

## PART III

### NON-ELEMENTALISTIC STRUCTURES

The history of human thought may be roughly divided into three periods each period has gradually evolved from its predecessor. The beginning of one period overlaps the other. As a base for my classification I shall take the relationship between the observer and the observed. . . .

The first period may be called the Greek, or Metaphysical, or Pre-Scientific Period. In this period the observer was everything, the observed did not matter.

The second period may be called the Classical or Semi-Scientific—still reigning in most fields—where the observer was almost nothing and the only thing that mattered was the observed. This tendency gave rise to that which we may call *gross* empiricism and *gross* materialism.

The third period may be called the Mathematical, or Scientific Period. . . . *In this period mankind will understand (some understand it already) that all that man can know is a joint phenomenon of the observer and the observed....*

Someone may ask, How about “intuitions”, “emotions”, etc. ? The answer is simple and positive. It is a fallacy of the old schools to divide man into parcels, elements; all human faculties consist of an inter-connected whole . . . (280) A. K.

The organism is inexplicable without environment. Every characteristic of it has some relation to environmental factors. And particularly the organism as a whole, *i. e.*, the unity and order, the physiological differences, relations and harmonies between its parts, are entirely meaningless except in relation to an external world. (92) CHARLES M. CHILD

In reality it is the brain as a whole which is the centre of association and the association is the very *raison d'être* of the nervous system as a whole. (411)

HENRI PIÉRON

The views of space and time which I wish to lay before you have sprung from the soil of experimental physics, and therein lies their strength. They are radical. Henceforth space by itself and time by itself, are doomed to fade away into mere shadows, and only a kind of union of the two will preserve an independent reality. (352) H. MINKOWSKI

This assumption is not permissible in atomic physics, the interaction between observer and object causes uncontrollable and large changes in the system being observed, because of the discontinuous changes characteristic of atomic processes. (215) W. HEISENBERG

Well, this is one of the characteristics by which we recognize the facts which yield great results. They are those which allow of these happy innovations of language. The crude fact then is often of no great interest we may point it out many times without having rendered great services to science. It takes value only when a wiser thinker perceives the relation for which it stands, and symbolizes it by a word. (417)

H. POINCARÉ



## CHAPTER VIII

### GENERAL EPISTEMOLOGICAL

The physiological gradient is a case of protoplasmic memory since it represents the persistence of the effects of environmental action. The establishment of a gradient in a protoplasm may be regarded as a process of learning.

CHARLES M. CHILD

In what has already been said, we have emphasized repeatedly the 'organism-as-a-whole' principle. The principle is structural, involving most important semantic factors and so deserves a more detailed consideration.

Since the days of Aristotle, more than two thousand years ago, this principle has been often emphasized, often belittled, but, withal, seldom applied. That all we know about life and organisms seems to justify such a principle seems obvious.

The arguments of those experimentalists who belittle or object to such a principle seem to be all of a similar type, and are, perhaps, best expressed by Professor H. S. Jennings, who, in his friendly review of Ritter's book on the *Organismal Conception of Life*, concludes that such an 'organismal conception' is quite justified, but is entirely sterile and does not help laboratory workers.

It must be granted that at the date when the book of Ritter and the review of Jennings were written such a statement was *seemingly* justified. The principle is usually treated as a rough generalization from experience and is not analysed further; the *structural*, epistemological, psycho-logical and semantic consequences were not known, and so the laboratory workers actually did not realize that they *have much help*.

As we have already seen, the main semantic issues were, and are, *structural*. How can we apply the organism-as-a-whole principle if we insist on keeping an *el* language and attitude? Naturally, if the principle is *not* applied, it is futile to look for semantic consequences of a non-applied principle. But once the principle *is* applied, a new language has to be built, of different structure and, *therefore*, *new implications* which suggest a long series of new experiments.

A new and structurally different theory may be summarized in a single term—as, for instance, 'tropism' or 'dynamic gradient', a fact which not only revolutionizes our knowledge but which leads also to entirely new experiments and further knowledge. Experiments, as such,

always give relational, structural data, that, under such and such conditions, such and such results follow. The *non-el* attitude and language, as opposed to the old elementalism, is a part of a broader and more fundamental semantic problem; namely, *similarity of structure* between language and the external world. Such similarity leads to similarity of 'logical' relations, predictability, and so forth, and, in general, to the understanding of the structure of the world and *new s.r.*

There are many examples of such organism-as-a-whole terms, but for the present we will mention only the terms 'tropism' in the generalized sense of Loeb, and the 'dynamic or physiological gradients' of Professor Child. The term 'tropism' means the response of the organism-as-a-whole to special external stimuli. For instance, the term 'heliotropism' is applied in cases when the organism responds to the influence of light; 'chemotropism', when it reacts to chemical stimuli; 'galvanotropism', when the organism responds to galvanic (electrical) stimulation , .

The term 'dynamic or physiological gradient' is the foundation of the  $\bar{A}$  biological system of Professor Child. Because of its importance, I shall explain the meaning of this term in some detail.<sup>1</sup>

All protoplasm exhibits empirically a structural characteristic which may be called 'irritability', which appears as a reaction of living protoplasm to external dynamic influences. That 'irritability', as a structural characteristic, becomes obvious when we consider that structurally disintegrated protoplasm is colloiddally inactive and becomes 'dead'. Many of the most important characteristics of living protoplasm are strictly bound up with structural integrity.

This 'irritability' occurs in a structural *plenum* and is transmitted to other regions of the protoplasm with differing yet *finite* velocities, and not in 'no time', as Alice would say. Let us imagine a non-differentiated, except for the limiting surface (A), and living bit of protoplasm. This limiting surface represents that part of the protoplasm which is in direct contact with the environment. If the external dynamic factor (S) excites this living bit of protoplasm at a point (B), this stimulus will be the strongest at (B), and it will spread to the further removed portions of (A) in a , diminishing gradient. If the decrement is not too sharp, the stimulus will reach the furthest regions of (A); namely, (C), (D), (E), (F), .

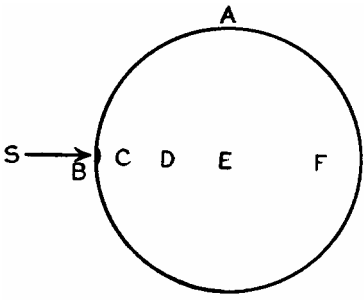


FIG. 1.

The presence or absence of the decrement or its steepness and the intensity of the excitation during transmission depends on the specific character of the protoplasm, and varies from individual to individual, and in different regions and under different conditions varies in one individual.

Thus, we see that a living cell has a necessary relationship with the environment and with external energies because of its limiting surface. The difference between the 'inside of the skin' and the 'outside of the skin' establishes the organism-as-a-whole. The interplay between the inside and the outside is *structural* and supplies the energies which activate the organism. The membrane formation is mostly not dependent upon the constitution of any particular protoplasm, but is rather a general reaction of all protoplasm to environmental influences.

The evidence we have seems to show that in all protoplasm in which we find no specialized conducting paths a certain decrement appears, so that the effectiveness of transmission is limited. In a primitive non-differentiated protoplasm different points further removed from (B) will show different degrees of excitatory changes decreasing from (B). At a certain point the transmission may cease altogether.

The result, then, becomes an excitation-transmission gradient of greater or lesser length, the different levels of which represent various degrees or intensities of excitation.

The primary region of excitation (B) is physiologically more affected and dominant over the other regions to which the excitation is transmitted, because it has more effect upon them than they have upon it. The effect of such conditions gives rise to a temporary structural organismal pattern. The region of primary excitation (B) becomes the dominant region, and the other regions become subordinate to it.

The potentiality for the excitation and the transmission was structurally present in the protoplasm, but this could not produce the pattern which resulted from the external excitation. We see that the action of the external factor was necessary for the realization of the definite physiological pattern whose potentialities were in the protoplasm.

These new excitation-transmission patterns exhibit all the characteristics of new structural patterns in the protoplasmic mass. They determine localized differences at different points, (C), (D), (E), . These differences and *relations* with the dominant region (B) constitute a physiological axis with (B) at one pole. This new pattern constitutes a new structural integration, which is a joint phenomenon of the potentialities of the protoplasm and the environmental action. This relation is of a functional and not merely of a 'plus' character. Child shows that

the physiological axes in their simpler forms are similar to, if not the result of, such excitation-transmission gradients.

For the organism to work as-a-whole, some sort of integrating pattern is necessary. The behaviour of the organism-as-a-whole results, first, from patterns already present, and, second, from the possibilities of further development and integration in response to particular external factors. The physiological gradients give such means.

The development of our nervous system is strictly connected with the above principles discovered by Child.<sup>2</sup> In axiate animals and man the chief aggregation of nervous tissues is localized in the apical (head) end, which region is characterized primarily by a higher rate of metabolism in the early stages. Physiological gradients originate as simple protoplasmic reactions to external stimuli, and so the nervous system originates in protoplasmic behaviour. Nerves then become simply *structuralized* and permanent physiological gradients, and so exert a physiological dominance over other tissues.

From an epistemological point of view, we should notice that the gradients are primarily quantitative and that we do not need specific factors to determine them. Any factor that will determine a more or less persistent quantitative differential in the protoplasm ought to be effective. The above theory is structurally supported by a large number of experiments. For instance, we can experimentally obliterate or determine new gradients.<sup>3</sup> The organism appears in this new light as a behaviour reaction-pattern, and substantiates the old saying that the function builds the organ. Not only should the organism be treated as-a-whole, but it is impossible to isolate the organism from its environment. A functional interrelationship is established between the two.

This theory appears, also, to be fundamental for psychiatry and for psychologies, for it establishes the head as a dominant region on the base of an experimentally proven higher rate of metabolism. From Child's point of view, as suggested by Dr. William A. White, the main dynamic gradient, the central nervous axis, gives the *structuralized* evidence of the degree of *correlation* of the other organs and of the degree that the body is under the control of the head-end of this gradient. The failure to keep in touch with this centre of control leads to the disintegration of the individual<sup>4</sup>. The head-end is also the most modifiable point in the axis of control, a conclusion which is of the utmost significance in psychotherapy. It is known that the metabolism of organs can be affected by 'psychic' stimuli, and it is only one step further to understand, as White says, why we may have other structuralized functions, such as structuralized anti-social feelings, structuralized greed, structur-

alized hate. , facts which are observed daily in ordinary life and in asylums. From the point of view of the theory of Child, the nervous system appears not only as a structuralized conducting gradient, but it also explains how specific conducting tissues could have evolved from non-specific living protoplasm. It is important to notice the dominance which the primary region of excitation exerts over the others, since, with the great complexities of the human brain, we understand better why so-called 'mental' and semantic issues, which are phylogenetically the youngest, are of such importance.

In our daily life we deal with different people, some of whom are seriously ill 'mentally' and who, under favorable conditions, would be under medical attendance. The majority of us—some specialists consider it to run even as high as ninety per cent of the whole population— would be better off if taken care of by some psychiatrist, or, at least, if under consultation from time to time.

Owing to old religious prejudices, often unconscious, it is still believed that those 'mentally' ill are either obsessed by 'demons' or are being punished for some 'evil', . The majority even of enlightened people have a kind of semantic horror or fright at 'mental' ills, not realizing that under the *animalistic conditions* which prevail at present in our theories, 'ethical', social, economic. , those only with the least human traits are favored, while those most human cannot stand such animalistic conditions and often break down. It is not a novelty that a moron cannot be 'insane'. A moron lacks something; only the more gifted individuals, the more human (as compared with animals), break down. I know of many psychiatrists who say that 'it takes a "good mind" to be "insane" '.

Now, 'mental' and semantic excitation, which phylogenetically appeared so recently, naturally plays, in many instances, a dominant part, a fact which science, until very lately, has completely disregarded. The present theory makes it quite obvious that with animalistic theories in existence, and un-sanity (lack of consciousness of abstracting, confusion of orders of abstractions resulting from identifications. .) practically universally operating in every one of us, a seriously unbalanced race must be produced.

There can be no doubt that the consistent application of a *non-el* language in the analysis of animal behaviour has suggested new experiments and that, as a result, the use of such terms had its influence on laboratory workers. It does not matter to what extent these terms, or the theories which they represented, were 'right' or 'wrong', they were terms of the *non-el* type, and they expressed in one term entirely *struc-*

*turally new* and far-reaching theories. In testing these theories, new series of experiments were required. Even when the new experiments were devised to verify the older experiments, again the laboratory workers got direct benefit of the structurally new terms. But these benefits were largely unconscious, and so biologists *could* believe in the older days that they had no laboratory benefits from the use of such terms; however, this belief is now entirely unjustified.

Since the *non-el* principle is not only a structurally justified empirical generalization, but also involves for its application the structural rebuilding of our language and old theories, the semantic issues are far-reaching and of great practical value.

The application of the principle means the rejection of the old elementalism which results and leads to identifications and to blinding semantic disturbances, which, in turn, prevent clear vision and unbiased creative freedom.

According to the modern theory of materials, as given in Part X, the mutual interdependence, the mutual action and reaction of everything in this world upon everything else appears as a *structural* fact and a necessity, and so *el* languages cannot be expected to lead to satisfactory semantic solutions. We should not be surprised to find that the struggle against identification and elementalism appears at some stage in every science.

Some of the most prominent examples of this tendency outside of biology, psychiatry, , can be found in modern physics. From a structural point of view the whole theory of Einstein is nothing else than an attempt to reformulate physics on a *structurally new non-el* and  $\bar{A}$  foundation—an exact structural parallel of the biological organism-as-a-whole principle.

Einstein realized that the empirical structure of ‘space’ and ‘time’ with which the physicist and the average man deals is such that it cannot be empirically divided, and that we actually deal with a blend which we have split only elementalistically and verbally into these fictitious entities. He decided to build a verbal system closer in structure to the facts of experience and, with the help of the mathematician Minkowski, he formulated a system of new structure which employed a *non-el language* of space-time. As we know from physics and astronomy, this *non-el* language *suggested experiments*, and so it had beneficial laboratory application. But, in fact, the influence goes still deeper, as the present work will show, for such structural advances carry with them profound psycho-logical, semantic effects. Although, at present, these



beneficial influences operate unconsciously, they, nevertheless, tend to counteract the *el* and absolutistic semantic effects of identification.

It is interesting to note that the Einstein theory, because structural, has had the effect upon the younger physicists of a semantic release from the old structural elementalism and has prepared the semantic ground for the crop of young geniuses which has sprung up lately in the quantum field. It was found that the *el* 'absolute' division of the 'observer' and the 'observed' was false to facts, because every observation in this field disturbs the observed. The elimination of this elementalism in the quantum field led to the most revolutionary restricted 'uncertainty principle' of Heisenberg, which, without abolishing determinism, requires the transforming of the two-valued *A* 'logic' into the  $\infty$ -valued semantics of probability. Again, this advance in quantum formulations has suggested new experiments.

The  $\bar{A}$ -system, as originated by the writer in his *Manhood of Humanity* and other writings, is also the result of the structurally *non-el* tendency. In *Manhood of Humanity*, I introduced a *non-el* term, 'time-binding', by which is meant *all* the factors *which as-a-whole* make man a man, and which differentiate him from animals. In carrying the system further in the present book, I reject the structurally *el* separation involved in such terms as 'senses' and 'mind'. , and introduce, instead, *non-el* terms, such as 'different orders of abstractions'. , where 'mind' and 'senses'. , are no longer divided. Curiously enough, even in such a field, the method has suggested experiments, and so again the new language has laboratory importance.

What has been said above about the organism-as-a-whole, and illustrated by particular cases, seems to show a general characteristic of all our abstracting capacities. We usually disregard, or fail to appreciate, the fact that a single structurally important new term might lead to the re-postulation of the whole structure of the language in the given field. In science we search for structure; so any structurally new term is useful, because, when tested, it always gives structural information, whether positive or negative. In our human affairs, it is different. All our human institutions follow the structure of the language used; but we never 'think' of that, and, when the silly institutions do not work, we blame it all on 'human nature', without any scientific justification.

Poincaré, in one of his essays, speaks about the harmful effect which the term 'heat' had on physics. Grammatically, the term 'heat' is classified as a substantive, and so physics was labouring for centuries looking for some 'substance' which would correspond to the substantive name 'heat'. We know by now that there is no such thing, but that 'heat' must

be considered as a manifestation of 'energy'. If we choose to carry this analysis further, we should find that 'energy' is also not a very satisfactory term, but that 'action', perhaps, is more fundamental.

In dealing with ourselves and the world around us, we must take into account the structural fact that everything in this world is strictly interrelated with everything else, and so we must make efforts to discard primitive *el* terms, which imply structurally a *non-existing isolation*.

The moment this is realized, we shall have to treat the *non-el* principle seriously. As the new terms have, also, their *non-el* implications, such terms throw new light on old problems.

In practice, it is difficult, at first, to avoid the use of old terms. When we want to digest fully a new and important work based on new structural terms and acquire corresponding *s.r.*, the best way to train oneself in the use of the new terms is by gradually dropping the old terms. If we *have* to use the old terms, then we should train ourselves to be aware of their *insufficiency* and of their *fallacious structural implications*, and so be free from the old *s.r.*

The use of the new terms should be deliberate. We should put the problem to ourselves somewhat as follows: The old language is structurally, and, therefore, by implication, semantically unsatisfactory; the new terms seem to correspond closer to facts; let us test the new terms. Are the new terms always structurally satisfactory? Probably not, but in science experiments check predictions, and so new structural issues become clarified.

We have been speaking about new and old terms quite simply, yet the issues are not so simple. The invention of a single structurally new term always involves new structural and relational notions, which, again, involve *s.r.* For instance, if we study any event, and in that study use the terms 'tropism', or 'dynamic gradient', or 'time-binding', or 'order of abstractions', or 'space-time', or 'wave-packets'. , we must use all structural and semantic implications the terms involve.

Using the first four terms, we are bound to treat the organism-as-a-whole, for the terms are not *el*. They are not based on the notion of, nor do they postulate, some fictitious 'isolated' elements. In using space-time, we introduce the individuality of events, as every 'point of space' carries with itself a *date*, which, by necessity, makes every 'point' in space-time unique and individual. In using the term 'wave-packet', we re-interpret the older objectified and, perhaps, fictitious 'electron', .

The consistent and permanent use of such terms naturally involves, structurally, a new world-outlook, new *s.r.*, more justified by our scientific and daily experience. But the greatest gain is usually in getting

away from primitive structural notions and metaphysics, with their vicious semantic disturbances. In creative work, semantic limitations hamper a clear understanding, and prevent scientists from inventing or formulating better, simpler, and more effective theories of different structure.

As soon as we possess 'knowledge', then we shall 'know' all that there is to be known. By definition, there cannot be any *unknowable*. There is a place for the unknown structure. The unknown is rather extensive, partly because science has been, and still is, persecuted, as has already been pointed out.

The so-called 'unknowable' was the semantic result of identification, of a semantic unbalance, which posits for knowledge something 'beyond' knowledge. But has such a postulation any meanings outside of psychopathology? Of course not, as it starts with a self-contradictory assumption, which, being senseless, must lead to senseless results.

We have dwelt on the problems of the structure of terms at such length, because they are generally disregarded, but they are, for semantic purposes, fundamental. The reader will get the main benefit of this book and will receive help in understanding modern scientific issues if he becomes entirely convinced of the seriousness of structural and semantic problems.

Terms are artifices of humans which are necessary to economize effort in the field of 'experience' and experimentation. They are useful in reducing the actual amount of experience necessary, by allowing verbal experimentation. The human rate of progress is swifter than that of the animals, and this is due mainly to the fact that we can summarize and transmit past experiences to the young generation in a degree far more effective than that of the animals. We have also extra-neural means for recording experiences, which the animals lack entirely.

That such verbal experimentation is possible at all is conditioned by the fact that languages have *structure*, and that our knowledge of the world is *structural* knowledge. Let us repeat once more that if two relations have similar structure, all of their 'logical' characteristics are similar; therefore, once structure is discovered, such a process of verbal experimentation becomes extremely effective, and an accelerating cultural device. The use of an antiquated language in our human affairs, in addition to other drawbacks, prevents our being more intelligent in those affairs.

The natural order of investigation is indicated thus: (1) Empirical search for structure in the sciences; (2) Once this structure is discovered, at each date, the structure of our language is adjusted to it and

our new *s.r* trained. Historically, we have partially followed the reversed, and ultimately pre-human, and so pathological, order. Without science, and with extremely meagre and primitive knowledge of the structure of the world, we have produced grunts and languages of primitive false structure, reflecting, of necessity, its implications as to the assumed structure of the world. We have made out of it primitive dogmas which are still in full sway and embodied in the structure of the old language. This is also the reason why, outside of technical achievements, we are still on such primitive levels. It is easy to understand why experimental science is of such importance and why theoretical (verbal) predictions must be tested experimentally. The above also gives a deeper and a new justification for what is called 'pragmatism'.

Experiments constitute a search for relations and structure in the empirical world. Theories produce languages of some structure. If the two structures are similar, the 'theories work'; otherwise, they do not, and suggest further search and structural adjustments.

It should be mentioned, perhaps, that the main epistemological principle which has led to the writing of the works of the present author was a definite inclination to abandon identification and the resulting structurally unsatisfactory *el* language in general use, and to produce a *non-el* system, which, in structure, would be similar to the world around us, ourselves and our nervous system included. This structural novelty was the foundation on which the  $\bar{A}$ -system has been gradually built.