, we consider as knowledge only special portions of which the knower is reasonably sure, at least subjectively. Mere opinion or persuasion moves into actual certitude by degrees when it becomes possible to demonstrate and to communicate it.

The aim is to discover regularities and similarities in a complex and changing world.[4] The human mind fixes attention to anything that suggests a form in uniformities and differences. Usually, the understanding grants preferential treatment to traits or events which are to some extent also traits of another event. The uniformity may apply here not necessarily to the total particular event, but merely to some part, function or structure of it. A mouse is grouped together with an elephant under the classification of "mammal."

Knowledge rests on the fundamental belief that there are uniformities in the world around us, or at least in our internal images of an external universe. Knowledge rests on the faith that there

exist such regularities beside determinable differences and beside remaining irregularities.

It is John Dewey's merit[5] to have drawn attention to the fact that every reflective investigation must start with some trouble. It seems necessary to formulate first a precise question which will determine the directions in which we look for specific answers.

Following William James, and John Dewey, we would have to stress the "cash-value" of every question which starts a search for knowledge. It appears advisable to add that the cash-value will have to cover more than mere immediate practical usability. It has to include anything that may at some time point to practical or even theoretical effects. We live in a totality in which ends and means move into each other. What may appear as a useless end today, could become easily an important means tomorrow, in another context.

Knowledge is not only an interaction between subject and object, it is also conditioned by an interaction of the individual knower with human beings around him, and after him. This starts on the day a baby is born. The child has to grow organs to stand on his feet and to utter sounds in clearer symbolic speech. For this, the human creature must have certain inborn faculties. But, there has also to be a tremendous effort by every child, and neither the activity nor the abilities would help if they were not guided and assisted by social actions of parents and teachers.

In this situation, to "educate" can only mean, quite literally, to lead the learner in his own work of learning. On the learner's part, knowledge is always a transformation of what is offered. It is hardly ever a mechanical effect produced by outsiders, like an image in a mirror. Knowledge and methods of knowledge are, therefore, individual functions which are grown in interaction between the knower and his community, from the days when a baby starts to get on his two legs and to form words and thoughts.

Man is, also in knowledge and in methods of knowledge, not a lonely individual. He acts as a member of huge groups. He is conditioned in selections and materials and methods by generations before him and beside him and he influences human beings who are not yet born. The search for knowledge is a social func-

tion, interacting with individual functions. It is even nationally colored. It may be true that science has no country. But every scientist wears the clothes of his time and expresses himself in a space-time language. He shows in his work characteristics, to some extent, which he must have absorbed from a rather narrow society.

The social influence is enhanced by the fact that every one of us can verify very little in his whole lifetime. In an age of specialization, and of tremendous communication, most of our knowledge and our methods have to be taken on authority and with faith in the reliability of innumerable other workers in the vineyards. This leads often to a strange triangulation[6]: Here I stand; there sits an author who reports an event or evaluates it; and on the third level, behind him, is the event itself in its context. Very often, I have to know the general position of this author to work out a perspective concerning his report and concerning my vicarious knowledge of his event. Often, I should better be critical not of what he says, but of what he will have omitted, as a residue which did not appear relevant to his message.

Bertrand Russell, who has spent his long life on investigations of methods, has arrived at the conclusion[7] that knowledge is a vague concept—uncertain, inexact and partial. It does not seem fair to be so cautious. A person who looks at a cup which is half-filled may complain that it is half-empty. But, he may also just as truthfully rejoice that it is half-full. This accentuation of the positive would render better justice to great achievements of many generations. It would also render better justice to Russell's own contributions.

Chapter II

OUR CREED: A BALANCE OF DIVERSITIES IN UNITY

RECENTLY I was asked, in friendliness but rather seriously, whether this book will be worth the time and effort—my time and effort as well as the reader's. In other words: will our discourse arrive at firm standards by which we can say what is right and what is wrong?

Many opposing and differing opinions and beliefs have always appeared beside each other, or in subsequent periods, or in various countries. The mantle of authority has slipped from the shoulders of rulers or churchmen who decided for all who lived in their realm what was true and what was false. Has science assumed these functions, and are methods of knowledge available by which each of us can now autonomously make proper decisions?

Or has our emancipation brought us the certainty of general uncertainty? Are we now compelled to reduce observations and thoughts to irreducible atomic axioms and to grant equal validity to the unprovable foundations—and therefore, also, to the whole opposing buildings? Is, under such a view, Adolf Hitler—with his gas chambers—just as right as Albert Schweitzer, and can methodology only point to correctly described bases and check further conforming to the building codes?

To justify the existence of methodological work, we should state our argument immediately, here at the beginning. We believe

that all learning should sharpen judgment and deepen understanding. The scientific man should do more than the common man. However, this should never lead to a surrender of the common man's sane and simple judgments.

Every normal human being is aware of an abundance of opposing opinions. Every un-specialized man lives in subjective assurance of his own ideology, and considers many other opinions as justifiable, even if he does not share in them. Every common man draws lines somewhere, and excludes certain ideologies or details as outright wrong.

Proper methodology will do just the same, but it will provide for finer tools to do a better job. Science deepens and heightens man's faculties. It makes him not less than a human being, and it also makes him not superman who can answer all riddles of the universe.

A. *The Many Diversities*

Our book will develop these opinions gradually in every chapter, from many angles. It is held together by the central theme that knowledge is based on an interaction and co-existence of many functions—human functions as well as aspects of the surroundings.

Our viewpoint was advanced in a beautiful fable of thousands of years ago. Once upon a time, there was a prince in India. He owned, of course, an elephant and at his court lived beggars who were in need of a royal refuge. Some of these people had the misfortune to be blind. On a sunny morning his highness ordered the elephant into the yard. One of the blind men was led to the animal's leg and was asked to describe what he found. He touched it and reported that there was a sturdy column, firmly placed on the ground, covered with a rough texture and too wide to be encircled by arms. Another blind beggar went to the trunk and told that it was thin, moving quickly in all directions, with a moist finger at the tip. And the third man stood at the tusk and said it was smooth, hard and curved, sticking out into the air.

The moral of this story is fairly obvious. Every one of the three

blind "observers" spoke truth and nothing but truth. But none of them could experience or tell the whole truth. The report of one seemed to contradict the others, but actually, all three tales had to be placed together to come closer to the total truth.

Our story of the blind beggars at the Indian Court does not only refer to the observers, to the subjects of knowledge; it also points at the same time to objective levels, to the observed event. Its totality spreads into many distinctions which exist in harmony with each other or could interfere with each other.

The Indian beggars express profoundly a general principle of human knowledge—that of subject and object, and the interaction between the two. In every part and parcel of our images of the universe we find reality rising out of a sum of aspects. One event, the elephant, presents itself to a multitude of observers in reality of different processes which are exposed to subjective experience. Only when things are contemplated in variety can reality appear—a sameness which is hidden in utter diversity. Totality means, mainly, plurality appearing in unity.

This principle permits many conclusions. Quite a number of opposing scientific theories or unscientific opinions can be resolved by taking all of them together as valid. Very often it would be wrong to decide in favor of one against all others. Frequently, every one of them is the truth, but the truth as seen from a specific angle. In most cases, none of them is the whole truth and all of them have to be pieced together to come closer to a complete revelation.

That we are faced with many philosophic systems, all disputing each other, may mainly be due to the fact that each of them places emphasis on a different aspect—e.g., the blind beggars of the Indian prince. Each of them often deals with a different essence and a different ideal fragment which claims, erroneously, the place of the whole being.[1] In this situation we find not a museum of aberrations but a Pantheon of God-like figures.[2] Every system is different and we must assess its uniqueness—and its limitations. This applies first to the selected objects which come from a constant flux and influence the methods of knowledge. It applies also to the observer who is part of his time and nation

and is partly determined by his surroundings, also in his methods of knowledge.

Life and science and philosophy are in constant changes in space-time and are in constant dialogue. Man is very finite and it would be reaching beyond the realm of human faculties to expect that some philosopher somewhere at some time could have uttered the last or final word. Similarly, this applies to methods of knowledge. Every great man in every nation and in every generation has spoken his piece and we have inherited limited contributions which we appraise and restate according to our own inner and outer existence.

This adds another reason for acceptance of plurality. Our views will force us to reject the claims of many monists who try to freeze explanations to some selected single cause. We are still surrounded by systems which proclaim narrow monistic creeds. Materialists consider substance as the ultimate from which everything had to derive, including life and thought and emotion. Historical materialism finds in economy the decisive base of all forms and changes and finds there all conditions for the determination of individuals. More than half of today's civilized world adheres to such belief.

In Kant's universe of appearances, we find the observing subject as the ruler. In rationalism, man's reasoning power becomes supreme. For Francis Bacon, it was sensual verification; for Berkeley, it was spiritual concepts; and Nietzsche or Sartre reduce everything to human activity, to the desire for discharge. In almost every one of these opinions, the revered single cause can indeed be isolated to good avail, but only for a closer look and only for a partial investigation. In almost every one of these issues, the selected monistic cause exists actually, but only in a bundle with other causes which contribute or interfere, and which have to be added for a closer understanding of the particular wholes. Only the cluster holds democratic sovereignty. The residues, which are embarrassing to all monists, have to be restored.

Our attitude of "togetherness" and the fable of the blind beggars find a parallel, on a different level, in Hegel's method of thesis and antithesis which are resolved in a synthesis. Left and

its opposite, right, become united as directions. Man and woman meet as human beings. We will have a closer look at Hegel's many-sidedness of reflections in Chapter V.

Plurality is most important also in the conceptual realm of reasoning and pure thoughts. It is easy to arrive in abstract terms at a highest hierarchic term, at the crowning monistic top of the pyramid, into which all the lower multitudes are flowing. But the higher our notion goes, the more removed it will be from content because it had to omit more and more details in order to get to the top. The higher and the more monistic our pure concept becomes, the more it is drained of value and meaning. Humanism may include all humanity, but it surely does not say much, as such, about you or me or any particular man. So, even in abstractions, we find useful and meaningful terms only on the lower levels of diversification, only in the realm of pluralities. In abstractions, as well as in all other relations, we live in innumerable combinations of innumerable elements, in diversities and their combinations and inferences.

The many causes that will necessarily always appear in one event should also remind us to be cautious whenever we express definite viewpoints. We will easily be tempted to utter verbal statements with much more precision than we can actually justify. It is misleading to convey a sharp picture of an event which is actually blurred, just as it would be wrong to describe edges as blunt when they are sharp. The difficulty here often is that the one and only viewpoint with which we happen to be dealing appears precise to ourselves as long as we focus attention on it, but will become softer and more amenable to additional facts as soon as we are aware of other causal aspects.

It happened, not so long ago, that Ludwig Wittgenstein wrote a basic book on his philosophy of language[3] and felt later that his statements had to be toned down.[4] The same has occurred to A. J. Ayer in an earlier and a later edition of one of his books[5].

A law will often find itself overruled by another law in a particular situation. On the other hand, we must often have the courage of a decision, namely, to isolate from the many favoring and obstructing conditions "the prevailing adequate cause," the

one which tips the scale. In all complications, we may often have to simplify, to jump for the jugular. The competent driver knows when to drive fast and when to drive slowly. And the competent researcher or professional will look carefully at distinctions, every one of them, in the context of all available others in a total field, until he jumps at his prevailing conclusion. Clarity, which is based on selection, will have to compromise constantly with considerations of residues—other different causes and aspects. Our inclination here in this book is to cope with this dilemma somehow in favor of a clear presentation to the reader. We will still try to achieve balance and will bring one point forth at a time. Variations, or interfering causes and supplements, will often then be taken up in their proper context in a later chapter.

Doing this, we are forced to a stringing-out by the structure of language. Whenever we communicate verbally or in writing, we must utter one statement after the other in a combination of fragmented sentences. But all parts and thoughts and chapters of this book have to be taken together, constantly at almost every step, each supplementing or qualifying the other statements. We must describe in linear succession of words many facets of one total event in our theories of knowledge.

When we describe knowledge as form, we have to be constantly aware of an interaction of many functions. Every sentence pokes at some aspect of the living phenomenon of such a process. All of them are reports of blind beggars who only in communication can hope to come close to an image of reality. The proper theory of knowledge requires a constant work of integration. All the interacting causes are upsurges on the same ground. The world—our object of knowledge—is a living entity which is constantly changing in movement and duration. We, the participating subjects, are living beings who grow and decay. No wonder, then, that the body of knowledge—that product of continuing relations between living subjects and living objects—grows and changes in many distinctions; not only in contents, but also in the intellectual tools and categories of formal methods.

B. *The Groups*

That this is so, will in no way lead to complete relativity or disorder. Let us look carefully at how we can establish some hierarchies and some guidelines.

The medieval Christians could not bear the existence of heretics or of alien religions. Past centuries have extended this enforcement of one faith to politics, to social orders and, to some extent, to science. We have still, today, many ideologies which seem to find life worthwhile only if there can be a fight for complete victory of their own uniform standards over all mankind. This view is held today by all communists. It is practiced by many others.

Actually, such an attitude should be hard to reconcile with factual observations which have, at all times and in all countries, shown a great variety in men's ideas about his own nature, about his relations with other men, and about his surroundings.

On the opposite pole, the so-called "liberals" have for quite some time, at least in lip-service, favored the opinion that every human being should be recognized as an individual, as a particular totality. Such an attitude embraces the view that knowledge and its methods are valid only for every one particular person; that they are produced by his specific intellectual equipment and that there is no proof or dis-proof among the various ideologies.

The truth seems to be somewhere in the middle—between the two extremes. It appears that the individual is neither "all-class" nor "not-at-all-class." People belong, predominantly, to some species of a class, to a smaller subdivision. They are not typed as individuals by a whole nation or by all humanity—monistic concepts which are drained of details and meaning—but they are also not alone in this world. They actually are members of a smaller or bigger "pack." Everybody has his group, socially as well as ideologically, or he will at least some day find his proper affiliation with companions of his preference and of similar characteristics.

That somebody "was a Nazi" says too much and not enough. It would say more if you could locate him as a business executive

who steered his corporation through the Nazi-tides. It would mean something entirely different if he belonged, in Germany at that time, to a unit of elite storm troopers and was a guard in a concentration camp.

It may not say much to mention that somebody is a lawyer. But it will become more significant to place him as a specialist for injury cases in a certain large city in the United States in the year 1966.

So, our first principle of order, in all diversities and ideologies, will be that we do not have to deal with every individual and his peculiarities but with groups of people. We can, accordingly, reduce the varieties, in knowledge as well as in methods, to groups.

Under the term "group," we recognize not merely a sum of independent individuals but a combination of interacting people who have certain traits and attitudes in common. We find this grouping present in national languages which are, again, united in families of languages. Our questions will determine, pragmatically, how far we will go in linguistics to move to smaller or bigger groupings of differences and dialects. What is true about our symbolic speech is just as true in general about all aspects of methods of knowledge. In modern psychology, C. G. Jung[6] places emphasis on "psychological types," into which human beings are separated.

An allocation of varieties to groups makes the areas smaller and makes it possible to describe and to classify ideologies, not into a total system of monism, but into definite numbers of related systems, all supplementing each other or existing at opposite ends of the scale.

Human knowledge has never been uniform. From the very beginnings, we find opposing opinions and opposing methods. But, we always find several people adhering to similar views in larger or smaller groups. Men exist and can be understood not under "all men" and also not under "every man by himself." Human beings live in groups, they act in groups, they believe in groups. Men are not universal and they are not singular. They happen to be particular.

C. *The Balance*

Our next step comes from a rather different level. We turn to the science of "Business Adminstration" and find there a special division of "Internal Control." This refers to a systematic organization of business enterprises for the purpose of safeguarding against pilfering of funds by employees. The basic method consists of breaking a complex job into several components and of assigning every component to a different employee. One employee makes the sale, another accepts the money, a third writes the record, and a fourth delivers the goods. In such a fashion is established a number of different functions and different responsibilities. All these diversities have to perform the job together, in harmony, under automatic mutual control. The one depends on all others and at the same time serves as a check on all others.

Such systems are generally accepted and have proved their effectiveness. Actually, Business Administration follows here, apparently without being aware of it, certain principles which the founders of our federal government established hundreds of years ago. We mean the system of checks and balances which Hamilton, Madison and Jay eloquently laid out in The Federalist Papers[7]. It was their contention that different authorities should exist together and against each other in a system of checks and balances within a particular political structure. Increased variety meant to them increased general security[8]. The Federal Union and the States, the legislative and the juridical and the executive branches in each of them, the judge and the twelve jurors, all orbit around each other.

The founders of such a political organism expressed clearly and intentionally that the various authorities should exercise command and responsibility for the common good and for proper general protection, by checking and counter-checking each other constantly, under a variety which formed a unity.

Whether Hamilton and his companions knew it or not, they were applying a principle of gigantic size reaching way beyond politics, indeed, way beyond society. The balance of varieties, in unity, actually dominates, physically and mentally, all our life. It dominates every part and parcel of the universe.

Our own bodies exist physiologically in a balance of secretions and of organs. We fall sick as soon as this balance is perturbed, be it by underaction or by overaction of some part. Man lives in an equilibrium of physical and mental faculties. If we look at one of our functions singly, we will find that a horse can run faster than man, that a dog has a better sense of smell, and that a lion is more powerful. If we consider mechanical simulations of human types of actions, we find that automobiles cover distances quicker and with better endurance than men's legs. Telephones carry voices farther and computers add and multiply many times quicker and more accurately.

But man is still unique as the one and only creature who in entity and equilibrium unites such abilities with innumerable other functions that melt into each other and give him superiority as a particular whole, even while almost every single element of his compound appears inferior to comparable carriers.

In the world around us, stars and planets move in balances of gravity, attracting and repelling each other in a heavenly dance. Every atom teems, in all probability, with harmonious patterns of energetic charges. Our daily activities are integrated in balances of distinctions, in sleep and waking, in work and play, in active togetherness with family and quiet contemplation in solitude.

In economic and social organizations, we live under divisions of labor, with innumerable specialists performing different types of tasks all over the world, all held together in frameworks of national and international balances. As a social being, man exists in an ever-renewed suspension as an individual and as a member of a group—conforming, and forming, and withdrawing.

If we turn now to methods of knowledge, we will find many applications of our general principle of the distinctions within unity, of the eternal equilibrium. Among several legitimate theories that have all passed our tests of exclusion (what we mean here is discussed in the next part of this chapter), we will prefer the one that is best balanced. This means: the theory which can be reconciled properly with the greatest number of other opinions.

Desire for balance will often lead one to look at the same problem and the same solution from the viewpoint of an opposing

hypothesis. It will often happen that the same result—the same answer to the same question—can be rendered through a hostile ideology. Whenever this can be done, the area of agreement with opponents can be widened, in sincerity and integrity, with the conclusion by both adversaries that a discourse on ideology becomes irrelevant. It may come as a surprise that this line of argument is often used in the legal field and is effective whenever it can be forwarded.

New discoveries are made by moving separated views together in a new balance of a new unity. The true genius has a mind of eager general powers, only accidentally devoted to some special field, ready for all things but chosen by circumstances for one.

Whoever works as a scientist, and is a ready consumer for our methodology, will have to live ahead for generalizations and general connections, with an eye for particulars. Our principle of balances will lead to the desire for a true dialogue with opponents, to the desire for solutions of problems from all possible angles, and to the desire for removing errors from our own system. Whatever we have described here in detail, in connection with the principle of balance of diversities, represents only a few samples, and it does not even matter whether you agree with every one of them. What counts is that the principle is universal.

The balance permeates appearances, events, knowledge and methods everywhere, and will meet its impact in ever-changing contexts, in every chapter of this book. The totality of all our opinions and statements rests on such a foundation of pluralities which exist together in suspense. All diversities swing in a pendulum of harmony and repulsion and all belong together in unity.

These principles can easily be established, by perceptual observation, by logical reasoning, and by judgments. It should not be difficult to arrive at a mutual agreement about this foundation on which our discourse rests.

D. *The Exclusions*

From all these heavenly harmonies, we turn now to the dissonances: How do we arrive at exclusions, at absolute disap-

provals or approvals of ideologies or details, at the definite yes or the definite no to certain opinions?

We can do this by drawing, first, a simple conclusion from our principle of balance. It requires that every set of ideas and beliefs has to preserve a minimum amount of room for other values and forces; also, in the use of means for ends. Every ideology can be true only preponderantly, in an encompassing world, and must leave some room for a minimum of deviations and of values at other levels.

This principle of minimum balance is not just a device to denounce all ideologies which happen not to be liberal or democratic, or which we just do not like for some reason or other. Communism, much as I disapprove of it, could easily provide for some minimum individual integrity or initiative, and a democracy has to include social limitations and connections of individuals. Only the extreme means or the exclusive goals will have to be condemned under our rules of balance.

Our next level of exclusions are outright errors. This effects first the area of conceptual fallacies—the realms of faulty reasoning and conclusions. It does not require much courage to say that three plus three does *not* result in seven, under our assumed mathematical rules. Whoever has wrongly totaled a column of arithmetical figures and has been shown his error will hardly defend himself by saying that the supposedly correct sum is relative and can not be established with absolute certainty.

In the realm of perceptions, we must exclude as not valid all statements about facts which are claimed to be proved while they are only wishful thinking or have already long been disproved. This applies also to a denial of facts or their omission after they have been proved beyond doubt. I was still taught in school about that marvellous light-ether, years after the Cleveland experiments by Michelson and Morley had dispelled the factual bases for such an assumption.

In combinations of percepts and concepts, the disproof of fundamental facts must affect the whole superstructure, which will then have to be altered or abandoned. When certain basic facts are proved outright, the whole structure on them will have to be

recognized; it cannot any longer be denied.

When we speak here of certain circles of absolute assurance, in the yes or the no, we must not assume god-like omniscience of man; we must be content to speak with sufficient assurance within our space-time conditions. All our discussions are placed in such a situation and we are satisfied with a distinction of absolute assurance in certain areas under the human condition. If this should not be good enough for a pure philosopher, and if we should be exposed to the objection that we cannot establish absolute certainty in the metaphysical sense, we would gladly yield the point.

It is true that in later periods important facts may be disproved or discovered, or factual social conditions may have vanished, or new conceptual hypotheses may gain ground. Modern science likes to pride itself on the ever-present status of probation and of possible change. We prefer to look at this just a bit differently and a bit more positively. Opinions which are valid in good faith on certain limited knowledge at a certain time should be accepted then and there as rock-like ground, positively or negatively. After all, even the cautious modern scientist must deep-down believe that what he states is correct.

We finally have, in a positive direction, a rather small circle of natural facts which are in accord with basic human nature or with nature in general, as it always has been known. The facts that men can have knowledge and that they are distinguished by speech and thoughts and judgements, or that the sun shines, or that men exist on earth, will hardly be considered as relatively unsure, in the opinion of anybody who can be considered sane.

Within our circles of exclusion from relativity—within the realms where certainty exists, at least under the human condition of our space-time—pulses now a tremendous abundance of truly relative systems and details. Here, neither bases nor superstructures nor interpretations can be proved as valid or invalid, under scientific methods. In this tremendous area we encounter true plurality.

In all these directions, we encounter again our principle of balance which helps to reduce the remaining fields of relativity. After we have done all we can to reduce relativity, we will still

find a huge field with true plurality and co-existence. These are the remaining opinions and ideologies which in bases or details can be neither proved nor disproved nor reconciled. But for this realm, we can speak of relativity as such. Here, each entity rests on axiomatic foundations which remain beyond objective decisions. We meet here the particular convictions of honest men who do not see alike on issues.

We said before that men travel in groups, neither alone nor all united. Here I stand, a particular entity, together with the friends of my group; we have our axioms in which we believe and which we cannot prove, but we also have conclusions and observations which are provable. Relativity enters here only when I look at other groups. There is nothing uncertain in my individual assurances that I have a definite opinion and that I am entitled to it. Relativity means only that I have to grant the same right to the units of other fellows, admitting the co-existence of our diversities.

We are all, again, sustained in balance. This means true tolerance. Not just the friendly politeness of a sceptical or unsure person, but the faith in one's own stand and the faith in the need of balancing distinctions which check and countercheck opinions.

In this symphony of different units, it can hardly be decisive whether one set is generally accepted at present or not. Christianity can hardly have been wrong at the period of the Apostles and suddenly be absolutely right in medieval Europe. Kierkegaard and Schopenhauer were considered worthless in their time and are considered profound today. Karl Marx appeared ridiculous in the Germany of his lifetime and is the father of the political-economic structure of half of the world today.

When we look closer, we may find some reasons for such changes. The ability and contributions of great men must have proper conditions and surroundings to be of effect. Time and place must be ripe for them, and their greatness must coincide with the demands and needs of the environment. This means another aspect for the tolerant co-existence of diversities. What is today in opposition, may just be valuable merchandise in a huge storehouse, waiting for retrieval and for tasks at other times and

places when the general problems or facts become different.

In the abundant harmony of varieties, nobody should abandon his birthright to state his definite yes and his definite no in absolute assurance to some extent and in awareness of the relative validities in others—absolute, of course, on human grounds and not under the standards of all-knowing gods. We must also remain aware of the identity of others and welcome their presence, which holds ours in balance. The sound of the trumpet remains different from that of the violins, but joins them in the interweaving of a musical composition.

Chapter III

SELECTIONS AND ABSTRACTIONS

CHAPTER II set the mood and the frame for this study. Whenever we look at a detail, we will see it at the same time as a particular entity and as part of both a sub-whole and a whole. Whatever we single out for a closer look exists within a universal process. All distinctions are inter-acting or counter-acting within unity.

With this approach, it seems safe to come now to the actual object of our book—the methods themselves. Here we intend to start with conventional scientific theories which have worked for thousands of years through so-called "essentials." This means that static fragments were selected and combined. These procedures apply to all faculties of human knowledge, to observations as well as thoughts and judgments. We live within such processes not only in science, but also in our daily tasks.

A. *A Child is Born*

The world around us and the world within us appear as a stream of events, a vague, raw existence, alive and growing and dying. We gain understanding and we establish control by cutting out small pieces, by selecting a few significant facts, by recognizing similarities and patterns. We isolate what is really imbedded.

An example may bring this into sharp focus. Let us take, for instance, the event of a child's birth. The doctor is concerned with the physiological process of birth. A statistician marks a column.

The family's lawyer checks a trust agreement—if our baby should belong to the right family. The photographer scrutinizes a tiny face. The psychologist may be interested in early mental reactions, and a writer will translate into verses the mother's pain during the glorious emanation of new life.

Every one of our "specialists" chooses just a few elements which appear important under a certain viewpoint. For the purpose at hand, everyone of our participants has a close look at a few selected factors and neglects all other details which he considers irrelevant to his purpose. The chaff is removed from the substance, and what is chaff in one context may become substance for a different investigation.

This method works on different levels. It applies first to the observed object of which only certain portions are chosen. But it affects also the subject, the observer. Prior to his acts of selection, he has already channeled his attitudes of observation. He has selected the direction in which he intends to throw his beam of light. It will be a narrow beam aimed at a wide stage, illuminating a tiny sector of visibility and leaving everything else in darkness.

The observer will design his patterns of selection according to his prior experience, which has been stored in his memory and is now retrieved. Habit as well as experience will present selective directions for observations and for verifications. The problem may suggest new combinations and new avenues which had not been tried previously. All these "methods" will actually come from an abundance of interactions between subject and object.

Our lines of selection will be influenced by our emotional judgments. Our interests, our anticipations and our repulsions modify the categories of perceptual experience and determine concepts and modes of reasoning. We can only see what we have decided to look for and we will hear the sounds to which we strain our ears. We find only what we are searching for out of thousands of other events which we could have experienced just as well but which we did not choose. We select, also, special patterns of thought out of thousands which are available for the grasping.

In all observation, only a few details are reaching me. I have

filtered out all others. The existing total event has to pass through reductive lenses, through the observer's mind. Every work of man betrays the prejudiced eye governed by selective codes which lend coherence to a vision. Every selection chooses parts, exaggerates these parts, and simplifies the connections.

Such a choice of relevant fragments has been a tool of science ever since science was born.[1] Outside of science and long before science, the "choice" has always been a way of human living, from the hour when we wake up in the morning down into the dreams of the night.

Out of overwhelming multitude, we select our line of work, our employers and our hobbies, our house and our car—last but not least—our spouse, the companion of our lifetime. We select our friends and we choose our enemies. Fate has selected for us, again out of infinite multitude, our niche in space-time, our nationality, our social background, our gifts and our shortcomings. Even our body, through every organ and every tissue, selects and classifies from differing substances just the elements which can satisfy this or that need. The rest, our body simply disregards[2].

B. *Abstractions: The First Step of the Classical Scientific Method*

Our principle of selection, by which we live, also governs our scientific methods. Every branch of science, today and far back, has been working with classifications, by so-called abstractions and by systematic combination of such abstractions. We approach here the fundamentals of all theories of knowledge.

In selection, we may actually break a whole substance into its components. The chemist does this by analysis when he separates water into two parts hydrogen and one part oxygen. The physicist does it when he smashes particles into atoms. Gutenberg did it when he combined separate letters into a matrix, which he placed into his printing press.

In pure science, such cutting of wholes into elements is mostly done without destroying or harming the particular object; it is done simply mentally—by thoughts—not physically. Through this we leave the object intact and just observe certain parts or think

of certain selected portions and their relations. We do it by "mirrors." We use mental isolation of certain components of directly given data. Out of a complex, we select portions by mental action.

I look at a table in my room and state that it has four legs, a light brown color, or that its style is Early American. I meet my neighbor's poodle and recognize that he is of so-called "toy-size," of black color, of friendly disposition and that he is a dog. I read in my newspaper about L. B. Johnson and realize him as a President of the United States, a husband to his wife, a father to his children, a Southerner, a rancher, or a professional politician.

Taking selected parts out of complex particulars, mentally and in thought-images, is called the process of abstraction. Here, something which does not exist in isolation is considered in an isolated state. Attention is given to some limited aspect of a complex whole—or better, sub-whole—and all remainders are neglected. We concentrate on one detail, or on a few details, for a closer look. In our mind, we de-totalize the totality. The "simple" is wrested from the confusion.

The complex is decomposed, in mental operation, and each of these ideal elements of a particular event is linked with related elements of other events. We isolate some property or some relation which some event has in common with other events and we bring together under one term similar elements which are taken from various individuals.

By such human faculty of reflection—a contemplating activity of observation and thoughts and judgment—we discover the universal in the particular, the permanent in the transient. Reflection gives, through abstraction, some reference to elements or a complex event, leaving the complex alone in all other aspects. Reflection searches for limited truth and for a few definite conditions in the conditioned. And every selection means at the same time, negatively, an anti-selection of all remaining residues. Every inclusion determines the exclusions.

The word "abstraction" is of Latin origin, from *abstrahere*. It means, literally, to remove, to take off. It seems that the term

covers the activity discussed above pretty well. Our method of abstraction has completely taken over all branches of science. It lives in all methods of knowledge and is integrated in our daily lives outside of science.

Abstractions, by purpose and definition, are part of the mental world and are opposed to the concrete, actual reality as it exists or as it appears. We abstract mentally from concrete or apparent events. But we can also go further and form abstractions from thoughts and abstractions by removing elements of compound concepts which we combine, then, with similar elements of other abstractions, climbing to higher and higher levels of determination.

In our thought-images we abstract a common element from various particulars, from universal classes which we describe verbally or symbolically. These classifications become mental families of which the particulars are only members. (The neighbor's Fido is a dog, a mammal, an animal.)

As we climb higher in our abstractions, we order them into sub-systems and systems, in clean hierarchies. As we move higher, the individual characteristics of the events necessarily become more and more lost. The similarity to life becomes more and more extinct in generalizations. The vivid red of a pretty dress of my daughter becomes a lifeless "color." Happy poodle Jackie becomes just "a dog." My friend Billy, actually a nice reliable chap, is reduced to a middle-aged engineer, an American citizen, or even just a human being.

The reflective power of abstraction produces fixed, static images. The dust of such dead generalizations is drawn from a universe which teems with life and which exists in fluid continuity. Even a cluster of rocky mountains at which I gaze and which seem sturdy and unchangeable have actually a span of age, with an origin of millions of years back in history. These same mountains have before them a process of decay and of eventual annihilation over merely a few more million years hence. At present, these rocks are pulsing in fields of energy and contain in their atoms continuous movements and charges.

Obviously, even what we call static matter exists in constant processes. It appears only static to us humans because of our rel-

ative position based on a short life span and limited senses. In all probability, there may exist in the world actually nothing which is genuinely static, with the exception of our mental, abstracted images or the abstractions of science. Nevertheless, this fragmenting and deadly method of abstraction has gained tremendous ground and has produced marvellous results.

In our schooldays, we used to separate concrete objects from abstractions. In childhood's language, this meant the difference between what we can see and what cannot be seen. Or, in more precise words, we consider as concrete the particular objects in the world of appearances which are accessible to perception.

When we look closer, this neat distinction may become slightly uncertain. Almost every statement about perceivable reality is already a mixture of abstractions with concrete references. When I state that four legs give stability to my table, I have never heard or seen the "four" or the "stability." The verb "give" is also obviously abstracted from many observed concrete actions and is applied here pictorially. The legs and the table may be concrete, referring to an actual particular entity which exists before me.

But even here, I call such a concrete particularity by names of class memberships, by family names of abstractions. When I utter a word and give a name to some concrete complexity, I seem to be able to call it only by its classifications, by abstractions under which it belongs.

To make it clear that I mean a concrete, singular, certain object, I have to add to the abstract classification name of "table" a demonstrative word, calling it "this" table, or a possessive term, "my" table. When I do this, I actually add several abstract terms together. To single out one particular complex I add other specifying abstractions to the general abstraction (my two-year-old brown poodle, Jackie).

Everything that is expressed in language seems to make use of universals and seems to string together only abstractions. Even when we refer to the concrete, we cannot escape identification by combined abstractions. This domination of our cognition by abstractions could be explained a bit more scientifically. Modern

science continues Kant's neat distinctions—which we will present in more detail in Chapter IV. Accordingly, the conceptual categories (avenues of thoughts and abstractions) are prior to all experience and to all perception, and are guiding observations. Independent from all experience, thoughts and concepts exist also purely in their own realm.

Our abstractions will, naturally, be concepts. They will often be conceptual images taken from perception, or so-called concepts by intuition. As soon as we think, or abstract, or speak, we can only move within the lofty realm of intellectuality—removed from the concrete. Our abstractions are actually not taken from observation, but only correspond to it on a different level. They are, always, thought-images or pure thoughts. We speak in abstract reflections which we have of concrete things—and not of concrete things as such.

With this in mind, we repeat: what we said about complete domination of our world by abstractions does not just refer to a scientific activity. It permeates all human endeavors—our sensual perception, and our expressions concerning emotional judgments, every part and parcel of human activity. We repeat also: we live by selections. This means as well that we live by abstractions, either purely or in combinations. There is nothing left that remains untouched by this almighty cutting method. The "systems" have become part of conscious and subconscious human nature and have penetrated science as well as daily life.

It is a very old controversy as to whether we actually encounter abstracted universals in immediate experience. In other words: do we really see a building when we look at a house; do I really see "brown" when I look at my poodle? Or do all abstractions exist only in one's mind, as nominal mental labels, all stored in the memory and retrieved when they are triggered by observation.

There exists another old question which goes back to Plato, namely, whether universals have an ideal existence in the infinite. In our time, Sartre has revived the problem, in modern verbal dress, that the abstract haunts the concrete as a possibility fixed in the in-itself which the concrete has to be.

Modern science is inclined to stay away from both sets of questions, apparently under the principle: of which you cannot speak, you must remain silent (or in less refined wording: it seems a waste of time to ask foolish questions which cannot be answered).

Our methods of abstractions are very old procedures of all sciences, dating back to their origins thousands of years ago. They still rule supreme today, especially in natural science. Our specialists consider hardly anything else as scientifically permissible.

I like to call this abstractive process a classical method. The term is used here in various meanings. Abstractions are classical because they work with classifications. They are also classical in allusion to related movements in literature and art which aimed at static presentations and which were opposed to the Romantics, who preferred images of processes under subjective impressions. I also like to call the abstract method classical because it was already used in very early periods of history and because it has remained a time-honored procedure.

Actually, we have so far dealt only with the first set of steps, with the analytical work done by abstractions. We have only hinted at the combinations. To understand fully the force and success of static fragmentation, we must turn to the next step, to the methodic unification of such partial thought-images.

C. *Combination of Abstractions: The Second Step of Classical Classifications*

In chemistry and in psychotherapy, every analysis is undertaken for a later synthesis. Every step of separation keeps in mind this goal of unification. This attitude applies to all abstractions and we must supplement what we have said so far. We do not just select and divide. We must also combine again into mental images of relations some of the fragments which belong actually to a particular whole. Every abstraction involves great omissions. The residues must be taken into consideration, at least to some small extent, by adding a few other mental images of other isolated elements. We have separated these for closer inspection and for a

more detailed look.[3] Our very purpose requires some pulling together of severed particles.

The abstracted isolation was only temporary and was always aimed at certain limited unifications. The classical scientific method abstracts elements from a particular whole and then conjoins such abstracted images with other such images to arrive at higher combinations so as to see relations and structures among the fragments.[4] In this work, the investigators search for self-evident patterns, for skeletons which convey a clearer understanding. Every abstraction means not only an inclusion, but also exclusions consisting of suppressed pre-suppositions. Our process of unification tries to restore artificially, to some small extent, the composition in a static imagery.

Compared with the abundance of the real event, this unification will still end in a very incomplete presentation. It will still, after all combining has been done, remain necessarily selective and restricted. After all, adding one and a few other ones can never total to infinity. Our combinations of abstractions will never restore the whole reality, but they will cover a larger area.

As abstractions are joined by systematic hierarchies, we arrive at reductions of reality or appearances. The combination of abstractions draws advantages from simplifications which omit vast residues. Through such cutting away and cutting through, structures, which otherwise would not be visible, are pictured. We strive for a transparency of limited knowledge where, otherwise, a whole particular appearance would remain opaque.

The action of combining and joining has already begun before we start to place independent abstractions together. The very act of abstracting already involves combinations. The act of abstraction means to conjoin fragmented elements of one particular event with similar elements of other events in recognition of a mutual class-membership.

To make this clear, let us return to our earlier example of the birth of a child. We said, for instance, that when a baby is born a statistician marks a column. He could, however, do this only by conjoining the membership of this newborn baby with the proper

class of babies born during the current calendar year.

Language, as well as thinking, moves in vertical classes and conjoins in horizontal classifications or subsumptions under memberships. Every single abstraction is preconditioned by the selection of universals, which we know from concepts of previous experience and which join together similar elements from similar events. When we abstract, in our first set of steps, we also combine. Most often, the abstractions will conjoin parts of events that are not similar in general, but have only certain small characteristics in common. When I say that a rose bush has leaves, I join it not only with other rose bushes but with big families of plants.

Since understanding can apparently dissect only in connection with conjunctions, and can conjoin only in connection with separations, we can better phrase our previous statements. We should say that we abstract elements from a particular entity in a process that is preponderantly reductive in quality. And we should qualify this by saying that by combinations we mean processes which handle abstracted elements through concepts of grouping having some abstracted elements.

This interaction of fragmenting and joining builds levels of abstracts in every branch of science, in precise orders of rank and hierarchy, moving from lower levels to abstracted higher steps and from there to still higher levels, joining on every height a number of abstracts in horizontal directions. Fido is a member of the class "poodle"; higher up, "dog"; higher up, "mammal"; higher up, "animal".

Every branch of science consists of a particular system of abstractions, selected and built under a specific set of selections. We distinguish sciences by such identifying characteristics. For instance, in mathematics, magnitude was—at least originally—the decisive concern, to the neglect of all other types of elements of complex events. In legal science, we collect rules for the behavior of men which are enforced under the monopoly of the State. Similarly, we see that in every field there is a carefully limited system of selections in observation, concepts and methods, under a specific direction.

Knowledge begins with the apprehensions of existing objects in very specific and selected partial uniformities and differences. Thought and judgement arrange and manipulate such selections under selected rules.

In all such hierarchic orders of levels, our systems of abstraction start at the bottom, with so-called atomic facts—descriptions which cannot be reduced any further. Usually, these axioms can neither be proved nor disproved by methods of knowledge. Scientists are fond of speaking of assumptions. They mean that we have not any evidence of their reality; that we just posit them, tentatively, as if they were proper images of appearances. However, in spite of all caution with verbal terms—which reminds us a bit of children's games of "let's pretend"—scientists must often act on the belief that reality or appearances come mighty close to the images. The unproven foundations are sustaining, after all, pretty high buildings with a lot of activity in them.

From these so-called atomic images—the lowest abstracted units —we move higher and higher. What actually in every case should be the lowest irreducible image or the highest abstraction can in reality hardly be determined with absolute certainty. In every investigation we stop rather arbitrarily somewhere. Our problems decide this for us. We go just as far down or up as we need to in order to arrive at proper solutions.

Mr. and Mrs. Smith may be one unit as a married couple, but can be two units as human beings. The tree means the smallest reducible unit to a forester, but the protons in the atoms of its woods may represent its basic unit for a physicist. The questions which we ask and the scientific system under which we ask them will determine the scope of our investigations.

Usually, a scientist, as well as an artist, will start somewhere in the middle levels of his hierarchy, neither completely at the bottom nor completely at the top. He will find there his problems and will also look there first for his answers; then he will work his way gradually up and down and sideways.

Actually, we also live with intellectual hierarchic systems outside of science. We are in their midst every day and every hour. When-

ever we plan an action, or try to understand some occurrence or form verbal expressions, we are moving within abstracts, up and down and sideways. My wife has her birthday. I know she likes jewelry. So, I look for a ring in a store, give it to her, and am rewarded by the expected joy.

One of the most spectacular combinations of abstractions is one that demonstrates that even movement can be simulated. This has been done technically, for instance, in the movie camera. A camera producss the illusion of movements by taking a sequence of different still pictures, one after the other, each arresting a different instance of the fluid reality.

In the end, all these static images, which are isolated abstractions from an observed reality, are run through the projector. There they are blurred together synthetically on a screen. Miraculously, the many separate abstractions are now combined to produce the illusion of a fluid movement.

What a movie camera does exists apparently in similar fashion in mathematics. In differentials and integrals, Newton and Leibniz and their successors have designed methods, through calculus, which plot instants on co-ordinates, with the result that static points of reference are added together to give a stimulation of movement. Motion is broken down into static fragments and is then re-produced by a combination of these static abstractions. Modern research and modern engineering appear to use refined methods of such types of mathematics as tools, placing innumerable computations on computers for an analysis and a simulation of fluid processes.

This is the utmost accomplishment which abstractions and combinations of abstractions can reach. Even so, systems of abstractions will leave large portions of reality outside of the pictures and will disregard enormous bulks of residues. It is a necessary part of our classical methods to consider only small fractions of reality as it appears and not to take into consideration large chunks of reality. To make something clear, the explanations have to accentuate essentials and to remove and throw away obscurities.

Binoculars are aimed at a spot in the far distance, bringing a

small area into sharp focus and enlarging it. At the same time, all the surroundings are left outside of the angle of view. An orderly collection of pictures of this type may be placed together and may produce a combination of images which, again, cover a larger area. But the effects of such a sum, an over-simplified map, is still a far cry from the view a human being would have of the real landscape if he could see it all in one sweep.

D. *Sampling and Verification*

In observations and in factual verifications, it becomes an important aspect of our methods of selection and abstractions that we can only rarely take a look at all similar elements of existing particular events.

In an unusually favorable case, we could find out exact age groups, service years and annual salaries of all employees of a certain corporation at a certain date—which would be helpful for a computation of life insurance premiums under a group contract. But such situations, in which we have direct personal access to all facts, are very rare. In most cases, human observation cannot possibly cover all similar elements of all relevant events. Mostly, we can look personally at only a small number of related phenomena out of a vast multitude.[5] We must be content to observe and consider a few particular factors, and we must hope that all other members, or at least most of them, will be similar or will behave in similar fashion.

The proper selection of samples becomes here important and will determine how reliable our verifications and the bases of our general abstractions really are. Complicated techniques for sampling have been developed.[6] In most of these procedures, the material is taken entirely at random, by chance. Obviously, this will only work when we can be safely sure that all particulars are similar, or at least close enough to each other. Refinements provide for breakdowns of events into groups and for selections by random out of each group. Further refinements will then apply weights to such mixtures. In other words, the selected material has to be

representative. It must be taken from homogeneous bulks, or at least from homogeneous subdivisions, and must not likely be subject to fluctuations within this whole or sub-whole. It is obvious that all sampling is built on quite a number of assumptions which may sometimes turn out to be wrong. Whenver we deal with sampled selections, we are also exercising anti-selections and may overlook relevant factors or cut ourselves off from important information which may come from portions of the whole.

Results of sampling are, therefore, to be used with caution. If they go against common sense, we had better take a second look. These few remarks should indicate that we are dealing here with a field which is far from being precise and which is greatly influenced by subjective judgements. We often encounter strange surprises. Certain life insurance companies, for instance, used mortality statistics which were developed for the total population of the United States. When they wanted to compare their own actual experience of collected data from their customers, they noticed that more people survived in the earlier and middle age groups. This evidence proved to be correct. The insurance companies and their actuaries—their probability mathematicians—arrived at the explanation that people who can afford life insurance are a select group of higher income earners who take better care of their health.

Sampling is obviously important in all social investigations, in pools of populations for market research, for political elections, and in almost all statistics.[7] With certain variations, sampling is needed and used in almost every other field—in natural sciences and in daily life. We have no choice but to infer constantly, from our few observations, to generalizations. We must trust constantly that all elements, or at least most of them, will be similar to the few which we are able to observe.

Most of the content of our knowledge is based on assumptions which we cannot prove and on observations which we accept, trusting in the reliability of other people. We must admit that everyone of us can verify, in person, very little during his lifespan. We are able to see merely a few samples in a few fields and must rely, for the vast remainders, on reports which may be oral, written or

printed. On top of this, we will often prefer the report of another person to our own, even if we could produce a personal observation.[8] Imagine yourself standing on the bridge of a ship. The officer on duty points to the horizon and says that there is a lighthouse. You look, but do not see it; however, you accept the fact that the trained eye of an experienced sailor will be more reliable than your own observations.

In our time of specialization and separation of labor, we are surrounded by such situations. We must use verifications and statements which are made by other experts in related or unrelated fields; we need such data in our work and for our opinions. Even if we had direct access to samples we would often neither be equipped nor have the time or experience to check facts or related conclusions.

Whenever I read a book by a historian or listen to a lecture on data-processing or wonder about Einstein's formulas, I can only follow accepted opinions and must have faith in the credentials of authorities. We live with trust in other members of society who simultaneously trust us.

So, we live on deeper and deeper levels by means of selections which we make directly or indirectly by choosing authorities in whom we have faith. We sample, but we verify extremely little, even if we pride ourselves on being very critical, and we use constantly the vast store of information which is communicated to us by armies of experts. This reliance on sampling, done by ourselves but mostly by others, and on communication of verifications, adds another facet to the plurality of our world of knowledge which can exist and grow only in a combined effort of diverse people.

Chapter IV

OUR MENTAL FACULTIES

KNOWLEDGE exists, obviously, through the faculties of our mind. We must distinguish here carefully between the products of mental efforts—the known—and the processes of knowing. Observations, thoughts and judgments, as they are created by the human mind, gain a separate existence and a systematic entity. We live with such products as they are arranged. Husserl[1] places emphasis on this difference between the subjective process and the objective results of our intellectual endeavors—he uses the term *"noeses"* for the mental effort and *"noema"* for the accomplished concepts. Husserl stresses, in this connection, that there is a strong interrelation between both fields. For our clarification of methods of knowledge, we will look at both aspects and will separate them only as far as this appears useful.

A. *Limits of Knowledge*

It is generally accepted that science, the highest form of human knowledge, means a systematic ordering of a disorderly content. In our time, science wants to be careful and modest. It sorts and orders only so far as this can be done safely, and leaves all the rest to disorder. With this attitude, modern scientists are usually not in the mood to speculate about substances or properties of events. Such a search appears futile and would be beyond men's scope of understanding. Science, rather, limits itself to recognizing

relations and structures—more precisely, functional relations between variables, preferably relations which can be defined in some unit of measurement.

To some extent, we can trace this attitude very far back. From its beginnings, scientists have considered as the bases of science the so-called axioms, meaning elements which cannot be reduced any further. These foundations are simply taken for granted and are experienced immediately. We can observe them, we can describe them, and we can form a corresponding thought-image—the concept. In conceptual constructions of thoughts, science starts, similarly, from postulates which can also be stated as concepts but cannot be reduced any further. Scientific methods always begin with such unknowables or reduce things to such unknowables, and then build total systems from that point by developing conclusions and different deductions from such conclusions.

Knowing, under such an arrangement, becomes an observable exercise of skills and of capacities instead of a secret operation of hidden entities. Or, more precisely, knowing is the observable portion of an iceberg, while the unknowable portions of it remain hidden under the water.

This trend of science goes back to Aristotle and was cultivated by Descartes, Hume and Kant. Their so-called scepticism and criticism placed trust in the observer and distrust in the observed reality. Descartes[2] used the example that we assume the gravity of heavenly bodies but do not know the nature of gravity or its principles, and that the same may be said of the vacuum or of atoms, of heat and of cold. David Hume[3] stated that we do not have any impressions of substances, or of matter or of the mind since we can smell or touch none of them. We can only be aware of relations between actions and motives which conjoin events.

Immanuel Kant[4] gave the sharpest wording to such opinions. According to him, we cannot know how things really are apart from their appearances, which means the sum of our impressions. It seems impossible to ask how things look when they cannot be looked at. We move only from an awareness that things do appear to an expectation that they will appear again under certain

conditions. With this view, the subject becomes the only carrier of all objectivity.

Within such restraints, modern science, or at least natural science, has apparently done extremely well. Nobody knows or cares, for instance, what electricity really is, but we have gone far in achieving the finest electrical functions and manipulations. Such knowledge has made it possible to harness electrical energy for human purposes.

Here, in our investigation of the processes of knowledge within the faculties of the human mind, we have to live with a similar attitude. No one knows, and in all probability no one will ever know, what thoughts really are or where they come from. Nobody knows or seems to care which substances the nerves of our senses really have and how they actually produce sensations. We do not know where or what our memory actually is or how it really functions physiologically. Medical science is not even in a position to explain physiologically how our eyes produce pictures outside of our bodies or how our ears hear sounds which we experience externally.

When we turn to methods of human knowledge, we act scientifically: we deal mainly with relations and structures, just as science does in any other area. Here, we start also with a selected area of events. We also work with a few chosen elements of selected objects, applying observations, thoughts and judgements. Here, in our specific area, we will also build abstractions and combinations of abstractions; we will also arrive at statements which should be verified or which should, at least, be proved indirectly.

In our scientific approach to methods of knowledge, we are amazed that our literature reports very few controlled experiments, very few statistics, and hardly any examples of sampling. The explanation may be offered that the underlying facts should be obvious. The evidence could be considered the property of common sense—a mixture of sense and understanding—and of common observation, so that there would be no need for further confirmations.

While such a situation seems unusual among scientists, it could be argued that it is not a weakness but may be a source of

strength. Every reader and worker—the layman and the specialist—should be able to verify personally most of his facts. Everybody lives in knowledge, and we may here be in one of the few fields where we do not have to rely on remote experts. It could be argued that everybody spending time and effort on theories of knowledge is moving on familiar grounds. We know already, somehow and maybe vaguely, the territories to which we are drawing intellectual maps. All we need would be some guidance, some systematic ordering of familiar material, and some insight which would light up easily. Then, certain relations, structures and patterns should become clear.

In this vein, it could be said that knowledge concerns all men and that its techniques must more or less be the property of all men. In such a situation, the formal working orders should reveal themselves easily to every average person and not just to a specialist, and not just through special experiments or observations. Such arguments are supported, from another angle, by the thesis that it is extremely difficult to design controlled experiments for isolated elements in any cultural science, especially in the complex field of methods of knowledge. I found as one of very few such efforts, a report on simple experimental work with cleverly designed wooden blocks for an investigation of relations between thoughts and words.[5] This one set of sketchy experiments, done on a small scale, had, however, a very devastating effect. It proved quickly and definitely that the repeated claims of language philosophers were wrong and that we could distinguish between thoughts and verbal expressions, on all age levels.

The results from one simple set of experiments may urge a second thought on experiments in general, as far as methods of knowledge are concerned. It may also force us to consider again whether something is wrong in the general speculative mood about methods of knowledge. Our field is actually in dire need of getting out of the complacency of un-verified general discussions. Our trust in common sense and common knowledge has obviously gone too far.

It must be repeated—what we stated in Chapter I—that theories

of knowledge and values have to turn to verification if they want to grow. It is high time we became concerned about specific proof, factual proof, in actual performance, for principles which are claimed in our theories. Too many statements are being made which refer to facts belonging to other fields and scientific branches without proper corroboration by specialists. It happens too often that our theories misstate or misunderstand what proper experts could easily correct. It is high time we establish proper communications and public relations with scientists of other branches who use methods of knowledge and values—or are at least potential customers.

Returning to our methods of knowledge, we must remain aware of natural boundaries that are built into human faculties. Knowledge, wholly or partly assured, including the world of reason, can exist only within a more or less narrow scope, beginning with foundations which are unknown and ending with unknowns. A typical example of this statement can be found in chemistry. Compounds were reduced to a certain number of elements which could not be reduced any further and had to be accepted as axioms. There remained eighteen such entities. It then became possible to determine these elements quantitatively by atomic weights and to bring them, in this way, in relation to each other. It also became possible to determine compounds quantitatively by weights of elements. From here on, scientists moved into the realm of hypothesis. By conceptual constructs, it was assumed that every element consisted of atoms and that these atoms were small orderly systems of electric charges which orbited around each other. In this approach, the formerly irreducible atom of a chemical element was reduced to physically conceived entities. Again, here we arrived, through hypothesis, at a final axiom and irreducible entity with which knowledge had to stop.

It will be the task of this chapter and of the following chapters to define the dimensions of knowledge—where it starts and where it ends—and to look at the mechanics of knowledge. We know within the confines of ignorance and we believe on the basis of a kernel of knowledge. We all sit on a pier, as it were, looking out on an

ocean which vanishes into invisibility in the distance. Better telescopes of all kinds will gradually permit us to see more. But we must remain modestly aware of the fact that some borders will always enclose human beings as long as they live on earth. We can be highly grateful that our cups are partly filled, and that they continue to be filled slightly more as time goes on. It is surely awe-inspiring to think how far man, in all his frailty, has gone. However, it would be an illusion of grandeur to claim, as the rationalists and some of their relatives love to do, that all we have to do is wait and science will eventually discover everything and so become God-like—all knowing and all-informing.

In spite of all the extensions of knowledge we are able to achieve, men will never be able to discard the unknown axioms and to see all the way to the end of creation or of human nature—the cause of all life and the complete determinations of men. We will always live on an island of truth surrounded by wide and stormy waters. Every new solution has always disclosed new problems.

B. *Perceptions: Our Sensual Experience*[6]

Whatever we know of the world around us seems to arrive first and directly through our senses. We see and hear, we smell and taste. This sounds very simple, but it is actually quite involved.

Whatever we know of the world around us seems to arrive in processed form. Every observation occurs as description and classification, which are intermingled with sensual impressions. If we were to speak of pure facts, we would have to isolate the mere sensual elements and imagine them in purity. In such a state, sensual facts would be vague and unindentified. (It seems that some modern painters are trying to convey this pictorially. Their blots and splashes present an undifferentiated aesthetic continuum. If we were to try to visualize factual sensual data in this way, we would find that they can be only the raw material of knowledge and can never convey any recognition.)

We speak of "sensations" when we refer to such undifferentiated products of our senses. The usual term "perception" goes, however,

much further. It includes mental activities which complete the sensual impressions. It usually covers, also, principles of reason which guide the form of sensations.

Henri Bergson, actually an existentialist, uses the term "perception" in a still wider meaning. To him, our bodily sensations are only reflections of something external. He distinguishes from our internal products such corresponding outside "perceptions" as the parts of external things. In his view, perceptions are parts of processes rather than parts of ourselves.[7]

On the other extreme, doubts were raised, mainly by Descartes, Hume and Kant, as to whether we can be sure at all of any external world. To them, all external objects are accessible only as constructs of the perceiver[8] in a world of images which are produced as appearances.

Here, in our discussion of sensual perception, this would raise the question whether things appear as they really are or whether they appear as our stimulated sense organs picture them.

We may safely leave such problems unresolved for our present investigation. Most of us will believe, or will at least assume, that we live in some external existence which consists of a relation of observer to object. If an extreme subjectivist should deny this, he could still, for the sake of our discussion, accept our statements about processes of individual perception. He would simply have to translate our remarks about external reality to another level of subjective individual sensations and to phenomena which are products of our sensations.

Most people will not go so far, yet will accept as an observation that all observing men are part of a universal reality. Whenever I move a chair physically in my room, my sensual impressions change. There must be a connection of some sort between the metaphysical reality and the phenomena, even if my perception may give me only a partial picture. If this were not so, science could hardly dare to make any valid observations or predictions. Every scientist actually lives, whatever he may say in principle, under the expectation that there is some similarity between our impressions and our actual external existence.[9]

The problems of sensual perceptions were originally discussed by philosophers in the framework of their total ideologies. We have mentioned already Descartes, Hume, and Kant. In the course of time more and more special branches have peeled off from philosophy and have taken over investigations of their own. This also happened to perception, which moved over into "psychology", a field which we must carefully distinguish from psychotherapy.

The original explanation of perceptions, especially under Hume, was that certain external stimuli affect our sensual organs and that different sensations are received by different nerves. Every nerve end registers, according to this view, just one type of stimuli. From a red ball which flies through the air, one nerve will experience the redness, another one will see the roundness, and a third will register the movement. Our total vision of an event becomes, then, a superstructure built by mental associations out of all these atomic sensations.

Gestalt psychology attacked this opinion and stated that we are given wholes of things in one direct, total sensual impression.[10] Not content to let the statement rest there, the Gestalt people added that this total impression is formed somewhere in the cortex of our brain. What applies to Hume's view of many specialized nerves as well as to the Gestalters' statement about the cortex is that both of them are without a shred of evidence. Both theories trespass, apparently, the limitations of modern science.

A later school of Functionalism has stressed that perception requires a participation of the observer, a willed preparedness to look in order to see, and a willed process of identifications. This makes perception a mental activity.[11] Perception is not considered any more a passive mechanical response to a stimulus. Before we can see, we must look, and while we see we must identify, classify and interpret in order to be aware of what we are seeing. Perception goes out to meet the environment; this activity utilizes the physicochemical processes of the senses, but is not identical with them.

I look at Fido, our neighbor's black poodle, running down the street. I see "him" only if I have known Fido before, and only if I know what a "poodle" is, what a "dog" is, what a "street" looks

like and what "running" consists of.

This means that with sensual impressions, I must obviously employ a skill of selection, of immediate identification, of classification and interpretation, all built around past experiences. Whenever I use my senses I use at the same time concepts of thoughts or memories which I have built into myself very gradually. I must have started to do so in the first year of my life and I must have developed all this from my subconscious—from the irrational layers—since the conscious levels were not yet there. I have built my skills under the influence of my surroundings—people who taught me and set examples which I could imitate, and things to which I learned to react. The seed of perception must have been in me. I had to grow it. Perception is truly an interaction of many aspects—of internal efforts and external objects.

Functionalism is apparently on the right track. In perception, a vast input is processed and re-assembled and stripped of everything that appears irrelevant under selection. We control the input, not only the output.

To complicate the process a bit more, we find that perception is intermingled with memory-images, which we constantly retrieve in order to complete, guide and interpret our impressions. The result of every observation, at least to some extent, moves, then, back from perception into the memory so as to be available for later use. (Since our mysterious faculty of memory affects not only perception, we will have a closer look at it in its own context at the end of this chapter.)

In our process of perception, we encounter still another complication and condition. There have to be not only a subject and an object, but also a third medium between the two of them. We need light for illumination so as to see and airwaves for sound so as to hear. Whenever a required medium is missing, we remain in nothingness and cannot perceive.

Science has yet to offer any sensible explanation about how we see images outside ourselves as projections in separate space. Our senses provide us with an immediate external world which appears apart from us; and they do not give us an internal imagery which

remains subjective. There is an obvious interaction from us to the outside and not just from the outside towards us.

Our skills of perceiving include also the ability to make corrections within the framework of experience. For instance, my wife comes along the street towards me and I never doubt that she remains the same size, although the image of her starts small in the distance and becomes gradually larger as the relativity of our positions towards each other changes.

Modern theories of relativity lead to other intellectual correction of perceptions. If two explosions occur exactly at the same time at points which are eight miles apart, an observer will hear them at the same time only if he is stationed close to mid-point between both places. As soon as he is stationed closer to one explosion, he will hear that one earlier, while a person who remained closer to the other explosion will confirm that the first one occurred later. This shows that space-time relations of observers have to be considered; this alone should caution us greatly against too much reliance on mere sensual verifications of theories.

When we deal with observations of very small entities we encounter Heisenberg's law of uncertainty, which states that the measuring mechanism will always influence slightly what is being measured and will make it impossible, for this reason, to ever arrive at precise measurements. To give a simple example: The wire of an ampere meter which records an electric current absorbs, through resistance, a small portion of that current.

If we now turn our attention to the subject—the observer, who exercises, after all, the functional skills of perception—it appears obvious that all human experience will be limited by the boundaries of human faculties. There are animals whose eyes are less developed than others' and who will see less. On the other hand, there are, for instance, dogs who smell things that we will never notice and who hear sounds that are beyond our reception. We cannot see ultra-red or ultra-violet, but we do see a lot of other colors within the borders of the spectrum.

To some extent, such borders can be extended. The sensual organs can adjust to various levels of intensities of stimuli. The pupils

of the eyes can be slightly contracted to sharpen focus or to reduce illumination.

Men have also invented mechanical instruments which increase the scope of perception. The telescope and the microscope are simple examples. Beyond this man—the toolmaker, the homo faber—has made gadgets which translate inaccessible data into forms which we can sense and measure. Invisible electric currents move indicators on gauges so that we can read voltages or amperes.

In spite of all such extensions, and in spite of the probability that more will be invented, we must some day reach final borders beyond which further expansion will not be possible. We can only construct aids to human faculties; we cannot change our human organs into God-like powers of recognition.

While we have so far looked at perception as such, in isolation, we must realize that in the process of knowledge and in daily life all other faculties are constantly intermingled with it.The next part of our chapter deals with concepts and will discuss Kant's contribution to the recognition of the role which thoughts play in all observation. He has stressed that we must first have guiding intellectual principles for experience. These intellectual categories provide, according to Kant, the form in which all events appear to us, while senses account for the content.

We may now summarize. Sensual experience as such is not purely sensual, and it is not a passive, mechanical reception. It is an activity, a human skill, intermingled with non-sensory abilities —namely, with thoughts and conceptual classifications, with memory and with language-identifications, and with selective judgements. All sensual images are produced by such interaction.

In this situation, perception is just a part of total experience. Every human being, insofar as he is sane and healthy, is convinced of the truth of what he sees, hears and smells. Everybody needs such subjective assurance for a normal life and for proper functioning within the world. This subjective assurance is anchored in our total recognition. Sensual verification remains an important part, but cannot be singled out of the complex of all mental and emotional faculties.

The human organism not only reacts to environment, it eats and drinks environment, fights and mates environment, burrows and builds in environment. Even in merely observing environment, it modifies, dismantles, analyzes and re-assembles after its own fashions, converting mere noise into symbolic information.

We live in plurality and interaction, in human faculties and in perceptions. Even senses have no magic claim on special evidence. Perceptions have such claim—not more and not less—only in the totality of all mental faculties which encompass percepts, concepts and judgments, as well as subjects and external objects, or individuals and society.

C. *Concepts: Our Thoughts and Our Reasoning*

Thoughts, to which we now turn, may be considered in isolation without any sense data. I think of a dragon and of a knight fighting it. Or better, and more prosaically, I add four and four to a total of eight.

Usually, however, we will find thoughts and percepts conjoined; or, our thoughts, if they are pure, will be directed so as to prepare them for an intermingling with sense data and judgements. Concepts without perception or judgements are empty, and pure perceptions are blind. In the end, almost every problem and statement becomes a question of "fact and law" (to use a lawyer's language). Observation, thought and judgement have to appear in interaction. Our total activity of thought is identified by concepts. When we look closely at both sides—at the process of thinking and at its products, we must again realize that we do not at all know how thoughts are physiologically created in us. Again, we must start with an unknown axiom—the atomic event. From here on, we systematically investigate relations, structures, and combinations of these events-in-themselves, which our intellect places before us.

We are able to describe the atomic event of a concept and we are able to draw conclusions and deductions in all directions. A person may use a television set properly even though he does not know its electronic nature; indeed, he may even satisfactorily engineer such a set. When we speak of intellectual faculties, we must dis-

tinguish carefully the various levels on which thoughts operate. On another level, our intellectual faculties break a concept of observation into abstracted components. We take common properties from different particular entities and form a general mental picture of similar elements. We abstract or analyze when we see churches, ranch houses and skyscrapers together as buildings. Or we arrive at circles when we consider wheels, bracelets and automobile tires.

In our time[12] certain thoughts—the concepts—are carefully separated into concepts by intuition and concepts by postulates. The intuitional concepts denote something that can be sensed, while concepts by postulation introduce unobservable entities and relations. When I speak of blue and mean the color of a flower, I am using a concept by intuition. But when I speak of blue as a wavelength in the color spectrum, I am referring to a postulate. To some extent, intuitional concepts may be inducted from events, while postulatory concepts are always deductive constructions.

The distinctions between intuition and postulates have been broken down further. Concepts by intuition—the thought-images of reality or of appearances—are directed at a constant flux of events, at a continuum which is at the same time particular and unified. We look here at a differentiated continuum. If we isolate, in our thought-images the differences, we arrive at our old classical abstractions. When we concentrate in a thought-image on the continuum as such, apart from differences, we gain an existentialistic view. We may also investigate one difference within the total context of the continuum—within its surroundings and all its interactions—and this will give us a concept which physics would call a field theory.

Concepts by postulate are designed in specific theory. We turn here to unobservable entities, relations or structures. This may mean postulates by imagination—which cannot be found in our world of senses but can still be pictured. Atom models would serve as good examples. Or we may use postulational concepts by intellection which can neither be sensed nor be presented in an intellectual image. Modern mathematical theories would belong here, or Aristotle's theory of the unmoved mover.

On all levels of conceptual activity, we find irrational emotional judgements or decisions which form an order. We find also that the revolving particular totality of our recognition may be entered at any spot. It may often be convenient to enter it at the a-priori level of concepts-by-postulates and to look from there for intuitional concepts and for corresponding perceptual verifications. Whenever we follow this order, we must not overlook the possibility that the observational a-posteriori experience of our past will influence selections and recognitions of abstract forms and will suggest to us, consciously or subconsciously, tentative postulated solutions and theories. All conceptual guesses are educated guesses —educated by the total personality of people who are working with knowledge.

The development of levels of thought in children has been clarified in careful experimental work by a Russian psychologist, L. S. Vygotsky.[13] He contends that children start to develop vague thought-images or particular observations at the age of three years. Between the ages of seven and fourteen, this image complex distinguishes itself into concepts of the general properties of elements which particular events have in common. Finally, under education in schools, the elementary concepts are placed in conceptual hierarchies and positioned in order. What Vygotsky shows as genetic development in the child throws light on the conceptual functioning of the adult who lives on all three levels simultaneously.

David Hume[14] claimed that our thoughts can never exceed our original stock of perceptions. However, he included under such original material internal impressions, which include emotions and passions. So, according to Hume, thoughts deal with more than percepts; they also deal with internal experiences. Even so, the statement appears rather narrow. Abstractions may use as objects other abstractions, the so-called secondary observations.[15] In this process they may lose entirely the traces of original concrete events of reality or appearance—in concepts by postulates.

While it may appear obvious what we mean by thoughts, it will still be better to identify their essence a bit closer. Their character can be identified by an example which we take from mathematics,

the proudest child of human reasoning. In geometry, we consider a triangle as a two-dimensional figure composed of three lines which intersect at three points, forming there three angles. When we draw this on paper, every line as it is depicted from the lead of a pencil must necessarily have a bit of thickness of width, small as such dimensions may be. However, in our ideal world of mathematics, each of the three lines exists without any bulk. Geometry says so. It assumes bulklessness and does not care how the impure human drawings actually behave.

In antiquity, Plato speculated that such ideas, of bulklessness, exist really in an eternal realm and that we can experience them immediately in a state of mental purity, just as we are able to see concrete objects in earthly bulk. According to Plato, these ideas are forms or creative powers which transform potentialities, inherent in prime matter, into particular objects in this world.

Even Immanuel Kant, in all his suspicions against knowledge of eternal things-in-themselves, felt that synthetic judgements in mathematics were as certain as pure concepts.[16]

Today, science likes to downgrade the eternal correspondence of absolute certainty in concepts. Today, science looks at idealizations as merely models—as sets of assumptions that are abstracted by man and are selectively simplified to a fine degree.

Modern science means by "model" a pattern, a map that is true within itself and is composed of intellectual images of certain chosen premises. Correct reasoning draws conclusions from such premises. On all steps we deal with intentional, subjective oversimplifications. Even with concepts by intuition there will always be differences in perceptual concreteness, but the differences will be small enough that we can neglect them for our intellectual purposes, so that we can safely use the simplified ideas on a less precise reality. In our conceptual world, we have thus just omitted individual deviations—the bulk of geometric lines—and we have done so for clarity and recognition.

This means that idealization—intuitive or postulated— is regarded as a subjective construction, an artificial image-building which can only approximate appearances,[17] or certain characteris-

tics hidden in appearance. The moment man passes to generalizations, from history to logic and from time to eternity, he has exchanged experience for something artificial, which is more perfect and more intelligible.

Structures of concepts and their relation to perception were given thorough consideration by Kant.[18] In his critical approach to metaphysics—against philosophical arguments about freedom of will or immortality of the soul or the Supreme Being—he turned to an investigation of the limits of human knowledge. Kant's system is usually reported under metaphysics. It should, however, be obvious that his statements carry great impact on theories of knowledge; we will, therefore, give him proper consideration here.

Kant's special terminology aims at precise terms for each step. He regards the totality of external objects as a so-called world of appearances which exists for us humans only insofar as we can recognize it through a combination of senses and thoughts. In our knowledge, we can be sure only of the knowing subject and of his imagery. The objects—the so-called things-in-themselves—are definitely not just a result of our fancy or dreams. There must exist a world of reality behind the appearances. It is this real world which makes the appearances appear. But while we admit such an existence, this natural world may just as well not exist for us humans since we are not able to recognize it. For us, it is beyond our bounds.

This human world of appearances is ours in knowledge, which is a combination of thoughts and percepts. All events have form and content. Our thoughts—the concepts—determine the form, and the senses, directed by thoughts, determine the content of our experience.

According to Kant, we know events only by having within us certain organizing principles and concepts. We possess, first, methods of knowledge which are built into our human apparatus and which have to go to work before we approach emanations of external objects. From such prior concepts, we distinguish the subsequent knowledge—a posteriori—which stems from experience of perception. We look at the landscapes through colored glasses and cannot remove the lenses.[19]

In the realm of pure concepts, Kant lists four so-called categories under which we order our thoughts: quantity, quality, relation and modality.[20]

When we turn from pure concepts to empirical sensual knowledge, we live again under a-priori concepts which determine in advance the form of our perception. We have here first, according to Kant, concepts of space and time—to him purely subjective conditions under which men experience all percepts. According to Kant, also, we humans are pre-conditioned by additional conceptual principles in all our sensual experience. The principles are applications of the four pure categories.

We mentioned before David Hume's contention that there is nothing in thought which has not been before in the senses, at least partially. Kant seems to turn this opinion around: nothing can be in the senses which was not preconditioned by thought; the reason is primary—or a-priori.

Closing our report on Kant's contentions, as far as they concern methods of knowledge, we like to add a few remarks. The precision of his distinctions between prior forms of thought and posterior content through senses may have its proper use in the clarification of some processes and theories. However, even this will remain true only in a very general way. Whenever we mortals experience anything, we will find interactions which move and countermove in all directions; also, from the perceptual contents into the a-priori forms. The sensual contents help to shape the forms into proper, integrated adaptations. We think and we sense in unity, in which form is partly shaped by content and in which content appears under conceptually pre-selected forms.

In knowledge, we also have to be aware of the inherent things-in-themselves which are breaking through constantly from irrational insights and from necessary assumptions of axioms, even into the conceptual forms and into the methods themselves. Kant's careful exclusion of this other-world-beyond-knowledge works only in the thin air of pure reasoning—and not even there, fully. In Kant's time one of his faithful followers, the German poet Friedrich von Schiller,[21] added to Kant's contention that emotions and

irrationality shape man's destiny. He pointed in this context to art as the median realm between the natural and the ideal status.

D. *The Memory*

This may be as good a place as any in our discussion of human faculties to add a few words about the memory, that mysterious ability of ours to store percepts, concepts and emotions of the past —or better, images of all of them—ever ready for retrieval and always enriched by the new experiences with which they mingle.

In its work, memory is obviously influenced by many forces, and also by irrational drives. Memory is selective and prejudiced. Freud has shown that we forget what we do not want to remember and that we retain what our emotional ego prefers. The store of memory is in constant flux around a core.

In spite of its tremendous importance for human functions, we find very little published about the memory. Obviously, even our advanced period knows almost nothing about the gift of remembering. We simply do not know how it is produced or where it is localized. The hypothesis of Gestalt psychologists—that electric remnants between brain tissues are responsible—has no evidence to support it and does not lead to any usable conclusions.

The psychological terms of associations also do not make the problem of memory any clearer. It would be wiser and closer to the truth to admit that at present we are ignorant in this field. All we can do is to appreciate memory for its enormous participation in learning and in all levels of knowledge—in perception and concepts, in judgments and insights, and in the shaping of all the methods which we apply. Memory, which somehow connects recollections of past events with present awareness, also plays an important part in all the verifications of science—a rather intangible element in so-called tangible proofs.[22]

In identifications and interpretations of memory, past images and present objects seem, strangely enough, to coincide as one and do not appear as the conscious matching of two.[23]

In more recent times, Henri Bergson[24] has tried to look closer

at memory's strange functions. He does not see any way to locate it in the cells of the brain. In certain illnesses which involve loss of memory—amnesia—we do not find, according to Bergson, any precise physical lesion, but we do encounter abrupt and entire loss of whole periods of the past. On the other hand, in other disorders where cerebral portions are physically damaged—in aphasia—we find that memory still functions—that it is only diminished in intensity. This seems to indicate to Bergson that the mechanics of the brain insure the working of recollections but do not imprison them in cells.[25]

Bergson distinguishes between memory and habits that are events of instant recognition. Habits are, to him, recollections which come from the learning of ever repeated lessons. Since repetition as such could hardly create anything new that was not before in the original text, Bergson assumes that our minds analyze the original text into fragments, by repetition of parts, and then unite these fragments, which results in a subconscious storage of ever-available reactions. The true particular memory of past events serves, in this way, as a base to habits, and both of them shift into each other constantly.[26]

From a given situation, we extract that which is useful in it and store these portions for eventual later reaction. The memory coexists with consciousness, overlaying perceptions with reflections, and mirroring perception in reflection. We have here again an integrated fluid process, an intermingling of ideas, observation, emotions and memory, all in turn mingled with emanations from objects. All this is an organic process and not an assemblage of discontinuous multiplicities of fragments.[27]

The past continues to flow through us in hundreds of channels. All our sensations, thoughts and emotions are not just of an isolated present moment, but are with us in continuous flow, linking the total past to the total present.[28]

This concludes our remarks about mental faculties of knowledge —the percepts, the concepts, and the memory. We know embarrassingly little about the physiological causes of any of these faculties. Observations, even theories, about the bases of our mental opera-

tions are extremely meager. There is some hope that one day our scientists may discover what is still entirely lacking. Human knowledge will always remain limited and we will never be able to enter certain areas. But the functioning of human faculties should not be outside of our realm forever.

Chapter V

CORRELATIONS OF PERCEPTS AND CONCEPTS

IN THE preceding chapter we discussed mainly perception and concepts. We now propose to discuss, in more detail, how both may be arranged and put to work in interaction.

A. *Customary Correlations*

Everything we investigate will have to be approached either in historical or in topical order. In an historical system, elements or subassemblies are described as they occur, in succession of time. In topical order, we place percepts or concepts in levels of hierarchic principles, moving from particulars to universals, or in the opposite direction, from universals down to elements or particulars. We may also move sideways from elements of one level to other elements of the same level.

By such arrangements, we may investigate vertically in depth, going straight up or down from one level of abstractions to another. Or we may work horizontally, looking for related elements on the same abstracted level. This means that we look either for much or for many, either for *multum* or for *multa*.[1]

In explaining relations between percepts and concepts, we will often start from sense data selected under conceptual categories and will move from there to concepts. We match both sets of images

with memory, move to a decision in emotional judgment, come to a "willing" for action, and observe the result which we store partly back in memory. While all this happens, we are experiencing most of it—thoughts as well as observations—in the garb of language.

Or, we may shift the sequence. We can start with a concept, for instance, an idea which is connected with some image from memory, and we scan the events around us for similarities which we can perceive. We may let it rest there. Or, we may start anew at that very point with a chain of correlated concepts. We may also use perception and intuition purely, in habits, short-cutting conscious thought. We said before that such shortcuts happen with almost all our skills, which are first learned through conscious repetition until they move down into subconscious abilities.

In such sequences of percepts and concepts, we speak of "induction" whenever we infer from perceived objects up to concepts, looking for a common denominator in some class or classes of events. And we use the term "deduction" when we move in the opposite direction—from an intellectual concept down to other concepts, or to a correlation in observation.[2] Actually, we cannot separate both methods too exactly, not even in scientific work. The induction is usually triggered by a problem which will often mean a question phrased deductively in thought.

Before we start with observations and inductions, we must already have selected a spotlight of investigation in our concepts; we turn this beam on a narrow area of perceived events. Our perception, therefore, does not mean any more a first step, but already a second one. (Kant's applied conceptual categories which govern all perception refer vehemently to this priority of thoughts in observation.) On the other hand, in deductions we will most likely select and develop conceptual thoughts under some influence of previous factual experience and under consideration of how we can use this on facts. Therefore, our pure reasoning will usually not be so pure.

Another strong bond between postulated concepts, intuitional concepts, and perception is established by the requirement of modern science that a postulated law can only be accepted if it is some-

where verified and if certain predictions become factually true.

In our world of thoughts, concepts and percepts, or in any combination of them, we must be aware of a twofold truth. In the lofty realm of thought—in the area of intellectual potentialities—we are bound only by coherence. All that can be required is the proper structure and connection of statements and conclusions. The factual world of perception requires more—namely, correspondence. Statements must be confirmed, as certain or probable, or must at least be confirmable by observations. Whenever we speak of knowledge and understanding, we must be aware of this twofold truth. We must insist on coherence of abstractions and conceptual connections. And we must also look for sensual verification—for the correspondence.

In the correlation of concepts and percepts, men have always gained understanding by connecting events under the mechanism of cause and effect. Originally, a cause meant, in this context, an active force which worked actually on a passive event and produced thereby a physical change.[3] Descartes, Hume and Kant have raised serious doubts[4] as to whether we can be sure of such forces and changes. They prefer to speak only of relations: If A and B happen, C will happen. Science has followed this approach and sees now in causes merely functions between variables.[5]

Modern science has in this respect even retreated a bit further. In physics, Planck's Quantum Theory[6] dealt with the behavior of small particles in thermodynamics. It was not possible any more to predict precise results for every particle. Starting with the input of a certain quantity of units, under certain conditions, we would arrive only at a fraction of that quantity in the resulting output. The residues would get lost and could not be accounted for. Planck arrived at a mathematical constant for such predictions.

From certainty of each particle's behavior, we come now to a fractional probability of the group; we cannot any more be certain of the individual.[7] Before Planck, similar probabilities were applied in insurance, especially in life insurance, under so-called actuarial or mathematical assumptions. (We cannot know whether the insured Mr. Miller will die at age 55, but we can predict that out of

a million human beings who are, like Miller, today 35-years-old, a certain number will be dead at age 55.) Probabilities, as mathematical fractions, were apparently first advocated by Pascal[8] in investigations of the throwing of dice.

By this kind of probability we mean a frequency ratio of groups of events; we venture to call this an objective probability. From this, we must distinguish cases of subjective probability. When we state that "Dick is probably a happy man" or that "Shakespeare has probably existed", we deal with events which as such must have happened or not. Only my judgment is not fully ascertained. I prefer to call this a subjective probability. Von Mieses has investigated this realm[9] also in mathematical formulas.

Both levels of probability can exist beside each other. In both probabilities, we deal with situations in which residual factors had to be neglected. We must concede that such factors may revenge themselves by distorting a more-or-less small portion of the results, forcing us to accept the results by ratios of probability.

How far we should go in our striving for more precision by hunting down residual aspects will often be a pragmatic question of cash-values. For some purposes, a cruder probability may be sufficient. Sometimes, we may need finer results and may have to use other methods or develop new theories.

By adopting probabilities, modern science has succeeded in building openly its failures into statements. Theories correspond now better to experience, and predictions will become more reliable.

B. *The Hypothesis Compared with Fiction and Analogy*

In the history of science, especially within branches of natural science, the emphasis has shifted from deductions over inductions to a combination of both. Modern science relies greatly on inferences which are neither abstract nor concrete. Science rests on basic axioms and postulates which often cannot be perceived at all and cannot be verified sensually. All they have in their favor is that they support theories which explain other facts. Such entities are, for that reason and with that justification, "scientifically" assumed.

Reichenbach calls such factors—like protons or radiowaves—by a special term added to concrete and abstract; he names them *illata.*[10]

We enter here the field of the hypothesis, which is a combination of induction and deduction. Again, we start usually with a specific question; for an answer, we observe carefully certain selected situations. We abstract and induct relevant factors.[11]

Our dilemma, which makes us turn to the hypothetical procedure, is that intellectual explanations which we are able to propose cannot be verified directly by observed facts. We cannot prove that the universals that we have abstracted from certain events can actually be found in a true set of facts. So, we turn to an indirect proof. We deduce our explanation down into other consequences and then try to prove the conclusions.

To describe the hypothetical method a bit more precisely: after we have perceptibly experienced the problematic facts and the facts which surround the problem, we move to a level of concepts by intuition—the thought-images which denote elements that can be sensed. We describe, identify and classify our elements there conceptually. Then we move to concepts by postulation—intellectual explanations which cannot be sensed but can be grasped either by images or else purely intellectually. Such a reasonable explanation must permit predictions of recurring events. The theory is theoretically developed into postulated conceptual conclusions, and these theoretical consequences are correlated to intuitional concepts—thought-images of facts which can be verified by experience.

In this fashion, the theoretically conceived operation is linked to empirical operation. This verification of the last step in perception decides whether the total conceptual theory is valid or not and whether it can be accepted as a workable explanation. The tentative theory means a possibility which has an option on being.[12]

Sometimes, the hypothetical procedure may really move in an orderly fashion, step by step, such as we have just described. Actually, we will usually encounter interacting influences from one step to the other. When we start with an investigation of the basic facts of a problem, we are already able to select and view things under educated conceptual categories (with definite possibilities

of solutions in mind). On the other hand, the first facts will shape and modify the subsequent conceptual procedure. When we form a tentative conceptual theory, we may then test factually certain portions, and may change the theory accordingly as we go along.

We have tried to show here only a blueprint of a method. It will be left to the deft practitioner as to how he arranges these tools and what he does with them.

While every hypothesis appears, as far as we have described it here, as a joint product of perception and concepts, it will actually always be guided and formed by imagination and inspiration—by an a-rational and a-sensual strength. Every hypothesis is made uncertain to some extent by quite a number of factors. It must be based on axioms and postulates which can be neither verified nor perceived. It must deal with events which are under pluralities of influence and disturbances and which are composed of many elements.

To affirm a consequent, and to induce from there to a cause, is always risky—and is considered in logic even an outright fallacy. I theorize that if A, then B; and I find B. But I might get the same result if I assume a cause C and argue down from there, or it may be A combined with C or D.

It is part and parcel of a good theory to also establish, as far as possible, proof for the uniqueness of the explanation: that this is the only theory which can be confirmed. But it is hardly ever possible to trace a complex effect to all possible causes or conditions. Whenever we form concepts we select certain intellectual elements and omit others. What appears negligible in our original context, on factual grounds—or in concepts by intuition or by postulation or by connections—may later loom up in other problems and may call for a revision of the original theory, under new considerations or pre-suppositions which were originally suppressed. So, alterations of a hypothesis become necessary whenever new and unfavorable observations occur, or when neglected observations or concepts become relevant. Sometimes large revisions of theories may be necessary to account for rather small corrections or refinements of predictions.

In such dealing with reality, the huge realm of hypothetical explanations often has to assert not just an isolated explanation; it must also present a theory which fits into accepted whole clusters of existing other hypotheses.

It is understandable that in such a situation almost every theory lives on probation. Old theories are constantly replaced by newer ones. This means a growth of understanding. Very often, the old concepts are not overthrown or discarded—nobody could prove them directly right before and nobody can prove them directly wrong now. The new explanations will often only supplement their predecessors or qualify them for certain other problems. Usually, the new assumptive hypothesis will respect the previous opinion to which an original insight may have been due.

Every hypothesis strives for a corresponding truth, even if only indirect proof can be offered and even if only a probability is expected: most likely it is this way; but it may be otherwise.

Science is prepared to reverse and refute and change whenever new evidence or new problems show that the accepted explanation was not sufficient. Science may not be "objective"; but it remains forever dynamic, open-minded and self-correcting.

Hans Vaihinger deals with a different type of correlations, which he calls "fictions" and which he distinguishes from hypotheses, warning us that in his opinion most hypotheses will turn out to be actually only fictions.[13]

Vaihinger defines as fictions the conceptual explanations to which no empirical existence or correspondence can be assigned. They are, to him, conceptual constructs without any proof through perception. They are strictly of an "as if" type—factually all wrong, but workable in communications, in practical life, and even in science. To Vaihinger, such artifacts are justified by the service which they render to science or experience, as a mechanical aid in thought processes. We should admit, according to Vaihinger, that they are neither true nor meant to be true.

Vaihinger sets forth innumerable examples for his claim of fictions in scientific theories or applications.[14] He refers, for instance, to "paper money", which is not metal but is said to be

treated "as if" it were. If we take, however, this same example and look at it a bit more closely, we will find that Vaihinger just picked the wrong elements for the abstraction of the universal which both kinds of money have in common. Coin and paper are indeed different, but both are legal tender accepted in economics and under law as exchange and as a unit of economic value. Their abstracted common factor is the function and not the substance, and the proper common universal is actual and not pretended.

Vaihinger confronts us with another legal example. He turns to corporations and deals with them as human beings, which they obviously are not. Actually, corporations are associations of humans and the associations function under law and in economy as carriers of rights and obligations, the same as individual humans do. Here again, in spite of Vaihinger, we have properly a function as the common universal, actually and not by pretension.

Vaihinger sees fictions everywhere. Everything has become the big lie[15] for the sake of a workable explanation. However, almost all his examples are wrong. He has a talent for selecting a false connection instead of the available, common, universal concept which would be true, or at least probable.

C. *Hegel's Synthesis*

Whoever has been exposed to Hegel's dialectical method[16] will remain influenced by this procedure of reasoning for all his life. It does not matter whether we accept Hegel's total philosophy, with its absolute idealism and concrete universals which assign reality to spirit and consider individuals as accidents of spiritual activities. His hostile opponents—for instance, the existentialists Kierkegaard and Sartre—constantly apply his dialectical method even when they refute him. The founders of historic materialism and communism —Marx and Engels—remained faithful followers of dialectics.

The dialectical method is based on the proposition that we find ourselves face to face with opposing concepts in every investigation. Whenever we form an observation or percept, or whenever we arrive at an abstract concept, we encounter its opposite. Whenever

we express opinions or judgments, we meet their contraries.

Opposites, contends Hegel, are necessary to each other. Every selection must mean, at the same time, an anti-selection. Anything that appears has to determine its borders as an entity against otherness. The limits which enclose a particularity are at the same time borders which exclude anything outside of it. When I describe "heat", I must refer, explicitly or by implication, to "cold", the "non-heat". When I speak of being, I can describe it only by distinguishing it from nothingness. We live within the polarities of concepts.

Hegel's next step is to resolve the two opposites—the thesis and its antithesis—into one common, higher level: e.g., heat and cold are both temperatures; being and nothingness are both counterparts of development; man and woman are both human.

In this scheme we find the thesis and the antithesis on the same lower level. They are resolved into a synthesis which actually states a universal abstraction common to both of them, a mutual element of the two opposites, or the one line on which both are extreme poles. We actually isolate this universal element, which belongs to the next higher level in a conceptual system. It is in the comprehension of such unity of opposites, of the positive and the negative, that speculative knowledge exists, aiming at an understanding of the finite as a whole.

The methods of the three steps—the triad—of a thesis plus antithesis resolved to a common synthesis is not a subjective seesaw of arguments pro and con. Also, it does not aim at a compromise between two opposites. It actually leaves each of them intact; it rejects neither of the two, not even partially. It does, however, regard each of them as incomplete and as a one-sided truth, as fragments which await completion by the other and await integration into a higher, common third in which the first and the second disappear. The synthesis becomes an annulment of the two opposite terms of the lower level. Thesis and antithesis are thus apprehended and preserved in the common, higher universal. Hegel's term is "*aufgehoben*", which has the double meaning of "raised" and "extinguished".

Actually, to consider both opposites as annulled and unified in a third universal, is to overstate the fact; and should be corrected. This unification happens only to their common universality, to that portion of each which is partially similar. There must, in every case, remain considerable residues which are not abstracted by the universal. These remainders are not affected.

Here we are reminded again of the fable of the blind beggars at the Indian Court. Placed at different spots around an elephant, they reported how the elephant's leg appeared to one man, the trunk to the other, and the tusk to the third, each giving his partial image of the total elephant. In this fable, the meaning was that we have to take opposing observations of the parts of a thing together to come closer to the whole truth about that thing. What is done by the simple beggars in the fable in observing a particular object is done by Hegel on a conceptual philosophical plane, in a new scheme of combining concepts.

In Hegel's synthesis, the opposites disregard their differences, accentuate what they have in common, and hold hands like friends on common ground. The thesis and the antithesis are actually opposing extremes on the same set of co-ordinates. They are identical except for the opposite spot, and for the positive or negative sign before their identifications (the heat and the non-heat).

We may add here that there is no reason to limit the method to just two opposing theses which resolve in the synthesis, under a triad. Obviously, there is no limit to the number of theses which can be treated this way, as long as they are differing under one common reference. The term "dialectical", which indicates two entities, is therefore a bit too narrow.

According to Hegel, we exist in a vast system of pairs of contradictions. Every unifying synthesis can link itself to another negation of itself; it then becomes a thesis and meets on this level another antithesis, with both arriving at a synthetic universal on the next higher level. Triad follows triad, and triad links itself to the next triad in triadical fashion, up and down and left and right, on higher levels of systems.

Thus, the dialectic forms all structures of knowledge, in science

and outside of science. Hegel not only discovered the precise dialectical method, he was also an outstanding practitioner of this new method. In his works we find innumerable triads: of being and nothingness resolved in development, of old and new uniting in the permanent, etc. Positive magnetism and negative magnetism are raised to polarity. Similarity and difference, likeness and unlikeness are united in essences. Universality and particularity find their synthesis in actual individuality. We should add that we can extend to human experience outside of knowledge or consciousness: laughter and tears resolve in emotional reactions, and love and hatred are sides of emotional attachments. The vast realm of triads finally turns in a circle to an opposite of the original thesis, newly positioned in a total system; and we can enter the overwhelming set of circles at any point.

Hegel wanted, obviously, to overcome the rigidity of fragmented concepts to which classical understanding has reduced everything. He wanted to establish chains of moving conceptual principles which would somehow simulate, at least partially, the continuous fluidity of reality. Contradictions and their unification, and new contradictions to that unification, in a never-ending succession, seemed to him such an approach.

However, this method is still basically the classical abstract procedure of classifications. In the simplest form, the triad works, again, with two classes on the same level—the thesis and the antithesis. A common element is abstracted from both classes and this new, higher universal class then appears on the next level of classifications. This is just another pattern of a combination of two, or maybe more, lower classes, with one higher abstracted class taken from the lower ones. We have already encountered such patterns in the forms of hypothesis or fiction earlier in this chapter. We will meet still another form in Chapter VI, when we look at Aristotle's famous Syllogism.

All these forms, to which Hegel's synthesis belongs, are subdivisions of logical constructions which consider one higher universal concept as the predicate of two lower concepts. Hegel took his name "dialectical" from the discourse among people of oppos-

ing opinions which Plato had developed in Socrates' dialogues. But, according to Hegel, we do not need another person to be refuted. We are quite capable of splitting ourselves and of speaking with opposing tongues to ourselves.

Benedetto Croce[17] raised the objection that Hegel's dialectical method would not work when thesis and antithesis are distinct only by degrees and are not completely opposed. He reproached Hegel for overlooking this distinction in many of his examples.

Whatever the merit of some of Hegel's examples may be, we feel that there is no reason to restrict the method in such a way. Modern science has moved, since Croce, a long way from recognizing only complete assertion or negation, and has learnt to consider them merely as extreme poles on co-ordinates, with many intermediary points. This is the age of fractional probabilities and finer distinctions.

Croce also attacks Hegel for using dialectical methods on empirical individuals and particulars in his examples.[18] Again, whatever the merit of Hegel's applications may be, we do not see any reason for Croce's principle of restrictions. Actually, dialectics are a method of logical reasoning and can, therefore, deal with all kinds of thought-images. This would include conceptual notions of individuals or of particulars.

Such conceptual notions mean, again, classifications on some lower level for thesis and antithesis. It is then always possible and just as effective to abstract the common universal in a synthesis. To give an extreme example, we point to the thesis and antithesis of people with differing basic ideologies, opinions and emotions. Nietzsche expressed beautifully his rejoicing that another man works and feels in a different and opposite way and that love, in a synthesis, must be able to bridge that contrast in joy.[19] The existentialist Kierkegaard and the existentialist Sartre use dialectics constantly on thought-images of subjective entities. They prove it can be done to good avail, even on particulars.

We find a display of the dialectical method on all levels in Hegel's famous *Philosophy of History*.[20] The triad appears there in his distinctions of methodical treatments of historical data. He

separates original history, reflective history and philosophical history. The "original" means reports by eye-witnesses; the "reflective" refers to research, description and ordering of facts which are remote from the researcher; and the synthesis between the two leads to principles which are to be uncovered behind the facts, the philosophical history.

The highest hidden principle of history, according to Hegel, is approached through dialectics. Hegel speaks here of "Spirit", the German "*Geist*", which means to him both intelligence and will and which has to him universal reality as objective spirit as well as human realization in subjective spirit. The highest goal of history to him is the development of self-determination, of freedom—when objective reason and subjective reason become unified in the State. In such a process, the historical man follows his subjective self-interests, but he has an opportunity to succeed only when the time is ripe, when he fulfills objective public interests—the common good—in a synthesis of political activity.

When we read this, we feel reminded of Adam Smith's *Wealth of Nations*, which seems to show a similar approach to modes of capitalistic economics. And we think also of Machiavelli's triad of *virtù*, the ability of the individual man, which must correspond to *fortuna*, the general conditions, to make any useful political activity possible.

Triads appear everywhere in statements and casual remarks throughout Hegel's *Philosophy of History*: Nature as thesis and spirit as antithesis are reflected in the universe;[21] light and darkness meet in primal existence;[22] man and God are posited in the Christian religion.[23]

The dialectical process may have had historic predecessors before Hegel.[24] But beyond doubt, it was Hegel who gave it the precision of a scientific general tool and forged it into a new and basic conceptual method for relations of concepts. It became, through him, a formal procedure, applicable to widely varying opinions and concepts. Ever since Hegel, dialectics have been used extensively by people who differed from Hegel's basic philosophy. It is an approach to unifying diversities in thought,

to reflecting plurality and development, to simulating, at least to some extent, the fluidity of reality on which all conceptual methods use the knives of fragmentation. This is surely the highest peak of abstract thinking, and it goes as far as classical abstractions can actually go. Croce[25] claims that dialectics re-established the coherence of organic wholes. Unfortunately, this praise seems to overstate the merits. We gain, through dialectics, only a simulation of a still rather incomplete reality.

Dialectics work with abstractions and with small fragments through mechanical levels. In dialectics, we deal only with simulations of life and not with immediate experience. Even a well written love story can hardly replace or convey the joy and sorrow of one's own involvement in a love experience. And Hegel's concepts are still only sums and collections of rigid abstractions.

Yet Hegel still looks for essences. His form is strict and conceptual, even if he assigns to his contents the notion of eternity, of the divine, of the Christian Redeemer, or of spirits who have reality in the universe.

Hegel seems to have seen his characteristics in the proper light when he gave his system the name: "Absolute Idealism". It is still idealism, a system of conceptual ideas, even if the content is described as absolute and real.

Compared with the existentialists, who approached reality immediately, Hegel did not find a new path. He is, however, the completer and fulfiller of the established abstract science of classifications. Hegel represents the finest and highest accomplishment of conceptualism and reasoning, just as Mozart in music was the last and best of the "Rococo" and just as J. S. Bach climaxed at the end of "Baroque."

D. *The Dynamic View: Gestalt Psychology, Vygotsky and Bergson*

So far, we have looked at the classical methods of abstraction and classification. They work with immobile conceptual and intellectual elements and then combine such notions and ideas. We discussed there the ingenious devices of the human mind which have become

imparted into our daily lives, into our methods of knowledge and into science.

Still, powerful as these methods are, they remain rather mechanical and are used on a world of events which are positioned in a dynamic process, with constant genuine mobility, with time-duration, and with spontaneous life. Fragmental methods break events apart, form concepts of such dead particles, and use them as building stones for rigid intellectual constructs.

Very often, the results have been fantastic, especially in natural science. But often, the mechanical approach will not be adequate and will not bring sufficient understanding. We will then need different procedures which contemplate a living entity as such. Sometimes these other methods may be needed instead of a fragmented analysis and synthesis. Often, the new methods may just have to be added to conventional procedures of classification, and will have to be used in complete integration.

Let us take a first step in this direction and look at the views of psychologists who aim at total percepts. They say that the human mind recognizes psychologically a whole particular event in a flash, by imminent recall.

Actually, we find ourselves limited here to sensual perception. But in our totality of functions in recognition, such different views of the perceptive faculty will naturally also affect concepts and judgements which are intertwined with observations. What will be said in our context about perceptions, transfers itself eventually to the level of concepts by intuition, the thought-image denoting events which can be sensed.

We turn first to Vygotsky, a Russian scientist.[26] He promotes the viewpoint that properties of a part at which we look in static selection may often depend on the position of the part within an organic whole. He refers, as an example, to the chemical analysis of water into hydrogen and oxygen. Neither of the two elements possesses properties of the whole. Each of them has properties which the whole does not have. And the whole has not combined properties of both. Water extinguishes fire, but hydrogen burns and oxygen sustains fire.

Other examples could be found coming from investigations of events which involve actions of lively organisms or of social complexes. Here, the essence of temporal situations is very often not the same for more than a moment. Man's personality, for instance, is in constant change as new experiences enter and old experiences flow out.

So, it often becomes important to supplement the mechanical view by immediate consciousness which turns on the functional whole. This has been attempted by a school which originated in Germany under the name of "Gestalt Psychology".[27] Its American followers have continued to use the German label. The word "Gestalt" means "form", but with a connotation of life. "Shape Psychology" would come pretty close to the original meaning.

Pattern recognition is the word which data-processing people have chosen for their first tentative steps in a similar direction.[28] The term tastes of the mechanical, and so do their approaches.

Let us now turn to an example of the dynamic attitude. I go to the public library and ask the librarian where I may find Pankard's *Pyramid Visitors.* I add that I just cannot recall the first name of the author. She looks up from her book and replies the name is Packard and not Pankard, that his first name happens to be Vance, and that I also have the title wrong. Actually I mean his *Pyramid Climbers,* and I will find it in the Sociology Department, on the second floor.

The librarian knows all this at once; her answer is an immediate reaction. She does not have to look up anything and she does not apply any analytical method. She does not riffle through index cards or address the new computer for Pankards or Pyramids; in all probability she would have to search for hours in vain because my question was incomplete and faulty.

Or another example: I meet Fido, the neighbor's black poodle, who is wagging his tail and running towards me on our street. I just know him. There is no need for an orderly search of my memory to tell that he is nothing but a dog and that he is not any of all the other poodles with whom I have the good luck to be acquainted. Or, I read something and know instantaneously that it

is right, without having to look up a hundred references and without applying a few hundred comparisons. Or, I write a letter and know that what I write is more-or-less exactly what I want to convey. I do not need several hours of scrutiny using dictionaries and grammar books to check my verbal constructions.

There is nothing mystical about this type of total knowledge; or better, there is nothing more mystical about it than any other forms of knowing. The Gestalt psychologists have, unnecessarily, tried to explain it by saying the nerve cells in the cortex of our brain are arranged similar to the structure of the events—in topological parallels—and that we are therefore able to receive a total impression of an event in the cortex. For instance, a three dimensional object would be viewed in simultaneous reception by the brain cells, which are arranged in the cortex in a three dimensional position.

It is strange that such mechanical explanations are offered for a rather unmechanical opinion. There is not the slightest evidence for these physiological explanations, especially not in the many psychological experiments with animals which Gestalt psychologists have carried out.

Henri Bergson, who worked independently of the Gestalt psychologists but came close to their views in some respects, has offered the enlightening term of "Instantaneous Recognition". He refers to the fact that we form a habit-memory from repetition of lessons.[29] In this process, all learning starts from consciousness and moves down to automatic total representations and motor habits, from which overlapping images are retrieved in actual total recognitions.

Bergson raises the interesting question[30] of how mere repetition in learning could produce something that was not in the original material. His explanation is that the repetition itself decomposes the complex data into parts and then recomposes these parts into a subconscious totality. According to Bergson, we act in a pattern of classical analysis and synthesis of abstractions and classifications, producing a habit that moves into subconsciousness and intuition.

This theory has at least, the advantage of corresponding to veri-

fiable observation. We must bear in mind that the explanation reaches way beyond actions which are based on teaching in schools. Man is taught constantly outside of school, before and after it.

Bergson seems to have succeeded in constructing a beautiful synthesis of two opposing attitudes. Whatever the reaction to his explanation may be, we surely do possess and use constantly "instantaneous recognition". If our experienced order of knowledge is to be a true image of corresponding facts around us, if our methods shall be described as proper maps to existing territories, we had better allow for the lively view. Sometimes the dynamic approach will help to supplement the classifications. Sometimes it alone will provide the proper answer. It will often substitute as a quick recognition when details are not relevant. Very often it will help us to experience an appearance of a detail in reference to the whole layout of the surrounding field.

Chapter VI

MORE DETAILS ABOUT REASONING: LOGIC AND MATHEMATICS

LOGIC IS a system of rules devised for the reasoning power of men. It deals with procedures which lead from certain conceptual statements to other statements in the realm of concepts.[1]

Factual observation may translate percepts into conceptual images—so-called concepts by intuition. In knowledge, conceptual conclusions will have to be tested somewhere on perceptions. But despite its function in factual observations, logic itself, in pure form, deals exclusively with selected intellectual possibilities and, as such, does not care whether its intellectual symbols correspond to sensual reality.

A. *Language and Symbols in Logic*

In the classical period, logic presented itself mainly in the form of an analysis of language—in declaratory sentences—which were called propositions. Proper methods of connecting subjects and predicates, through copulas, expressed the channels of reasoning. Obviously, the goal must have been to reach the thoughts behind the words and to observe reasoning and contemplation as they became evident in the flesh of sentences.[2] In orthodox logic we speak of propositions, but we mean apparently thought-images and their manipulations which appear in verbal symbols. Often, we may even infer to a further level—to the elements of events which are imaged in thoughts or in the concepts of intuition.

While classical logic worked toward an analysis of language, modern logic has turned to non-verbal symbols.[3] Almost all modern logic calls itself symbolic for this reason, and expresses itself in quasi-mathematical signs instead of verbal forms. This reduces human reasoning not anymore to words but to mathematical notations.

The argument in favor of this new trend seems to be that the new idiom is shorter and more precise. It is also argued that the new symbols can be manipulated easier. The disadvantage appears to be that the new presentations denote only form and not any content. We must, therefore, translate the symbols back into verbal statements, at least at the beginning and at the end of a chain of reasoning.

It seems that the use of symbolic expressions for formal thoughts was first advocated by Leibniz.[4] He spoke of a calculus of reasoning which would consist of quasi-mathematical signs. In his opinion, such a system could be read by Germans in German, by Frenchmen in French, and by Spaniards in Spanish. In this fashion, it would establish a universal and international vehicle of communication among all scientists.

Apparently Leibniz only proposed this, but never did anything to work out such a system. Modern logicians have taken up this task. An example of the modern method is the translation of the sentence that John Smith (b) has (=) red hair (rh) into : b = rh.

The first really symbolic system of logic was apparently established by George Boole in his famous *Investigations of the Laws of Thought*.[5] This was published in 1859 but was ignored in its time. Boole only gained fame recently, long after his death. Modern mathematicians have rediscovered him and found his work useful to the needs of data-processing.

In the field of symbolic logic, the modern pioneers seem not to have made much use of Boole's work. It appears that modern logicians started from scratch, although Boole's method commended itself by its simplicity and precision. Boole used letters to represent things or properties. Horned, white sheep became to him:

abc. He added mathematical signs for relations or combinations: plus, minus, times or equal. He used a simple symbol for quantity: v means some and x means all.

In a mathematical sense, Boole's methods do not measure magnitude. He accomplished this by using the basic equation y^2 equals y. This, obviously, can be so only if the constant 1 or 0 replaces the variable y. In this connection, his "1" stands for the sum of all existing classes and his "0" denotes not any class. Or in other words, the "1" means the universe and the "0" means nothing, a complete negation. When, therefore, his y would represent a certain class, the $1 - y$ will mean everything else that is not in class y.

On this foundation, Boole's basic law becomes $y(1 - y) = 0$. Or verbally, a certain class times everything that is not this class will resolve in nothing.[6] His symbols for all or some will often add clarity. All men are mortal would become: $xy = vz$. And, men who are not mortal do not exist would change to: $y(1 - z) = 0$.

Under Boole's rules, the mathematical methods are obviously applicable not only for magnitudes but for any order of events, and especially for relations between classes or propositions. He has added certain principles of operation and manipulation of the symbols by development, elimination and reduction. In symbolic presentations, he arrives from premises at conclusions.[7]

Long after Boole, and mainly independent of him, modern logic has developed symbolic systems on the basis of progress in non-quantitative mathematics.[8] Modern logic, for instance, shies away from the copula of equalization which Boole used constantly. In our time, science has become uncertain as to whether properties are real and substances exist. The modest sign of "implying" is now used exclusively, and the symbol is: $\supset$. Aristotle's "all A is B" would now be written : $A \supset x(fz \supset gs)$.[9] Boole used to say this much more simply : $xa = vb$.

To a small extent, symbolic logic has also used geometric representations. John Venn modified so-called Euler diagrams. Here, a rectangle is drawn as a field of reference and is the "field of the universe of discourse". Into such a rectangle circles are placed which represent classes and which show their interrelation

by intersecting. The overlapping segments are within the two-or-more circles and show, visually and geometrically, that so far the different classifications imply properties or substances that both have in common.

These are just examples to show what symbolic logic tries to do and how it does it.[10] Actually, symbolism has almost taken over logic, and it has become impossible to talk today about logic without acknowledging this state of affairs. Still, we would like to raise the question: is all this symbolism really worth the trouble? Engineers and natural scientists are apparently used to a technical, mathematical jargon in their work and generally prefer sign language to words. Adherents of the cultural sciences may find occasional advantages to symbolism when it permits here and there simpler and clearer expressions. But on the whole, they will find it clumsy to apply to their work, which is usually not dominated by quantities and mathematic formulas. Also, it seems hardly recommendable to use special codes which are not understandable to outsiders, and not even to some co-workers in the particular field or in related fields.

From here on, we will use symbols occasionally when it appears convenient and will otherwise stick to normal language.

B. *The Impact of Classifications and Definitions in Logic*

Classes are the units which our connective reasoning—the science of logic—uses in its work. Like any other science, logic must start or end, somewhere, with descriptions of our actual observations. But, we deal in logic only with the intellectual image of such facts, with concepts by intuition. And we deal only with certain narrow portions—with the universals, which are taken out of appearances and are formed into a notion.

Traditionally, logical science is divided into deductive logic and inductive logic. Deduction means reasoning from premises to conclusions. Inductive logic establishes rules of evidence for valid perception. Both branches are, of course, strictly conceptual in viewpoints and methods. The prevailing attitude is that thoughts are connected with perception, to some extent, and are verified by

it, but only indirectly. There is accepted a correspondence, a relation, but never an identity. Our thoughts are of different character, different altogether from observation, and when my theory is proved by perception, the intellectual prediction remains parallel, and not identical, with perceived facts.

Let us turn first to deductive logic. In every theory, we deal with postulates—the basic intellectual rules. We reason from concepts to consequences under established, orderly principles.

The device of definitions shows how logical methods work. Strangely enough, the literature of logic treats definitions rather lightly, altough they are one of the most widely used tools of reasoning in all branches of science.

Definitions signify the spot a concept holds in the hierarchy of classes. The definition brings a certain complex term to better understanding by replacing it with a combination of class and species, of genus and differentia. A grandfather becomes, according to this, the male parent of the parent of a child.

In definitions, the original term is called a *definiendum,* meaning the something which should be defined, and is equalled by the *definiens*. In such an equation, the explaining *definiens* states first the upper class to which the original term belongs and then the differences which bring it down to the proper lower level. A ranch house is a residential building of one floor in a contemporary rural style.

The term which shall be defined is usually a sub-complex which exists somewhere in the middle levels of a conceptual hierarchy of classifications. We reduce it by abstractions into universal elements of higher and lower orders. We may take one of these elements, which will usually not be atomic but will at the same time be some sub-complex, and may break it, by the same method, into its parts. Where we start and how far we go are strictly left to our judgement, and will depend on the problem which we intend to clarify. In this connection, we owe gratitude to Dewey's pragmatism, which placed such emphasis on the cash-value of questions.

The same term may have certain relevant universal elements under one viewpoint and may have entirely different elements and

definitions under another context. An automobile may appear as a mechanized vehicle of transportation; in another discourse, however, it may be a unit of the current inventory of a dealer.

Definitions date back to the very beginning of logic. Plato used them extensively in his dialogues to clarify ethical rules of conduct. In all natural and cultural sciences, we use definitions to pinpoint structures and relations and to recognize uniformities and differences. Definitions allocate conceptual indentifications. They bring particulars down to elements and reduce vaguely known complexes to accurate classifications. This allocation will often, in itself, lead to conclusions and will, at least, remove some fog.

Denying any importance to definitions, Wittgenstein[11] called them mere expedients in presentation, saying that equating "a" with "a" could hardly lead to any meaning. Actually, definitions are never of Wittgenstein's pattern. In their simplest forms, definitions look more like : $xa \supset$ (vb plus vc plus vd). Boole used a more involved example: that wealth (w) consists of (=) goods short in supply (st) which either cause pleasure (p) or avoid pain (r, not p). According to Boole, then, we would arrive at the equation: w = st (p plus r [1 −p]). This seems rather far removed from Wittgenstein's a = a.

Obviously, definitions replace a complex term by a combination of universal upper and lower terms which are more elaborate and say quite a lot more than the reduced term could do. This replacement alone means a manipulation and permits, almost automatically, further conclusions, operations and subsumptions.

C. *Logical Methods*

Aristotle was the first logician who took simple declaratory sentences and analyzed them. "All men are mortal" contains definite elements, namely a subject (men) to which a predicate is ascribed (mortal). Both are connected by the copula (are). We may add that we actually have a fourth element—namely, the quantifier "all" before the subject of men.

Now, either subject or predicate may differ by "quality", which may be either affirmative (men) or negative (no-men). A simple

example for such a negative predicate would be that "all Americans are non-Europeans".

Subject or predicate may also express different quantities which may be either universal (all) or particular (some). The singular —for instance, in "Socrates is wise"—would here be considered as a universal since it covers the whole existing class of one member.

Out of these few simple elements, Aristotle formed four primary propositions: All A is b; all A is non-b; some A is b and some A is non-b. Names were attached to these four forms: universal affirmative and particular negative. In later classical logic, identifying letters were used to symbolize these four classes: A,E,I and O. These are the first vowels taken from the Latin "*affirmo*" and "*nego*".

It is important that in logic we become extremely class-conscious. We must remain aware of the fact that subjects as well as predicates always indicate membership in conceptual classes. "All Frenchmen are Europeans" means actually that all members of the class of Frenchmen are considered to be some members of the class of Europeans—which has also other species of members beside the French nationals.

We see immediately that such statements cannot necessarily be reciprocal or symmetrical. In our last example, we can obviously not reverse subject and predicate and we cannot say that all Europeans are Frenchmen. The logical reason is that "Europeans" covers a wider class which has also other sub-classes. Classical logic attaches to this differentiation the term "distribution". A subject is distributed if it covers all possible members and it is not distributed if it covers only a part of the class. In our example, the subject "Frenchmen" is distributed, while the predicate "Europeans" is not. Tables have been developed in classical logic to show the possibilities of distribution in the four primary propositions.

To fit statements into the class-patterns, logic has sometimes tried to translate vernacular sentences into stricter form. "Bagpipes make noise" changes here to "All bagpipes (quantified sub-

ject) are (copula) things which make noise (predicate)". To indicate distributions can, by the way, be done much easier by using Boole's symbols of x for all and v for some. According to Boole, for instance, the statement that only the brave deserve the fair would become : xs ⊃ vp.[12]

Based on this analysis of propositions, Aristotle developed three so-called laws: the law of identity (a = b); the law of contradiction (a = −b); and the law of the excluded middle (if a, then not b). Actually, these three laws have become completely ingrained in our daily reasoning. They reach much further than a first glance will indicate. Here again, we must pay close attention to classifications.

The law of identity means that a member of a certain class belongs to another class, or has properties which belong to another class. It may also mean that one member has elements in common with other members of his same subject-classification. Symbolic writing, in my favorite Boole style, will make this clearer: xa = vb; or xa = (vla plus v2a plus v3a); or vla = v2a. The law of contradiction shows the same relations with a negative property or substance. And with the law of the excluded middle, either p or q points to the important relation that one conclusion may be produced by either of one of two premises.

What can be done with simple sentences—with only one term for each part of subject or predicate—may just as well be done with compound primary propositions, which consist of several connected subjects or predicates. "Some English knighted politicians were poets" would first have to be translated into a logical pattern and would then become: "Some (quantifier) politicians (subject) were (copula) knights, Englishmen and poets (compound predicates)." Such compound compositions are handled like simple sentences. Both groups reveal proper classifications and connections.

From primary propositions, simple or compound, we turn now to the secondary statements which deal with the relations of several complete primary sentences. Here, we use whole primary sentences as subject or as predicate. If one complete sentence is

true, the other must be true or must not be true. Or, we may use subaltern structures: if the first sentence is true, the second is true. Just as we stated about propositions, here we may or may not be able to turn predicates and subjects around. The statements may be reciprocal or they may not permit the reversal, depending on the class-relations.[13] This is merely a parallel to our question of distribution in primary sentences, which is here applied to the whole sentences with which we deal.

A revered form of secondary reasoning is still Aristotle's famous Syllogism. We have in this a first complete sentence, the major premise: "All men are mortal". Then comes the second complete sentence, the minor premise: "All Greeks are men". Now follows the third proposition, the conclusion: "Therefore, all Greeks are mortal". In classical logic, this was represented by letters: A=B; C=A; therefore: C=B.

In our example of the Syllogism we used simple propositions for all steps. The middle term "men" is eliminated and does not appear in the conclusion. Only the other two elements appear in the concluding proposition: the Greeks and their mortality.

The two premises jointly suggest the conclusion. To understand better what is happening here, we must again become extremely class-conscious. Actually, the first or major premise states that a certain class—"all men" is included in the predicted class of mortals. Our second or minor premise merely asserts that a certain subclass or species—"all Greeks"—belongs to the more general class of the subject in the first premise—"all men". In the conclusion, we express only that what is true of the whole class—of all men—must naturally also be true of the subclass of that whole class—Greeks—who were, after all, already covered by the original larger classification of our first sentence.

Or to say it differently: If every member of a certain class indicates a certain property, and if a particular group is included in that subject-class, then that particular group must have the same property. We have here a *dictum de omni*: What is true of all members of a class must also be true for some of them.[14]

Simple and obvious as this method may be, it has retained its

attraction and importance through thousands of years. It has earned its place because it is efficient in deductions from general laws and useful in subsumption of facts under rules, or better, of conceptual images of perceptions under postulates. In the legal field, for instance, it is used constantly for this purpose. Murder is defined as a combination of certain actions. We find that Smith has done all this. Therefore, Smith shall be electrocuted.

Descartes objected to syllogisms.[15] In his opinion, they do not discover anything new, but are only of avail in the communication of what is already known. However, logic and conceptual work can never create something out of nothing. They only break down and connect elements, mainly in classifications. The syllogism helps greatly to do this and to clarify relations between universals and particulars. In this fashion, often new results are accomplished (our murderer Smith will even be electrocuted). Or, at least, results are produced which were before not visible to the investigator.

With this, we move to the inductive branch of logic. We said before that inductive logic deals with conceptual rules governing the evidence of perceptions and their translation into concepts by intuition. Obviously, every branch of science will have here special methods which are custom-tailored to its needs and postulates.

Experimental tests by a chemist will be quite different from methods which a lawyer uses in establishing proof before a judge and jury. There may be some general principles which all such methods have in common; they must however, be qualified by the differences in every branch of science, and it will have to be left to each branch to present its own package.

Logic, in its total process, is a very sensitive tool and must be handled with care. It can easily be misused to wrong conclusions, through errors and bad intentions. It is important that we remark on such pitfalls—the so-called fallacies.

It can happen that comparative observations are presented as historical. This means a confusion of logical levels. A famous example is Rousseau's Social Contract, with its moving tale of

how man has decayed through history from pastoral innocence to his rottenness in social organizations. Another example is presented by Darwin's followers, who claim long historic developments, also in cultural fields, for situations which actually coexist beside each other. Neither of the two presents proper evidence for monistic simplification of topical factors.

Among other fallacies which misguide proper conclusions, we find the argument *ad ignorantiam.* The absence of proof is taken for presence of disproof. Rationalists and materialists love to quote the surgeon who had never seen a soul when he cut up human beings or corpses. He had, by the way, not seen matter or reasoning power either.

There may be a fallacy of significance. The premise may be proper, but it does not justify the conclusion. Man functions physio-chemically; therefore, he can only be physio-chemical, with all his other functions stemming from this.

We also encounter the fallacy based on misplaced authority. This fine football player endorses that good toothpaste. Or the famous baby-doctor signs a petition against nuclear testing.

A more intricate fallacy consists of the wrong connection of an inductive fact to a conceptual cause. Two researchers drink highballs every evening and get drunk every time. They want to track down the cause and vary one variable, namely the liquor. First they mix scotch and soda-water. The next evening they mix bourbon and soda-water. For the third meeting it becomes soda-water and rye whiskey. The common unvariable element in every test is the soda-water. So, they conclude, it must have been the soda-water which caused them to become intoxicated.

Our last example hints at an extremely dangerous fallacy which we encounter very often and which is, unfortunately, usually a bit harder to recognize than the one in our drinkers' story. It is the fallacy of the single cause for a complex result. Any cause may be necessary and the result may be conditioned on it, in the form of a *conditio sine qua non.* Without this condition, the event does actually not occur. I remove a bulb from a television set, for instance, and the jazz band with its whole performance

vanishes from the screen. But I can hardly conclude that nothing but the bulb caused the performance to exist. The bulb was a condition, one of many, but not the only one.

This flaw in arguments is very often not so obvious. But, it exists in almost every monistic view which elevates one aspect to the principal motive. We hear, for example, that life must have evolved from matter, that economic interests determine all human actions, that steady jobs will prevent crimes. All ascribe a condition to a single cause, without proof.

Logic consists of intellectual concepts, and concepts depict possibilities; their corresponding realities may often include residues which were simply omitted when the intellectual images were drawn.

Any warning against failures in rational reasoning shall, of course, be uttered with due respect for the overwhelming contributions which proper logic has made to understanding for thousands of years. But it can never be overlooked that reasoning power could produce whatever it has accomplished only in integrated cooperation with all other human faculties.

D. *A Few Words about Mathematics*

It may appear odd that we treat mathematics as an appendix to logic and that we talk about it in a few paragraphs. However, we merely want to show mathematics' essential character within theories of knowledge.

Whoever works in natural science, as a researcher or professional, will have to be thoroughly familiar with certain aspects of the mathematical field. In cultural sciences, mathematics plays a relatively small role; it consists mainly of statistics and of simplified presentations.[16]

Mathematics and logic have one very significant thing in common—they must both be regarded as completely conceptual activities. Mathematics is a theory of symbols and their manipulation, and not of things. Its fundamentals are neither based on experience nor are they necessarily in conformance with facts.[17] In

our preceding discussion on symbolic logic, we pointed to the close connections between non-quantitative modern mathematics and modern symbolic logic. New methods of teaching mathematics seem to aim also at logical explanations and connections for quantitative mathematics and its handling of magnitudes.

Just as any other branch of science, mathematics has a pure and an applied branch. In pure mathematics, the deductions are not linked to verifications of contingent statements, while practitioners of applied mathematics must be concerned about verifications at all stages. It would be bad, for instance, if the stresses for a bridge were not based on proper formulas.

Moving into non-quantitative realms, mathematics has become a science which draws necessary conclusions in symbols.[18] It is not any more merely a science concerned with quantities. In this new extended form, as well as in the classical form, it aids in other fields; although it does not replace them. There is mathematical logic, just as there are mathematical optics or mathematical economics or mathematics for employees' pension funds. Mathematical logic is formal logic. However, formal logic is by no means the whole of mathematics.[19]

Logic proper concerns itself with the coherent organization of concepts. Its methods use mathematics for unmathematical goals. In the opposite direction, mathematics uses logic, but also more than logic.

We find the interaction of mathematics in other fields, including the cultural sciences. It is everywhere a service and nowhere a master, and it exists also as its own entity—just as logic does and just as our theories of knowledge and values do.

Concluding our remarks about logic and mathematics, we must again stress the plurality and interaction of all faculties and of all methods of understanding. We have looked at the organization of concepts in isolation but only to understand and to handle our material better. We must never forget that reason is only one faculty among others and that all abilities and approaches are interconnected and intermingled in all performances.

Chapter VII

IRRATIONAL INFLUENCES ON KNOWLEDGE

MAN IS NOT only a rational being—he does not only think—he is also a feeling, seeking, desiring and aspiring being.[1] Knowledge involves the total man and is produced in an interaction of all human faculties.

A. *Irrational Elements of Creative Work*

In previous chapters, we have looked closely at perception—the sensual observations—and at concepts—the lofty realm of organized thoughts.

Irrationality is a third human faculty. The linguistic term "irrationality" covers all that is not rational or is not "thought". We may add that it includes also all that is not observation.

Max Planck—physicist, Nobel Prize Winner, and founder of the Quantum Theory—confesses: "Ultimately, any new (scientific) idea is the work of the author's imagination and to this extent, progress is tied to the irrational element at some point."[2]

John Dewey, the pragmatist and prophet of the practical utility of all questions, stresses the balance of consciousness and unconsciousness: "The unconsciousness gives spontaneity and freshness, while the consciousness give conviction and control", and he concludes with the need for "interaction of the near and the far, the imagination and the observation in thought, emotion and senses".[3]

We may go back to St. Augustine, in his *De Musica Libra Six.*[4] He describes musical impressions as a complex mixture of diverse occurrences: physical sound, faculty of hearing, image and memory, classification and evaluation, and finally, enjoyment and emotional unification of the soul with a universal principle.

Closer to our time, we find Alfred North Whitehead saying that "the power of incorporating vague and disorderly elements of emotional experiences is essential for advance and novelty".[5]

The positive character of irrationality is expressed in the "subconsciousness" of the psychoanalysts, or in the "will" of Schopenhauer. The common man's motto is "emotions and judgements".

We will use the term "irrational" all the way through this chapter. It is generally accepted in literature which we will quote. And the reality behind the word is mighty enough to take care of itself, even under a strange name. Human emotions, just like any other actual occurrences, can of course be described by rational concepts or can be observed in their emanations. But these will produce only images. A cook book may give a recipe for a meal and may teach a girl how to prepare food. But the food itself, the real article, is something immediate and quite different. So are love and hatred, as are all our human emotions.

When we turn to knowledge and to the irrational elements in it, we like to be as factual as possible. It seems promising to start with extreme cases. We find a wealth of important data about irrational influences on creative work in science and art, when we listen to testimonies of great scientists and artists.

In our time, Dale Hutchinson has collected questionnaires from many scientists and artists and has tabulated the results.[6] He defines as creative effort the initiative and execution of some work of art or science which has to be essentially new.

Hutchinson is greatly concerned about reliable data and he quotes a precedence. The American Chemical Society had questioned 233 directors of research laboratories; about 83 percent of these people admitted in their replies to the basic assistance of insight in their work. In his investigation, Hutchinson sent detailed questionnaires to about 250 famous contemporary thinkers and

artists in America and England. He correlated and documented the replies.

He reprinted, in facsimile, the answers of four outstanding men, including Bertrand Russell, who surely will not be suspected of mystical leanings or of rational deficiency. Russell says that the moment of inspiration was most important in his work and that such emotional moments were exciting—"like quick motoring". Russell adds: "I have no voluntary control over ideas, but I find that by concentration I can plant a topic in my subconscious, so that later ideas come to me". "Starting with day-dreaming, about the nature of my work, ideas pop into my head."[7]

In another questionnaire, Aldous Huxley explains similar experiences: "I do not feel that these things were dictated to me by someone else, only that I was in an exceptional state when I wrote them."[8]

Tabulating his material from two hundred and fifty questionnaires and quoting from them in detail, Hutchinson arrives at an agreement of his creative people on four separate stages of the creative process: A stage of preparation, a stage of frustration, a stage of insight, and a stage of verification. Naturally, not all work of great persons can be creative or revolutionary. But the real discoveries fall into a pattern of these four stages.

The first of ~~our~~ the stages—the preparation—states the problem and consists of systematic work along conventional channels. The problem is worked over from all available angles. This is basically an un-inspired procedure.

If the first process does not lead to a satisfactory solution, after long and tedious work which exhausts all known approaches, the creator will naturally become impatient. Frustration and tensions mount, representing the second stage and leading to typically neurotic symptoms of anger, inferiority feelings and irritations. This tension is essential and always present in creative production on a second level—there is complete agreement about this among all witnesses.

The necessary presence of a neurotic intermittent stage has led to the opinion that a neurotic disposition is a condition of creation

and must be part and parcel of every creative person whatever his field of work may be. Of course, to be neurotic alone hardly assures greatness. But without an inclination to hysterics, the other abilities do not seem to become effective. Neurotic emotional accumulations seem to be needed, so to speak, to supply the power to drive latent creative gifts to realization.

According to Hutchinson and his respondees, the creator may calm his perturbance by laying the work aside and turning to other, easier assignments. Out of the dammed-up tensions, whether temporarily delayed or not, breaks then suddenly the flash, the insight, the solution, apparently coming up from the realm below the consciousness.

The answer may arrive in a dream, or in a visual image or, for instance, to a composer, in sounds. The creator may feel like a recording instrument possessed by some higher intelligence within him. The burst can hardly be explained, but it can be described and almost everyone of Hutchinson's more than two hundred respondees has done so. Here, we run again into the typical modern scientific attitude—not to bother about essential substances or properties of the things-in-themselves, but to be concerned merely about manifestations, relations and verifications.

The creative process continues and ends with the fourth and last step, the verification. Now, after an overwhelming insight, we are back on the firm ground of reasoning and observation. The verification may consist of experiments whenever a natural scientist has to prove his hunch. It may mean scissor-work in the cold light of a new day to an author. In whichever medium the creative act is placed, the last part of creation means a return to a critical attitude—a self-evaluation—after moments of elation.

It may happen that our precise sequence of the four steps is changed in actual cases, starting with a sudden hunch. Or it may start with a postulated result recognized by a man who is already aware of all available orthodox approaches—moving directly into the frustration and being then awarded with the sudden insight.

The sequence is not "mandatory", but the existence of the

four separate steps seems assured, including the built-in third step of irrational "insight". We find, independent from Hutchinson, a similar statement about our four stages in Lepley's *Verifiability of Values*.[9] He uses different terms, speaking of preparation, incubation, illumination and verification.

The mysterious second and third step—the tension and the flash—are linked by Hutchinson to psychoanalytical explanations. Under emotional pressure, certain bits explode to the surface—from the subconscious emotional realm into the consciousness—or, in other words, from the unformed into the formed. It would also fit psychoanalytical concepts that such creative explosions effect a cure: the tension is released into creative action and is resolved into complete relaxation.

Apparently completely unaware of Hutchinson's work, Arthur Koestler, a well known writer of our time, has recently published an extensive book, *The Act of Creation*.[10] It covers about 800 pages and presents fifteen years of work. The approach is systematic and includes about 400 pages which are devoted to parallels in natural science.

Koestler comes, independent from Hutchinson, to statements which are very similar to our four steps. He adds, mainly from his field of literature, evidence from other well known writers. He also considers that the sudden illumination followed by abreaction and catharsis is linked to effects of psychoanalytical methods of bringing repressed complexes into a patient's consciousness.[11]

Koestler looks at processes which underlie scientific discovery and artistic originality, and tries to isolate the unconscious portions.

Science cannot create something out of nothing. It can only combine parts of events and discover hidden territories, making better telescopes to find new stars. It connects residues which were disregarded before. It removes a veil. The neglected somethings out of which a new image is fathomed become apparent in a spontaneous illumination. It may well be that a shred of evidence makes the transformation possible. But often it is not even depending on any new information. Often the new comes from an original correlation, from an uncovering or selecting or reshuffling or com-

bining of facts or ideas or skills or faculties which were all known before in isolation or in different contexts.

In such arrangements, which produce the new solutions, we find large chunks of irrationality. The human sources for these fresh approaches and patterns can only come from an unknown, from the underground layers of the mind. They are reached through a temporary regression to earlier, less specialized and more primitive levels of the human mentality.

Referring to this recourse to primitive subconscious levels, Koestler likes to speak repeatedly of *"reculer pour sauter mieux"*, which means a walking back to run for a jump. To dive into such depth is always a leap into the dark, and the diver is more likely to come up with a handful of mud than to grab a coral. Only when he comes up into the light, in our fourth step of verification, can he see whether he found anything. In this level, which comes always *post factum*, will the creative act be completed.

Turning to details, Koestler the writer starts his factual inductions with an investigation of the character of humor, of the cause of laughter. He selects this area because he finds here a sharply defined bodily response, a true reflex which can be observed for verification. He looks closely at a few samples of funny stories. In the happy days of *La Ronde*, a dazzling but penniless Austrian officer tried to obtain the favors of a fashionable courtesan. To shake off the unwanted suitor graciously, she explained that her heart was, alas, no longer free. He replied politely: "Madame, I never intended to aim that high."

Koestler quotes another story, told by Chamfort, of a Marquis at the Court of Louis XIV. Entering the boudoir of his wife, the Count finds her in the arms of a Bishop. The startled husband walks over to the open window and starts motions to bless the people in the street. His wife cries out what is he doing and he answers: "Monseigneur is performing my functions, so I am performing his."

Koestler endeavors to analyze why such jokes are funny and why we laugh. He states that we do so because we have had our levels shifted with a sudden shock. We suddenly were turned to

something which we did not expect, to something entirely different. In our first story of the Austrian officer we moved a metaphoric reference of "aiming" and jumped to the different bodily meaning of the aim. Our Marquis decapitated the lines of action which we expect by jumping from the meaning of a "function" in a marital relation to a professional reference of the clergyman.

So, humor consists of connecting several somethings which before had no apparent kinship. We are torn from an accustomed association into a different groove, into a bi-sociation. Our habitual level is suddenly broken and we are thrown on an unexpected second lower ground. We become, unintentionally, multi-headed instead of remaining level-headed.

We may illustrate this ~~once more~~ with a joke ~~which I like very much.~~ A man comes every Friday after office hours to the same bar for years, and orders always two martinis, which he drinks one after the other. One evening he orders only one and downs it fast. The bartender asks what has happened and our man replies that years ago he used to go with a friend to a bar, every Friday after the office, for a drink, and the friend died in the war. Ever since, he has always continued and has always set up another drink for his dead friend. The bartender considers this explanation but wants to know why there was only one drink tonight. And he receives the answer: "Oh, I gave up drinking."

In the smooth flow of this story, we are here jolted from the level of a symbolic act—of drinking to the friend's memory—to our man's physical consumption of alcohol—the unexpected bi-sociation.

The shifting to hidden connections is found, by Koestler, not just in humor but in all great discoveries of science. All innovations consist of sudden shifts of attention which place the emphasis from the usual and expected to some previously overlooked aspect. The inventor sees, all at once, something which was omitted before. The great source of discovery is an unclassified residue, or method, which was formerly selected out.

Koestler advances many examples. We will mention only Einstein's Theory of Relativity, which was derived from a connection

of Maxwell's electromagnetic field theories with astronomy. Or, in earlier times, Galileo's laws of gravity which came to him from the movements of heavy balls.

What is found behind humor or beyond scientific creative acts also appears in all branches of art. Rembrandt's "Man with the Golden Helmet" shows the face of an old man, but through the technique and behind the physical face shine the intimate struggles of a whole life.

What makes the person perform and succeed in this central act of bi-sociation—of leaving his associative groove and of finding the "other" ground—is not known. It can only be irrational, and it can only come from judgement, from the totality which exists under all special knowledge. The more familiar the separate parts, the more striking and unexpected will be the new connection to a new whole which emerges spontaneously from the depth of the unconsciousness.

To say it again in other words: Every great discovery has to go beyond the sterile avenues of the special field, mostly into channels of a different land. It is obvious that solutions could not come from special experience or from conventional conceptual knowledge. The problem has to be transferred from the structure under which it was first apprehended to an entirely different context. Such a solution can only come from an insight into another aspect of totality. An ability has to be mobilized which cannot be analytic and which cannot be preponderantly intellectual.

Every child must develop out of his unconsciousness and irrationality the organic skill to walk upright and to form his organs in speech. Intellect, reason and speech grow in every child through his own efforts and can grow only from his pre-existing irrationality. As man grows up, his irrationality gives more and more room to his increasing intellect, reason and perceptions. But the spiritual powers are never fully lost in the adult, and it is this glorious residue from which all creative emanations come forth.

In the second part of his book, Koestler is concerned with extensions of his principles into natural science. He points to the strange fact of organic life—that every part is a sub-whole comprised of

parts, but is itself also a part of a larger sub-whole and whole. There are everywhere patterns of relations. Partial processes are manipulated on the next higher level as a unit.[12] The hierarchies of autonomous sub-wholes are surrounded by hierarchies of environments and by hierarchies of feed-backs.

In his outlook on natural science, Koestler stresses the strange regenerative powers of living bodies. If I cut my finger, the body grows back the cells up to a restoration of the proper substance, form and previous structure, not a bit less and not a bit more. This strange force of forming and growing, under a precise code of a species, appears from birth to death of every human being, every animal, and every plant. We encounter self-regulating, intrinsic codes which assure to parts the status of a sub-whole.

Whenever we look at a certain particular entity and consider it as an autonomous whole, we must be aware that it is composed of other parts and sub-wholes and that it is itself a part of another whole. Every analysis, every recognition of an appearing reality, requires, therefore, at least at some time, a view of a field which surrounds and influences in totality our object.

Every creative act moves in a field where it locates previously unconnected frames of references. This overall awareness comes in leaps of the imagination, under spontaneous intuition. We encounter a connection of many disciplines at which our analytical views can look only in isolation.

Such inspirations are, unfortunately, often wrong and are proved to be wrong when cold verification marches after the hunches. Koestler states flatly that up to ninety percent of all insights are worthless.[13] Even the great Einstein wasted two full years of his life on work which never showed results. The ingenious inventor Edison spent his last years on lightweight storage batteries which never succeeded.

It is already difficult to investigate a small selected sector in depth with conventional, specialized, scientific methods. It is even much more difficult and risky to gain the overall awareness. It has been said that genius is, to a great extent, sweat. It is not true, as far as the creative insight—the leap—is concerned. All

the sweat on earth would not help Simple Simon. But it is true, as far as the incessant follow-up of verification is concerned, where tons of sand must be sifted through the sieves to retain a few golden nuggets.

In our age of complicated factual and conceptual situations, the genial hunches must be highly educated hunches. Luck or insight comes only to the few who are well conditioned. They must be able and prepared to search in knowledge and to follow up by proper methods. The third step of inspiration comes only to those —and not even to many of them—who can take the first, the second, and the fourth steps. There is a constant interrelation of all four processes, and an interaction among all of them. Grace can be bestowed only on a few of the many who are competent and who are forever striving.

We do not know what the spark really is which welds the parts into a new whole. It exists outside of rational-observational knowledge. It is irrational. It resides in the unconscious emotional layers of the mind. Where this subconsciousness could dwell physically, is a senseless question. Dr. Schweitzer's glands will not differ from the glands of John F. Kennedy's murderer, and Einstein's discoveries can hardly be explained by his bodily secretions.

We speak here of intangible functions which are superimposed on physical-chemical aspects. There is a world of difference between our description or observation or rational localization of the irrational spark or leap and the leap itself. The printed menu is not the meal and does not still our hunger, although it describes in symbols food and classifies it and guides us to action which leads to the real food. Here again, we live in a multi-levelness of many aspects.

B. *Confirmation by Computer Experts and by St. Augustine*

The irrational foundations of all knowledge have been confessed in many tongues.

Surprisingly, we find such confirmation in a very technical field which should be dominated by rational logic. Specialists of the "data-processing science" have called attention to similarities

between functions of the human nervous system and the mechanical operations of electronic computers. The feed-back mechanism, for instance, seems to suggest parallels to human controls. Mechanical research may profit from investigations of mental activities and —in opposite direction—the mechanical processes may lead to a simplified understanding of mental functions.[14]

This cannot mean that mechanical engineers could copy natural structures. The wheel does not have any counterpart in animals' organs, yet it performs, functionally, similar to legs of animals.[15] Da Vinci observed birds and tried to construct flying machines after their pattern. But, this did not work and the actual technical solution came much later, from the discovery of aerodynamic principles and from the availability of small power machines which could drive huge screws through the air.

There will be a similarity of functions and a great difference of organization. This applies also to data-processing, which uses automated machinery to collect and operate data in pre-set patterns and computations. Still, the experts of the new field are greatly interested in the structure and manifestations of human thoughts and percepts. They have suggested the combining of teams of psychologists, physiologists and engineers to research together laws which underlie thought and to look together for the proper ways of mechanical simulation of such functions.[16]

Let us now go back many centuries to an antique civilization and turn to St. Augustine.

In his *Confessions*, which were written A. D. 399, St. Augustine dealt with the integrated complex actions of irrational powers, of reasoning and of senses. Under the unifying category of "Memory", he expressed thoughts which come close to modern opinions and which are clothed in words of moving beauty.[17]

In the storehouse of the memory he finds, distinct and intermingling, the sensual impressions,[18] the thoughts and all our learning,[19] and the "ideas".[20]

It is all there, past and present, and in a mode which is different from present experience. I may recall that I was cheerful, but I am not cheerful now.[21]

It is not easy to say whether all this runs by images, or what in reality it may be.[22] In memory, man meets himself and more than himself. He remembers what he has done and experienced and what he has been told in the past. He can meditate on it, and can weave it into new events and he can picture hope for the future.[23]

In his words, St. Augustine restates our statement of the co-existence of percepts, concepts and of irrationality.

C. *The Modern Rediscovery of the Soul*

In the eighteenth century, the emotions and irrational powers were ignored completely, as far as faculties of understanding and of knowledge were concerned, and this contempt carried over into the nineteenth century.

Striving for another monism, David Hume tried to reduce all human knowledge to perception. Our thoughts and our imagination are, to him, only separating and combining perceived parts to new secondary units.[24]

Under perceptions, he included internal impressions and not just data of external events. Emotions covering also love and hatred become here, in his words, lively ideas or impressions. It might be that Hume had some doubts about his hierarchic order and that he wanted to safeguard his opinion by the vague qualification "lively". We find him saying in another context[25] that reason is a slave of passions, serving and obeying them. In another spot[26] he even stated that men are in great measure governed by "interests".

In the days of enlightenment, the emphasis was shifted from Hume's perception to the monistic power of reason. The new rationalists believed in a future society where reason unclouded by emotions would guide human conduct and would lead to a morally pure world. Men have only to be educated and have only to learn and they will become good.

These days will never come,[27] for emotions are a natural part of men, just as senses and thoughts are. Man does not only think or observe, he is also a creature of impulse; he is demanding and

fearing and loving and hating. You must close your eyes to a vehemently active part of human beings if you consider them mainly filled with intelligence and reason.

The Age of Enlightenment actually impoverished man's knowledge of himself and his controls by ignoring vital powers which were outside the revered reasoning powers. Marcus Aurelius listed with equal rights beside each other; the body, the soul, and the intelligence. "To the body belong sensations, to the intelligence principles and to the soul appetites." And he placed intelligence in proper perspective: "To have intelligence that guides to things which appear suitable belongs also to those who betray their country and do impure deeds when their doors are shut. There remains that which is particular to the good man, namely not to defile the divinity which is planted in his breast." [28]

Awed by the revolution in natural science, only a few small groups in the nineteenth century and in the beginning of the twentieth dared to remain aware of the spiritual and of the irrational. The general rebirth of a recognition of the irrational soul—of the "subconscious"—came suddenly from an unexpected corner. Blindness against emotions and hostility against them brought a generation of intelligent and educated people deeper and deeper into neurotic and hysteric symptoms. Looking for new medical treatments for such mental disturbances, the physician Sigmund Freud stumbled on new methods and new insights. His psychoanalysis, which actually included a synthesis in every case, helps the patient to relax on a couch in a darkened room and to break down the intellectual barriers across his soul. Talking out loud in free associations, the treated person gives vent to underlying subconscious drives which dwell in a realm that is not intellectually controlled: in dreams or accidental mistakes of speech or actions, in associations to old memories.

Freud's method is truly an artificially induced regeneration through a penetration to irrational layers. The new approach was revolutionary. The experts first smiled, then accepted slowly and finally overboard, with the result that today there is a strange overapplication of Freudianism—seeing the subconscious everywhere.[29]

To ignore or to hide the irrational side of man and of the universe can only give an incomplete view and can present only a thesis which requires a close look at the antithesis to come closer to the whole truth. We are today, at least most of us, far removed from the downgrading of irrational judgements and emotions to secondary perceptions or reflections.[30] We have gone away from the opinion that "belief" is only a "lively idea related to a present impression."[31]

That human beings live in an integrated totality of unconsciousness and consciousness cannot be ignored any more. Most of man's life is spent in an unconscious process in which his roots are grown and his actions are rooted, and in which all his habitual skills are moving.

This does not mean that we now value less verifications by perception or the ordering force of concepts. It only means that we admit another equally important cause, namely, the irrational judgement and insight. It means also that we must remain aware of the plurality in our world and in our theories of knowledge.

D. *Irrational Elements in Methods of Knowledge*

So far, we have looked at great gifts of great men, at the cretive powers of Planck, Russell, Einstein, St. Augustine. We have tried to isolate and to inspect the irrational elements in the glorious breakthroughs of giants in science or art.

Apparently, our geniuses were not just blessed with genial irrational imagination. Mostly, they were also superb craftsmen and technicians. All their abilities were on a peak—their irrationality, perceptions, reasoning and perseverance.

Naturally, we find mixtures of different grades—the values—of the various abilities. Some of the great discoveries were left to the perceptual verification by others. Maxwell, as far as I recall, did not even live to see the proofs of his theory of electro-magnetic fields or waves. Einstein, a theoretical physicist, never conducted an experiment in his life and had to wait for years until the experimenters pronounced his postulates as factually correct.

We have, so far, talked about unusually gifted people, about extremes of creativity and irrational power. We spoke of the great leaps. The world is, however, mainly populated by smaller fry; so, too, in science and art. What we found evident in the work of great men shows in gigantic proportions and in clarity the elements of irrationality. But we encounter the same characteristics also in the rank and file, in lieutenants and sergeants and privates of science and art.

Creativity, with its irrational elements, is not even a peculiarly human gift. It is merely a high manifestation which is discernible on successive levels of an evolutionary hierarchy reaching from the one-celled organism to the common adult man and to the genius.[32]

In the field of human knowledge, we can accordingly trace the irrational portions all the way through the modest accomplishments and to the grind of common work. Whenever knowledge is practiced, the irrational element appears on every step. Negatively spoken, it is the "I do not know" and the "nobody knows". But, positively it is just as well the "I feel sure of" and "everybody feels assured". From such irrational substrata of man—of the knowing man—stream all energy, all judgement, and all forming into which knowledge is cast. From such substrata shine the light of "enthusiasm"—the Greek word *"entheos"*— the God within.

The irrational portion, the emotional judgement, penetrates all steps of knowledge of all men who know, even on the lowest possible level. The mind functions, whenever it functions, intellectually and emotionally and in sensual perception—all in one.

Chapter VIII

LANGUAGE—THE INCARNATION OF KNOWLEDGE

KNOWLEDGE is acquired, expressed and communicated through language. We intend to look here mainly at the relations between methods of knowledge and language. We are not concerned about requirements of effective writing;[1] nor are we interested in verbal definitions of principal terms.[2]

A. *Symbolic Character of Speech and Writing*

Language consists of speech and writing. Speech is a system of symbolic sounds designed to convey information. Writing[3] presents visual symbols for existing vocal symbols; therefore, it is a symbolization twice removed from reality.

We must recognize that the physico-chemical process of producing words, or the technical process of producing written material, are aiming at the symbolic aspects but are very different from them. The meaning is a function, intangible, although produced by the tangible physical events of speech or writing or printing. In meaning, we have an unrealistic functional superstructure over realistic physico-chemical actions. Language, as such, is a process of the human condition, integrating physical actions, thoughts and irrationality and directing them toward an integrated end.

B. *Structure of Language and Knowledge*

Bertrand Russell once remarked[4] that a study of the syntax of

language may lead to considerable knowledge of the structure of the world. Most likely he meant by this not the metaphysical reality of the world, but the totality of appearances. We should, however, distinguish more carefully between the observed event, the speech-symbol and the meaning. Words are not thoughts and thoughts are not events, interrelated though they all may be.

Not enough attention seems to be given to such differences of structure and we will have to find our way almost without guidance. The differences may become clearer when we use a bit of imagination for an example. Suppose I walk around the Empire State Building in New York City. While my feet move over the pavement, my eyes glide up and along the huge walls of stone and glass, from bottom to top and from left to right. I turn the corner and continue looking up and down and sideways. I turn the next corner and then the next one, returning to the spot where I started. I have now completed a tour around the outside of one complex event, the Empire State Building. I have collected sense-data in a succession of space-time as I walked along. When I translate my impressions into language, the structure of my description can easily follow and copy the order of my successive collection of data. Although the event—the building—is one complex particularity and actually has not the separations which I experienced during my walk, I had actually strung out and seen my subjective perceptions as I walked along and looked. My speech will easily and properly be parallel to the structure of my experience, although it will not be parallel to the actual objective event.

That the medium of language is radically different was already noticed in the eighteenth century by Gotthold Ephraim Lessing, in his *Laokoon*.[5] Comparing sculpture and painting with poetry, he concluded that the form and color of bodies can be simulated well in visual arts, but that action lends itself well only to poetry. He contended that we experience an emphasis on space in bodies—leading to visual arts— and an emphasis on time actions—pointing to poetry. We would prefer to broaden Lessing's statements to say: Whenever we apply language, we translate impressions of events

into strung-out descriptions, presenting a timely succession in linear movements.

We have so far looked at perceptions; we move now to expressions of thoughts or concepts. It might be expected that thinking and reasoning exist in linear patterns and could, therefore, be copied easily in language which also has linear categories. However, even here we seem to encounter basic differences. Many of our thoughts are not quite linear. They are, to a great extent, clustered.

The thoughts in our minds are mostly imbedded in hierarchic systems; we are aware of many connections of a particular concept. This awareness comes to us in a flash—instantaneously, or at least in very rapid succession. Our words cannot come fast enough to cover more than just a convenient label of a complex, or one aspect of it, at a time. I think, for instance, of our term, "knowledge." After all the time I have now spent on this event, the one term covers in my thoughts innumerable connections, conclusions and explanations in its particular complex. But language is limited and can express in one instant only either the complex or a certain aspect of it. Language must, again, revert to a structure of linear expressions as soon as it wants to deal with a conception.

Language encounters similar problems when it turns to descriptions of emotions and irrational judgements. Here, linguistics can lead to only approximate understandings which must be aided by imagery and by allusions. Poetry presents an obvious example.

Above all these structural differences, we must recognize that knowledge is hardly ever just perception or concepts or irrational judgement. It is always all of them in one complex interaction. As soon as we use words, we must spread out this cluster into successive linear descriptions. Our linguistic structure has to translate the structure of interrelations, and it will always be radically different from the structure of our event of knowledge in this respect.

We also seem to possess built-in powers which help us to ex-

perience the different objects in their particular structure behind the linguistic symbols. I read a book or listen to a speaker and I seem to be aware of the proper event itself in its external appearance. I hardly notice that I am exposed only to symbolic letters or sounds, and I am also not aware any more of the different structures. The actual event comes toward me in all its glory of intermingled facts and thoughts and emotions.

C. *Technical Dialects*

In almost every branch of science, the specialists have arrived at special technical languages. The technical languages use the same linguistic structures which ordinary speech and writing use. Only the vocabularies—the nouns and adjectives and verbs—are partly different. Such jargons are, therefore, still on common ground with ordinary language. It would be better to describe these as technical dialects.

Special sciences have, obviously, a legitimate need for such technical dialects. Daily common speech covers wide territories of all human experiences and will often be too vague to serve properly the requirements of precise scientific work. On the other hand, such private languages become less and less understandable to outsiders. It has come to the point that a learned man finds it difficult to talk about his field with people who are not members of his profession.

This becomes really serious in the cultural area.[6] Here, the affected events are activities of human beings who live in ordinary language. The results of scientific processing have to move back into the social realm of ordinary people who have normal speech habits. The man who is being tried in Court, for instance, has a human right and a civil right to understand why he is sent to jail. He has a human right and a civil right that the evidence for him and against him is collected and evaluated within the bounds of normal language which the witnesses and he can grasp.

Something should be done so that technical things remain specific but still are understandable to the common man. Jargons

will have to mend their ways to come close to such a compromise, in all sciences including philosophy.[7]

Improvement can be accomplished if we first examine carefully whether any special term is really necessary. There exists, at present, a general admiration for complicated words which cover simple facts. The "unrealized learning potential" still means only that the pupil does not work hard enough. There should be an effort made to find simple terms for complicated thoughts, instead of using complicated language to convey simple ideas.

Whenever science coins a new word it should also make an effort under our double standard to be specific for the specialist and still understandable for the layman. In the new Cybernetics, the word "feedback" was an excellent choice. But the official name of this new branch of science, "Cybernetics", represents a bad offense.

Whoever uses a technical term should consider whether it could be replaced by a word which is generally understandable. Many people in the field of study undertaken by this book speak of theories of knowledge and values, not of Epistemology or Axiology. It may sometimes be necessary to list the old terms in parenthesis until the new usage is gradually established. If such streamlining is done carefully, the new language will not lose precision in communication with the specialists and will gain general understanding.

D. *General Semantics and Philosophers of Language*

Several philosophical movements have addressed themselves to linguistics as the base of an ideology of knowledge.

Alfred Korzybski founded General Semantics. This movement revolves around the relation between understanding and language. Language is the start of all investigations; we should therefore look at the influence language has on our thoughts and interpretations. Korzybski warns that our present language is way behind the times. We still use words for substances, properties and forces which science has long rejected. We still say, for instance, that the sun rises. We still state that "it" rains. Because of our speech

habits the heat "flows", the cat "grins", the boy has "broken" his arm, life has "left" a man, and someone "has" a neurosis.

Korzybski's principal book has the title *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics.*[8] The reference to sanity points to the therapeutical value which he expects from proper linguistic usage. In psychological treatments to which his followers have actually applied his principles, the patient's "everything always goes wrong with me" should be replaced by "it seems that a lot of things are not working out right now."

The stand against Aristotelian logic as reflected in the title of Korzybski's work, attacks the limits of a conceptual system which works with only all or nothing. Korzybski tries to replace this by finer small values between the extremes, and he applies this to linguistics. To accomplish this, he suggests the use of indexes which will distinguish an individual from his membership in a group. We should not just say that Miller was a Nazi,"N". We should rather describe him as N1, to separate him from N2 and N3 to Nn—all of whom have other relevant distinctions.

He also suggests a time index. Our Nazi, N1, will have been different in 1944 and 1966; we should therefore label him accordingly as N1-1944 or N1-1966. We should fit our linguistic maps better to our territories.

The attention which General Semantics draws to increased precision of language represents a certain contribution to methods of knowledge. Sometimes, more precision will be helpful—although it will often be adequate to apply common usage. We may need fine tolerances when we build a precision instrument, but it would be a waste of time to build, say, a garage to a thousandth of an inch.

It seems, however, to be a monistic over-simplification to expect clearer reasoning from improvements in language. Knowledge means an interaction and integration of observation, thoughts and judgements, and also of language. It would be more effective to improve reasoning within its own realm, and remain aware of the interconnection of the totality of all levels of recognition.

A bit related to Korzybski's indexing seems to be the so-called theory of truth by Neurath and Hempel which Bertrand Russell has reported.[9] Here, someone says that he saw a table in the room. He should rather have said: "I report now at 3:17 P.M. that I have perceived in my mind a table at 3:16 which was there in the room at 3:15." I am afraid that common sense will object to so much wisdom. The time intervals do not seem important and are not even correct. In reality, the intervals must have been much shorter, only fractions of seconds, and will have been so short that they were practically negligible and hardly noticeable.

Going much further than this theory of truth, several modern philosophers have considered language as the one and only entity which we are able to investigate in the totality of knowledge. This opinion was first presented by Russell and by Ludwig Wittgenstein.[10]

Here, language is ranked as the ultimate unit of knowledge. Reality may exist and may produce appearances which we perceive, and we may arrive at thoughts and may use emotional judgements. But the argument is now that we can experience all of this only in the flesh of language, only as far as we are forming our recognition in significant verbal propositions. We own only word-pictures, and knowledge means only a totality of sentences.[11] According to this view, all we know is language and whereof we cannot speak, we must be silent. However, it should be remembered that all great creative progress has come from people who asked questions which could not be answered.

The creed of the "ordinary language philosophers", as they like to call themselves, actually pushes Kant's limitations of theoretical reason back to language.[12] How do I know that this color is red? It would be a sufficient answer to say that I have learned English.

A verbal sentence now becomes the incarnation and model of reality. Kant's categories are now replaced by principles of the internal structure of language.[13] Under Kant, such categorical conditions are prior to sensual experiences and can, in themselves, not be experience. In similar fashion, according to Wittgenstein, the

structure of language is prior and cannot be expressed in words; it exists before words.

Such a belief is highly questionable and is not supported by any factual verification. To a genuine a-priorist, Kantian or otherwise, the factual proof comes after the principles and cannot be turned around. Such a belief in language overlooks tremendous differences between the structure of language, the structure of thoughts and the structure of observations, which we have tried to point out earlier in this chapter.

The retreat to language raises the interesting question of how any statements can be verified—we live, after all, by verification, in science as well as in daily chores. The language philosophers have admitted that it would hardly be good enough to prove one sentence by looking at another sentence.

They have tried to solve the dilemma by pouring old wine into a new bottle. A verbal statement is now considered meaningful, or may we dare to say valid, when it is either analytic—in other words, broken down into other small atomic sentences—or when it is possible for experience to render it as probable.[14] This is called a weaker requirement of empirical verification. Even in this cautious wording, our language philosophers seem to jump beyond the limits of the analysis of language.

Wittgenstein apparently became doubtful about his own contentions later in his life. He was not certain later on that even language could serve for systematic principles.[15] He considered language only as a shifting social agreement which is based on unprovable assumptions. On the other hand, language remains still the only accessible ultimate reality. In this situation, philosophy and assured human knowledge really lose all the ground under their feet. Philosophy becomes now merely an activity whose modest purpose is to make clearer and sharper our verbal expressions, which would otherwise remain opaque and blunt. There is no longer any room left for philosophical methods or for methods of knowledge, not even within the area of language. There are only different therapies, and the whole cluster of philosophy may now condense into a drop of grammar.[16]

Wittgenstein instituted a strong following, the so-called Vienna School,[17] which developed his theme in more or less independent variations.

When we try to evaluate these language philosophies, we find that the early Wittgenstein mainly shifted old Kantian distinctions to the foreground level of linguistics. Hardly anything new was gained, and important distinctions of level concerning perception, concepts and judgement were lost, or at least blurred. Wittgenstein later threw away intellectual tools of long standing and effect in favor of a mere polishing of verbal statements.

The language philosophies, every one of them, represent, again, a monism. Taken at face value, as they are meant, they make methods of knowledge poorer and less precise. One approach, in this case, language, is singled out and all others are swept under the carpet, as residues.

Opposing the language schools on the firm ground of factual experimentation, Vygotsky[18] restored the plurality of distinction between language on the one side and percepts as well as concepts and judgements on the other. His work was important enough to give it some attention.

Vygotsky was a Russian child-psychologist who worked between 1920 and his death in 1934, mainly as a researcher in educational methods. He designed tests with wooden blocks of different shapes and colors. A nonsensical word was written on the bottom of each test block. The student had to sort the blocks and to find the associations to the nonsensical words. This permitted a separation of a later synthesis between observation, thoughts and verbal symbols.[19]

The test was given to different age groups. From tabulated results, Vygotsky concluded different stages of development in the formation of abstract thoughts and of verbal associations.

It should be obvious that thoughts can be non-verbal and that speech may be non-intellectual. Vygotsky's work proved these obvious facts. He found that small children gradually grow verbal meanings. They first associate only in vague images which remain complex, comparable to a family name. The notion covers the

total particular object—a mother or a dog—and does not distinguish abstract discrete elements. Gradually, the child analyzes such elements in spontaneous concepts. Later, under the influence of schools, such concepts are placed into systematic order and become scientific.

Based on his experiments, Vygotsky discovered behind oral speech a different inner speech which is neither vocalized nor communicated, but consists still of verbal thought-images. Such inner speech is not only silent, but also vaguer, more abbreviated and faster than the spoken words.

Behind the inner speech hide the thoughts, and behind the thoughts lurk the affective tendencies. To understand another person's actual speech fully may often require one to guess at his contexts of thought and even to be aware of his emotional motivations and affiliations.

What is shown here genetically, as a development of children in successive steps, exists functionally in the adult simultaneously: the verbal meaning, the inner speech, the complex concepts, the spontaneous notions and the scientifically ordered tongue-images. In all this, we encounter fluctuating processes with delicate interrelations.

All this proves that language cannot be equated with thinking, and that we can separate language from thoughts or percepts. The proper position of language shows it as one of many aspects of knowledge and of methods, giving a body to communication and a form to our elements of knowledge. It exists in integration with all other levels of methods.

As far as the form of language is concerned, it has to live up to many standards. It should be general and specific, it should be technical and still somehow vernacular. To top it all, it should have warmth and energy and should convey with ease and simplicity certain ideas which are often neither easy nor simple.

Within such requirements, language surely does not belong to fine arts. But we could truthfully call it an applied art; we find that its usage stems from elements which speakers and writers will have in common with poets. To speak well or to write effectively

comes from an aesthetic taste, and from a skill which in itself means an integration of observations, concepts and emotional judgements.

Verbal ability has blessed Nietzsche and Schopenhauer and Wittgenstein and has poured a warm glow over their ideologies. Lack of such ability has hampered Immanuel Kant's work and the messages of many others. Indeed, the account of the sixth day of the Genesis could have been written: He gave them speech and they gained knowledge.

Chapter IX

EXISTENTIALISM—AND ITS IMPACT ON METHODS OF KNOWLEDGE

WHEN MAN turned to reason and modern science and dissolved his old affiliations, he gained tremendously in knowledge, power and material affluence. But he also suffered heavy losses.[1]

His spiritual and emotional assurances began to shrink. He no longer belonged to an earthwide genus. But fortunately, he was also not left alone. He became a species, a member of a particular group; he acquired the habit of joining a division of companions.

Existentialism represents such a group. It is mainly involved in religion, in literature and in general philosophy. But we will see that it can also have a powerful impact on methods of knowledge.

A. *Existentialism—Purpose and Forerunners*

All existentialists, whatever differences they may have among themselves, are set against the imperialistic claims of abstract science. It is a characteristic of science to cut selected fragments from complex events and to form corresponding thought-images which are ordered in hierarchies. Such a method cannot mirror movements or processes. But it can simulate flux by a summation of static points of reference. This is bound to work well on inert matter or on events which move in definite patterns. Abstract science is less successful when it has to deal with life. It becomes

embarrassed in biology when it tries to reduce everything to chemical-physical aspects, letting life escape as a neglected residue.[2]

Abstractions are even less satisfactory when they turn on human actions—in all social sciences and humanities. The observed processes involve here a complex of alternative human decisions which evade the mechanical static translations. When I sit in my study, my senses acquaint me only with the internal surfaces—walls, ceilings and floors. But this does not represent by any means the sum-total of the world in which I consider myself situated at that moment.

I meet existence when I look at the world as it is around me, the way a peasant looks at it while he plows his soil. And I meet the existentialists as soon as I turn to such an attitude.

The word "exist" refers linguistically to all that is out there, outside of ourselves, as part of the universe. This means a recognition of an individual's position within the universe. Existentialism views the human being and every other object as a particular whole, in the total context.

In Greek mythology we read of Tantalus, the human son of Zeus, who was permitted to share the table of the gods. Yielding to the temptation of testing divine knowledge, he slaughtered his own son Pelops and served pieces of the body as a dish at the heavenly table. Enraged, the gods banned Tantalus to the underworld and restored Pelops to unity and new life. He was reborn by the mercy of the gods after having been murdered and cut to pieces by his father.[3] Existentialism strives to bring this rebirth to the sons whom the abstracting scientists have cut to fragmented pieces.

In his view of particular entities, the existentialist needs a truth which is more than mere intellectual coherence and more than a correspondence to fragments. Heidegger gave expression to such a general truth.[4] It appears when you are open to the "being" outside of yourself, and it does not matter whether you can express this assurance in words.

The common ground into which all existentialists are rooted is this very attitude, that reality must be felt immediately in every

particular totality. The ultimate unit lives in its birthright within the surroundings and not just as a mere bundle of exemplifications of this and that theoretical component; it cannot be grasped as a summation of conceptual universals of thought.

The question arises, where does an existentialist go from here, from this common opinion? The direction of such further moves differentiates individual existentialists greatly, from deeply religious men to atheistic activists, and from deniers of any order to systematic philosophers.

Strangely enough, Hegel, in his striving for conceptual understanding of changes and movements, already used terms which sounded close to those of existentialism. However, whenever he used such words he was actually only adding another intellectual concept and a new abstracted fragment.

This applies also to Husserl, the founder of Phenomenology.[5] While he considers particular organic entities as the principal units of investigation, he takes pains to ensure that his method strives to be a science of pure thought,[6] merely describing the a-priori essentials in fragmentary essences.[7]

We come to the core of existentialism when we turn to Bergson.[8] He belongs there, body and soul, and it appears strange that he is usually not mentioned as a member of the family. To get the movement and rhythm of a total complex event, he urges us to raise intuition to a recognitive power. For this, it is not necessary to transport ourselves outside of the domain of senses and consciousness.[9] Rather, we have to apply a totality of mental abilities in organic union, meaning senses plus thoughts plus irrational emotional insight, which illuminates the other elements of recognition.

In this intuitive existential view, Bergson sees a second method of knowledge, complementary and supplementary to science; both enter into each other in theory as well as in practice.

B. *Kierkegaard and the Philosophers Jaspers and Heidegger*

Quite some time before Bergson, and apparently not known to

him, Soren Kierkegaard gave the deepest expression to existentialism.[10]

Troubled in his faith as a Christian and disgusted with the organizational and rationalistic pre-occupations of his church—the "System"—he turned to the individual man. All religion seemed to him a free relationship of a particular human being to God, and everybody had to save himself.

Kierkegaard presented his creed in many forms, from many angles, in very different styles and modes. His love for dialectics went so far that he published his books, which were hardly bought or read in his lifetime, under different pen-names, giving a particular style and character to each name. He was an essayist, a philosopher and a theologian, and he could even be a rude journalist in his last attacks on Denmark's Lutheran Church. His books have tremendous scope. They are partly religious in purpose and spirit, and they are partly, intentionally, un-religious. He probes all sides co-present in man, and he probes them with a poet's penetration.

His faith begins where reason leaves off and can be reached only by a "leap", the qualitative jump into eternity (*"ein seliger Sprung in die Ewigkeit"*). Man jumps from earthly ground into the air of infinity. Here, as a human, he reaches the eternal condition for a short interval, after which gravity pulls him back again.

In modern psychology we find a fascinating parallel in so-called "peak-experiences", those rare moments of impact that may happen to every one of us. We may encounter this when we fall in love, or when we are entranced by a performance on a stage and the tears well up in our eyes, or when we make a great discovery. These moments—the peak-experiences—will shine on for years after, rare and cherished. There is hardly any human being who has not been sustained by such glory—fleeting yet everlasting, and more-or-less intense.

In his last polemic against his church Kierkegaard phrased his religious creed more clearly, illuminating everything that he had published before. To be a Christian of the New Testament required that he forsake everything mortal to which man may cling

for the sake of the infinite communion with God. He expressed this brutally: "God is thy mortal enemy, out of love and for love, not fulfilling your wishes and filling you with fear and dread."

As far as the Church was concerned, Kierkegaard did not aim at reforms or at any replacement of persons. The whole institution seemed to him to be indefensible—a crime against God.

The German philosophers Jaspers and Heidegger have added philosophical commentaries to Kierkegaard's reflections. To Jaspers we owe the notion that transcendence "encompasses" us,[11] designating transcendence as the world and all that it is, including all men. Science is concerned with an experimental factual world and "other than reason" is either changed back into reason or recognized as a limit to reason. But, man is always more than he knows himself to be. He is encompassed and encompassing.

Science and knowledge are only forms of interpretation. They recognize something about men, some process which really takes place, but they never comprehend man as a whole.

Truth, according to Heidegger, can only be shown by calling attention to it, and faith is life out of the comprehensive.[12] Central to Heidegger is his "being in the world", his *"Dasein"*. Man, which means, even linguistically, one of many, is placed amidst all being, above creatures as well as things, within the whole of the universe. Being in the world is not just a position in space or time. It exists in total emotional commitment. No experience, be it of a landscape or of friends or of professional activity, can ever be without the universal horizon. Individuality and totality are constantly re-uniting. There is an ocean of nothingness from which we emerge for a short time, but which is always there to swallow us. This nothingness in itself is part of the universe and not just a concept.

We owe to Kierkegaard the founding of existentialism and its depth. We owe to Jaspers and Heidegger the clarifications which supplement and illuminate our understanding.

C. *The Anti-Back-world Men: Nietzsche and Sartre*

Nietzsche has been recognized as an existentialist posthumously. Sartre, the best known of all existentialist publicists, followed closely many of Nietzsche's creeds.

Nietzsche,[13] with a poet's insight, distinguished long before Freud between the Apollonian element in men—contemplation and interpretation—and the Dionysian element—which is fired by will and visions. Every product of art comes, to him, from a mysterious union of both areas in an organic particularity.

On the other hand, Nietzsche's attitude towards an external universe remained completely negative. The things-in-themselves are not only inaccessible to human faculties, they are also entirely unnecessary to human life. His Zarathustra speaks with utter contempt of all these "back-world-men."

In the ultimate, man stays as a particular totality on his own feet. Under his drives of passion and desires, he wants above all to discharge his strength. All this leads to a philosophy of aggressive action whose aim it is to propagate man not onward but upward into superman (apparently an allusion to Darwinian evolution). We should look not to the fatherland, but to the land of our children.

It is actually Jean-Paul Sartre[14] who in our lifetime has made existentialism widely known and has re-discovered Kierkegaard as well as Heidegger. Sartre works in a wide scope, as a writer of plays, as an essayist, and as a professional professor of philosophy.

The ultimate accessible entity is, also to him, the particular individual man in his totality. The environment does not act mechanically on a human subject. Man fulfills himself in action. He is what he makes of himself and he is always in the process of making (*"faire et en faisant se faire"*).

In his actions, the human being uses his will within conditions. Sartre illustrates this by a story. I look at my companion who starts towards a window for the purpose of letting in some air. He does this because he is warm. He is not set in motion by a stimulus (warmth) which provokes a predetermined chain of reactions.

He acts freely because he wants to surpass a material situation which bothers him. Man exists constantly in this way, in relation to conditions and within them, but not run by them.

Sartre, who fought in the French underground during the Nazi period, stresses greatly the social obligations of every individual towards his fellow-beings and the commitment to political and economic action as the proper free choice of the individual within conditions.[15]

Sartre's views are, of course, manifested in his plays.[16] Here, human beings act with and against each other out of choices which appear to radiate from their opaque totalities. There is no essential principle or motive which guides them. They are understandable only from the whole of their actions, through which they affect their surroundings.

D. *The Impact of Existentialism*

Sartre made existentialism fashionable about twenty years ago. Since then, it has gained ground in various areas. It has, naturally, influenced theology. After all, Kierkegaard, the founder, was mainly concerned with man's relation to God. We find, for instance, Tillich[17] as an existentialist in the Protestant realm and Martin Buber[18] in the Jewish realm.

Since we are here mainly concerned with methods of knowledge, it is important to turn now to the effects which an existentialistic view could have on our theories of knowledge and values.

In such applications, the existentialists will strive to experience the whole around the parts, and the particularities in their totality. Existentialism will mean: to be aware of the surrounding fields whenever attention is given to a specific fragment.

In our theories existentialism implies that we pull life back into dismembered appearances. It does not imply that we turn our back to any scientific knowledge or investigations; and it does not imply that we neglect details and precision. It will add the surroundings and the sub-wholes to the essences and it will move beyond science into emanations of reality.

All this means more of an added emphasis and attitude rather than a new procedure. But it is an important attitude. Actually, the great masters of science have almost always lived and worked this way, although their verbal phrasings may often have sounded different. We now bring this out into the open and hope to put it into its proper perspective.

The new view of the existentialistic approach will permeate methods of knowledge on all steps and in all interrelations. Here we are going way beyond Bergson, who advocated the total view as an intuitional second realm beside the sciences. The new view will affect openly all selections which govern scientific work. Knowledge as a relation between knower and known consists of educated judgements at every recognition of a problem. Selections determine, then, the designs for tentative solutions. Here the existentialist will cautiously look for fields around the narrow areas of investigation, for compliments and interferences.

The new view will affect the object, the known. The snappy isolations of monistic causes and the easy explanations of a deceptive translucence will be considered with suspicion. There will be more concern for the residues and for the opaqueness of particular events which we try to clarify.

Materialism, rationalism, humanism and determinism now appear as theories which are applicable to a specific aspect, every one of them touching only one side of reality and each of them in need of being supplemented by the others. We are reminded again, of our story about the blind beggars.

The existentialistic attitude will extend to every level in our theories—to perceptions, to concepts, to judgements, and to their interrelations. To start with perceptions, we refer to Vygotsky and Bergson and the Gestalt-psychologists who turned to a dynamic apprehension of particulars in a comprehensive sensual experience. Perception as such is already an interaction between senses, categorical thoughts and emotional judgements, all working together on emanations of an external object.

As for concepts, we like to point to Northrop's concepts by intuition, the thought-images of sensual experience which cover

actuality as well as potentialities. Such thought-images, according to Northrop, are directed on an undifferentiated aesthetic continuum of the world around us. There, our concepts may either select the continuum—which would mean a rather vague notion of the particular entity—or may single out the differentiations—and we are then in the area of abstractions. But our concepts may also choose one or a few differentiations within the field of the surrounding continuum. Such a conceptual view would mean existentialism pure or applied.

In physics, Maxwell's famous electromagnetic theory considered electricity as produced by influence of the surroundings. Einstein's Theory of Relativity seems to have been deeply affected by such field concepts, which he transferred in bi-sociation to new cosmic areas. The rays which reach me—the observer—from the sun, left there eight minutes ago. More precisely, the long rays of light which I see stretched out consist of portions which left eight, seven, or six minutes ago.

Our position in the universe and the relative position of stellar bodies towards each other can only be understood and grasped in a total view of movements towards each other and towards the observer. We have here an outstanding example of the use of existentialistic attitudes—in field theories, affecting concepts by intuition.

The second level of concepts, according to Northrop, are the postulates—the pure thoughts which no longer have counterparts of images. Protons or neutrons or numbers in mathematics would belong here. Here, in pure concepts, the existentialist view has actually been used whenever a great discovery was made. In a bi-sociation from accustomed constructions, the new intellectual explanation could only come from another aspect of a total system. The abstractions, also in pure reason, are not only diversities, but also are sub-wholes, and the parts belong always to encompassing hierarchies.

When we move to our last faculty of knowledge—to emotional judgments and insights—we again encounter the immediate particular apprehensions of totality into which our specific insight

must be imbedded. In our existentialist view of particularities and encompassing totalities we never doubt that the ability to isolate elements from existence is a fundamental function of man and has more than proved its effectiveness. Such abstracted methods will remain with us and should remain with us. But only by going through and beyond the processes of isolation have great scientists actually grasped the concrete and conquered it. Whenever we focus on a fragmented detail we should be aware of the fields within which these fragments are placed. This is often overlooked, even today. I discovered recently in an article by a data-processing expert that his colleagues should hold the highest positions in commercial enterprises because all human activity has in common, after all, that definite units are ordered in certain patterns. The author could have applied his argument just as well to writing a poem or composing music or making love: all data-processors would be bound to be supermen in all, according to his logic.

An existentialist approach will keep perspective to particular fields and will prevent sweeping statements and claims, to which all specialists are monistically inclined. Existentialism seeks to place the problem and the solution, and the way from the one to the other, in their organic totalities. Existentialism seeks to bring back the whole man within the specialist. It seeks to bring back the whole around the part in the object. It seeks to place man and his surroundings into proper context.

The language which existentialism speaks lends itself not only to religion or philosophy or literature, but also to theories of knowledge and values. This language is not understood by all in the same way. To some ears it may evoke the echo of a long gone past. But others hear in it the joyous songs of the future.

Chapter X

THEORIES OF VALUE

OUR METHODS of knowledge are beginning to force us to pay attention to so-called values. Promising as the study of values may be, there is still much work to be done; we are in a state, according to experts, that the science of physics was in around the year 1650.[1]

A. *The Problem*

All scientists aim at a particular accounting for some object or event. Whenever this object or event is unlively, science has done wonders in our age. But when an investigation is directed at something that is alive and conscious, the classical systems become embarrassed. This situation prevails in biology where physico-chemical aspects are used and life itself escapes consideration. It prevails foremost in all so-called moral or cultural sciences which center on human habits, opinions and actions.

We can assume good reasons for this evasiveness toward cultural objects. Men have the free choice of making decisions within certain conditions—whether determinists like this or not. This freedom within limitations makes predictions elusive. In the cultural realm, complexes cannot be broken down so neatly into components—or, if they are, there will be neglected important residues. Last, but not least, cultural components cannot be meas-

ured under mathematical magnitudes with the precision of inert particles, and are usually not measured at all.

This leads to the question of whether cultural fields lend themselves better to different scientific methods, or whether it would at least be better to use specific variations of classical abstracted science.

It is in such a context that we turn our attention to values. When we investigate man's activities and attitudes we observe what he wants; it becomes obvious that man, our object, is a creature with preferences and dislikes which we choose to call values.

In such an investigation, values become data which we study; they are not the end of our labor. While we study such values as given facts, we must refrain from valuing them. We have to study values in a value-less way, or at least in a way that enables us to avoid the pre-suppositions of the investigator.

If values are preferences or dislikes which we attach to events, they belong to the realm of judgements or irrational emotions. This would, of course, localize values as objects only in their purest form. We have seen before that irrational judgements permeate knowledge on every step and in all interrelations. We will have to keep this in mind when we examine values, but we will still have to consider values, in themselves, as strictly irrational.

We have to distinguish between valuing and value, between the human activity and the resulting entity, between the knowing and the known. Robert Hartman, who has done lucid work in this field, makes this point with the remark that to be an expert on mysticism is very different from being a mystic.[2]

B. *Localization of Values in Concepts*

The basic question as to which methods and on which level we should investigate values has been answered very differently. Some of the answers may throw us easily into confusion.

That values as such are emotional judgements and are therefore irrational does not determine that the method of their investi-

gation should be on the same level. Just as any other emotional event—be it love or hate or prejudice—we can investigate an emotional phenomenon in a non-emotional way. Thought-images and conceptual manipulations can be formed from any aspect of an object, be it sensual or emotional or conceptual, or a mixture of the three.

We have to try to be as precise as possible. Values—meaning value-judgements and value-propositions—shall now be our facts. They are capable of scientific investigation and control—just as any other facts or events.

The easiest approach will be to first use classical abstract methods in our approach to values and see how far these will carry us. The essence of abstracted methods is, as we have described earlier, to observe events and to form thought-images of selected portions of them—the so-called concepts by intuition. We form, then, tentative theories with thoughts that cannot be sensed but that can be imaged, or at least grasped intellectually—the so-called concepts by postulation. We move by reasoning down to conceptual conclusions and correlate these conclusions with intuitive thought-images of factual existence—again the intuitional concepts—and we test, finally, the correlating perceptions by experiments or observations.

In this fashion, the question of values, what is good or bad, will be placed under accepted, integrated, intellectual methods, even if the values themselves belong to irrational emotions.

In our method, which is the conservative procedure of abstract science, we start with perceptions and end with perceptions, and we deal with irrational judgements. Sandwiched into this are wide realms of concepts, and of logical theories. For the sake of precision and clarity, it seems worthwhile now to isolate this conceptual portion of our investigations.

Robert Hartman has done just this in quite a number of publications.[3] His presentation is clear, in a rather vague field, and provides a good approach.

According to Hartman, "good" does not necessarily mean an ethical reference. I call a physician good, or a burglar good, and

may only intend to point to his professional efficiency. I may not intend to say that his occupation appears useful; nor may I intend to say that he is ethical in his work or that he is a kind human being. Good means, therefore, according to Hartman, merely the statement that X is a member of a class C and that he has all attributes of that classification. A good doctor is a man who has passed proper examinations and knows medicine. According to this, good appears as the predicate of a subject, which fulfills a definition. Therefore, values are posited logically as concepts. They are, as such, neither ethical nor emotional statements, but are merely logical terms, even if the content may be emotional.

Such logical values will be objective, although all applications are made by humans and are necessarily used under individual variations. This will, after all, be the case in all actions of reasonable recognition.

To elaborate the thesis a bit: X is a good C, if he is first a member of the classification C. This class will have a number of defining predicates, such as a, b, c, d and so on to n. Our particular X will be a good C if he fulfills all these universal requirements, and he will be a better C than another member Y, if he fulfills more of the predicates and our other member fulfills only some. In other words, a value measures the conceptual fulfillment of elements of a wider concept. On every such attribute, Hartman uses a full yes or a full no or a neutral in the middle between the two extremes. He works with one, or with minus one, or with zero.

Hartman distinguishes certain dimensions of relations of values. They may be analytic, synthetic or singular. His analytic relation covers classifications of extension. His synthetic level is systematic and his singular is intrinsic. If I say that the man X is a good lawyer, I judge him under an extensive classification. When I state that the same man is a fine scientist, I apply a systematic reference. If I say that he is a good and kind man, I refer to his total particular intrinsic position.

Following the fashion of symbolic logic, Hartman proposes calculations of values with symbols, always prefaced either by

one, or minus one, or zero. Under such computations, we can compare individuals with values and figure out that X 1 is a better C than X 2 if he ranks higher on a total of attributes or predicates under a proper conceptual definition.

Hartman points out that natural sciences have been made precise and predictable by measurements of components and by mathematics manipulating such measurements. His proposed system of the logical constructions of values—the science of axiology—intends to provide a similar set of tools to master and order all branches of cultural sciences. Under axiology, a value is not a property of an object and it is not an emotional preference of a subject; rather, it is considered a logical concept within other logical concepts.

Remaining within this frame, we may ask why only three positions—all, or minus all, or nothing—should be considered on every conceptual attribute of definitions. Since we are dealing here with logic, the answer will most likely be found in an adherence to Aristotle who, in all his logical propositions and combinations, actually used the same rigid distinctions. Korzybski made a violent attack against such a limitation, as we saw in Chapter Eight. Korzybski pointed to the factual need for finer differences. Judgement not only means to accept or to reject or to refrain; it also means to accept partly.

In this respect, J. O. Unson[4] goes much further than Hartman, suggesting a fine grading scale for every reference to which the observed object is broken down. According to Unson, somebody should make such a scale for every element by setting the figure 100 on the positive extreme and 100 on the negative pole and setting between the extremes all intermediate points which appear to be needed. This scaling has to be done by the investigator, according to particular needs, and will, necessarily, be arbitrary. However, so is every mathematical scale, whether we measure in grams, ounces, yards or meters and whether we work with tolerances of an inch or a thousandth of an inch.

How far we go in our intermediate points on the scale of elements will depend on the problem with which we deal, on the

object which confronts us, and the methods which we select.

Hartman's threefold grades of yes, no or neutral will, in all probability, be insufficient in most cultural investigations. Unson's detailed scales sound just like a transfer from natural science and will in most cases of cultural events be neither possible nor necessary.

It seems advisable to interrupt here further speculation and to turn to an investigation of facts. Let us look at large fields in which, at present, valuing is actually done on a large scale and over a long time in the cultural area. This will give us an opportunity to verify and to establish how the observable facts of life correlate with our theories. By this inductive approach we may find factual assurance which will lead to correction of theories.

A suitable area for factual investigation can be found in the realm of colleges and schools. Teachers face the necessity of grading and graduating students. In every such evaluation they first establish criteria. Let us take a French class, for instance: there will be a certain set of goals for every class and each set will be broken down by elements—for instance, grammar, vocabulary and comprehension. In this process, usually five grading brackets are used, from the highest, A, to B, to the average C, to the barely sufficient D, and to the failing F. If necessary, intermediate brackets may be assigned: the A Minus, or the C Plus. In certain situations—for instance, on written tests with true-false questions—precise percentages of correct work are assigned to the brackets, and machines may even be used to grade the papers, to figure the percentages, and to express the brackets.

What is done in schools repeats itself in adult life on a much larger scale in the annual evaluations of employees, which are customary in government agencies and in many industrial enterprises. Here we usually find a so-called rating-sheet on which criteria are broken down—from "getting along with people" and "neatness" to theoretical knowledge and practical speed. On these rating sheets, we encounter, again, brackets for every attribute, also usually about five, from "outstanding" through "very good" and "good" to "satisfactory" and "unsatisfactory".

In schools as well as in employment situations, we also use a compound valuation on top of the grading of elements. What is the overall rank of a boy in a graduating class if he has an average of C in French, A in mathematics, and D in Social Studies? Will he rank, in total, so that he can graduate? Where does he stand within the group?

This compound position can be stated by weighing the attributes and establishing the total, almost mathematically. Or it can be done, as it is mostly done in government valuations, by letting the individual ratings stand as they are and leaving it to the evaluator to state his total judgement, which may not be precise but is to some extent supported by the grades of the criteria. All such procedures fall somewhere in the middle between the exact measurements of natural scientists and vague opinions.

This leads to the important question of the verification of values.[5] Students, as well as employees, would be outraged if grades or ratings could not objectively be proved or disproved, at least within reasonable boundaries. To become used to bracketed concepts of values and to become used to verifying them, or at least making efforts at verification, will be an important step toward getting cultural sciences out of their ruts of speculation.

C. *Values Localized Everywhere*

All events or objects can be approached through all the levels of our mental faculties and we can select a corresponding portion of the objective particulars. When I speak of my daughters, I switch on the perception that there they are. Or I use concepts by intuition: they are such pretty girls. I could also apply postulates: they are two. It may happen that I become aware of my emotional attachment: I love them. I could also experience them in an interrelation of all aspects: I love those two pretty girls who stand there. Or I will turn to the field-approach: look at their command of French within their general education and poise.

Every one of these levels of recognition can now be brought under finer distinctions of values, with brackets of magnitudes of

intensity. I see the girls around the house, but not very often—Grade D; they are pretty, but not too—Grade C; I love them with all my heart—strictly Grade A.

What I can do with my two girls, we can do just as well with all other events or objects which surround us, and we are doing this constantly. In science and in our everyday life we are constantly valuing all levels of faculties. This means we are aware of distinctions of intensities; we may act in compounds and elements and we may be more or less conscious of our grading.

When I speak of Mr. X, I may say, or just think, that he is a grade A attorney, that his looks are C, and that he has, unfortunately, only D manners, and F interest in music, and seems to be a C husband, all anchored in a B socio-economic status. What my compound value of Mr. X will be depends on my references and relations to him: whether I need an attorney, or want to approach him for a contribution to a symphony orchestra, or intend to invite him as a casual guest to my house.

When I hire a stenographer, I will question her technical ability and judge it by a grade; I will try to find out how well balanced she is, and how she ranks on education, job experience and background—every aspect more or less consciously under brackets A, B, C, D or F—and I end with a compound grade; how much I want to have her in the office. I compare her with the other applicants and I then come to a decision to employ the one who ranked highest.

Wherever and whenever I experience recognition I also experience gradations—measurable intensities on all levels and in all interactions. Facts and values move into each other.

D. *Sets of Interrelated Values: The Ideologies*

We have seen that we mean by values the measurable gradations of intensity that are inherent in all external objects and in all elements of knowledge—the subjective faculties of perception, of concepts, and of judgements—and also in the interrelations between objects and subjects.

If we turn to an existential view or to a field-principle of methodical knowledge we would have to rephrase this statement. We would then say that we are surrounded by particular entities and are ourselves such an entity within totality. In methods of knowledge we select some distinctions within the totalities and with a regard for the totality. These aspects will be variables and will be graded in the cultural field in brackets of values.

We found that we must recognize values—the measured gradations—whenever we recognize something in the cultural field. This may actually be anything—it may be objective or subjective; it may be element or sub-whole or field.

It should, therefore, be obvious that we will also have to be aware of values—of the measured grades of intensity—when we turn now to integrated packages of particular opinions which dominate the total life of a group of humans and which distinguish one group from another.

Nations and groups are divided by specific sets of norms on all levels. These can be called ideologies. Ralph Borsodi[6] has enumerated five subdivisions of such ideologies. There are, first, epistemic values which deal with a gradation of truth or error of convictions and recognition; second, telic or teleological values, which deal with graded ends and graded means to realize the ends; the third level is ethical—the good and the bad; fourth, aesthetic values, which effect the problems of beauty and ugliness; the fifth and last level consists of economic values, which are concerned with the production and distribution of material goods.

Borsodi does not elaborate, but it seems that he wants every cultural event determined, simultaneously, by every one of these categories, and he seems to say that different ideologies consist of different grades or values in every single element and in the compound.

It may help to turn to a simple example. A County wants to build a bridge over a river, and asks for a design and for estimates of cost. Several bids are submitted and are compared. The commissioners check every category: Under the epistemic value they ask how reliable the data are which are submitted, and whether the

bridge will carry enough traffic. Under the other four categories, the question will be whether the business principles of the contractor and his relations to employees are ethically acceptable, whether the bridge will be pretty or ugly, and what the economic implications of price in ratio to product will be. Under every view, a grade will be assigned, a value will be applied, consciously or subconsciously, and the total bid will come under a compound value.

Historically, we find in every society a dominant package of interrelated grades attached to every element of Borsodi's five categories. A social class in a given nation maintains traditional grades throughout the specific ideology. The ruling group will oppress other sets of ideologies that are embraced by a minority. Usually the opposition moves and stirs, and will move, in due time and under favorable conditions, victoriously into dominant position. This is so-called progress, an ever-flowing process bringing with it replacements of interrelated sets of value norms—the ideologies. Every element that goes into the ideology is graded; the different grades make the different totality of the image of reality to which a human group adheres under a particular ideology.

Borsodi[7] has tried to present classifications of all existing ideologies in groups, according to metaphysical, epistemological and cognitive categories. He has drawn a chart of all such ideologies and has designed another chart showing which ideologies provide solutions to certain basic problems and how they differ in the directions under which solutions are approached.

In these packages of ideologies we find that statements of verification may be different. Some people will deny that a certain event actually carries a certain grade, while others may affirm this, and certain conclusions may depend on the acceptance of the graded premise. What I call a first-rate violin player may sound fifth-rate to somebody else. Sometimes it may be possible to agree on criteria and to resolve the discrepancy by factual investigation. Whenever such solutions are not possible, we are not worse off than in any other verification of facts: we have to accept the relativity of the two oppositions.

Chapter XI

METHODS OF CULTURAL SCIENCES

IT SHOULD be obvious that cultural sciences are lagging behind the sciences of nature. Everybody seems to agree that their status retards human progress and may even endanger our survival.

Within the framework of our study we must raise the question of whether scientific methods could be improved in the cultural field and whether this would result in more precision, better predictions and better controls.

A. *Problems and the Reduction to Specific Axioms*

For almost thirty years we have been moving from the fruits of the industrial revolution into the so-called scientific age, which brings a general application of scientific methods to industry and to common life. The use that is made of automation, electronics, or atomic energy is influencing social patterns, political organizations and economic areas. The natural "forces" which men are unleashing require some social control and some individual reaction. It will surely be justified to turn to the question of how scientific methods can be adapted to better recognition and better manipulation of human actions.

It is the faith of all scientists that nature, as well as man's behavior is orderly, as least to a great extent, and that we should be able to discover patterns and to influence them. Such a belief in order extends obviously to all external events and also to all

internal experiences. According to the characteristics of objects on which scientific inquiries are turned, we distinguish between two large groups—natural sciences and cultural sciences. In such a division our natural branches seem to be concerned with the behavior of nature, while the cultural branches deal with the behavior of men.[1]

Whenever we look at a human being we may use either viewpoint. Albert Schweitzer can be considered as a human body. But it was surely not the circulation of his blood or the condition of his thyroid glands which caused his estimable moral and social qualities. The cultural branches are merely concerned with certain functions of conscious human agents, with the conduct of men.

Under the term "cultural sciences" we intend to cover all that is left in philosophy, mainly ethics, aesthetics, logic, and our theories of knowledge and philosophy itself. We add to this certain divisions which have moved out of philosophy. Among them are history, geography, sociology, linguistics, law and political science.[2]

All cultural branches form two distinct groups: the social sciences and the humanities. The social portion studies men as members of human groups, while the humanities look at humans as individuals with a highly personal inner life. Under this view, the social portion would mainly consist of geography, history, sociology, economics, anthropology and law.

The humanities, the sciences of the individual, cover principally all of philosophy—including logic and our theories of knowledge and value—all verbal skills—literature and linguistics—all theories of visual arts—architecture, painting, sculpture—and the theories of temporal arts—music and dance.

Depending on aspects or attitudes, we may sometimes be in doubt as to whether a certain branch is natural or cultural. Psychology, for instance, was considered by Freud as completely cultural and non-medical, while the American Medical Association seems to place it, at least its therapeutical features, under its wings.

Our scientific methods have grown mainly in the natural field

and are obviously well adapted to such phenomena. The same methods, more or less, have so far been used in the cultural areas. This leads to the question of whether mechanical fragmenting procedures are proper and promising when we approach living objects whose behavior of yesterday may not repeat itself tomorrow under apparently similar circumstances.

Different areas with differently acting facts may require different methods. Other contents may respond in another form. Heinrich Rickert, who was one of the first to point to such views and who coined the term "cultural", has suggested the solution in directing cultural sciences to mere phenomenological descriptions of particular individuals or particular groups.[3]

We admit that every science, be it natural or cultural, will start on the lowest approach with a description and identification of certain selected and combined universal abstracts which are ordered systematically, all in intuitional concepts. We must also admit that certain sciences did not get any further. Linnaeus' botanical system would be a prime example, in its recognition of orders of plants by numbers of stamens or pistils of flowers and by the patterns in which plants are joined together.

In natural sciences, however, such descriptive research has moved to postulated theories and explanations. Scientific agriculture has gone way beyond Linnaeus.

If we were to follow Rickert for cultural science we would pass a sentence of death on the real accomplishments of science, which has always worked wonders elsewhere by intellectual superstructures and by verifications of correlated percepts.[4]

It cannot be true that cultural sciences deal with the products of men. They deal actually, as far as the product is concerned, with human relations and with intangible human involvements. Cultural are the economic conditions and the social impacts of that product. The field of cultural sciences, then, is not limited to an entanglement with tangible products. It deals, simply, with human motivations and reactions as such, which may involve any events, whether such events are made by men or born by nature. Such intangible connections can also be concerned with internal events on a secondary level.

When cultural scientists speak of "values", they refer apparently to such intelligible correlations. We, however, prefer to use the term "human interests" so as to better distinguish this from the mere measurements of intensity which we attach to every element or sub-whole of a cultural event; only this measuring, in brackets, should be covered by the narrower term "values". In our terminology, then, cultural sciences are occupied with sets of valued human interests; these interests represent human needs and human relations to a world which is outside of us or in us. Such valued human interests are formal terms which have variable contents. The valued interests will be represented in intellectual concepts whenever we move within our theories of knowledge. Science—and the theory of knowledge is scientific—can only talk in concepts, taking observations or emotions or other concepts as a content of investigations.

Outside of science, we will find valued human interests—the cultural object—in everyday life—in percepts and judgements and emotions. Whether I act as a father to my children, or as a husband to my wife, or as an employee to my boss, or as a visitor in an art-gallery, I always live in an experience of valued interests.

Since we live by selection my interests will also be selected, out of different references and areas. While I approach the same set of particular factual entities, I may bring my set of valued interests only to one narrow aspect, which may fall under a special conceptual scientific branch. If I look at children playing in the back yard of a house in the slums, I may be concerned only about the social relevance, or about the photogenic impact, or about the psychological implications.

Man's selection of valued interests—the cultural event—is also greatly influenced by the compounded cultural pattern which he has accepted. The package of various sets of interests, formed into ideologies, will not be the same for all people of our time or for a whole nation. But the set will not be entirely individual for every human being. We experience in our space-time particular cultural identifications of groups of species of men. Such functional packages are functionally integrated, covering many categories of cultural

valued selections, with different criteria and different values of intensity. Borsodi has given comparative tabulations of different ideologies.[5]

It will be necessary to consider such contexts whenever we look at a special aspect of culture, be it law, or economics, or political science, or even ethics. It would be foolish to investigate Nazi atrocities without proper attention to the total Nazi conception of ecology, of political patterns and of moral levels. This applies to almost every cultural fact, and to every special branch of cultural science.

The great difference to natural science is not only that we deal in culture with intangible human interests within total packages of interests, it is also that our object is fluid and evasive.

When Galileo made his observations, he could be sure that bodies would fall under his laws of gravity all over the earth and through all times. They would not fall faster in Europe and slower in Asia, or faster in his time and slower three hundred years later, although it was later discovered that there are very small deviations due to latitude and altitude of locations. Such differences, however, can be calculated and considered in precise predictions.

In culture we deal with human wants which are highly variable and do not follow exact patterns. If I look at a woman's garment and say it is black, I can be sure that it will stay black as long as it exists—or that I can account for a change when it is dyed. But when I state that women's fashions accept principally black dresses, I must first specify of what year and what place and what income class I am speaking of. And when I have all this specified, the same ladies may turn around next year and wear only grey.

The fickleness of cultural events is bound to the freedom of men, which evolutionists and rationalists like to overlook. The facts are, and the evolutionists may please forgive me for saying so, that men have a free will if they are not under duress, if they are mentally sane, and if they encounter conditions under which alternatives are possible. It is admitted that conditions are there and that men are free in their will only within certain borders.

We live not under complete determination and not under complete freedom, but in an interacting balance of order and liberty.[6]

Max Planck tried to reconcile determinism, free will and scientific natural principles. All observation requires, to him, a time-lag, a possibility of seeing before and after. In human motivations, we cannot experience any such intervals. This built-in uncertainty prevents us from knowing motives in the cultural field. Planck uses in another form, actually, the famous Heisenberg principle of instrumental uncertainty for his reconciliation.

Whatever our explanations may be, we must realize that the cultural order is not reducible to the natural order and that man's freedom of decision, within given conditions, presents a set of interrelating facts which enter into all cultural intangibles. To some extent, the alternative decisions in the cultural realm are imbedded in total ideologies, and this may give us a basis to investigate a certain detail down to the basic total context.

It is the task of the cultural scientist to present useful alternative solutions to alternative experiences. He is a consultant, he is not a field marshal who orders armies into battles in which thousands may lose their lives. The natural sciences have to go down to certain unknowns and to certain unknowable axioms which are not explained any further and are not explainable. In cultural science we have to do, in our methods, something similar, only the axioms are of slightly different character. They are not any more forces of substances or properties in themselves; they are now the total ideologies, the intangible packages.

It will not be possible to prove or disprove in economics or in political science that capitalism is right or that communism is the one and only correct approach. But we can investigate the instrumentations of one or the other and follow through on their details.

We have, so far, tried to show the problems of cultural science and to offer a few directions which may lead to some solutions. All this is tentative and much work will still have to be done.

B. *A New Method Based on German Legal Science*

In our research for new methods we now turn to a specific

branch of the cultural sciences to see whether we can find in actual use any methods that have proved their worth and may be used in other branches, through "by-sociation." With this in mind we look at the legal field. It recommends itself strongly because it has reliability and precision and firmness. It has not the vagueness of past and present economics, political science or sociology, where whatever you read may or may not be so.

In law, we have a precise conceptual body of legal provisions issued and published with the authority of enforcement in systematic order. Here we find a cautious collection of facts and a careful system of verification under rigid rules of evidence; we find a constant interplay from thoughts to facts and back to thoughts and back again to facts.

In the legal field we have a situation in which we can narrow disagreements to bases of assumptions or concepts which can often be clarified easily and are often solved, under duress of a legal procedure, through factual evidence. Humans will always disagree, and it is in the legal field that we find unique resolutions of disagreements.

There is simply not any cultural science which can compare with the law in concepts as well as in facts. If any science has stood the test of time and space, it is the law. So, it seems only natural that we look first and foremost here for methods which may give us some help in all branches of culture.

Many philosophers have, somehow, felt some attraction to legal precedence and have been fond of quoting the law to prove philosophical theories. The only trouble with this is that often our philosophers did not know enough about law and did not bother to ask somebody who knew. Among philosophers we find, therefore, mostly speculations—what they thought the law might be. I think here, for instance—one example of many—of the amazing thesis by Hilliard[7] that the law exists for the maintenance of individual happiness.

What law really exists for is the synthesis between the thesis and antithesis of opposed valued interests. Smith claims payment of money from Miller and Miller claims he does not owe it. The

State decides the issue from the viewpoint of what the surpassing general social interest requires—namely, that Miller pays if evidence shows that he had promised the amount for a certain service and that he received this service; or else the State decides that Miller does not have to pay if that service was criminal or immoral.

Law is the order of human behavior through which the common will of a national society is forcibly realized.[8] In modern legal systems of the political subordination of citizens, the State determines the collective content. Individual freedom in human relations exists only so far as the State, in the legal system, leaves self-determination to the subject.

We have said before, and repeat here, that all cultural life consists of valued human interests. More than forty years ago a courageous school of legal philosophers in Germany brought this into the open, limiting it to the legal field, in the "Jurisprudence of Interests". We have an American publication of their thoughts[9] which conveys their aims and methods. Behind this modest presentation stands the original German literature. Their axiom is that every law or legal problem regulates a conflict of valued interests of men or groups of men. We find, historically, legal regulations for the same behavior but with radically different contents. Laws have upheld dictatorships, monarchies and democracies alike. Laws have upheld capitalism and fascism and communism. Laws have sanctified slavery and have put a heavy penal sentence on it. Laws have in places protected the accumulations of private property and in other places placed it under the death sentence. Legal systems have enforced polygamy here, monogamy there; they have forbidden divorces or have made them possible. The law has recognized nobility and has abolished it; it has forbidden censorship and has organized it.

The reason behind all this vacillation seems to be that legal viewpoints do not determine the content of a law, just as the technique of printing does not decide what is printed in a book. All law is only form; its content is not law. Whether a law is good or bad, and whether it deserves the grade value "A" for excellent or "F" for flunking, depends only on the question of

how well it carries through the assumed content—how good it is as an enforcer of whatever its master has told it to enforce.

Laws are merely the instrumental means of a culture. They see to it that the people do what the lawgiver wants to accomplish as a cultural end, which will be an end that is not legal. The goal of all laws is, and has always been, to force on people the will of society, which is concerned with many, many issues. The monopolizing state, as the giver, sets the content of law. This content consists of valued social interests which the society under the affected state has accepted and approved and has placed under legal protection.

These valued interests, which are imbedded in legal forms, may be economic, religious, domestic, political, sexual, or educational, or whatever the society, represented by its authorities, wants to regulate. Whoever wants to understand the legal norm has to be aware of this ordered content—the material of law—besides knowing the formal realm of mere legacity.

Orthodox German legal opinions considered every contract complete covering all actual relations of the parties. Empty spots —the "gaps"—existed only subjectively for the persons who had to interpret the agreement. The lawyers and the judge now had to discover the hidden arrangements which had to be deducted out of the silent document, and had to find solutions by so-called interpretations or by fictitious factual considerations (what the parties would have agreed upon, at the time of the execution of the agreement, if they had foreseen the unforeseeable.)

The orthodox legal methods turned here to the arsenal of logical deductions—they had nothing else to turn to. Conclusions were here, always, possible in all directions and were leading to entirely opposite results. One argument could be from part to total—since Party A was granted a portion, he should get always all, or the answer would be restrictive, that this party should get only what he had explicitly coming and nothing more. Analogies or syllogisms would also fly in easy flow to a yes or to a no. The decision would then usually come from a hidden emotional, irrational judgement which preferred the one logical conclusion to the other—although

both had logically exactly the same value or lack of value. At least, this was the charge which the new school leveled, adding that the orthodox would hotly deny that the final decisions all rested on the emotional, irrational selection of a logical stratagem. The same lawyers and judges would pride themselves, in less guarded moments, on their so-called common sense and human understanding which were guiding them in this jungle of conceptual growth.

The new school of "Jurisprudence of Interests" turned to a radically different conceptual theory. In a phenomenal view, it limited the actual contract to its actual coverage and considered the uncovered as genuinely not regulated, as a genuine "gap"—"*die Luecke*". These not-covered factual occurrences had to be brought under new conceptual postulated solutions. The gap had to be filled and this could only be done by an investigation of the underlying non-legal content, out of the valued interest of the parties.

The School gave itself the name of the "Free Legal Movement" (*Die Freirechtslehre*), "free" referring here to the fetters of conceptual logic. In every problematic case the valued interests of each party had to be established and the distribution between opposing interests as it was generally agreed in the contract, had to be unearthed. The overriding social interest had then to provide for the solution.

What such an approach required—and the originators were usually not clear enough on this one aspect—was that the overriding interest could not be what lawyers or the judge (the kingly Judge, as they liked to call him) considered decisive. Since all law is under monopoly of the State, the overriding interest had to be the valued interest which the lawgiver had sanctioned as a general principle. This general law-given principle had also to be unearthed and postulated and had to be taken into consideration.

Almost every scientific statement must be expressed in one-sidedness at first—our verbal expressions force us to do this—but even this requires a qualification under an added total view. Although the legal realm as such is only a form of a-legal contents, it can nevertheless become a valued interest itself. There can be

formal principles, for instance, strict rules of evidence or provisions for procedures which must override everything else, under certain circumstances, and which will determine the decision in specific cases.

But the additions and qualifications still leave intact the tremendous impact of a radically new theory which goes down to the real issues—to the non-legal level of valued interests. Instead of vague intuition which decides between opposing logical conclusions, we move on another level, in bi-sociation, down to the interests, into the realm of a total living particularity. We still leave room for intuition, on all levels, but within a well organized body of perceptions and concepts.

While the new theory was developed by Germans for German practice of law, it should reach beyond national borders, although the freer German rules of evidence are specially favorable to the theory since non-written evidence is permissible there under a dispute over a written contract.

The German school did not apply the theory just to contracts; it extended it, coherently, to all problems which occurred under "uncovered" provisions, or better, under legal rules which did not cover certain facts. This meant also codifications of civil law or tax law. Whenever our American system has codified areas, for instance in tax laws, or whenever common law rules and a specific decision could not be located, we encountered the same type of problems and we could also use the same methods of solutions as under the "Jurisprudence of Interests" theory.

It must truthfully be admitted that the new German theory was never really victorious in Germany, although quite a number of young attorneys who worked over there some thirty to forty years ago displayed the revolutionary methods openly in briefs and hearings. Whoever was exposed to the new dimensions could hardly forget or forego their attractions.

Here in the United States, "Jurisprudence of Interests" was propounded only in a few books and in a few secluded discussions. It seems important to resurrect the theory and hope that it may finally find general acceptance after years of obscurity, just as it

happened once to the theories of George Boole in mathematics and Kierkegaard in existentialism.

There are some good conclusions to be drawn from our theory, first in the legal field itself. It is not enough for a lawyer or a judge to know the law. It is necessary to go down to the valued a-legal interests in order to understand the contents with which the legal forms are dealing. It is necessary for a specialist to recognize the formal legal aspects and the a-legal aspects of interests which, altogether, appear in a specific particular sub-whole.

Actually, all good legal practitioners have always worked that way; only theoretical researchers may have to clarify their awareness. The patent lawyer has always had to be enough of an engineer or chemist to apply his special laws properly. A lawyer in a tax department of a department store will find himself forced to pick up quite a lot of knowledge of the factual side of his business, including finances and accounting, if he wants to handle the tax problems of the enterprise.

Let us now move a step further. What we just learned inductively from the legal field and from the German school of "Jurisprudence of Interests" represents a general principle which reaches way beyond the profession of law. It represents a principle which extends into all cultural sciences.

I recently met a member of a firm of actuarial consultants who wanted to install a computer in his office. He found that other similar enterprises had tried this with disastrous failures. He found that the main reason for the troubles was that the specialists of data-processing did not know enough about the requirements of actuarial work and that actuaries did not know enough about the technical features of the computer to arrive at solutions which the one could use and the other could perform. Our actuary decided to take six months off from his job and to learn data processing so that he could see his problems in the light of the computer and could then get together with these other specialists for a joint effort. He felt proud that his six months were well spent. He ended with a proper installation which worked smoothly and cost a fraction of the original estimates.

I just read that the American Airlines did something similar when they placed all their reservations on computers.[10]

C. *Down to the Facts: Values, Verifications and Probabilities*

From the interrelation of the form and content of valued human interests, each viewed in a different scientific branch and both considered together in interaction, we return now to the general methods that every cultural branch could use in its own area.

Classical abstractions and classifications prevail in all sciences, natural as well as cultural. Let us summarize again those methods which we presented fully in previous chapters.

Investigations are usually prompted by a problem[11] and start with a description of the factual situation, according to identifications and abstraction of universal elements. This means transformations from perception into concepts by intuition (thought-images of elements of observation). We turn, then, to a tentative theory, to concepts by postulates which are expressed in thoughts of images or of symbols. From here, we deduce down to concepts of intuition and correlate these concepts to actual perceptual verification.[12]

We accept, wholeheartedly, the classical abstract methods in cultural sciences. However, they have to be adjusted to the fluidity of the cultural content—the flexible valued interests. For such an adaptation, we have recommended mainly two approaches, both of which are based on a recognition of the existential particularity of culture.

Natural science prides itself on its measurements and on its mathematical involvements. We stated in Chapter X that cultural sciences deal with values[13] and these are also measurements. They are less precise, since they have to be usually in a few brackets. But our cultural facts do not permit of more precision. On the other hand, such limited precision, and its tools, have so far hardly been used, at least not in theoretical work. We are, here, just at the beginning of a new area.

In all cultural sciences, a better recognition of values will permit

considerable progress. To work with values requires first that every problem be broken down carefully into components, that every solution be separated into criteria, and that the relations between both be treated also in this fashion. The breakdown has to be done "scientifically", which means that disagreeable elements have to be faced and dealt with. It has to cease that any systems push contradictory fragments under the carpets. Unfortunately, such monistic tailoring of facts is very easy to do in the field of cultural intangibles, much easier than in natural sciences, which deal with tangible objects.

Working with values means that we state measurements in graded brackets on every relevant element and on the compound. We have discussed this in detail in the previous chapter and come now to the use to which our previous findings are to be assigned in cultural sciences.

In valuing, there are differences between the methods of cultural science and the methods of natural science, which measures with finer distinctions. But the differences are only gradual. Natural science has grown to precision and success by measurements and mathematics, which is the conceptual tool of magnitudes and logic.

Values could accomplish a parallel growth in cultural sciences. Needless to say, measurements alone could not have produced today's splendor of natural science and mathematics could hardly substitute for good theories or gifted hunches. But measurements and mathematics were indispensable. The same will apply to cultural sciences as well as to our theories of knowledge.

D. *Predictions and Manipulations in Sciences of Culture*

It is the goal of all natural sciences to start with descriptions, to gain understanding, and to arrive at predictions and modifications of the appearing reality. Natural science has developed from contemplations and proceeds from concepts and postulates to manipulations. In natural science, the scientific methods aim at power over environment. Natural science is concerned with power-thoughts and with actions.

Natural scientists like to deny that cultural disciplines can produce predictions of events or manipulations of facts. They like to conclude, under this argument, that the cultural branches should not even be honored by the name of science. Their attack implies that the failure in predictions or controls is not due to faulty methods or to the poor status of the cultural crafts but is inherent in the cultural object, in the fickleness of human interests which may shift under man's will within a few years or from one group to another.

However, natural science has gained the ability to predict and to control only lately and only gradually. It seems fair to grant the cultural disciplines a similar patience of development. Predictions and manipulations are, even in the field of natural science, the result of long scientific work and are not a pre-supposition or condition of scientific methods.

Even if the results should often not yet be good enough in predictions or manipulations, the cultural disciplines are, in their work, dedicated to scientific methods on every element and in every step of perception, concepts, judgements, and hierarchies, and on the interacting combinations of all these levels.

In our present situation, predictions and controls are rather differently precise in our different disciplines of cultural sciences. In some branches, we do rather well and are completely equal to the naturalists. In law, we are doing fine. Here we have exact conceptual systems—they are even enforced by State monopoly. And here we find strict rules about factual evidence which are controlled by officers of the courts.

"History" seems to be at the other pole. From a careful recognition of the past or present, it appears almost impossible to arrive at predictions or manipulations of the future. However, the standards and designs of historic investigations aim merely at a proper recognition and conceptual ordering of events which have occurred, comparable to Linnaeus' botanical system. To conclude trends for the future would belong to political science, economy, sociology, or other branches which will have some standards of prediction. In its proper limits, history will be sufficiently assured

to take on the role of prediction.

In every discipline of cultural science, the specialists may feel that much has been accomplished, at least during the last decades, and that the time-honored methods, as they are used more or less consciously, were not so bad. To some extent, this will surely be true.

Outsiders, including natural scientists, will often say that much has still to be done and that much could be improved. If cultural scientists search their souls, they will in all probability very often admit this. Cultural improvements will require better methods, and our suggestions try to contribute a few possibilities in these directions.

Here, in our theories of knowledge and values and in the field of scientific methods—especially in cultural disciplines—we must know the past, exist in the present and do our best to point to a future.

NOTES

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