

THE JOURNAL OF PHILOSOPHY

PSYCHOLOGY AND SCIENTIFIC METHODS

OF NEURURGIC AND NOETIC CORRESPONDENCES

I.

IN these days our masters in psychology teach us to throw aside the psychological atomism of our forefathers, and ask us to look upon consciousness as systemic in its nature. That this modern teaching is warranted I fully agree, and in fact am inclined to hold that our conception of systems existing in the physical world is gained only through the recognition in a marked form in nature of certain of the characteristics which we find within consciousness itself.

Of all the systems existing in the physical world the most interesting to the psychologist is the human nervous system, and this because of our discovery that changes in the degree of the activities within this nervous system correspond in some way with modifications within consciousness.

The acute investigations of the neurologist during the last century have enormously increased our knowledge of the nature of this nervous system; and have brought out clearly one fact which seems to the writer to be of great importance to the psychologist. They have taught us that the nervous system is not a simple system, but is really a system of minor systems of hypothetical nervous elements. Within the nervous system, taken as a whole, we find minor nervous systems of the first order, one (α) which has to do with environmental stimulation; another (β) which has to do with the organism's reaction upon its environment; and another very broad system (γ) which has to do with the coordination of minor nervous systems α and β . But within these minor nervous systems of the first order we find minor nervous systems of lower orders, one within another in indefinite number. Each minor nervous system of one of the lower orders is integrated, as we say, and has its characteristic individuality; but these minor nervous systems of the lower orders are interrelated and integrated to form broader minor systems, and all

of these latter are bound together to form the highly complex nervous system as a whole.

This being so, it is exceedingly interesting to note that the introspective psychologist in like manner discovers, not only that consciousness is systemic, but that it is a vastly complex system of minor psychic systems. We find, for instance, minor psychic systems of what we may call the first order; (A) sensations, which have to do with environmental stimulation; (B) instinct feelings, which have to do with reaction upon the environment; and (C) the very broad realm of ideas,—of thoughts, which has to do with the coordination of minor psychic systems A and B. But within these minor psychic systems of the first order we find minor psychic systems of a second order. In the realm of sensation we have light, sound, etc.; in the realm of instinct-feeling various types of emotion, for instance, love, anger, etc.; and in the realm of thought a vast array of what, following Stout, we may call apperceptive systems. And beyond this, within each of these minor psychic systems of the second order we find an indefinite number of minor psychic systems of still lower orders. Each minor psychic system of one of the lower orders is integrated, as we say, and has its characteristic individuality; but these minor psychic systems of the lower orders are inter-related and integrated to form broader minor psychic systems, and all of these latter are bound together to form the highly complex psychic system which we call consciousness.

In this and later articles, which through the courtesy of the editor will appear in successive numbers of this JOURNAL, I shall ask the reader to consider the meaning of, and certain implications of, this fact that consciousness is a complex system of minor psychic systems.

II.

In the remainder of this article I shall consider briefly the nature of the correspondence between nervous activities and modification within consciousness. And in the beginning I may say that it seems perfectly clear to me that, if we had discovered the broad correspondence above considered before we had been taught to believe that the activities of the cortex of the brain are alone concerned with modifications of consciousness, we would not have considered this latter hypothesis tenable. On the contrary, we would have assumed that the correspondence between what I have called *neururgic*¹ and *noetic* changes is thoroughgoing; that not only is there no modification of consciousness without a *neururgic* change; but

¹There is no word in current use signifying 'relating to the activity of nerve.' I have therefore used this term in previous writings as a convenient one to express this meaning.

that no neururgic change can occur without a corresponding modification of consciousness.

We would have made this assumption because, with the data before us, and without the preconceptions with which we now approach this subject, we would consider the problem somewhat as follows:

We would begin with the assumption, which I think we are entitled to make, that each nervous element is in some measure active so long as it is alive. If this is true, then whenever we observe what we call a special activity in a part of the nervous system we are dealing really with what is merely an emphasis of activity in a special part of an all-active system.

If we thus assume that all parts of the living nervous system are active, then we may symbolize its neururgic condition in spatial terms by conceiving the neural elements to be spread out on a plane; and so distributed that each neural element would be represented by a little square on a flat surface divided by two sets of equidistant lines drawn at right angles to one another. We may then represent the amount of activity of each element by a certain rise of its corresponding little square above the plane. In any moment considered all elements would rise to some degree above the plane; but some elements would rise higher than others, and the neururgic condition of the whole system would then be comparable to the surface of a liquid on which would appear a wave pattern.

That is, at each moment the nervous system as a whole displays what we may call a *neururgic pattern*, in which certain parts are more markedly active than others. The markedly active parts are not the only active parts; but their activities are set over in contrast with the great body of less markedly active parts, which latter form an undifferentiable mass of minor activities against which specially marked activities appear as *emphases* of activity.

Having thus represented to ourselves the condition of the ever active nervous system we would then argue that, if the neururgic and noetic correspondence is thoroughgoing, the condition of consciousness at any moment may be described in similar terms as follows. At each moment, consciousness, which is a vastly complex noetic system of systems, displays what we may call a *noetic pattern* in which certain psychic parts are more emphatic than others. The markedly emphatic parts are not all there is of consciousness in any moment under consideration, but these markedly emphatic parts are merely set over in contrast from the great body of less emphatic parts; which latter form an undifferentiable mass of minor psychic parts against which the specially emphatic parts appear as *psychic emphases*.

And this we would find to accord with experience. For in the first place, we have what is generally agreed to be ample evidence that the psychic states which we designate as the field of attention, (what under our terminology we would call the noetic emphases), do correspond with emphatic activities in parts of the nervous system, (what I would call the emphases of activity in the neururgic pattern).

This being granted, the question would arise whether there exists an undifferentiable noetic mass against which these noetic emphases are contrasted, corresponding with the undifferentiable neururgic mass against which the neururgic emphases are contrasted. And to this question we would not hesitate to give an affirmative answer. For we note that the field of attention, if we may use a current ocular simile, spreads out from a clear focus to a margin, and this margin to 'fringes,' and these 'fringes' to a vague and illusive aura. Even if we experience the most punctual of vivid sensations, for instance, it does not seem to exhaust the consciousness of the moment; there is always felt to be a something more of consciousness of the moment when the sensation appears; its appearance clearly does not involve the annihilation of this rest of consciousness. And this becomes clearer in the fact that we have come to speak of these clear elements of attention as presentations. If they are properly so called, they must be presentations to something; and under our view that to which they are presentations, or, as I should prefer to say, increments, is the undifferentiable mass of unemphatic psychic parts which constitutes what we may well speak of as the *field of inattention*.

This field of inattentive consciousness we would hold must always exist while life exists, and we would, therefore contend that the common man is wrong in stating that we are unconscious during sleep or in states of coma. And if evidence in favor of this statement were demanded we would in turn demand from our critic evidence that inattentive consciousness does not exist under such conditions; asking him to note that the only evidence he has to offer in favor of his contention is the fact that he is unable to recall in full-awake life any psychic events of the moments of what he calls unconsciousness; and showing him that his argument if valid would compel him to hold that he is unconscious in all moments where the psychic events fail of recall in later moments, which would force him to refer all forgetfulness to moments of unconsciousness in the past, a position which is, of course, untenable.

We would then have before us for explanation the facts which in the main have led to the adoption of the current theory that the 'brain is the organ of mind,' viz., (1) the fact that the occurrences within the field of attention, or, as we should say, the noetic em-

phases, correspond in general with emphatic activities in the cortex of the brain; and (2) the fact that a large mass of activities in parts of the nervous system, other than the cortex of the brain, are not accompanied by any noticeable modifications of consciousness.

(1) The first fact we would restate in terms of the theory of a thoroughgoing neururgic and noetic correspondence by saying that the mass of noetic emphases corresponds with neururgic emphases within the brain.

And this would seem to us to be a most natural condition, for a number of reasons: (1) because so large a mass of the nervous system is crowded into the brain, where the various parts are cross connected and interrelated as is impossible in other parts of the system; (2) because, in consequence of this fact, and in consequence of the close relation of the brain to the most highly elaborated sense organs, a very large variety of diverse and forceful stimuli from the environment are brought to bear upon the brain; and (3) because the brain part of the system, if genetically considered, appears to be of late development; and this being so, it must be supposed, speaking broadly, to be markedly mobile, as it were, less fixed in the interrelations of its parts, and more subject to disturbances of normal functioning, than is the case with the other parts of the whole nervous system.

(2) As to the second point we would, of course, agree that a large mass of activities, in parts of the nervous system other than the brain, are not accompanied by any *noticeable* modifications of consciousness; but we would hold that this does not stand in opposition to the hypothesis that the psychic correspondents of these activities exist, but are part and parcel of the vast undifferentiable psychic mass, *i. e.*, the field of inattention.

III.

And here we find our theory throwing light upon an important problem which is not touched by the currently accepted view. For we note that typical reactions which seem invariable are, broadly speaking, what men call unconscious; or, as we should say, have accompanying them only such psychic correspondents as are wholly within the field of inattention; while, on the other hand, variant actions in general are the ones which have correspondent with them emphases within the field of attention.

As a preliminary to the study of the problems which these facts present to us, let us consider for a moment the basis of what we call variation in the form of animal activities.

If we could isolate a living cell we must assume that it would react in a definite way to appropriate stimuli, and its reactions we may, if we choose, call its 'instinct-actions.'

Now if a number of such cells (for simplicity let us say 5), are brought into relation as a little organism; and if each of the cells retains specific modes of instinct action;² then, if we consider the group rather than its elements, the combined instinct actions of the elements would give what would appear as a specific instinct action of the whole group, or little organism.

The normal instinct actions of the five elements would together constitute the normal instinct action of the group. But if the instinct action of one of the five elements should be, *not changed in character, but merely markedly emphasized*, then the normal instinct action of the group would be modified. This emphasis of activity in the element would thus appear to be the basis of modification of the instinct action of the group taken as a unit.

If now we suppose that for each of these five elements is substituted a little system of five elements; then we would have a system of five minor systems of five elements each. Each of these five minor systems would display its own group instinct actions; and the instinct actions of all the five minor systems would give us what we would call the normal instinct action of the whole system of five minor systems.

Here again; if the instinct action of a special minor system within the group of five, were not changed in character, but merely became emphatic, the typical instinct action of the group taken as a whole would appear to be modified. And even if the instinct action of only one element in one minor system were emphasized, its little minor system's typical instinct action would be modified, and thus also we should have a modification of the typical instinct action of the whole large organism. It would thus appear that modification of the normal instinct actions of such a simple organism of 25 elements could all be traced back to mere emphases of activity in some of the minor systems, or in the elementary parts themselves.

If this is the process of modification in such a case as I have pictured, it is easy to see how complex might be the modifications of the typical instinct actions of an enormously complex system of minor systems such as the human nervous system is; and nevertheless it might well be that these variations of mode of instinct action of the organism as a whole might be all of them traceable back to mere emphases of the instinct actions in some of the minor nervous systems, and then farther back still to a mere emphasis of the instinct action in some element of a minor nervous system.

Emphases of activity in minor parts would thus appear to be

² These will of course be different from the instinct actions of the cell when in isolation.

the basis of modification of instinct actions of the organism as a whole.

If all this is true we should certainly be led to expect to find exactly what we do discover; viz., that variant activities, being those which involve neururgic emphases, must also involve noetic emphases; while typical, and apparently unmodified, activities do not involve either neururgic or noetic emphases. In other words the psychic correspondents of those of our instinct actions which are typical and relatively unmodifiable (*e. g.*, our 'reflex actions') are almost wholly within the field of inattention; while variations from these typical forms of reaction have corresponding with them forms of consciousness which we speak of as intelligent.

Corroboration of this special point is had if we ask ourselves how these emphases of activity within the nervous system may be brought about.

(1) In the first place, in all organisms, from the simplest to the most complex, they would certainly be in great part determined by the energy of stimuli reaching the parts of the system from the environment of the whole system.

But when the organism is very complex, emphases within minor systems might be due to influences quite within the whole system; appearing in parts of that system which are environmental, as it were, to the minor system whose activity is emphasized when modification occurs.

(2, A) But these influences within the complex system, which thus produce emphases of activity in one of its minor systems, might themselves be emphatic activities in other minor systems; or on the contrary, (2, B) they might arise out of the great undifferentiable mass of unemphatic activities against which the emphases of activity are contrasted.

If then our theory of a thoroughgoing neururgic and noetic correspondence is true we should expect to find (1) the most marked form of these variations, as thus connected with states of attention, distinctly related to the reception of environmental stimuli. That this is true is clear.

But beyond this, as we have seen that the emphases to which modifications of activity are due may be the result of influences arising within the whole nervous system, and (2, A) as the result of specially emphatic activities already existing within the system; so we should expect to find the emphases within consciousness accompanying modifications of instinct action often due to emphatic influences within the conscious system itself; and this we surely do find in the stream of thought which runs parallel with a large proportion of those variations of activity which we observe in ourselves.

In this stream each emphasis in attention seems to be influential in producing its successor.

But finally, (2, B) as we have seen that the neururgic emphases to which variations of activity are due may be the result of influences arising out of the great undifferentiable mass of unemphatic activities against which the emphases of activity are contrasted; so we should expect to find the emphases within consciousness, which accompany variations of activity, determined often by influences which are felt to arise out of the undifferentiable psychic mass of unemphatic psychic states; *i. e.*, we should expect to find the field of attention at such times determined by obscure influences from the field of inattention. And this we surely do find in what is called voluntary attention; *i. e.*, in attention which is maintained as such by the reaction of the whole system of consciousness. And in this, as all psychologists acknowledge now-a-days, we have the root of that modification of our reactions upon the outer world which we describe as due to volition.³

In the preceding paragraphs I have presented a version of the theory of neururgic and noetic correspondences which enables us to hold that it is thoroughgoing. The test of a theory lies in the explanation it enables us to give of facts of experience which otherwise baffle us. In the articles to follow this I shall first attempt to show that if we accept the theory thus outlined we are able to answer certain questions of interest and importance; and shall then trace some implications of the theory which have bearing upon current psychological problems.

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DIMENSIONAL EQUATIONS AND THE PRINCIPLE OF THE CONSERVATION OF ENERGY

PHYSICISTS generally consider that the assumption of three independent quantities as fundamental dimensions is necessary and sufficient. Time, space and mass are usually selected as elemental, and expressions for physical units, in terms of these three, are called the dimensional equations of these quantities. In Table I. (accompanying) the usual expressions for the more common physical quantities are given.

³The relation between intelligence and variation from typical forms of reaction I have discussed at length in my 'Instinct and Reason': the limits of this paper prevent any further consideration of it here. Cf. especially Chapter XVII.