BOOK I

A GENERAL SURVEY OF

NON-ARISTOTELIAN FACTORS

Allow me to express now, once and for all, my deep respect for the work of the experimenter and for his fight to wring significant facts from an inflexible Nature, who says so distinctly "No" and so indistinctly "Yes" to our theories. (550) HERMANN WEYL

The firm determination to submit to experiment is not enough; there are still dangerous hypotheses, first, and above all, those which are tacit and unconscious. Since we make them without knowing it, we are powerless to abandon them. (417) H. POINCARÉ

The empiricist . . . thinks he believes only what he sees, but he is much better at believing than at seeing. (461) G. SANTAYANA

For a Latin, truth can be expressed only by equations, it must obey laws simple, logical, symmetric and fitted to satisfy minds in love with mathematical elegance.

The Anglo-Saxon to depict a phenomenon will first be engrossed in making a *model*, and he will make it with common materials, such as our crude, unaided senses show us them.... He concludes from the body to the atom.

Both therefore make hypotheses, and this indeed is necessary, since no scientist has ever been able to get on without them. The essential thing is never to make them unconsciously. (417) H. POINCARÉ

If a distinction is to be made between men and monkeys, it is largely measurable by the quantity of the subconscious which a higher order of being makes conscious. That man really lives who brings the greatest fraction of his daily experience into the realm of the conscious.* MARTIN H. FISCHER

The thought of the painter, the musician, the geometrician, the tradesman, and the philosopher may take very different forms, still more so the thought of the uncultivated man, which remains rudimentary and revolves for ever in the same circles. (411) HENRI PIÉRON

One need only open the eyes to see that the conquests of industry which have enriched so many practical men would never have seen the light, if these practical men alone had existed and if they had not been preceded by unselfish devotees who died poor, who never thought of utility, and yet had a guide far other than caprice. (417) H. POINCARÉ

* Spinal Cord Education. *Ill. Med. Jour.* Dec., 1928.

The men most disdainful of theory get from it, without suspecting it their daily bread, deprived of this food, progress would quickly cease, and we should soon congeal into the immobility of old China. (417) H. POINCARÉ

If one wishes to obtain a definite answer from Nature one must attack the question from a more general and less selfish point of view. (415) M. PLANCK

In particular—if we use the word intelligence as a synonym for mental activity, as is often done—we must differentiate between the primitive forms of sensory intelligence, with their ill-developed symbolism beyond which backward children cannot advance, . . . and the forms of verbal intelligence created by social education, abstract and conceptual forms. (411) HENRI PIÉRON

A civilisation which cannot burst through its current abstractions is doomed to sterility after a very limited period of progress. (575) A. N. WHITEHEAD

. . . almost any idea which jogs you out of your current abstractions may be better than nothing. (575) A. N. WHITEHEAD

That is precisely what common sense is for, to be jarred into uncommon sense. One of the chief services which mathematics has rendered the human race in the past century is to put ‘common sense’ where it belongs, on the topmost shelf next to the dusty canister labeled ‘discarded nonsense.’ (23) E. T. BELL

If you have had your attention directed to the novelties in thought in your own lifetime, you will have observed that almost all really new ideas have a certain aspect of foolishness when they are first produced. (575) A. N. WHITEHEAD

To know how to criticize is good, to know how to create is better. (417) H. POINCARÉ

The explanatory crisis which now confronts us in relativity and quantum phenomena is but a repetition of what has occurred many times in the past. . . . Every kitten is confronted with such a crisis at the end of nine days. (55) P. W. BRIDGMAN

The concept does not exist for the physicist until he has the possibility of discovering whether or not it is fulfilled in an actual case.... As long as this requirement is not satisfied, I allow myself to be deceived as a physicist (and of course the same applies if I am not a physicist), when I imagine that I am able to attach a meaning to the statement of simultaneity. (I would ask the reader not to proceed farther until he is fully convinced on this point.) (150) A. EINSTEIN

Einstein, in thus analyzing what is involved in making a judgment of simultaneity, and in seizing on the act of the observer as the essence of the situation, is actually adopting a new point of view as to what the concepts of physics should be, namely, the operational view. . . if we had adopted the operational point of view, we would, before the discovery of the actual physical facts, have seen that simultaneity is essentially a relative concept, and would have left room in our thinking for the discovery of such effects as were later found. (55) P. W. BRIDGMAN

Let any one examine in operational terms any popular present-day discussion of religious or moral questions to realize the magnitude of the reformation awaiting us. Wherever we temporize or compromise in applying our theories of conduct to practical life we may suspect a failure of operational thinking. (55) P. W. BRIDGMAN

I believe that many of the questions asked about social and philosophical subjects will be found to be meaningless when examined from the point of view of operations. It would doubtless conduce greatly to clarity of thought if the operational mode of thinking were adopted in all fields of inquiry as well as in the physical. Just as in the physical domain, so in other domains, one is making a significant statement about his subject in stating that a certain question is meaningless. (55) P. W. BRIDGMAN

There is a sharp disagreement among competent men as to what can be proved and what cannot be proved, as well as an irreconcilable divergence of opinion as to what is sense and what is nonsense. (22) E. T. BELL

Notice the word “nonsense” above. It was their inability, among other things, to define this word . . . that brought to grief the heroic attempt of Russell and Whitehead to put mathematical reasoning on a firm basis. (22) E. T. BELL

The structure of all linguistic material is inextricably mixed up with, and dependent upon, the course of the activity in which the utterances are embedded. (332) B. MALINOWSKI

To sum up, we can say that the fundamental grammatical categories universal to all human languages, can be understood only with reference to the pragmatic Weltanshauung of primitive man, and that, through the use of Language, the barbarous primitive categories must have deeply influenced the later philosophies of mankind. (332) B. MALINOWSKI

Since no two events are identical, every atom, molecule, organism, personality, and society is an emergent and, at least to some extent, a novelty. And these emergents are concatenated in such a way as to form vast ramifying systems, only certain ideal sections of which seem to have elicited the attention of philosophers, owing to their avowedly anthropocentric and anthropodoxic interests. (555) WILLIAM MORTON WHEELER

The words *is* and *is not*, which imply the agreement or disagreement of two ideas, must exist, explicitly or implicitly, in every assertion. (354) AUGUSTUS DE MORGAN

The little word *is* has its tragedies it marries and identifies different things with the greatest innocence, and yet no two are ever identical, and if therein lies the charm of wedding them and calling them one, therein too lies the danger. Whenever I use the word *is*, except in sheer tautology, I deeply misuse it; and when I discover my error, the world seems to fall asunder and the members of my family no longer know one another. (461) G. SANTAYANA

The complete attempt to deal with the term *is* would go to the form and matter of every thing in *existence*, at least, if not to the possible form and matter of all that does not exist, but might. As far as it could be done, it would give the grand Cyclopaedia, and its yearly supplement would be the history of the human race for the time. (354) AUGUSTUS DE MORGAN

Consciousness is the feeling of negation: in the perception of ‘the stone as grey,’ such feeling is in barest germ; in the perception of ‘the stone as not grey,’ such feeling is full development. Thus the negative perception is the triumph of consciousness. (578) A. N. WHITEHEAD

But, if we designate as intelligence, quantitatively, the totality of mental functioning, it is evident that the suppression of verbal thought involves a defect, relatively very important among cultivated individuals leading a complex social life: the uneducated person from this point of view is a defective. (411) HENRI PIÉRON

The philosophy of the common man is an old wife that gives him no pleasure, yet he cannot live without her, and resents any aspersions that strangers may cast on her character. (461)G. SANTAYANA

It is terrible to see how a single unclear idea, a single formula without meaning, lurking in a young man's head, will sometimes act like an obstruction of inert matter in an artery, hindering the nutrition of the brain and condemning its victim to pine away in the fullness of his intellectual vigor and in the midst of intellectual plenty. (402) CHARLES S. PEIRCE

PART I

PRELIMINARIES

Corpus Errorum Biologicorum

. . . . . .

But exactly the distinctive work of science is the modification, the reconstruction, the abandonment of old ideas; the construction of new ones on the basis of observation. This however is a distressing operation, and many refuse to undergo it, even many whose work is the practice of scientific investigation. The old ideas persist along with the new observations, they form the basis—often unconsciously—for many of the conclusions that are drawn.

This is what has occurred in the study of heredity. A burden of concepts and definitions. has come down from pre-experimental days; the pouring of the new wine of experimental knowledge into these has resulted in confusion. And this confusion is worse confounded by the strange and strong propensity of workers in heredity to flout and deny and despise the observations of the workers in environmental action; the equally strange and strong propensity of students of environmental effects to flout and deny and despise the work on inheritance. If one accepts the affirmative results of both sets, untroubled by their negations, untroubled by definitions that have come from the past, there results a simple, consistent and useful body of knowledge; though with less pretentious claims than are set forth by either single set.

Our first fallacy springs from the situation just described. It is:

I. The fallacy of non-experimental judgments, in matters of heredity and development. . . .

Our second general fallacy is one that appears in the interpretation of observational and experimental results, it underlies most of the special fallacies seen in genetic biology. This is the fallacy that Morley in his life of Gladstone asserts to be the greatest affliction of politicians; it is indeed a common plague of humanity. It is:

II. The fallacy of attributing to one cause what is due to many causes. . . .

III. The fallacy of concluding that because one factor plays a role another does not; the fallacy of drawing negative conclusions from positive observations. . . .

IV. The fallacy that the characteristics of organisms are divisible into two distinct classes; one due to heredity, the other to environment. . . .

VII. The fallacy of basing conclusions on implied premises that when explicitly stated are rejected. . . .

Many premises influencing reasoning are of this hidden, unconscious type. Such ghostly premises largely affect biological reasoning on the topics here dealt with; they underlie several of the fallacies already stated, and several to come. . . .

VIII. The fallacy that showing a characteristic to be hereditary proves that it is not alterable by the environment. . . .

IX. The fallacy that showing a characteristic to be altered by the environment proves that it is not hereditary. . . .

It appears indeed probable, from the present state of knowledge and the trend of discovery, that the following sweeping statements will ultimately turn out to be justified:—

(1) All characteristics of organisms may be altered by changing the genes; provided we can learn how to change the proper genes.

(2) All characteristics may be altered by changing the environmental conditions under which the organism develops; provided that we learn what conditions to change and how to change them.

(3) Any kind of change of characteristics that can be induced by altering genes, can likewise be induced (if we know how) by altering conditions. (This statement is open to more doubt than the other two, but it is likely eventually to be found correct.) . . .

X. The fallacy that since all human characteristics are hereditary, heredity is all-important in human affairs, environment therefore unimportant....

XI. The fallacy that since all important human characteristics are environmental, therefore environment is all-important, heredity unimportant, in human affairs. (247)H. S. JENNINGS

CHAPTER I
AIMS, MEANS AND CONSEQUENCES OF A NON-ARISTOTELIAN REVISION

> The process of intellectualism is not the subject I wish to treat: I wish to speak of science, and about it there is no doubt; by definition, so to speak, it will be intellectualistic or it will not be at all. Precisely the question is, whether it will be. (417) H. POINCARÉ

> The aim of science is to seek the simplest explanations of complex facts. . . . Seek simplicity and distrust it. (573) A. N. WHITEHEAD

The present enquiry originated in my attempt to build a science of man. The first task was to define man scientifically in non-elementalistic, functional terms. I accomplished that in my book *Manhood of Humanity* (New York, E. P. Dutton & Co.), and in it I called the special characteristic which sharply distinguishes man from animal the time-binding characteristic.

In the present volume I undertake the investigation of the mechanism of time-binding. The results are quite unexpected. We discover that there is a sharp difference between the nervous reactions of animal and man, and that judging by this criterion, nearly all of us, even now, copy* animals in our nervous responses, which copying leads to the general state of un-sanity reflected in our private and public lives, institutions and systems. By this discovery the whole situation is radically changed. If we copy animals in our nervous responses through the lack of knowledge of what the appropriate responses of the human nervous system should be, we can stop doing so, both individually and collectively, and we are thus led to the formulation of a first positive theory of sanity.

The old dictum that we *'are'* animals leaves us hopeless, but if we merely *copy* animals in our nervous responses, we can stop it, and the hopeless becomes very hopeful, provided we can discover a *physiological* difference in these reactions. Thus we are provided with a definite and promising program for an investigation.

Such an investigation is undertaken in the present volume.

The result of this enquiry turned out to be a non-aristotelian system, the first to be formulated, as far as I know, and the first to express the very scientific tendency of our epoch, which produced the non-euclidean and non-newtonian (Einstein's and the newer quantum theories) systems. It seems that these three, the non-aristotelian, non-euclidean and non-newtonian systems are as much interwoven and interdependent

* The use of the term 'copy' is explained in Chapter II.

as were the corresponding older systems. The aristotelian and the non-aristotelian systems are the more general, the others being only special and technical consequences arising from them.

Both the aristotelian and the non-aristotelian systems affect our lives deeply, because of psycho-logical factors and the immediacy of their application. Each is the expression of the psycho-logical tendencies of its period. Each in its period must produce in the younger generations a psycho-logical background which makes the understanding of its appropriate disciplines ‘natural’ and simple. In an aristotelian human world the euclidean and newtonian systems are ‘natural’, while the youth educated in the non-aristotelian habits will find the non-euclidean and non-newtonian systems simpler, more ‘natural’, and the older systems ‘unthinkable’.

The functioning of the human nervous system is a more generalized affair than that of the animal, with more possibilities. The latter is a special case of the former, but not vice versa. John Smith, through ignorance of the mechanism, may use his nervous system as a Fido; but Fido cannot copy Smith. Hence, the danger for Smith, but not for Fido. Fido has many of his own difficulties for survival, but, at least, he has no *self-imposed* conditions, mostly silly and harmful, such as Smith has ignorantly imposed on himself and others. The field covered by this enquiry is very wide and involves unexpectedly special suggestive contributions in diverse branches of science. To list a few for orientation:

1. The formulation of General Semantics, resulting from a General Theory of Time-binding, supplies the scientists and the laymen with a general modern method of orientation, which eliminates the older psycho-logical blockages and reveals the mechanisms of adjustment;

2. The departure from aristotelianism will allow biologists, physiologists, etc., and particularly medical men to ‘think’ in modern colloidal and quantum terms, instead of the inadequate, antiquated chemical and physiological terms. Medicine may then become a science in the 1933 sense;

3. In psychiatry it indicates on colloidal grounds the solution of the ‘body-mind’ problem;

4. It shows clearly that desirable human characteristics have a definite *psychophysiological* mechanism which, up till now, has been misused, to the detriment of all of us;

5. It gives the first definition of ‘consciousness’ in simpler physico-chemical terms;

6. A general theory of sanity leads to a general theory of psychotherapy, including all such existing medical schools, as they all deal with

disturbances of the *semantic reactions* (psycho-logical responses to words and other stimuli in connection with their *meanings*);

7. It formulates a physiological foundation for ‘mental hygiene’ which turns out to be a most general preventive *psychophysiological* experimental method;

8. It shows the *psychophysiological* foundation of the childhood of humanity as indicated by the *infantilism* in our present private, public, and international lives;

9. In biology it gives a semantic and structural solution of the ‘organism-as-a-whole’ problem;

10. In physiology and neurology it reformulates to human levels the Pavlov theory of conditional reflexes, suggesting a new scientific field of *psychophysiology* for experiments;

11. In epistemology and semantics it establishes a definite non-elementalistic theory of meanings based not only on definitions but also on *undefined* terms;

12. It introduces a new development and use of ‘structure’;

13. It establishes structure as the only possible content of knowledge;

14. It discovers the *multiordinality* of the most important terms we have, thus removing the psycho-logical blockage of semantic origin and helping the average man or scientist to become a ‘genius’, etc.;

15. It formulates a new and physiological theory of mathematical types of extreme simplicity and very wide application;

16. It offers a non-aristotelian solution of the problem of mathematical ‘infinity’;

17. It offers a new non-aristotelian, semantic (from Greek, to signify) definition of *mathematics* and *number*, which clarifies the mysteries about the seemingly uncanny importance of number and measurement and throws a new light on the role, structural significance, meaning, and methods of mathematics and its teaching;

18. In physics, the enquiry explains some fundamental, but as yet disregarded, semantic aspects of physics in general, and of Einstein’s and the new quantum theories in particular;

19. It resolves simply the problem of ‘indeterminism’, of the newer quantum mechanics, etc.

I realize that the thoughtful reader may be staggered by such a partial list. I am in full sympathy with him in this. I also was staggered.

As this enquiry claims to be scientific, in the 1933 sense, I must explain how, in spite of great difficulties and handicaps, I was able to accomplish the work. As my work progressed, it turned out to be

‘speaking about speaking’. Now all scientific works in all fields are written or spoken, and so are ultimately verbal. In order to speak about speaking, in any satisfactory and fundamental 1933 sense, I had to become acquainted with the special languages used by scientists in all fields. I did not realize beforehand what a very serious undertaking this was. It took many years and much hard labour to accomplish it, but, once accomplished, the rest was simple. Scientists do not differ from the rest of us. They usually disregard entirely structural, linguistic, and semantic issues, simply because no one has, as yet, formulated these problems or shown their importance. The structural revision of their language led automatically to new results and new suggestions, and hence the surprising list.

The present enquiry is limited and partial, but because it deals with linguistic and semantic issues and their *physiological* and psycho-logical aspects, it is, as far as it goes, *unusually general*. I found that, in writing, it is extremely difficult and impracticable always to state explicitly the limitations of a statement. It seems most practical to say here that, in general, *all statements here made are limited* by further considerations of the actualities of an analysed problem.

Thus, for instance, a ‘theory of sanity’ deals with the most important semantic issues from limited semantic aspects, and has nothing to do with forms of ‘insanity’ arising from different organic, or toxic, or other disturbances, which remain as serious as ever. The statements made cover just as much as further investigations will allow them to cover. and no more.

The reader should be warned against undue generalizations, as they may be unjustified. It is impossible at this stage, to foresee all the ramifications of the present work. The verbal issues, which correspond roughly to the older ‘mental’ issues, seem to pervade all *human* problems to some extent, and so the field of application and influence of any such enquiry must be very large. Most of the results of the present work involve factors of unusual security of conclusion, though they may violate canons of our ‘philosophical’ creeds.

The explanation is astonishingly simple and easily verified. The present non-aristotelian system is based on fundamental *negative* premises; namely, the complete denial of ‘identity’, which denial *cannot be denied* without imposing the burden of impossible proof on the person who denies the denial. If we start, for instance, with a statement that ‘a word is not the object spoken about’, and some one tries to deny that, he would have to produce an actual physical object which would *be the word*,—impossible of performance, even in asylums for the ‘men-

tally' ill. Hence my security, often 'blasphemously cheerful', as one of my friends calls it.

This general denial of the 'is' of identity gives the main fundamental non-aristotelian premise, which necessitates a structural treatment. The status of negative premises is much more important and secure to start with than that of the positive 'is' of identity, found in the aristotelian system, but easily shown to be false to fact, and involving important delusional factors.

Any map or language, to be of maximum usefulness, should, in structure, be similar to the structure of the empirical world. Likewise, from the point of view of a theory of sanity, any system or language should, in structure, be similar to the structure of our nervous system. It is easily shown that the aristotelian system differs structurally from these minimal requirements, and that the non-aristotelian system is in accordance with them.

This fact turns out to be of *psychophysiological* importance. The above considerations, and others impossible to mention in this chapter, have suggested to me the form and structure of the whole work. I have spared no effort to make the presentation as connected, simple, and, particularly, as *workable* as I could. As I deal with structure, and similarity of structure, of languages and the empirical world, a definite selection of topics is immediately suggested. I must give enough structural data about languages in general, and enough structural data about the empirical world, and then select, or, if necessary, build, my terminology and system of similar structure.

The reader should not be afraid if some parts of the book look technical and mathematical. In reality, they are not so. Speaking of the language called mathematics, from a structural point of view, I have had to illustrate what was said, and the few symbols or diagrams are used only for that purpose. Many of the structural points are of genuine importance and interest to professional scientists, teachers, and others, who seldom, if ever, deal with such structural, linguistic, and semantic problems as are here analysed. The layman who will read the book diligently and repeatedly, without skipping any part of it, will get at least a *feeling* or vague notion that *such problems do exist*, which will produce a very important psycho-logical effect or release from the old animalistic unconditionality of responses, whether or not he feels that he has 'understood' them fully.

My earnest suggestion, backed by experience, to the reader is to read the book through several times, but not to dwell on points which are not clear to him. At each reading the issues will become clearer,

until they will become entirely his own. Superficial reading of the book is to be positively discouraged, as it will prove to be so much time wasted. Experience teaches me that the number of semantic maladjustments, particularly among the white-collar class, is very large. At present, I do not know any case where a thorough *training* in such a non-aristotelian semantic discipline would not give very serious means for better adjustment. It will quiet down affective, semantic disturbances, sharpen orientation, judgement, the power of observation, and so forth; it will eliminate different psycho-logical blockages, help to overcome the very annoying and common 'inferiority' feelings; it will assist the outgrowing of the adult *infantile state*, which is a nervous deficiency practically always connected with some pathological sex-reactions or lack of normal and healthy impulses.

After all, we should not be surprised at this. Language, as such, represents the highest and latest physiological and neurological function of an organism. It is unique with Smith and of uniquely human circular structure, to use a logical term—or of spiral structure, to use a four-dimensional or a physico-chemical-aspect term. Before we can use the semantic nervous apparatus properly, we must first know how to use it, and so formulate this use.

In these processes an 'effect' becomes a *causative* factor for future effects, influencing them in a manner particularly subtle, variable, flexible, and of an endless number of possibilities. 'Knowing', if taken as an end-product, must be considered also as a causative psychophysiological factor of the next stage of the semantic response. The disregard of this mechanism is potentially of serious danger, particularly in the rearing of children, as it trains them in unanalysed linguistic habits, the more so since the human nervous system is not complete at birth. This structural and functional circularity introduces real difficulties in our analysis, disregarded or neglected in the aristotelian system. Human life, in its difference from animal life, involves many more factors and is inherently of different and more complex structure. Before we can be fully human and, therefore, 'sane', as a 'normal' human being should be, we must first know how to handle our nervous responses—a circular affair.

A non-aristotelian system must not disregard this *human-natural-history structural fact* of the inherent circularity of all physiological functions which in any form involve human 'knowing'. A non-aristotelian system differs essentially in structure from its predecessor, which, by necessity, through the lack of knowledge characteristic of its epoch,

disregarded these structural semantic issues and so was constructed on cruder *animalistic patterns*

The difficulty in passing from the old system to another of different structure is not in the non-aristotelian system as such, which is really simpler and more in accord with common sense; but the serious difficulty lies rather in the older habits of speech and nervous responses, and in the older semantic reactions which must be overcome. These difficulties are, perhaps, more serious than is generally realized. Only those who have experienced the passing from euclidean to non-euclidean, and from newtonian to non-newtonian systems can fully appreciate this semantic difficulty; as a rule, it takes a new generation to do it painlessly and with entire success. This applies to the general public, but is not an excuse for scientists, educators, and others who are entrusted with the education of, or who otherwise influence, the semantic reactions of children. If any reader realizes his difficulties and *seriously wants* to overcome them, another suggestion may be given. A structural diagram in the present work, called the Structural Differential, shows the structural difference between the world of animal and the world of man. This structural difference is not yet fully realized; neither is its semantic importance understood, as it has never been formulated in a simple way before; yet the permanent and instinctive realization of these structural differences is unconditionally necessary for the mastering of the present theory of sanity. This diagram, indeed, involves all the psychophysiological factors necessary for the transition from the old semantic reactions to the new, and it gives in a way a *structural summary* of the whole non-aristotelian system. As the diagram is based on the denial of the 'is' of identity, its use is practically indispensable; it has been made in relief and in printed forms, to be kept on the wall or the desk as a permanent visual structural and semantic reminder. Without actual handling, pointing the finger or waving the hand at it, seeing the *order*, and so on, it is practically impossible, or very difficult, to become *trained*, or to explain the present system to ourselves or others, because the foundation of all 'knowing' is structural, and the Structural Differential actually shows this structural difference between the world of animal and the world of man.

One of the best ways for grown-up persons to train themselves in the present theory of sanity is to try to explain it to others, repeatedly pointing to the Structural Differential. In my experience, those who have disregarded this advice have always made very slow progress, and have never got the full semantic benefit of their efforts. As regards the verbal side of the training, it is as important to use exclusively the terms

given in this book, which are non-aristotelian and non-elementalistic, as it is to *abandon entirely* the 'is' of identity and some of the elementalistic primitive terms.

The reader should be warned from the beginning of a very fundamental semantic innovation; namely, of the discovery of the *multiordinality* of the most important terms we have. This leads to a conscious use of these terms in the multiordinal, extremely flexible, full-of-conditionality sense. Terms like 'yes', 'no', 'true', 'false', 'fact', 'reality', 'cause', 'effects', 'agreement', 'disagreement', 'number', 'proposition', 'relation', 'order', 'structure', 'abstraction', 'characteristic', 'love', 'hate', 'doubt', etc., are such that if they can be applied to a statement they can also be applied to a statement about the first statement, and so, ultimately, to all statements, no matter what their order of abstraction is. Terms of such a character I call *multiordinal terms.* The main characteristic of these terms consists of the fact that on different levels of orders of abstractions they may have different meanings, with the result that they have no general meaning; for their meanings are determined solely by the given context, which establishes the different orders of abstractions. Psycho-logically, in the realization of the multiordinality of the most important terms, we have paved the way for the specifically *human* full conditionality of our semantic responses. This allows us great freedom in the handling of multiordinal terms and eliminates very serious psycho-logical fixities and blockages, which analysis shows to be animalistic in their nature, and, consequently, pathological for man. Once the reader understands this multiordinal characteristic, this semantic freedom does not result in confusion.

Accidentally, our vocabulary is enormously enriched without becoming cumbersome, and is made very exact. Thus a 'yes' may have an indefinite number of meanings, depending on the context to which it is applied. Such a blank 'yes' represents, in reality, 'yes_{∞}' but this includes 'yes_1', 'yes_2', 'yes_3', etc., all of which are, or may be, different. All speculations about such terms *in general*—as, for instance, 'what a fact or reality is ?'—are futile, and, in general, illegitimate, as the only correct answer is that 'the terms are multiordinal and devoid of meaning outside of a context'. This settles many knotty epistemological and semantic questions, and gives us a most powerful method for promoting human mutual freedom of expression, thus eliminating misunderstandings and blockages and ultimately leading to agreement.

I suspect that without the discovery of the multiordinality of terms the present work could not have been written, as I needed a more flexible language, a larger vocabulary, and yet I had to avoid confusion. With

the introduction of the multiordinality of terms, which is a *natural* but, as yet, an unnoticed fact, our ordinary vocabulary is enormously enriched; in fact, the number of words in such a vocabulary *natural for man* is infinite. The multiordinality of terms is the fundamental mechanism of the *full conditionality* of *human* semantic reactions; it eliminates an unbelievable number of the old animalistic blockages, and is fundamental for sanity.

A number of statements in the present work have definite meanings for different specialists, often running entirely counter to the accepted scientific creeds. As they followed naturally from the context, I inserted them for the specialist, without warning, for which I have to apologize to the general reader, although they will be useful to him also.

To make issues sharper, some words will be repeated so often that I abbreviate them as follows:

Abbreviation	Stands for	Abbreviation	Stands for
A	aristotelian	$\overline{N}$	non-newtonian
$\overline{A}$	non-aristotelian	*el*	elementalistic
E	euclidean	*non-el*	non-elementalistic
$\overline{E}$	non-euclidean	*m.o* or (*m.o*)	multiordinal
N	newtonian	*s.r* or (*s.r*)	semantic reactions, both singular and plural

In some instances, for special emphasis, the words will be spelled in full.

A $\overline{A}$-system, being extensional, requires the enumeration of long lists of names, which, in principle, cannot be exhausted. Under such conditions, I have to list a few representatives followed by an ‘etc.’, or its equivalents. As the extensional method is characteristic of a $\overline{A}$ treatment, the expression ‘etc.’ occurs so often as to necessitate a special $\overline{A}$ extensional punctuation whenever the period does not indicate another abbreviation, as follows:

Abbreviation	Stands for
. ,	etc. ,
, .	, etc.
. ;	etc. ;

Abbreviation	Stands for
. :	etc. :
. ?	etc. ?
. !	etc. !

This book is intended as a handbook, and I have avoided referring the reader to other books, but have given as much of structural data as I deemed useful for a general orientation. In a work of such wide scope and novelty, it seemed desirable to give a general outline rather than to elaborate in detail on some particular points, so that this work is not exhaustive in any field; nor, at present, can it be.

The notes at the end of the book are given for the purposes (among others) of indicating sources of information, as an acknowledgement, and to facilitate the work of the future student. As much as I could, I have avoided direct quotations from other authors, because usually it has seemed more expedient to change the wording slightly. In many instances, I have followed the original wordings very closely, always giving the proper credit.

I have not avoided repetitions, because I have found, through sad experience, that many times, when I was reproached for a repetition, the hearer or reader was disregarding quite happily and unconsciously the said ‘repetition’, as if he had never heard it before. For such a work as the present one, the standard literary habits—’avoid repetitions’, ‘let the reader discover it for himself’. , are extremely detrimental to the understanding of a few fundamental issues and to the acquiring of $\overline{A}$ habits and new *s.r*. To facilitate the student’s task, I had no other choice than to write as I did.

In 1933, scientific opinion is divided as to whether we need more science or less science. Some prominent men even suggest that scientists should take a vacation and let the rest of mankind catch up with their achievements. There seems no doubt that the discrepancy between human adjustments and the advances of science is becoming alarming. Is, then, such a suggestion justified ?

The answer depends on the *assumptions* underlying such opinions. If humans, as such, have reached the limit of their nervous development, and if the scientific study of man, as man, should positively disclose these limitations, then such a conclusion would be justified. But is this the case ?

The present investigation shows most emphatically that this is not the case. All sciences have progressed exclusively because they have succeeded in establishing their own $\overline{A}$ languages. For instance, a science of thermodynamics could not have been built on the terms of 'cold' and 'warm'. Another language, one of relations and structure, was needed; and, once this was produced, a science was born and progress secured. Could *modern* mathematics be built on the Roman notation for numbers —I, II, III, IV, V. ? No, it could not. The simplest and most child-like arithmetic was so difficult as to require an expert; and all progress was very effectively hampered by the symbolism adopted. History shows that only since the unknown Hindu discovered the most revolutionary and modern principle of *positional notation*—1, 10, 100, 1000. , modern mathematics has become possible. Every child today is more skillful in his arithmetics than the experts of those days. Incidentally, let us notice that positional notation has a definite *structure.*

Have we ever attempted anything similar in the study of man ? As-a-whole ? In all his activities ? Again, most emphatically, No ! We have never studied man-as-a-whole scientifically. If we make an attempt, such as the present one, for instance, we discover the astonishing, yet simple, fact that, even now, we all copy animals in our nervous responses, although these can be brought to the human level if the difference in the mechanism of responses is discovered and formulated.

Once this is understood, we must face another necessity. To abolish the discrepancy between the advancement of science and the power of adjustment of man, we must first establish the science of man-as-a-whole, embracing *all* his activities, science, mathematics and 'mental' ills *not* excluded. Such an analysis would help us to discover the above-mentioned difference in responses, and the *s.r* in man would acquire new significance.

If the present work has accomplished nothing more than to suggest such possibilities, I am satisfied. Others, I hope, will succeed where I may have failed. Under such conditions, the only feasible resort is to produce a science of man, and thus have not less, but more, science, ultimately covering all fields of human endeavour, and thereby putting a stop to the animalistic nervous reactions, so vicious in their effects on man.

At present, nowhere in the world are there such *psychophysiological* researches being made. There are large sums of money invested in different well-established institutions for scientific research, for 'mental' hygiene, for international peace, and so forth, but not for what is possibly the most important of all lines of research; namely, a general

science of man in all aspects of his behaviour, science, mathematics, and ‘mental’ ills included.

It is to be hoped that, in the not-too-distant future, some individuals and universities will awaken to the fact that language is a fundamental *psychophysiological* function of man, and that a scientific investigation of man in *all* his activities, is a necessary, pressing, very promising, and practical undertaking. Then, perhaps, special chairs will be established in universities, and some such researches in *semantic reactions* and *sanity* will command as much interest and public encouragement as other scientific investigations.

I, personally, have no doubt that this would mark the beginning of a new era, *the scientific era,* in which all human desirable characteristics would be released from the present animalistic, psychophysiological, *A* semantic blockages, and that sanity would prevail.

That this is not a dream, and that such nervous mechanisms producing blockages do exist, has been demonstrated by Pavlov on his dogs, by all psychotherapy, and the experiments now being made on the elimination of the disturbances of the *s.r.* The abundance of geniuses among younger physicists, since the einsteinian structural revolution and semantic release, is also an important empirical evidence that different man-made verbal systems can stimulate or hamper the functioning of the human nervous system.

What has been said here has very solid structural, neurological foundations. For our purpose, we may consider a rough structural difference between the nervous systems of man and animal. Briefly, we can distinguish in the brain two kinds of nervous fibres, the radiating projection fibres and the tangential correlation and association fibres. With the increase of complexities and modifiability of the behaviour, we find an increased number and more complex interrelations of association fibres. The main difference, for instance, between the brain of a man and the brain of a higher ape is found not in the projection apparatus, but in the association paths, which are enormously enlarged, more numerous, and more complex in man than in any animal. Obviously, if these association paths are blocked to the passage of nervous impulses by some psychophysiological process, the reactions of the individual must be of a lower order, and such blockage must give the effect of the given individual’s being organically deficient, and must, therefore, result in animalistic behaviour.

The present investigation discloses that the *s.r* may assume very diversified forms, one of which is the production of very powerful psychophysiological blockages. These, when once we understand their mechanism, can be eliminated by proper education and training in appropriate *s.r*.