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THE BEHAVIORISTIC INTERPRETATION OF CONSCIOUSNESS I.

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I. PRESENT FORMS AND LIMITATIONS OF BEHAVIORISM

Behaviorism, beginning as a laboratory technique and a critique of method in concrete experiment, has advanced rapidly to a place as an accredited system of psychology, stressing the importance of objective methods and of physiological interpretations. The history of the movement is still reflected in the tendency of its exponents to stress experimental method rather than interpretation, in the lack of any systematic formulation of the relations of the science to the

specific problems of the older subjective psychology, and in a certain shifting of ground in behavioristic discussions which indicates that the behaviorists themselves are not yet quite certain of the philosophic implications of their system. Too often a statement of an extreme position is followed by a partial retraction or qualification which leaves the reader in doubt as to the degree of heterodoxy expressed. This hesitation before the plunge is not discreditable to the behaviorist: so great a departure from tradition in psychology demands caution. Moreover, the behaviorist is primarily an experimentalist and believes that many of the supposed problems of philosophy will, with increasing knowledge, resolve themselves into concrete laboratory problems. Why then dispute fruitlessly and at length about them before data are at hand for their solution?[1]

Nevertheless, preoccupation with experimental problems will not excuse behaviorism for certain apparent inconsistencies in its doctrines. In various discussions of the scope of behaviorism three distinct and incompatible formulations are discernible. All involve the conviction that a complete description and explanation of behavior can be given in terms of the physicochemistry of bodily activity. They differ, however, in the place assigned to 'mind' in the system. The formulations are as follow.

1. Facts of conscious experience exist and are capable of treatment, as distinct from behavior. The behaviorist is not interested in them, since they are irrelevant to his problems, and leaves them to the tender mercies of the introspective psychologists or philosophers. This is merely psychophysical parallelism with emphasis on the physical. It is the view of Bechterew (2) and other early objectivists.

2. Facts of conscious experience exist but are unsuited to any form of scientific treatment. This is the most common formulation of the behaviorist's position. It seems to have been Watson's view in his earlier writings (31), as is shown by the following statement:

[1] Watson (32) has emphasized this view in his discussion of the rôle of the observer in experimentation.

"Will there be left over in psychology a world of pure psychics, to use Yerkes' term? I confess I do not know. The plans which I most favor for psychology lead practically to the ignoring of consciousness in the sense that that term is used by psychologists today. I have virtually denied that this realm of psychics is open to experimental investigation. I don't wish to go further into the problem at present because it leads inevitably over into metaphysics. If you will grant the behaviorist the right to use consciousness in the same way that other natural scientists employ it—that is, without making consciousness a special object of observation—you have granted all that my thesis requires."

Watson seems now to have abandoned this position for the more extreme one outlined below (3). Weiss (33) still holds to the view when he says, "The structuralist point of view can, of course, be consistently maintained. There is justification for inferring the existence of a conscious correlate for at least some of our actions, but the heuristic value of this assumption seems doubtful when it is shown that behaviorism is not less discriminative or descriptive than structural psychology...." And again, "Perhaps the distinguishing difference between the functionalist and the behaviorist lies in the fact that the behaviorist disregards the entity which the functionalist calls consciousness" (34).

This we may call a methodological behaviorism. Experimentally it promises much, for it avoids the confusion of terms and issues inherent in systems which try to treat of both 'mental' and 'physical' data indiscriminately. It limits the problems definitely to interpretation upon one set of premises and avoids the common error of much older psychology in mistaking a psychological name for a physiological explanation. But it puts the behaviorist in the position of the dog in the manger. It omits a whole universe of phenomena, which have been supposed to constitute the chief realm of psychology. Simply because he can make nothing of the facts of consciousness (which he admits are facts) in his system of physical causation, the methodological behaviorist refuses to believe that any other system can be

devised which will permit the development of a science of pure psychics. And so long as he admits the existence of a universe of consciousness he lays open to attack his major premise, that behaviorism can account for all human activities. For the psychophysical dualist is constantly finding mental facts which he holds to be inexplicable in any mechanistic terms and by refusing to discuss such data the behaviorist prohibits himself from answering arguments based upon them. Moreover, so long as he admits the existence of entities in human existence which behaviorism disregards, he can not deny to others the right to try to study those entities and reduce them to a science by any means whatever.

3. The supposedly unique facts of consciousness do not exist. An account of the behavior of the physiological organism leaves no residue of pure psychics. Mind is behavior and nothing else. This view is implied in much of Watson's writing, although it is not stated in so many words. For the most part he expresses a methodological behaviorism, but such statements as the following leave little doubt of his fundamental denial of the fact of consciousness, as described by the subjectivist. "It is a serious misunderstanding of the behavioristic position to say, as Mr. Thompson does—'And of course a behaviorist does not deny that mental states exist. He merely prefers to ignore them.' He 'ignores' them in the same sense that chemistry ignores alchemy, astronomy horoscopy, and psychology telepathy and psychic manifestations. 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."

This is the extreme behavioristic view. It makes no concessions to dualistic psychology and affirms the continuity in data and method of the physical, biological, and psychological sciences. "Consciousness is behavior." "Consciousness is the particular laryngeal gesture we have come to use to stand for the rest." I shall speak of this doctrine as strict behaviorism, or for brevity simply as behaviorism, since methodological behaviorism is only a form of epiphenomenal-

ism. Such a behaviorism has been called a materialism by several recent critics.[1] Perhaps it is such, to the extent that modern physics and physiology are materialistic, but the word materialism implies a metaphysical theory of reality, whereas these sciences are, at least in their systematic treatment, altogether phenomenological. Psychophysical dualism and epiphenomenalism do imply theories of the ultimate nature of mind and matter, but behaviorism claims to avoid this and to attempt nothing more than a logical and mathematical description of experience such as is presented by the physical sciences. To stigmatize this as materialism is to appeal against behaviorism to the prejudices aroused by a crude metaphysic which is nowhere implied in its doctrines.

When we examine the evidence upon which strict behaviorism is based, a weakness in its current formulations seems evident. The behaviorist denies sensations, images, and all other phenomena which the subjectivist claims to find by introspection or by some form of direct knowledge. This disagreement as to matters of fact is not necessarily fatal to behaviorism, although it is the most frequent ground for rejection of the system. But when we examine the evidence adduced in support of the denial of consciousness, the behaviorist seems to have failed to strike at the root of the dualistic systems. The arguments employed—they can scarcely be called evidence—fall into four chief classes.

(*a*) Appeals to the principle of parsimony to exclude consciousness because it is unnecessary for the explanation of behavior (32, 34). The inadequacy of this argument is evident. The gravitational effects of Jupiter are irrelevant to a physiology of digestion, yet they are none the less a fact. The behaviorist must show further that his system is adequate to explain the supposed phenomena of consciousness as well as of behavior, before the argument becomes relevant. At best the argument in its present form can support only a methodological behaviorism.

(*b*) Reviews of the history of evolution or of superstition to show how the belief in the self may have arisen (35).

[1] *Cf.* Pratt, (23).

This argument is beside the point. It may force the subjectivist to deny the universality of evolution or of historical sequence, but this he has already done in claiming the existence of a universe of non-material things as the subject of his study, and in refusing to admit their derivation from the physical phenomena of evolution.

(*c*) Redefining of mind in objective terms as when Bawden (1) states that "...mentality or mind is a name for the fact of the control of the environment in the interest of the organism through the interaction of inherited capacities and acquired abilities." Such arguments likewise avoid the issue. They ignore the subjectivist's claim that he knows a unique mode of existence not definable in objective terms. At best from the standpoint of the subjectivist they constitute only a study of the physiological correlates of conscious processes.

(*d*) Attacks on the method of introspection. These are the behaviorist's big guns. In general, they take one of two forms. Introspection is inaccurate, unverifiable; the stuff revealed by it is variable and inconsistent. It is indeed so unreliable that we are justified in throwing out everything which it claims to establish. But much the same argument has recently been urged against the objective methods of mental testing. It may be a strong plea but it is not logically convincing. A method may be defective and yet reveal fundamentally important facts, as Loewenhoek's observations on infusoria.

The other form involves a theory of introspection. When one examines his own mental states he is really reacting to stimulation of his proprioceptors. Introspection is a physiological process and as such can reveal only other physiological processes. Even if mental states exist, they cannot be discovered by introspection. But the introspectionist may reply, "Your doctrine of introspection is only an hypothesis. You have not produced convincing proof of the homeodetic theory of introspection. My claim that mental states form a unique mode of existence is based on the nature of the material which introspection reveals. If it does reveal such phenomena, it must be more than a physiological process. It is

only by showing that mental states do not exist that you can prove that you have given an adequate account of the introspective process."

Thus it appears that the current formulations of behaviorism have not made good their claim to exclusive possession of the field of psychology. Methodological behaviorism has all the faults of psychophysical parallelism plus that of intolerance. It admits the existence of certain phenomena called conscious, admits that it can not fit them into its system, and denies to others the right to study those phenomena and to seek to formulate them into a science. Or, it reverts to the early objectivism of Bechterew and admits the possibility of a subjective psychology, merely asserting that this psychology is irrelevant to behavioristic explanation. It thus paves the way for the development of two cognate sciences, such as Fernberger (8) has recently advocated.

Strict behaviorism is advanced as a theory, but the insistence upon methodological behaviorism at all costs has prevented the consideration of any supposedly subjective data and has left the theory undeveloped. Yet if behaviorism is to become a complete science, if it is to avoid becoming merely a coördinate system with subjectivism, it must subordinate questions of method, of objectivity, to the application of mechanistic or physiological principles to the whole of psychology. This point is emphasized by Dewey (5) to whom the facts of consciousness appear as an experimental behavioristic problem. "To recognize that the behavioristic principle can make a place for them (the facts of consciousness) is important. For science is, after all carried on by men, and a seeming denial that such facts do exist and do come under the behavioristic principle is sure to keep alive in the minds of some a futile introspectionist method, by setting to one side a realm of facts to which (so it is thought) it *must* be applied since the behavioristic method confessedly does not apply."

Let me cast off the lion's skin. My quarrel with behaviorism is not that it has gone too far, but that it has hesitated, that it has been diverted by details of experimental method,

when more fundamental issues are at stake; that it has failed to develop its premises to their logical conclusion. To me the essence of behaviorism is the belief that the study of man will reveal nothing except what is adequately describable in the concepts of mechanics and chemistry, and this far outweighs the question of the method by which the study is conducted. I believe that it is possible to construct a physiological psychology which will meet the dualist on his own ground, will accept the data which he advances and show that those data can be embodied in a mechanistic system. A behaviorism will thus develop which will be an adequate substitute for the older psychology. Its physiological account of behavior will also be a complete and adequate account of all the phenomena of consciousness. It will be methodological only in insisting that the concepts of the physical sciences are the only ones which can serve as the basis for a science, and in demanding that all psychological data, however obtained, shall be subjected to physical or physiological interpretation.

Such a program demands that we face the issue squarely. We must accept tentatively the supposed data of introspection and test the validity of our system by its ability to deal with such data. We shall find but three alternatives: the data may be of such a character that we can not hope to embody them in any mechanistic system; they may even now fall into such a system; or we may be able to define the problem of consciousness as an experimental problem, unanswerable on the basis of existing data, but offering possibility of solution with the development of objective science. Indirect arguments and denials of facts which others consider verifiable will not suffice. The dualist advances specific data with certain definable attributes as evidence for the validity of his system. Perhaps we can not verify his findings objectively, but we can examine his claims and determine if and in what respects they are incompatible with the postulates of the natural sciences. The key to the development of behaviorism lies here. When the behaviorist denies that consciousness exists, he denies, not the existence of the

phenomena upon which the conception is based, but only the inference that these data constitute a unique mode of existence or that they are not amenable to analysis and description of the same sort as are 'physical' data. Unfortunately, the psychological terminology current today involves not only an enumeration of phenomena but also a definite theory of reality. It is this theory which behaviorism repudiates.

In the following pages I shall first seek to discover on the basis of introspective evidence the 'data of consciousness,' stripped of metaphysical theory. I shall then attempt to show that these data are adequately describable in the concepts of the physical sciences and that the addition of a dualistic interpretation adds nothing to our understanding of them.

II. The Evidence for a Mind-Body Problem

Before we can begin a constructive program we must define clearly the sort of data with which the behaviorist and the dualist claim to deal and must have in mind the presuppositions underlying the system of each. I am not concerned here with the development of an epistemological theory, but only with the empirical basis of the distinction between behaviorism and psychophysical dualism. A system of psychology can not be developed without some implied theory of knowledge, but, on the other hand, every theory of knowledge presupposes a theory of psychology and by changing the rules of the game innumerable self-consistent systems can be developed. Escape from this dilemma, in so far as it concerns the points of difference between dualistic and behavioristic psychology, is offered by the faith which both express in the validity of physical science. Both behaviorism and psychophysical dualism accept the formulations of physics, chemistry, and biology as adequate descriptions of the interrelations between certain data of knowledge, and hence both accept a theory of knowledge which must justify the methods and conclusions of physical science. Any theory of knowledge which does this must also permit an attempt to extend the methods of physical science to other aspects

or elements of experience and can not arbitrarily limit the field of physical investigation. The dualistic systems of psychology admit this and seek to justify their dualism upon empirical rather than epistemological grounds. They point to certain data of experience—qualitative diversity, transcendence of time and space, independence of 'physical law,' and the like—and assert that the concepts of the physical and biological sciences are inadequate to describe the relations and characteristics of these data. On this ground they justify the division of experience into two aspects or modes of existence and the formulation of additional postulates concerning the nature of 'mental existents.' The behaviorist, on the contrary, claims that the concepts of the physical and biological sciences are adequate to describe and account for the whole of experience and that there is not adequate empirical evidence for the distinction of mental and physical modes of existence or aspects of experience. "Grant me," he says, "the postulates of the physical sciences, and I can show you how the phenomena of mind may arise within a system which has no other attributes than those which the physicist ascribes to his phenomenological world."

The mind-body problem is thus a problem of the applicability of certain postulates and descriptive methods (those of the physical sciences) to certain specific data of knowledge (the so-called attributes or elements of consciousness). The controversy between behaviorism and dualism is not a question for philosophy but one to be answered strictly in the light of empirical evidence provided by psychological study.

We must first consider the character of the postulates and methods of physical sciences. These sciences are as yet incomplete and no one can predict what form they will finally take. Their simplest formulations at present involve postulates of the relation of discrete entities in time and space and the attempt at characterization of experience in terms of the mathematical relations of these entities. They seek to keep their postulates as few and simple as possible; to avoid ascribing to the entities other attributes than those implied in a time-space-number system; to avoid additional concep-

tions of energy, substance, and the like.[1] Complete success has not attended their efforts at simplification, but the physical and biological sciences have found it possible to develop with but few additions to the above named postulates. In general they have tended to quantitative formulations, with their implications of individual discreteness and qualitative identity of elements. I shall not attempt here to characterize their methods further than this, since the later attempt to deal with the phenomena of consciousness in physiological terms will give additional definition to the method.

The conception of mind has undergone a long course of evolution and many of its supposed attributes are only vestiges of the superstition, religious dogma, and false psychologizing which at various times have influenced its progress. Of these, many do not fit into the physical system, but we shall find that they are the illusions of a metaphysical legerdemain and not the discoveries of introspective psychology. Before we can attempt a behavioristic account of consciousness we must scrutinize these attributes and discard such as do not seem to be revealed by psychological investigation. Then we may begin the application of the methods and postulates of the physical sciences to the residual data.

The Distinguishing Features of Consciousness

There are almost as many analyses of conscious phenomena as there are writers on the subject and from the mass of frequently vague and conflicting discussion it is difficult to distinguish just what characteristics are held to differentiate conscious phenomena from the subject matter of the inorganic sciences. The following, however, seem to be the most frequently stressed and the ones upon which most general agreement may be obtained.[2]

[1] This mode of attack is not fashionable in philosophy today. Realism believes that it has scotched solipsism. But a consistent behaviorism can not admit any accurate direct knowledge of reality, since, if reactions constitute knowledge, the reactions may be to a part only of the total situation and knowledge is, therefore, limited by the reaction capacities of the mechanism. The behaviorist is under no delusion as to the 'ultimate' truth of the physical system. For him it is only an explanatory hypothesis, accepted because it seems the most flexible and widely applicable of all which have been suggested.

[2] I believe that the chief difficulties of the mind-body problem arise from such

1. *Awareness.*—The conscious organism has a knowledge of itself, of things other than itself, or of both which the inorganic mechanism, however complicated, lacks. Awareness may or may not presuppose a knower; it presupposes something known. It does not imply any particular pattern or organization of the known. It may or may not presuppose the doctrine of transcendence discussed below.

2. *Content.*—This is a universe of things known, of sensations, images, affects, etc., which stand in the relation of objects of awareness and which have certain attributes not definable in spatial, temporal, quantitative, or other 'material' terms.

Various writers have stressed these categories in different ways. For one, the knowing is the important thing and content is merely attribute of knowing. For another, content alone exists and when its characteristics are described, nothing need be said of any process of knowing. Content is sometimes physical reality distorted by the process of knowing, sometimes distinct from physical reality, a parallel mode of existence. That is, red may be ether vibration as known, or the psychical correspondent of ether vibration. But whether we are confronted with a pink awareness or an awareness of pink, the attributes of process or content which distinguish it from the physical world seem to be very much the same. For brevity of discussion I shall ascribe them to content and later discuss conditions where they seem rather ascribable to awareness.

Things known, then, have certain attributes which are held to mark them off as unique from a physical reality. The more important of these are:

(*a*) *Qualitative Diversity.*—Sensations, images, affects, have certain attributes—duration, intensity, extensity, quality, clearness, and the like. Of these duration, intensity, extensity have their parallel in the physical world and are not peculiar

analysis as this with the failure to appreciate the fact that the 'elements' are abstractions whose existence is conditioned by the intactness of the total organization of consciousness. We may speak of an element of consciousness but not of a conscious element. Confusion on this point has led to the various atomistic theories and to much meaningless discussion of consciousness in lower organisms. (See page 000.)

to consciousness, but quality and clearness (which is often reduced to a different kind of quality), form a unique existence. Differences of quality are not implicit in physical postulates and are not describable in mathematical terms.

(*b*) *Self-transcendence.*—The content of consciousness (or the conscious process) transcends time, space, and objective discreteness. The material in content unites past, present, and future, relates spatially separated objects in a unique unity, includes not only the explicitly known but also implicit meanings. This is sometimes stated as a function of awareness sometimes as an attribute of content, sometimes as the very essence of consciousness.

Sometimes content is held to transcend physical reality, as when an image refers to the past. Sometimes awareness is said to transcend the elements of content, as when two images are known together and compared. The problem of transcendence seems to be essentially the same in either case. It is the basis of the claim for psychological uniqueness in memory, recognition, meaning, purpose, and the unity of consciousness. Even the problem of qualitative differences has recently been reduced to a peculiar union of discrete neural impulses.

3. *The Organization of Consciousness.*—In addition to the processes or elements making up awareness and content, we may distinguish certain characteristics which may be ascribed to the organization of things known into the complex system of human consciousness. They are:

(*a*) *The Limitations of Content.*—In the field of consciousness certain elements are included, others excluded. This selective action is sometimes cited as having no parallel in the material world.

(*b*) *The Unity of Consciousness.*—This is perhaps implied in the doctrine of self-transcendence. The elements of content are said to be fused into a unique whole which is something more than mere coëxistence. Knowledge of the elements transcends the elements. The 'centrality' of consciousness is unique from the physical world.

(*c*) *Consciousness of Self.*—Through the warp of conscious-

ness there runs a thread of self-knowledge. This is not necessarily a knowledge of the knower, but is a feeling of personal identity which is a part of content and is distinct from other parts.

(*d*) *Self-arrangement.*—Under this heading I mean to include the various capacities of logical necessity, self analysis, intelligent action, and the like. These may be generalized as the capacity of the elements of consciousness to fall into ordered patterns, or as the ability of consciousness to define order within itself. Here we are treading upon dangerous ground, for to question the basis of logical analysis is to become involved in a scepticism which throws doubt even upon its own doubting. Nevertheless some of these capacities are held to distinguish the organization of consciousness from physical order and hence must be considered in a discussion of the behaviorist's problem. In the light of its premises, behaviorism must study the logician and discover how his logic arises from the interaction of propagated disturbances in his nervous system; it must study the scientist and show the material basis of human progress; it must study the moralist and discover the mechanism of his ethics.

This classification is not complete, but I believe that the more important arguments for the uniqueness of consciousness will fall into one or another of the categories listed. There is little unity or similarity among the affirmed elements and attributes of consciousness save the supposed impossibility of describing them adequately in terms of the concepts of physical science. If we can include those above in our behavioristic system, there will be little left upon which the subjectivist may base his claim to a distinct system of knowledge.

I shall now take up the questions raised by the dualist in greater detail, examine the subjective or introspective evidence which is supposed to prove that the various attributes of consciousness are different from the phenomena of the physical world, and try to show that the subjective evidence does not justify the demand for any other postulates than those made by the inorganic sciences.[1]

[1] Watson has repeatedly suggested that in the physical sciences the question of the observer is presupposed and disregarded and that behaviorism may follow the

The Subjective Definition of Awareness

Of introspective description of the process or state of knowing there is none, although many pseudodescriptions have been advanced. The neo-realists have given us a statement of the case for awareness which none of the other schools has been able to refute. I shall follow them, with some obvious deviations, in the subsequent discussion.

There is no direct experience of a knower. There is no direct knowledge of the process of awareness. All that can be discovered by the most careful introspection is the existence and attributes of the objects of knowledge, of the content of consciousness, and this content does not include the knower or awareness itself. Knower and knowing are implicit in the known, but are not directly experienced. That something produces the limits and attributes of content is a logical conclusion, but no description of that thing from experience is possible. All that can be said is that some process, relation, or what not, gives rise to the phenomena of content, and determines the character of the field of consciousness. Subjective experience does not justify any further statement concerning awareness than this.[1]

It follows that any process or relation which will account for the selection of the elements of content and for the attributes of those elements (other than being known), whether that process or relation be in a universe of physical things or

same method. I do not wish my position to be confused with this. It is only the postulated characteristics of physical reality in the absence of an observer that I consider here. The mechanism of the observer seems to me a real problem for the behaviorist, as it is not for the physicist. Nor does Watson altogether disregard the problem of the observer. The behaviorist may study a behaviorist in the act of studying a behaviorist, and is justified in concluding that his own processes of study resemble those of the other.

[1] Some writers have read other characteristics into awareness, as does Montague (22) when he defines consciousness as ". . . the potential or implicative presence of a thing at a space or time in which that thing is not actually present." But such statements are mere inferences from the nature of content. Because the thing known has certain attributes it is assumed that the knowing process has those attributes. This assumption is perhaps justifiable, but the point which I wish to emphasize is that, if the characteristics are not found in content, there is no other reason for ascribing them to awareness. If content does not transcend time and space, then neither does awareness. The only criterion of the process is the result.

in a realm of pure psychics, will fulfill all the subjectively discoverable requirements for a complete account of awareness. The subjectivist can not deny that any process whatever which will give rise to the characteristics of the known is the process of knowing. It is unnecessary, therefore, for the behaviorist to deal specifically with awareness. If he can give an account of the attributes of content, his task is accomplished.

The Problem of the Attributes of the Elements of Content

The two characteristics of the elements of content which are held to differentiate them from the data of physics are their peculiar quality or qualities and their self-transcendence. The psychological account of quality, as of awareness, is almost wholly negative. Quality is something unique, indescribable, except in terms of itself. Red is red, green is green. Neither is, by any stretch of imagination, a form of ether vibration or chemical change in the brain. This, of course, is crude subjectivism. Modern philosophy is more subtle. Quality is a fusion of discrete elements into a unique whole: it is the process of fusion, not the result (26). But the fact of qualitative diversity remains the basis for the argument. The fusion is deduced from the uniqueness of quality, not from any direct knowledge of the process. The concept of transcendence has been here introduced upon no other grounds than the existence of quality.

Let us examine the situation more closely. What has the subjectivist to say in description of quality? Qualities are diverse; some are less unlike than others; not all seem simple but those which are compound are compounded of simpler qualities, and when by analysis the simplest qualities are reached, nothing more may be said of them save that they are in different, undefinable degrees diverse.[1] They have no describable characters inherent in themselves; they are not analyzable into anything else. They exist by virtue of their

[1] Holt (13) has advanced evidence to show that all qualities are subjectively analyzable, his implication being that if introspection could carry the analysis far enough quality would reduce to some neutral, non-qualitative substratum. This is also the thesis of my discussion, save that the neural mechanism of introspection later developed seems to preclude possibility of any such ultimate subjective analysis.

undescribable differences and by virtue of nothing else discoverable by introspection.

For the subjectivist this is not the crux of the matter. He holds that quality is something apart from unanalyzable diversity, a thing-in-itself; red would always be recognizably red, though there were no other quality from which it differed. My point, however, is that the subjectivist can tell nothing of the process by which he knows quality-in-itself. He can neither affirm nor deny on introspective grounds that mere unanalyzable diversity *is* the source of this appearance of quality-in-itself. Therefore, the behaviorist is fully justified in assuming unanalyzable quantitative diversity as the sole condition of quality, provided that he can thereby show how the appearance of quality may arise and that he violate no requirement for description of other attributes of content.

On the basis of his own evidence the psychophysical dualist is compelled to define quality as a diversity which is not analyzable by the process of awareness or introspection. He can not, on introspective grounds, define the process of introspection. He can not otherwise define quality. It is merely something which is refractory to subdivision (analysis) by something else. But this is nothing unique from the physical world. If the behaviorist can show any system which is unitary in its relation to any other system in the behavior of the organism, which is therefore unanalyzable by that system, he will have met all the subjective requirements for an explanation of qualitative diversity and 'quality-in-itself.'

The doctrine of the image has occupied a rather large place in discussions of behaviorism. The existence of 'centrally aroused sensations' has seemed to offer considerable difficulty for a methodological behaviorism, since such sensations are presumably not open to objective study. For a behaviorism which is chiefly interested in physiological explanation, the difficulty is less serious, since it makes little difference in physiological principle whether a neural pattern is aroused peripherally or centrally. Nevertheless, on empirical grounds I am inclined to agree with Watson's reduction of the

image to terms of reaction. The sharp issue on matter of fact which that interpretation has induced seems, however, to call for some modification of the original formulation. The majority of psychologists claim to find peripheral sensory elements in their images. In my own, I find the condition to be as follows. The visual image is made up largely of the feel of movement, with a core of true visual quality. This, on closer examination, turns out to be an actual entoptic stimulus-retinal light or after-image—which is interpreted in terms of the motor activity. Thus an entoptic light, aroused by pressure, was successively interpreted as a human face, a wolf's head, and the wing of a flying bird, in accord with changes of the motor set.

Recent developments of the 'Gestalt' or integration theory suggest that the attributes of sensation are likewise dependent upon the reactions of the observer.[1] Sensory quality, intensity, movement, and extensity vary with the condition of the observer. All sensations are hence regarded as perceptions and 'pure sensation' becomes a meaningless abstraction. This conception, with the above view of the image, would make a continuous series of sensation, perception, after-images, memory images, illusions of day-dreaming, hypnogogic images, dream images, and hallucinations; the quality, vividness, and seeming reality of the experience varying with the character and degree of dominance of the interpretative set. Such part of the introspective literature on the image as does not obviously suffer from the stimulus error seems to bear out this view. Images are fleeting things and where the seeming peripheral sensory elements are actually described they have more the character of entoptic lights than of detailed pictures.

Whether or not this account of the image is correct, the image seems to present practically the same problem for behavioristic interpretation as does sensation. It contains qualitative elements which are not describable. In addition it is supposed to contain reference to the past, future, or to some spatially distant object, and hence to transcend itself or space or time.

[1] *Cf.* Koffka (15).

This doctrine of transcendence is today by far the more fashionable argument for the uniqueness of consciousness. This is true, partly because the subjectivists themselves have so nearly discredited subjective quality. Perhaps it is true, also, because there has been so little careful psychological study of this supposed characteristic. Whatever the cause, it is apparent that the doctrine of self-transcendence of mind is today dominant in discussions of psychological theory. It takes form in discussions of recognition, memory, purpose, spatial reference, and meaning. I quote statements here which represent extreme views of the psychic transcendence of time and space.

"Suppose we remember a visit to the Azores 20 years ago. That original visit, we are told, left paths in the nervous system, along which resistance is diminished, and the nervous discharge tends to follow those paths. But this physical account misses the essence of memory. The neural event is a present fact, similar to one that happened in the nervous system before, but not in any sense that past event; while in memory the past event is present. There is here a direct incompatibility between memory and the laws of material existence. Materially the past event is quite non-existent; mentally it is not, for it is present (with all its pastness too) as a part of our conscious experience. No matter whether it is directly present as if in a sort of perception, or present only as something not seen but meant or inferred. In either case it is an object touched by present consciousness; for inferring is a conscious act. Nor does it matter whether we say that the past event is relived in the present, or the mind leaps back into the past. In either way the gulf of time is bridged. But physically this sort of thing cannot happen, for a present physical event can not be or contain or touch an event that happened 20 years ago" (26).

"The organism is separated by space from the object to which it responds; mind with infinite speed passes from one to the other" (26).

"Thought constantly deals with the distant in space and with the remote in time; but the movements of the 'language-

mechanisms' in which the thought of a given moment is supposed to consist are strictly intracorporeal and are limited to that moment" (18).

There is not space here to review the arguments for transcendence in detail. The statements usually take one of the following forms:

1. Content transcends physical time and space

(a) By reproducing or invading the past or the spatially distant and bringing it, representative or real, into the present.

(b) By making physical diversity into unity, as in sensation.

(c) By referring or pointing to past or future, without actually bringing them into content.

2. Content transcends itself

(a) By identifying present content with past or future content.

(b) By uniting its own elements into a whole whose parts may be compared, yet form a unique unity. (This is also expressed in the doctrine that awareness transcends the elements of content.)

The first doctrine holds to an objective reality which is transcended by the non-objective. But this demands an explanation of falsification of memory, and the like, which has not been provided. I may imagine a remotely past object which once existed (*a*); I may imagine a past object which never had physical existence (*b*). How do these images differ? Both have past 'reference,' both 'point back.' I can determine that one refers to a physical past only by the correspondence of present physical evidence with present content. I conclude that (*a*) refers to a real event because of 'historical proof.' I deny it in the case of (*b*) because of lack of similar proof.

The same is true for events within my own memory. I remember that I locked my door. I later find that I did not. Only by correspondence of present physical evidence with content of memory can I establish that an objectively past event is or is not present in consciousness. The same may

be said of reference to a spatially remote object or of realization of purpose. The actual reference to a physical object can be established only by other physical evidence of that object. In this respect, a photograph is as much a slice of the past as is my memory. The reference is independent of the physical existence of the object. It is either a purely subjective feeling of pastness, or it is an inference drawn from the correspondence of present content with present physical evidence of former or distant events.

If we adopt a purely subjective view, the same argument applies. I remember that I remembered the incident of locking the door. Does this refer to an actual past content of consciousness, or is it but another falsification of 'memory'? 'Introspectively,' I can not determine, but I find above, evidence on the written page that I did so remember. A present content having 'sensory reference' corresponds to another content having 'past reference.'

The past state of consciousness is not recalled into consciousness, but another appears, containing the feeling of 'pastness.' The identification of this content with the past content, implied by the doctrine of transcendence, is the result of a false inference from some objective evidence or from some correspondence of 'memory content' with 'sensory' content. Thus we see that the supposed pointing of content is nothing more than a subjective feeling of pastness, remoteness, or futurity, which is unrelated to the real existence of the past, remote, or future event or object.

What is the nature of these feelings of pointing or reference? The introspective literature deals extensively with them. The introspectionists who seek to describe the objects of consciousness fall into two chief classes, the structuralists and the exponents of imageless-thought. The latter include in the objects of knowledge sensory content and process. In many cases the processes are, in the words of the observers themselves, merely inferences from the sequences of content. 'Judgments—problems and solutions—must be conceived as something more than successions of images. The latter will not account for the results attained. The results are evidence

for the existence of something more than the images.' But in other cases direct experience of process is claimed. I confess that I find these discussions almost unintelligible. The processes are awareness of meanings, fringes of content, irradiations, placid convictions, directions of thought, indescribable qualities of familiarity, Bewusstseinslagen. They seemingly have no other attributes than that of pointing, or implying.

As one reads the descriptions it seems as though the authors were trying to describe vague feelings: their words, as Titchener (27) says, have an 'emotive ring.' As we have seen, they are independent of real existents. They point to nothing present in consciousness, they point to nothing outside of consciousness. They are directions with nothing at either end. But is not such pointing from nothing to nothing sheer nonsense?

At this moment comes a call to lunch. I am reluctant to go. I have the feeling of swelling potentiality, of unexpressed volumes ready to pour from my pen, a magnificent Bewusstseinslage! But it is nothing more than a tenseness, shallow breathing, muscle tonus, enteric stagnancy, which remains unmoved by the suggestion of food. It points to nothing. It does not tell me what I shall accomplish. It is indistinguishable subjectively from the enthusiasm aroused by a progressing experiment. If I stop to introspect, it leads to the verbal expressions of 'swelling potentiality, etc.'—to this discussion. If I do not introspect, it merely keeps me at work, without other meaning until it is succeeded by another content. It means nothing in itself. Only as it leads to verbal expression or to accomplishment does it acquire meaning.

As a behaviorist I am disqualified for introspection. But there is authoritative introspective evidence in support of my contention. Titchener (27) has dealt at length with meanings and our transcendentalist friends will profit by re-reading him.

"I hold that, from the psychological or existential point of view, meaning—so far as it finds representation in consciousness at all—is always context. An idea means another idea,

is psychologically the meaning of that other idea, if it is that idea's context. And I understand by context simply the mental process or complex of mental processes which accrues to the original idea through the situation in which the organism finds itself—primitively the natural situation; later, either the natural or the mental. In another connection I have argued that the earliest form of attention is a definitely determined reaction, sensory and motor both, upon some dominant stimulus; and that as mind developed, and image presently supervened upon sensation, this gross total response was differentiated into three typical attitudes; the receptive, the elaborative, and the executive, which we may illustrate by sensible discrimination, reflective thought, and voluntary action. Now it seems to me that meaning, context, has extended in the same way. Meaning is, originally, kinaesthesis; the organism faces the situation by some bodily attitude and the characteristic sensations which the attitude involves give meaning to the process that stands at the conscious focus, are psychologically the meaning of that process. Afterwards, when differentiation has taken place, context may be mainly a matter of sensations of the special senses, or of images, or of kinaesthetic and other organic sensations, as the situation demands. The particular form that meaning assumes is then a question to be answered by descriptive psychology."

In other words, the only way in which an element of content may have meaning is by coëxisting with or by leading to another element of content, which is then the meaning of the first. Here is no mystic transcendence of time or space, no pointing from naught to naught, no fullness of meaning of nothing.

The fact is that meaning, on subjective analysis, reduces to a succession of images accompanied by vague affects, and to ascribe transcendence to it is to mistake logical inference for introspective analysis.[1] The behaviorist need only account

[1] I can not agree with Sheldon (26) that such inference involves the problem of transcendence. For psychology it is only the generalization of certain types of experience. Pastness, for example, is a name for a class of experiences having cer-

for the determination of the succession and for the quality of the affect.

There remain, of the transcendence hypotheses, the transcendence of physical discreteness in sensory quality and of the discreteness of the elements of content by consciousness. How do successions of ether vibrations or neural impulses become unitary in sensory quality? How may two elements of content be known together and compared in consciousness? The answer to the two problems is the same. On the one hand there is a system of elements which are by definition disparate. On the other, a union of these elements in the relation of being known as one. Introspection can tell nothing of the process by which this unity is brought about. The process can be defined only in terms of its products, quality and the 'conscious manipulation' of content. The keys are united by the ring. This union differs from subjective unity solely in that the keys do not thereby acquire quality or the capacity for self-ordering. Subjective unity in itself presents no problem.

I have devoted so much space to the doctrine of transcendence because its rejection seems to me essential to the progress of psychological science. Its acceptance disregards the empirical findings of both the introspectionists and behaviorists, leads to the mystic's substitution of emotional for rational conceptions, and abandons the use of scientific method in this field of psychological analysis. The behaviorist is justified in rejecting it as an inference from inadequate evidence, and can cite good introspective authority in support of his view.[1]

tain characters (perhaps a specific affect and lack of tension or of demand for immediate reaction) and the inference of pastness is only the assignment of an experience to this category. The inference of *real* temporal relationship is, psychologically, the translation of succession into a spatial or numerical series which can be thought in postural terms.

[1] The new realists have met this problem by pointing out that our conceptions of the character of time and space are only postulates and that if mind seems to transcend time and space, the fault lies really in a false notion of the latter. In real time or space objects are related as they are in mind. Modern physics has done much to revise our ideas of space-time relations but has not added the postulate of self-transcendence. And the evidence from mind does not seem to me to justify the addition. In this respect neo-realism seems to me a form of animism.

Certain problems of 'reference' remain, but they are experimental, not philosophical problems. "The particular form that meaning assumes is then a question to be answered by descriptive psychology" says Titchener (27). "It [the problem of meaning] becomes like others in psychology a problem for systematic observation and experimentation," says Watson (32). The behaviorist must describe the particular patterns of proprioceptive reactions which lead to the statement, 'That occurred long ago,' he must define the conditions of response which constitute recognition, and the like, but he need not seek a mystical self-transcendence in the physical world when none exists in the so-called psychic.

The Problem of the Organization of Consciousness

I have thus far dealt with the elements of conscious content, which, occurring in various combinations, make up the complex organization which we call consciousness. The tendency among writers of the subjectivist schools is to consider these as capable, at least theoretically, of independent existence, as though there might be awareness of a simple sensation, without other concomitant elements of content, or as though there might be awareness for one moment without preceding or succeeding moments. I believe that the greatest difficulties of the mind-body problem have arisen as a result of the fallacy which is involved in such an analysis. A single element is never experienced in isolation; it is an analytical convenience, nothing more. On subjective evidence one can not assert that a single element can ever be known alone. Indeed one must say that a single element never *is* known except in combination with others. The essence of consciousness is a field of many elements, organized after the plan of human experience. In the discussion of the elements of content I have sought to show that their 'peculiarly psychic' attributes of quality and reference are not intrinsic to them as self-existent elements, but can be defined only in terms of their relationship within the complex organization of which they are independent variables. We must now examine this organization in greater detail to discover in how far it con-

forms with the types of organization discovered by the physical and biological sciences within their realms of investigation.

At any moment the 'pattern' of consciousness consists of a number of elements coëxisting in the relation of being known together. The pattern is in a constant flux, new elements appearing and others dropping out with a certain regularity and consistency which provide the basis for the conceptions of logical necessity and physical continuity.

Various dualistic systems have emphasized different characteristics of this organization as evidence for the mind-body problem. The chief arguments from organization are based upon (1) the unity of consciousness, (2) the limitation of consciousness to a part of existence, (3) the persistence of the elements of self-consciousness, (4) the capacity for self-ordering or analysis, (5) the creative activity of mind.

The problem of the unity of consciousness and of the limits of consciousness is essentially that which I have discussed as the self-transcendence of the elements of content. Every system of dualistic psychology has postulated the existence of entities not present in content (indeed, the concept of the unity of consciousness implies the existence of other entities excluded from that unity) with, in brief, the attributes of physical existence. Within this physical system unity is defined as organization in a system whose parts are more closely or complexly related to each other in behavior than to the elements of other systems (for example, a solar system or a physiological organism). This is also a definition of the unity of consciousness. Conscious unity differs from physical unity only in that the elements of the physical system are mathematical entities, the elements of the conscious system are qualitative elements. The argument from unity therefore reduces to the argument from qualitative diversity.

The behaviorist has been strictured for his inability to determine objectively whether a process is or is not conscious, although he admits that some processes are and others are not conscious (19). What determines the content of consciousness at any given moment? A pure subjectivism, involving psychic determinism, may assert that preceding sensations

or images determine subsequent ones and hence the elements of content. But it is unable to explain for example how a momentary redness can determine a subsequent crashing noise. The postulate of a physical world tides over the gap (7). Every system of psychology which has sought to be more than purely descriptive has been forced to fall back upon the postulate of physiological processes to account for the inclusion of specific elements of content. One hears a noise because the ear is stimulated, thinks of the past because he sees something that reminds him of it. There is no subjective evidence as to what determines the content included at a given moment. Introspection may show perhaps that one complex of physiological processes involves consciousness, another does not. If the behaviorist can show a constant difference between these physiological processes he will have fulfilled the subjective requirements for an explanation of the limits of consciousness. Further, as I hope to show when I take up the constructive program of this paper, he need not appeal to introspection to determine whether or not he is dealing with a 'conscious' complex. The 'conscious' will be given in the organization of the complex itself. The limits of consciousness are the limits of an undefinable togetherness. Any togetherness which fulfills the other criteria of consciousness will satisfy the subjectively definable criteria of limitation of content.

The field is sometimes held to be united or given its character of 'centrality' by the consciousness of self, which runs through it. I need only refer to James' (14) description of the self to show that it presents no other problems than those of persistence of sensory elements and recognition. On introspection, the self resolves into a group of sensations, largely somæsthetic, which recur from time to time and, if they are dominant, lead to some internal or explicit expression such as "This is I," which becomes their meaning of self. Associated with this there may be a constant emotional tone, but subjectively, nothing more is discoverable than a constant affective and sensory element associated with ideas of self, which in turn resolve into verbal or imaginal expressions of, "This is I or mine."

The momentary aspects of content can not be separated from the temporal aspects, for the flux of content is continuous, although isolated elements may seemingly persist unchanged while others change. Here the field presents sequences which are classified roughly in accord with the regularity of their recurrence. Certain sequences are so regular as to be taken for granted as though they required no postulated relations to link up their elements. These constitute logical and mathematical necessity. Psychologically they reduce to unvarying sequences of ideas which, in turn, resolve into sequences of sensory or imaginal elements, subject to the same analysis and demanding the same sort of explanation as other sequences of elements of content, but since they also furnish the basis of that analysis and explanation, they seem to lead to a logical impasse. On analysis, the physical world is made up of mathematical and logical orders. But to argue, therefore, that the mind must be physical is to start a vicious circle which is completed by Bergson's (3) argument that the physical world has these characters only because of the structure of intelligence. They are in mind because they are in the physical world, because they are in mind, *ad infinitum*. In truth this order forms an argument for neither side. If the hypothesis of mathematical and logical organization of the physical world will account for the other attributes of consciousness, then it follows that mathematical and logical order must also rule consciousness, that logic is limited by the nature of material; as does the inverted argument of Bergson. The character of logical order therefore does not present evidence for the distinction of mind and body. If physical postulates fail to cover both logical and sensory sequences, they must fail for each as for the other.

Certain other relationships within the organization of consciousness seem to be less clearly implied in the postulates of the physical sciences. Elements known together may be compared, and yet retain their individual discreteness. This involves processes which are not obvious among physical events. But descriptive psychology finds in these processes only successions in content. Comparison, analysis, and the

like are but names for the fact that succeeding elements are determined by the sum of preceding elements. Introspection discovers unvarying sequence (determination) but the manner of this determination is undefined. Each of several elements may be followed by a specific sequence constituting introspection of, or thought about that element; or the elements in combination, under different conditions sometimes indefinable subjectively, may be followed by different sequences. This is all that is subjectively discoverable concerning the process of comparison.[1] A number of elements may be integrated in the final outcome, but the dynamics of integration is not open to introspective study. Explanation of the process demands postulation of mechanisms or processes underlying the successions of experience. The problem is as to whether physical mechanisms are adequate to account for all sequences which appear in consciousness.

Continuity of activity and sequence of events are included in the postulate of a physical world. To justify the setting apart of a psychic world it is necessary to show that the sequences of mental states differ either in the character of succession or in the results accomplished, from any sequences of the physical world.

The sequences and functions of thought are complex and difficult to state briefly, since they involve all the elaborations from day-dreaming to creative intelligence. For discussion we may divide them roughly into three overlapping classes.

1. The relatively unordered drift of revery. Here elements follow each other by rather superficial associations (habitual connections which lack complexity of organization), or through common association with some emotional background, though the elements themselves may seem otherwise unrelated.

2. The reproduction of habitual sequences, as in the flow of memorized material or making of habitual judgments. Subsequent elements are rather simply conditioned by pre-

[1] Such introspective accounts of comparison and generalization as that of Fisher (9) which attempt to give an exact description of content without metaphysical interpretation clearly bear out this contention that sequences alone are discoverable by subjective methods.

ceding ones, the whole dominated by an as yet undefined close organization of the system, represented by the 'set' for reproduction.

3. Creative thinking involving a problem set and a solution reached.

This is essentially the classification given by Watson (32), except that habitual sequences seem to me to involve a closer and more complex organization than do the sequences of revery. The first two classes present no new problems beyond those discussed under the attributes of content, save the determination of sequences. Subjective evidence gives no explanation of this determinism, but is forced to fall back upon the hypothesis of physical continuity. 'Aufgabe' and the like describe no causes whose mode of action can be understood, and in many cases the introspectionists confess that the determining tendency is wholly unconscious. There is determination, but no particular kind of determination and there is not subjective evidence to show that the determining tendencies may not be wholly physical.

The third class presents the supposedly creative work of consciousness. Subjectively, the problem seems to present three phases; determination of sequences, conflict of elements of content, and resolution of the conflict. I can make these points clearer by a concrete example.

I am confronted by a mass of stimuli—notes of experiments, histological specimens, charts, etc. My scientific training results in the habitual reaction to such masses in the setting of my laboratory by the question, 'What is it all about?' and by a feeling of dissatisfaction until an answer is given. The data are neurological.

Destruction of the frontal lobes—loss of habit.

Habit relearned after destruction.

Incomplete destruction of frontal lobes—habit retained.

Destruction may involve any half—habit retained.

These data are given, partly in verbal terms, but largely in kinæsthesis. There is, in addition, a feeling of tension, of movements, which, if completed, lead to gestural description of the data, but which for the most pa t seem in conflict with

other gestures. This is all that is subjectively present of a 'purpose' to solve the 'problem.'

Associations come: frontal lobes—attention—Pillsbury—attention necessary for learning—learning impossible in absence of attention center—possible in absence of frontal lobes, increased feeling of dissatisfaction and dropping of this line of association.

This presents the problem of logical conflict, a mutual incompatibility of ideas.

I start again, parts capable of doing what the whole does. (This appears as a somæsthesis of wabbling in three dimensions and during the problem solving it has no other meaning. When I return to it and introspect, it is followed by memories of my solution of Driesch's inconceivable machine, as a lazy-tongs reduplicated in three dimensions.) Driesch—violent emotional reaction with vague memories of discussions of vitalism—sensations of shrugging and raising upper-lip, abandonment of this line of association.

This presents failure of solution through emotional conflict.

I start again, lazy-tongs—multiplication of identical parts—identical parts in central nervous system—feeling of hands raised with spreading fingers—fibers to cortex—one hand down—part destroyed, remainder functioning. Here follows a relief from the initial dissatisfaction which constituted the problem.

The problems presented here are those of tension or conflict and relief from the tension. Subjectively the tension is nothing more than feeling of muscular tension and emotion. I tend to interpret it as an interference of two incipient acts which are incompatible (*i.e.*, 'up' is incompatible with 'down' because the feeling of raising of the head which is 'up' is interfered with by the feeling of bending the head which is 'down'.) But the incipiency is an interpretation from the fact that in subsequent introspection I find either or both of the two acts carried out independently. It is the old fallacy of inferred meanings.

Subjectively, the problem of creative reasoning reduces

to feelings of tension, determined sequences broken off after more acute tensions, and final subsidence of the initial tension. This may not be recognizable as a description of the solution of a problem, but the further characteristics usually demanded of such a description are teleological interpretations and not elements of the experience of problem solving.[1] The first tension we call 'set' because of its consequences. The sequences we call successful or unsuccessful trials, in view of the outcome. The correct solution differs from the incorrect only in its further consequences in behavior or mental content. In the process there are no attributes, save those of static content, other than the attributes of the physical world. The description of a rat opening a problem box is as complete an account of the *process* of thinking as can be given from introspective data.

In this analysis of the attributes of consciousness, I have attempted not to overstep the point of view of the subjectivists and to adhere to their terminology as far as possible. I have sought to discover, further, just what the unique features of consciousness are thought to be, to strip them of their mystical obscurity and put them in definitive form. On subjective evidence, nothing can be said as to how one idea leads to another, nothing as to why assent or dissent is given. The dynamics of thought is not an object of awareness. The goal in problem solving is no more evident in preceding contents than in the goal of evolution in the existing species of animals. Both can be known only when reached. If behaviorism can formulate any mechanistic account of accomplishment in problem solving, it will have fulfilled the subjectively definable requirements for conscious purpose and for the creative action of consciousness.

This brief analysis of the attributes of consciousness necessarily omits many considerations of importance for the complete development of the behavioristic argument, but I believe that it will indicate the direction which that argument

[1] In his recent criticism of behaviorism Pratt (24) has overlooked the fact that the introspective account of a purpose (for example) must be just as unintelligible to the philosopher as the behaviorist account unless it also is tagged with the name current in philosophy.

may safely take. The physical sciences deal with postulated entities having certain attributes and relations. Granting the validity of their system, we seek to extend it, without fundamentally modifying its postulates, to include the phenomena upon which the concept of mind, as distinct from the physical universe, is based. Analysis of these phenomena shows that in so far as they are definable on introspective evidence they consist of varying, complicated organizations of elements within a limited system; the elements themselves being definable only in terms of their relationships within the system. The behaviorist's problem is to describe this system in terms of the conceptions of the physical sciences; to show that relationships such as are ascribed to consciousness exist also among physical entities.

III. Vitalistic Arguments

I have thus far dealt with the view which maintains that there is evidence of a direct experience of a universe of psychic things which is fundamentally different from the universe of physical things. There remains another type of argument against behaviorism which holds that certain events in the physical world are inexplicable in terms of mechanism. This is the argument of vitalism, as distinct from the first or animistic argument. The vitalist cites particular phenomena —morphogenesis, regeneration, habit-formation, complexities of speech, and the like—and denies the possibility of a mechanistic account of them (6, 20). But he thereby commits what we might term the egotistic fallacy. On analysis his argument reduces every time to the form, "*I* am not able to devise a machine which will do these things; therefore no one will ever conceive of such a machine." This is the argument from inconceivability of Driesch and McDougall, put baldly. To it we may answer, "You overvalue your own ingenuity." But the real answer is the constant restriction of field which science is imposing upon vitalism. A few years ago the impossibility of a physicochemical explanation of secretion against an osmotic gradient was a favorite vitalistic argument.

Recent work in physical chemistry has given an adequate

explanation of the phenomenon in terms of electrical energy produced by adsorption in membranes and has led to the construction of a machine which actually secrètes against an osmotic gradient. Such is the answer of physical science to vitalism. Science has not yet explained the physical world, but the vitalist cannot, by taking thought, set limits to what it may explain.

A second anti-mechanistic argument is typified by Haldane's discussions (11). It is apparent also in certain attempts of some behaviorists to distinguish between their science and physiology (36). Haldane's argument is essentially the following. Physiological investigation reveals more problems than it solves. We can never hope to give a complete account of the organism in physical terms. All investigation, however, must be directed toward this end, and attempts at other explanation, as by introducing the concept of vital force, are futile. But since we can not hope for a full explanation of the behavior of the organism we must add to the mechanistic account the conception of the *organism* in physiology, and of the *personality* in psychology: wholes which are more than the sum of their parts.

I can not see in such discussions anything more than a warning against too great simplification of our explanations. Obviously the various physiological processes influence each other throughout the organism. But astronomy equally recognizes the influence of the farthest star upon the smallest atom in the earth and consequently admits the incompleteness of its account of the universe. Organization, in this sense, is no more a property of living things than of the non-living.

Of such objections to the formulations of behaviorism there can therefore be no criticism, so long as they remain simple warnings, but they seem inevitably to lead to an abandonment of the search for physiological explanation and to the substitution of empty names (the organism as a whole, regression of the stimulus, personality, and the like) for explanation. They seem to lead also to such statements as, "We must consider the social value of the stimulus in relation to the organism," as though social value had other existence

than in the reactions of the organism. And because of this tendency to replace explanation by name and to read into the names mystical potentialities, I must object to any definition of behaviorism which would make it more than the science of the physiology of reaction to stimulation.

The discussion of a third anti-behavioristic doctrine, which emphasizes the humanistic values of subjective psychology, I shall leave to a later section of this paper.

Thus far in the discussion I have sought to state the distinguishing attributes of 'mind' as the subjectivist must define them on the basis of the empirical evidence of introspective analysis. Too often in discussions of the behavioristic doctrines the impossibility of an account of consciousness in physical terms is asserted with no adequate analysis of the supposedly distinguishing features of 'mental' phenomena. To consider a specific instance: Lovejoy (18) says that the error of the behaviorist is easily demonstrated on his own premises, "For a behavioristic psychologist (*a*) is a human organism, (*b*) whose perceiving and thinking, if his own theory is correct, should be exhaustively describable in terms of of movements of his laryngeal and related muscles, but who (*c*) in fact thinks, or professes to think, of external objects and stimuli, that is, of entities outside of his body, (*d*) which thinking is obviously neither describable as, nor 'accounted for' by, movements of his laryngeal or other muscles inside his body." Now to the behaviorist his thinking is just as *obviously* so describable as it is indescribable to the subjectivist. The obviousness in either case arises from a background of metaphysical preposessions, in this case the belief in transcendence of space. Such conclusions are not self-evident; the premises demand further analysis and citation of evidence.[1] If we accept the subjectivist's postulate that mind presents things-in-themselves which are, by definition, not describable in physical terms, or relations which are not of the physical world, then *obviously* they are not describable in physical terms.

But examination of the empirical evidence shows that

[1] *Cf.* Warren's criticism (29) of Lovejoy's discussion.

many of the attributes ascribed to consciousness are not discoverable by introspection and that others, when cleared of the mysticism that has surrounded them and stated in terms of descriptive psychology instead of metaphysical interpretation, are not different from characteristics resulting from physical relationships. Our analysis has shown that 'mind' is definable in terms of certain kinds of relationships among elements which are not analyzable by introspection. In the following sections of this paper I shall try to show that these relationships are fully describable in terms of the attributes which the physicist and biologist ascribe to the physical world with which they deal. My thesis will be, primarily, that as complete an account of the attributes of consciousness can be given in behavioristic terms as can be given in subjective terms as a result of introspective study; that a description of behavior of the physiological organism shows just those relations and elements which are held to characterize consciousness. In other words, I shall try to show that the statement, 'I am conscious' does not mean anything more than the statement that 'such and such physiological processes are going on within me.'

(To be concluded)