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THE BEHAVIORISTIC INTERPRETATION OF CONSCIOUSNESS II

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IV. THE BEHAVIORISTIC SOLUTION

Restatement of the Problem

The problem which confronts the behaviorist is to find in the physical world deterministic relations between non-qualitative, discrete entities in time and space which fulfill certain conditions of relationship laid down by subjective evidence. I will restate these conditions briefly as the behavioristic problem.

1. Awareness, on subjective evidence, is merely a relation of something to something else, such that the attributes of content result. It presents no positive characteristics in itself and will be adequately accounted for by any physical process which will account for the attributes of content.

2. The unity of consciousness. This consists of a coëxistence of things (elements of content) in an undefinable relationship which excludes other things. Any physical system which gives rise to other attributes of content will meet this condition.

3. Sensory quality. This was found to be definable only as the indivisibility of something (element of content) in relation to something else (introspection). Any physical complex which behaves as a unit in relation to another physical process meets this condition.

4. The self-transcendence of content. This was found to

be only the fact that two elements can combine to condition the appearance of a third.

5. Determination of sequences. This reduced to the fact that one element follows another. The 'how' is not given to introspection.

6. Transcendence of time and space. This was shown to be a false deduction from the confusion of a postulated reality with the actual content of consciousness, which is a varying emotional quality. Behaviorism need only account for the origin of particular qualities, and the determination by these of particular sequences of content.

7. Self-consciousness. This turned out to be persistent sensory content capable, under certain conditions, of leading to behavior or ideational expressions of 'self,' 'I,' 'mine,' etc., with their behavior consequences.

8. Self-ordering of content. This order is as inherent in our conceptions of the material world as in consciousness, and irrelevant to the argument.

9. The creative action of consciousness. This resolved into processes whose manner of action is indefinable from introspection; processes which must be inferred in terms similar to those employed by the behaviorist in describing problem-solving; tension, trial and error, conflict, and resolution of tension.

We do not know enough of organic behavior to be able to say just how bodily mechanisms do bring about the details of behavior, but we are able to make rather probable guesses as to what is going on at any given time, and to outline roughly the kind of mechanisms that control activity.

The Conscious Machine

Let us assume that we have constructed a machine which can perform all of the neuroglandular and muscular activities of a man; a machine constructed on reflex principles, whose parts are capable of summation, facilitation, and inhibition of activity, which can react to mechanical forces on its periphery and in its interior, so that it may respond both to external stimulation, and to its own activities. Let us be sure that

we have not inadvertantly introduced any atom of psychic stuff: that the machine is not, by definition, conscious. Will its activities meet the subjective definition of consciousness, or will it remain 'merely a machine'?

Suppose that we stimulate the machine with light of wave-length = 6800 Å. The 450 trillions of vibrations per second will be summated by the chemical mechanism of the retina, and result in neural impulses of a given frequency and intensity. These will summate in turn to produce muscular movements. The pupils will contract, the eyes will converge in relation to the direction of the light beam, visceral activities will follow and finally the vocal mechanism may be thrown into activity. The machine will say, 'I see a red light.' If next we stimulate it with wave-length = 5200 Å., a different series of reactions will occur, also involving summation, and the machine will say, 'I see a green light.' If now we ask the machine to describe the color, our request will reinforce its reactions to its own reactions and we will obtain a series of internally aroused movements. But these reactions will not be to the individual elements of the previous reaction, but only to their patterns, by the process of summation. The machine cannot respond to the contraction of its pupils alone, nor to the activity of a single gland or muscle. But all these reactions, by summation, modify and condition the next response. The reaction to 6800 Å. would in turn arouse one further series of reactions, that to 5200 Å. another series. The machine can not react to the individual elements of the stimulus, but only to the two complexes of stimuli as unanalyzably different.

Now this situation fulfills all of the subjectively definable requirements for qualitative diversity (and for quality as a thing-in-itself.) Each stimulus, by summation, is unitary for subsequent reaction and therefore presents for that subsequent reaction an irreducible element. We have seen that the only possible subjective definition of quality is indescribable diversity from something else, (3, in list on page 329) and that quality as a thing-in-itself is indistinguishable from this. Our account of quality in the behavior of the machine

therefore leaves over no unexplained residue of psychic stuff, no conscious attribute.

But this attribute of indivisibility by something else is likewise in the relation of the knife to the loaf. Something more is required for our account of consciousness. And this is an account of the structure of content. It is not alone the attributes of the elements of content but the particular variety and pattern of them that makes up the supposed uniqueness of human consciousness.

To return to our machine. Its reactions are organized at several levels of complexity; that is, some stimuli call out movements in only one or a few parts, others throw the whole machine into activity. Suppose we set the machine to reading a book and to giving us a verbal report of the contents. This activity will involve the visual, gestural, vocal, and a goodly part of the intraorganic mechanisms, resulting in a complex organization of interacting parts. If now we stimulate the case of the machine lightly with a brush, a limb may be thrown into activity and scratch the stimulated area. The stimulus is adequate to excite this movement but its effects do not spread to involve in any way the vocal, gestural, or visceral mechanisms. The reflex reaction remains outside of the dominant system.[1] If, now, we apply a more intense stimulus to the case of the machine—if we pierce it with a pin, we arouse a more widespread reaction. The vocal mechanisms are involved, the machine says 'ouch!' the eyes are directed from the book and turned to the point of stimulation, the gestural mechanisms come into play, the reactions to the book are disturbed, and reactions to the pin now dominate the greater number and variety of parts of the machine. The content of the dominant system is now almost completely altered; the effects of the pin-prick have become a part of it.

[1] By 'dominant system' I mean to imply nothing more than the organized system which at the moment is most closely integrated with the speech and gestural mechanisms. That two or perhaps more such systems may be activated simultaneously is suggested by the facts of automatic writing, and the like. The confusion of tongues which might result on the motor or laryngeal theory of consciousness from such simultaneous activity, is avoided by the postulation of central chains of neural activity which activate efferent neurones only when the latter are facilitated by tonic innervation.

The subsequent activities of the mechanisms included in this dominant integration are in part determined by this pattern. New mechanisms become involved in the pattern and others drop out. The total content of the system determines the speech and gestural reactions of succeeding moments, and these in turn modify the organization of the system. A continuous flow of interrelated activities is thus produced. Reinforcement of any mechanism within the system will lend to it a greater influence upon the subsequent activities of the whole and tend to bring in other reactions associated with it.

These complexities of organization meet the subjective definition of the limits of consciousness, as a system including some and excluding other existents (2). The subjective systems have already wrecked upon this rock, and we have such self-contradictory expressions as co-conscious, foreconscious, subconscious, and unconscious mind. These are assumed to have all the attributes of consciousness except that of being known. They involve, as do the atomistic theories, the self-contradictory conception of unconscious consciousness. For this, the behaviorist may substitute the conception of systems of varying degrees of complexity, from the isolated reflex, to the activation of the entire mechanism, thus meeting the subjective definition of the limitation of consciousness: a field of varying complexity, from which some existents are excluded.[1]

The machine is capable of reacting to its own reactions.[2] Suppose that we confront it with the neurological problem described above, and study the specific instances of the working out of the relation of the frontal lobes and attention.

The request for a solution induces a set which keeps the

[1] The various attempts to correlate the presence of consciousness with a particular degree of synaptic resistance (30), with meeting of new situations (1), with associative memory (17), with conflict in response, and similar specific types of behavior have met with rather dismal failure. I believe that this conception of consciousness as the complex sequence of reactions, with the dominance of the language mechanisms, comes nearer to meeting the subjective description, than does any of the other physiological theories.

[2] The weight of evidence seems definitely against the hypothesis which makes every reaction take motor expression at once and looks upon thought as a succession of complete reflexes. The evidence offers some difficulty to the extreme methodological behaviorism, but is of little significance to the theory presented here.

mechanism active, and reinforces the habit-traces of certain systems of response-habits formed to the words 'frontal lobes,' 'learning,' 'brain lesion,' etc. 'Frontal lobes' and 'learning' have common habit elements with 'attention,' formed by reading Pillsbury's book. Reinforcing each other, they combine to arouse the verbal response, 'attention.'

This situation fulfills the subjective definition of self-transcendence of content (4), the conditioning of an element by two preceding. The determination of sequence is also met by the physiological determination.

The word 'attention' arouses the further word, 'Pillsbury,' with tension of the muscles of the arms and eyes. If we interrupt the machine's activity at this moment by asking the meaning of the last word, the reinforcement from the just preceding tensions of language mechanisms and arms, "I was thinking that off there (overt movements of hands corresponding to previous muscular tension) is the book." Here is meaning, and transcendence of time and space, in so far as they are subjectively discoverable (6).

Throughout all the reactions of the machine there persist certain common elements. Whatever the peripheral excitation to activities of the dominant system, certain constant elements of stimulation—visual from the body itself, organic from the movements of the heart, enteron, reproductive tract, etc.—will be present, modifying the dominant reaction. Further, at any time when they are reinforced so as to become effective for verbal-motor or gestural activity, they will lead to constant reactions, typified by the statement, 'This is I.' They will be unanalyzable by subsequent reaction into individual stimuli and will therefore have quality, will be the 'sensations of self' (7).

We have interrupted the machine in the midst of solving a problem. It had reached the word 'attention.' The machine has certain organizations of response which we may characterize, for brevity, as leaning forward or backward. With the first is associated the words 'yes,' 'present,' 'existent,' and the like (similarity of reaction to them constituting the likeness), making up a system of positive reaction. The second

is associated with 'no,' 'absent,' etc., making up the complex of negative reaction. Since the machine cannot simultaneously perform both movements, the systems are incompatible. These systems determine the next step in the attack of the problem. 'Attention-learning,' with forward movement. 'No attention'—backward movement—'*no* learning.' The remaining associations traced above follow by the same mechanisms until the traces of bodily reaction to 'no frontal lobes,' and 'learning present' bring about a simultaneous stimulus to conflicting movements, with a blocking of reactions.[1]

The machine has further a system of habits which tend, when aroused, to dominate its reactions. It pricks up its ears and relaxes its internal workings and gives the positive reaction at the word 'mechanism,' as it tenses and clinches its fists and straightens at the word 'vitalism,' or its associations. Further reactions, in the set of problem-solving, lead to a series of reactions which have many associations with 'mechanism.' The system presents, for a time, stimuli to no conflicting movements, and the relaxing effects of the associations with 'mechanism' gradually inhibit the tension of the set to problem solving. The solution of the problem has been reached.[2]

This is all highly speculative and by no means a true picture of the organic processes involved in human problem-

[1] This of course is an almost ludicrously simple analysis of the behavior summed up in the conceptions of positive and negative reaction. An understanding of the mutual inhibitions and facilitations of complex neural integrations will be necessary before an adequate statement of the nature of logical contradiction can be given. The above description however presents a conceivable mechanism for logical incongruity, which is all that is required for the present argument.

[2] The physiology of dynamic mechanisms in behavior is by no means worked out. In some cases, as in thirst, persistent peripheral stimulation is obviously the dominant factor in maintaining activity. In the majority of human activities the motivating mechanisms are more obscure. I have discussed the activities of the machine chiefly in terms of the reflex theory. Recent neurological evidence however indicates a much closer integration of reaction systems than is possible on the assumption of isolated reflexes. There may be special mechanisms for the maintenance of tonic integration (Lashley, '22) and it is not improbable that a common tonic innervation underlies the organization of mechanisms in the dominant system. In order that an overt reaction should occur, its mechanisms must first be primed by tonic innervation, and this may constitute the 'set' of the behaviorist.

solving, but it meets the subjectively definable requirements for determining tendency, comparison of elements of content, incompatibility of elements, blocking of the train of thought by conflict, and the final solution of the first tension (9).

We have seen that awareness is defined only by the attributes of content and the reactions of our machine have all of the subjectively definable attributes of content (1). The reactions are awareness.[1] The complexes of reaction meet the subjective description of the organization of consciousness, and leave over no undescribed psychic elements. We must conclude, therefore, that our machine is, by virtue of its organization, fully conscious. An adequate account of its behavior will constitute as complete a description of the content and processes of consciousness as can be given from introspective data. Nay, it is far more complete, for it not only describes the complexes which constitute the elements of content, but also describes the component parts of those complexes. Introspection can only describe the external form of the cloud; behaviorism may describe the constituent molecules of water vapor, their movements and patterns. In so doing, it also defines the external form of the cloud, but this dwindles to minor importance; only one of many characters of the aggregation.

V. Non-experiential Arguments

Against every system of materialistic or objective psychology there has been urged the objection that it leaves over some elements or attributes of consciousness which are not adequately accounted for by its formulations. In the foregoing pages I have attempted to analyze such of these attributes as have been clearly expressed as data of experience in the subjective literature and to show that they do not necessitate an abandonment of the behavioristic point of view. But there remain certain other attributes and other points of view which are not so directly open to attack on the basis of experiential evidence.

[1] Cf. Frost (10).

The 'Ineffable' Character of Consciousness

It may be urged that analysis of the attributes of consciousness is based upon the verbally expressible characters and that it thereby misses the very essence of consciousness, which is its impossibility of verbal characterization; that consciousness is pure experience, has no analogies, and is incapable of analysis. The behavioristic account fails because it gives no suggestion of this esoteric quality.

It is clear that subjective psychology can give no reason for its inability to express such supposedly ineffable traits of consciousness. It cannot tell in what way they are different from material things and can only affirm the distinctness by an act of faith, based, perhaps, upon the claim to a direct knowledge of the difference. I am without the pale. I can find nothing in my own experience which seems omitted from my verbal characterization. Consciousness therefore either lacks these inexpressible elements or I am not conscious and present in real life the "paradox of the thinking behaviorist" to the confusion of Lovejoy's arguments (18). I will grant either conclusion and support my thesis. But it is more pertinent to point out that, if language cannot characterize the ineffable qualities of consciousness, then a subjective science or philosophy of consciousness is impossible and the behaviorist account is as adequate as any other which may be formulated.

The 'Two-aspect' Doctrine versus Behaviorism

The parallelist may say, "After all, you have but reëxpressed the two-aspect doctrine. You have first described consciousness from within, then from without. Is it surprising that you have found a point-for-point correspondence? And does not the fact that you have given two such descriptions prove that there are two such distinct aspects?"

I am exceedingly astigmatic. To my uncorrected vision the moon appears as seven dim and overlapping moons. Now I might construct an account of the world in terms of my astigmatism. It would differ in many ways from an account written by a normal man. It would be true and real for me, but it would omit many details observed by the normal man

and would add nothing to his account which he could not predict from the optical principles underlying astigmatism. To the normal man it would be of interest only as an account of the effects of astigmatism. And as soon as I obtain adequate correction, my former account becomes for me also only a pathology of the eye.

The parallel holds for introspection and behaviorism. The subjective view is a partial and distorted analysis. Behaviorism presents the possibility of a more nearly complete analysis of the same data. It presents, therefore, a more nearly adequate solution of the problem and relegates introspection (except as the method of verbal reaction) to a subordinate place as an example of the pathology of scientific method. The subjective and objective descriptions are not descriptions from two essentially different points of view, or descriptions of two different aspects, but simply descriptions of the same thing with different degrees of accuracy and detail.

The basic assumption of the two-aspect and parallelistic doctrines is that a descriptive and analytic account of the content of consciousness can be given without reference to a physical world and that such an account will have value in itself. If the behavioristic interpretation is correct, such an account must deal wholly with systems of a high order of complexity, which are incapable of analysis by introspection but which may be analyzed by objective methods. Moreover, the account must be confined to actual content and cannot include the phenomena of the so-called subconscious. The introspectionist is in the position of describing the form and pattern of clouds which are capable of analysis into aggregates of water particles by other methods. What function can such a study serve?

We have seen that it does not reveal any different kind of stuff from that with which behaviorism deals and that it can claim only to study the same material by a different and less analytical method. One might study the form of clouds for their artistic value, as does the painter. This is avowedly not the purpose of the introspective psychologist. One may describe clouds as a recreation, in day dreaming, but surely

this is not the object of introspection. One may seek to correlate cloud forms with meteorological conditions; to explain or predict the weather by antecedent cloud pictures. This is a scientific procedure but we should have small respect for the meteorologist who confined his studies to this one aspect of his material, and excluded analysis of the structure of the cloud from the science of meteorology. Understanding of precipitation demands analysis of the cloud and a statement of the laws of condensation, of the interplay of temperature, water vapor, atmospheric dust, and air currents, elements which are not defined by cloud form. Behaviorism cannot object to such efforts at correlation, but it may point out the narrow limitations of the subjective method and its futility as an attempt to arrive at a complete understanding of the phenomena of consciousness. So long as human investigation was confined to the external form of the cloud, Jupiter Pluvius reigned in the heavens, as does the 'mind' in psychology.

VI. Lack of a Subjective Criterion of Consciousness

It is usually taken for granted in discussions of the nature of consciousness that one can at least determine the existence of consciousness by introspection or by some direct knowledge of the state and in the foregoing discussion I have admitted the assumption in order to deal with the claims for the uniqueness of consciousness. But a further examination of the evidence seems to throw doubt upon this fundamental assumption of the subjectivists. The criterion of knowing is the object known and there may be as many kinds of awareness as there are patterns of content. There is no subjective reason for holding that the process of knowing is ever twice the same. It is relatively easy to set limiting cases, to say that consciousness is typified by my condition during introspection and unconsciousness by dreamless sleep, but it is not possible to say that either of these is more like an hypnoidal state than the other. The question where consciousness appears during a gradual awakening is not less erudite than the question of when the soul enters the body of the fetus.

There are borderline states which cannot be studied by introspection for the simple reason that the slightest effort necessary for subjective examination destroys them. And below them are even vaguer states, with amnesias, which so nearly border upon the unconscious as to seem to have no definite distinguishing features.

This difficulty of introspection is well emphasized by the current patter of abnormal psychology. The various doctrines of co-, fore-, pre-, sub-, etc.- conscious states show a complete abandonment of 'knowing' as the distinguishing feature of mind and a perfect willingness to accept the paradox of consciousness without knowledge, rather than to face the problem of a subjective criterion of consciousness. Nor does such a difficulty appear only in the writings of psychopathologists. It is evident in the many atomistic theories of consciousness. We find McDougall (**20**) rejecting awareness as the distinguishing feature of mind and substituting for it an unconscious soul as the subjective element in the mind-body problem.

All this seems to point to the conclusion that there is no reliable subjective criterion of consciousness. All that introspection can do is to describe contents of varying complexity and assert that consciousness ends somewhere near the place where content becomes so vague and obscure that subsequent thought about it is impossible. Objective psychology provides an equally definite or *equally indefinite* criterion of consciousness. It describes systems of varying complexity, from the simple reflex, arousing no subsequent reactions, to the most complex chains of language and gestural activities. It can point out which of these systems is capable of arousing further activity, which is sufficiently well integrated to permit of verbal or gestural characterization, and in so doing it will have told as much as does the subjective statement that consciousness is or is not present.

For, after all, when I say that I am conscious of something, I say merely that there exist certain organizations of entities which are called by the introspectionists 'sensations, images, ideas'—describable patterns, the elements of which are inde-

scribable. The behaviorist says precisely the same thing when he describes the organization of behavior in terms of the interplay of reaction-systems which are unitary in their relations to subsequent activity. But for the purposes of science the arbitrary emphasis upon this particular kind of organization, the restriction of psychology to the study of 'conscious phenomena,' has no value and only hampers the development of physiological explanation. In modern psychology, with its hierarchies of the subconscious, the dividing line between conscious and unconscious has ceased to be of importance, relative to the dynamic features pervading both. And for behaviorism the distinction between activities which come to verbal characterization and other reactions is merely on a level with the distinction between spinal reflex and postural tonus.

VII. Consciousness as Physical Organization

The conception of consciousness here advanced is, then, that of a complex integration and succession of bodily activities which are closely related to or involve the verbal and gestural mechanisms and hence most frequently come to social expression. The elements of content are the processes of reaction to stimulation and do not differ in essential mechanism from the spinal reflex of the decapitated animal to the most complex adaptive activity of man. The objects of awareness are the physical stimuli, but in every case they act by a process of summation in such a way that the logically discrete physical elements (physicochemical processes) can not be reacted to separately and hence individually never become objects of awareness. The objects are always unanalyzable complexes specific for each reaction; hence the failure of introspection to reveal molecular vibrations etc. and the origin of sensory quality.

Such isolated reactions are not in themselves conscious or known. Consciousness consists of particular patterns and sequences of the reactions interacting among themselves and the attributes of consciousness are definable in terms of the relations and successions of the reactions. The patterns of

reaction may exist in varying degrees of complexity and continuity. As the complexity and continuity of the processes increase from simple spinal coördination to complex cerebral integrations the sum of integrated activity takes on more and more of the 'conscious attributes' of the normal waking individual. In the series of increasing complexity there are no sharp breaks, as there is no clear distinction between the subjectivist's divisions of conscious and subconscious. The 'states of consciousness' are patterns of response and their character is defined by the statement of the specific integrations concerned.

Some processes may be physiologically isolated from the principal integrated system. If they lack complexity or some continuity, they lack the essential character of 'conscious states' and are classed as reflex or automatic actions. If they are complex, long continued, and capable of influencing some of the verbo-gestural mechanisms, they may present some or all of the characters of fully integrated reactions and appear as automatic writing, somnambulism, or the like. They may even reach such complexity of integration as to equal that of the dominant system and constitute a secondary 'consciousness.'

The relation of any integration to the speech and gestural mechanisms is of prime importance for its 'conscious aspects.' Not only is the single certain evidence of consciousness in another person the existence of consistent, rational expressive movements, but the introspective evidence that there was consciousness at a given moment consists in the occurrence of thoughts (verbal or gestural sequences) conditioned by the state at that moment. The core of the 'conscious' integration is the verbo-gestural coördination.

The behaviorist has been content to limit his accounts of behavior to the simple reflex hypothesis. Neurological evidence however indicates that the complexity of integration may greatly exceed that permitted by simple reflex theory. I have elsewhere (16) sketched an hypothesis of an all-pervading substratum of postural tone upon which are superimposed reflex and voluntary movements. The evidence for

such a substratum throws some light upon the problems of 'set,' 'attention,' 'drive,' and dynamic mechanisms in general, and suggests that what I have called the dominant organization may consist of such a postural pattern with the adaptive reactions facilitated by it.

Consciousness is a general term applied to a variety of such complex integrations as I have sketched above. It marks off no group of phenomena which can be sharply defined or which have any characters requiring special scientific treatment. The distinction is made wholly on the basis of an indefinite complexity, and psychology is finding such distinctions of questionable value (witness the recent attacks upon the concept of instinct). For the behaviorist the setting off of these particular integrations from others is unimportant. The physiological mechanisms seem to form a continuous series and their analysis is hampered, not facilitated, by such artificial distinctions. 'Conscious states' have outlived their usefulness to science and with Watson we may say that, "the behaviorist does not concern himself with them because as the stream of his science broadens and deepens such older concepts are sucked under, never to reappear."

VIII. Science and Sentimentalism in Psychology

The acceptance of the postulates of physical science, whether we regard them as the attributes of a real objective world or merely as explanatory hypotheses, brings with it an avalanche of consequences which has not always been foreseen or enjoyed by the unwary adventurer in science. Once they are accepted, we cannot arbitrarily set a limit to their application and reserve a favored corner of our experience for consideration in other ways. Only empirical evidence of such limits can justify the claim to their existence. I have attempted to show that the so-called phenomena of consciousness do not constitute such a limit. Physical postulates are as fully applicable to mind as to the material world and there are no subjectively definable attributes of mind which distinguish it from other physical processes. The acceptance of a physical world seems to me therefore to involve as a

corollary a behavioristic psychology. The various forms of psychophysical dualism strive to set apart a fragment of knowledge and to apply to it a different set of postulates without adequate evidence for the distinction. They thereby violate the principle of parsimony, while accepting it within the limits of their respective systems.

The same criticism does not apply to other systems which definitely reject one or more of the postulates of physical science as applied to any phenomenon of experience. Solipsism rejects all, idealistic monism apparently the postulates of spatial relationship and individual discreteness of elements, creative evolution the doctrine of determinism, certain mysticisms the postulate of temporal relationship, and finalism rejects determinism and substitutes values. Since each consistently rejects the postulates of the others for all experience, they are each rationally unassailable from the postulates of the other. This leads to a consideration of the psychological factors involved in the construction and choice of a system.

The Psychology of Mechanistic and Teleological Systems

The psychology of philosophy is yet to be written, although it must be included in any psychological system. The finalist must show to what purpose his speculations, and the mechanist must explain how he is become as he is. Each must show the place of his system within his system.

In so far as one can analyze it at present, physical science seems to be the attempt to express all experience in terms of bodily activity. However abstract the notions of time or space, of gravitational attraction, and the like, they are thought of in bodily movements or postures. Translation into other terms is precluded in the system and in particular all emotional elements are ruled out. The more nearly the expression can be reduced to pure movement and posture, without push or pull (kinæsthesis), the more nearly it approaches the mechanistic ideal. Advanced mathematics substitutes verbal symbols for manipulative patterns, but the symbols are first derived from the patterns, and their meaning is a reënactment of the patterns from which they

were derived or for which they are named. The apparent limitations of science and metaphysics seem to be determined by the manipulative capacities of the bodily mechanism. Scientific explanation might be called the manipulative interpretation of the universe.

In addition to manipulative activities, the organism is capable of emotional reactions and these seem to furnish the basis for the antagonistic doctrine of finalism. It stresses the emotional and utilizes the manipulative only where emotional interpretation fails to cover the phenomena of experience. This point of view is most clearly expressed in Bergson's intuitionalism. Description and 'explanation' are of less importance than valuation, and the formulation of knowledge is to be made in terms of its emotional significance.

Perhaps other modes of interpreting experience may be devised, but thus far none has been. Other positive doctrines seem to exist largely by avoidance of clear statements of their postulates and by vacillation between these two methods of thought. A few writers see the antagonism of the two views, and, as Bergson, reject determinism with all its works, or with the behaviorists finalism and values, but the majority of psychologists are still precariously bestriding both steeds.[1] Adherence to mechanism or finalism seems to be wholly a matter of temperament; the choice is made upon an emotional and not a rational basis. Perhaps the psychoanalysts, specialists in human motives, can explain the choice of a system. Their account of my behaviorism would certainly run as follows:

A strong Oedipus complex; identification of the Heavenly Father with the father of the complex; transfer of the affect to all religious dogma; rejection of soul, mind, everything which suggests transcending or paternal authority. The history is clear. Coupled with this, a tendency to 'shut-in' temperament with its resultant *Schadenfreude*; organic inferiority with compensation through a derogatory view of others. "These superior men! They are only modified

[1] The most recent spectacle of this sort is presented by McDougall (21), who bounces back and forth between accurate scientific description and the exhortations of a soap-box evangelist.

entera with gonadal appendages. Nothing but machines which can claim no credit for their achievements."

But if this is the solution of my behaviorism, are the advocates of other systems in any better case? We can imagine the psychoanalytic account. Finalism is but an attempt to magnify the ego in another way. "What! am I only an evolved enteron? By no means! I transcend mere matter. I am a free mind, a self-created and self-creating being." This, like materialism, is but another form of the 'Myth of the Birth of the Hero' (25).

Valuation Versus Scientific Description

The two systems, mechanistic explanation and finalistic valuation, stand out as incompatible points of view, scientific versus humanistic. To the writer, the most serious defect of current psychology is the confusion of these points of view in the attempt to develop a science. There is an almost universal demand that psychology shall do more than explain mind in the sense in which other sciences explain their material. It must also subject itself to anthropocentric values; it must leave room for human ideals and aspirations; and it must present its material in such a way as to identify the explanatory principles with some qualitative elements within the reader's experience.

Other sciences have escaped from this thralldom. The astronomer and biologist no longer need to bow before man's egotism, and their conclusions are a frank denial of his preëminence. And equally they are freed from the necessity of arousing the 'experience of the thing described.' No one asks that the physicist's account of gravity shall make his hearer feel heavier, or that the biologist shall throw him again *in utero* by his statement of the recapitulation theory.

Yet many psychologists demand that the explanation of mind shall be, somehow or other, identical with mind. The final objection to behaviorism is that it just fails to express the vital, personal quality of experience. So far as I can analyze this objection, it is based upon the demand that the scientific description shall have the affective value of the

thing described. This demand is quite evident in James' arguments concerning the 'automatic sweetheart.' It is scarcely less obvious in other cases. The objection to a physiological account of the awareness of red, for example, seems unquestionally to be based upon the feeling that the description is not red; does not give the peculiar sense of possession which is in *my* red; does not arouse the experience of red. And so for other more obscure psychological data of the sort which is supposed to involve transcendence. There is a persistent demand that the scientific description shall be capable of arousing the experience of the thing described. Such descriptions belong to art, not to science. If such is the function of psychology, then the painter, musician, and poet far excel the psychologist in the practice of his profession. And a slap in the face is a better description of anger than can be formulated in words.

Not only is there this demand for an esoteric quality in psychological studies, but there has also been a constant attempt to inject metaphysics into the science. The developments of physics are independent of any theory of the ultimate nature of matter, and it is a bold metaphysician who ventures to take the physicist to task for ignoring things-in-themselves. But psychology has ever been the playground of philosophers, ignorant of its empirical findings but confirmed in their belief in the unassailability of their introspections and determined that psychology must be made the stepping stone to a knowledge of reality and value. And psychologists have accepted these unscientific aims and attempted to make the science to conform to them. Yet things-in-themselves are, as Conger (4) has phrased it, "the limiting case of nothing" and to the scientist *qua* scientist simple nonsense, and one of the chief lessons of empirical psychology is that values are never rational but always based upon an affective reaction. It is only by divorcing itself from metaphysics and values and adopting the phenomemological method of science that psychology can escape the teleological and mystical obscurantism in which it is now involved.

IX. The Behaviorist Program

I pick up at random an elementary textbook of psychology (not written by a structuralist) which is presumably representative of current interests in psychology; the best that psychology can contribute to the culture of the student. It is made up as follows: Sensation, perception, affection 66 per cent., anatomy of the body, 10 per cent., learning, 9 per cent., thought (more than half a discussion of sensation and imagery), 9 per cent., self (metaphysical) 1 per cent. The remaining five per cent., by a stretch of the imagination may be interpreted as a discussion of human motives. Perhaps this book is not typical, but it is fairly representative of the kind of psychology that prepossession with the mind-body problem has produced. It practically ignores what to the behaviorist are the most important problems of psychology, and what to the average student are the most interesting and vital questions, the problems of human conduct. The behaviorist is interested to discover the wells of human action: how does the individual meet the complex situations in which he finds himself, how solve his problems, how acquire social conventions, whence come his interests, prejudices, ambitions, what is the source of his genius or commonplaceness? These are not the problems of the introspectionist, yet they are unquestionably psychological problems, and their importance is far from measured by the grudging five per cent. granted them in the text. Only a vision grown myopic by long introversion could behold sensory physiology as twelve times more important than all the problems of human personality combined.

It is by this demand for change of emphasis in psychology that behaviorism has broken most completely from the traditions of the older psychology, which is willing to leave the problems of every-day life to the 'applied sciences' of sociology, education, and psychiatry. The behaviorist holds that the greater part of introspective psychology is only a poorly devised physiology of the sense-organs and that its minor importance as such should be generally recognized. He would make of psychology a true science of human conduct.

By what means? From physiology we inherit reflexes, conditioned reflexes, and glands; from animal psychology, habit, trial and error, and instinct; from psychiatry, emotional complexes and conflicts; from subjective psychology, a horrible example. With this meager equipment we must begin our task. The task is first to define more clearly the problems of reaction, of motivation and integration in behavior, to analyze the behavior components in specific human activities; second, to state these in terms of the physiological mechanisms involved. Without physiology behaviorism can make but little progress, for its explanatory principles are physiological and no sharp line can be drawn between the two sciences. For the present, if we are to deal with complex human activities, we must be content with the pseudo-explanations offered by such conceptions as 'set,' 'habit,' 'gestural reaction,' 'drive,' 'conflict,' 'dominant stimulus,' and the like, but our task is not completed until we can show something more definite than these as the foundation of the science.

At present, behaviorism is based largely upon the conceptions of subjective psychology. Its categories of behavior are derived from the categories of structural psychology and its 'explanations' are largely re-phrasings of subjective descriptions. This is due in part to language difficulty, in part to the early training of most behaviorists in subjective psychology, but chiefly to the backwardness of the science of physiology.

Our current psychological language is a weird composite of teleological and mechanistic terms; names for phenomena which, as experienced, reveal neither purpose nor cause. The result is that a scientific description of many phenomena may not be recognized by those who are less familiar with the phenomena than with the names and their interpretative implications. This has led to such objections to behaviorism as that recently advanced by Pratt (24) who has argued that to make himself intelligible the behaviorist must always fall back upon subjective terms, "...has to translate half a dozen behaviorist pages into two lines of introspective psychology,

in order to clear up his meaning even to his introspectionist colleagues." Such objections have perhaps been justified by behavioristic discussions, perhaps even by this paper, but the fault lies rather with the lack of an extensive and generally understood behavioristic nomenclature than with behavioristic theory. I may say that I am hungry and purpose to have steak and onions for dinner. The subjectivist and the man-in-the-street gets the meaning clearly. Yet my words have only been accepted names for the facts that stomach contractions, salivary secretion, changes in visceral tonus, specific laryngeal and tongue movements, contractions of trunk musculature, and the like are occurring within my body. An introspective description of my *purpose* would not reveal an influence of the future on the present, nor does the behaviorist account. Yet such is the defect of language that to be intelligible to any one except the most highly specialized behaviorist, the description of the phenomenon must employ a word which implies this finalistic interpretation (the very word *implies* has connotations which the behaviorist cannot admit, yet to avoid it I must use half a page to describe the actual phenomenon of implication, as it appears to either behavioristic or introspective analysis). Only the gradual development of a widely understood behavioristic terminology can eliminate this difficulty.

To the man trained in the older psychology or philosophy the traditional problems must still seem important, even though he has thrown off most of the metaphysics of the school in which he was trained. Moreover, unless he has first-hand knowledge of a vast range of human activity he must take his facts from the subjective literature where they are arranged and selected with the subjectivist's bias as to their relative importance. Small wonder then that current behaviorism shows the taint of introspection. Where the behaviorist is engaged in experimental work and is not trying to construct a system, this difficulty is by no means so evident and the few behaviorist investigations which have appeared are certainly not open to Pratt's criticism that the problems are derived from subjective psychology.

The behaviorist's chief handicap is the lack of an adequate physiology upon which to base his science. The exaggerated emphasis upon conditioned reflexes, suprarenal glands, and 'sets' shows the paucity of the material at hand. But by turning physiologist the behaviorist may hope to enlarge the number of his explanatory mechanisms and by a wider direct contact with human problems to escape the subjective categories under which they are now classed.

In this respect we need some compromise between the positions recently advocated by Warren and by Weiss (**28, 29, 36**). Weiss would make of behaviorism a science based upon the "individual-social" aspect of reactions, utilizing physiological results only as a basis for social valuation. Warren emphasizes the neuro-physiological problems of behavior.

The social categories of Weiss are certainly open to further analysis and must always be questionable—mere hypothecated processes or names for ill-defined groups of phenomena —until their neurological mechanisms have been solved. On the other hand, if behaviorism is to treat of human conduct, it must for the present employ such vague categories. The insistence upon neurological interpretation can now only lead to the formulation of preposterous neurograms or to the restriction of behavioristic research for many years to the physiology of the simplest neural processes. The compromise must include a healthy scepticism toward the present behaviorist categories, an insistence that the problem of their physiological mechanism be kept always in mind, with a full recognition of their practical value for systematizing the problems of human conduct.

Behaviorism began as a criticism of introspection. Must it retain as fundamental to its tenets the objection to any form of verbal report from its subjects? Certainly such reports are not necessary for a recognition and study of central processes. The whole concept of neural integration and the detailed accounts of spinal mechanisms which are now possible have been derived without recourse to introspection. On the other hand, there can be no valid objection

by the behaviorist to the introspective method so long as no claim is made that the method reveals something besides bodily activity. Behaviorism has a place for introspection, but it must be a vastly different form of introspection from that which now burdens the literature. Its avowed aim must be the discovery of cues to physiological problems and its final appeal for verification to the results of objective methods. Such introspection may make the preliminary survey, but it must be followed by the chain and transit of objective measurement.

The physiological analysis of human behavior presents a stupendous, perhaps insuperable task. It has not been my object here to develop specific physiological theories to formulate a system of behaviorism, or to prophesy the course which its development will take, but only to point out that the supposed problem of consciousness does not present insurmountable difficulties to behavioristic treatment. Subjective psychology has not revealed data which justify any type of psychophysical dualism. The attributes of mind, as definable on introspective evidence, are precisely the attributes of the complex physiological organization of the human body and a statement of the latter will constitute as complete and adequate an account of consciousness as seems possible from any type of introspective analysis. The behaviorist may go his way without fear that his final account will fail of including 'mind' and with the conviction that the inclusion of 'mind' will add nothing to scientific psychology.

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