

A Model For Resolving the Mind-Body Problem

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"Since everyone knows that attention and set exist, we had better get the skeleton out of the closet and see what can be done with it."

D. O. HEBB¹

"The earth has been round for some time now, but not in man's relations to man nor in the understanding of the arts of each as a part of that roundness. As usual we have occupied ourselves too much with the outer, the objective, at the expense of the inner world wherein the true roundness lies.

"I remember when I saw a water spider and it brought down a bubble of air and placed it over its nest—a magical and fantastic thing."

MARK TOBEY
America's Artist

■ The purpose of this communication is to present a model of attention which may be useful in resolving the mind-body problem.

THE MIND-BODY PROBLEM

Throughout time, man the model maker, has fabricated patterns of events in his historical effort to maximize his advantage over these events. Models are supposed to be useful in understanding, predicting, and controlling phenomena. In general, models are selected in by their utility and power to control, and selected out upon the appearance of more elegant and powerful models.² Old models never die, they just fade away.

One outdated model which has stubbornly refused to fade away is the mind-body model of cartesian dualism, or, as it is more commonly known, the mind-body problem. This model of flat, dichotomous, catalogic thinking³ has plagued investigators since its conception in the fertile and brilliant mind of Rene Descartes.⁴

At the bottom of Descartes' psychology lies his dualism of soul (mind) and body. It is a clean cut dualism, not a mere logical erection of antithetically related aspects, like Aristotle's form and matter. The definitions of each

member of this dichotomous model are in turn related to the dichotomous belief that animals are automata and without souls. Body is all that pertains to the inanimate and, in way of further explanation, extended substance. Soul is all that cannot pertain to the inanimate; it is non-extended substance and hence conscious⁴.

This dualism, conceived in the separation of psychology from religion and philosophy, is fundamental to most technical thinking since Descartes. All theories of mind and body imply it in some form, for there is no need for a theory of the relationship of mind to body until the two have been separated. It seems to be a severe stumbling block, impeding progress at all levels of behavioral investigation.

THE CONSEQUENCES OF THE MIND-BODY PROBLEM

The births of psychology with its methods of investigation, and physiology with its methods of investigation are a direct consequence of the mind-body dichotomy. The attempt at synthesis through psychophysiology is an attempt to repair that which was originally torn apart. Those who try to write of a mind without a body do not succeed,⁵ and

reassert the dualism by their very care to leave the body out. They assume, cartesian style, that the mind has a separate existence unto itself divorced from the other phenomena of behavior. Though they proliferate ponderous theories, they are short on good data, and simply close their eyes to those aspects of reality which are not in accord with their ideas. On the other side, those who work with a body that has no mind, fare well enough as physiologists, but are totally unable to understand or explain behavior. They traditionally labor under the illusion that theory is superfluous and collect data in minutiae without knowing what the data mean in a behavioral context.

The mind-body problem is further reflected and perseverated in the very word "psychosomatic," which, while intended to express unification of mind and body (sic!) actually implies a relationship between discrete entities.⁶ The idea that emotions cause bodily disease, rather than both being responsive and subordinate to a commonly shared transcendental variable, is a concrete result of the mind-body dichotomy.

This dilemma is further reflected in the practical world in the invidious distinctions evident between organicists with their somatic methods of treatment and psychogenicists with their talking-listening methods. The man on the street shares the delusions of his society's theorists and pays good money to be convinced that his mental events cause his emotional disorders and bodily disease.

CURRENT ANALYSES AND PROPOSED SOLUTIONS TO THE MIND-BODY PROBLEM

1. *Interactionism*.—Descartes and William James subscribed to the idea that brain and mind are distinct substances and they interact at a specified place.³

2. *Psychophysical Parallelism*.—This view, in contradistinction to Leibnitz's view of a pre-ordained non-interacting correlation, holds that mental phenomena coincide with brain phenomena or are parallel with them. G. E. Muller⁷ states: "The ground of every state of consciousness is a material process, a psychophysical process, to whose occurrence the presence of the conscious state is joined."

Though not overly concerned with this theoretical problem per se, one could speculate that Razran's concept⁸ of levels of learning in the conditioned reflex systems could be considered as a form of psychophysical parallelism.

3. *Double-Aspect Theory*.—The double-aspect theory of mind and brain assumes that there is but one underlying reality and that physiology sees one aspect and psychology another. This kind of theory represents, according to Boring,⁴ a trend toward operationism. It is a metaphysical monism and an epistemological dualism. Henry M. Fox⁹ considers the dichotomy of mind and body to be a special case of the more general dichotomy of thing and thought. These dichotomies are misleading because they verbally allude to a split which does not correspond to the unitary nature of experience. To him, the so-called mysterious leap from the mind to the soma represents an invitation to reunite certain ways of describing an organism which never was divided. He states: "There is no mysterious leap and, in fact, it behooves us to look well before making an unwitting leap from one frame of reference to another which can only lead to confusion."

4. *Inadequacy of Verbal Models Theory*.—With his customary brilliance and conceptual clarity, Reusch¹⁰ notes the conceptual dichotomies of Western peoples and linguistic devices which facilitate the study and control of nature. Abstractions, dichotomies, and other verbal models, are a function of language structure and words do not necessarily reflect entities which occur in nature. In this analysis, the mind-body dualism is a simple, and simply inadequate verbal model which is not isomorphic with natural events.

5. *"Isomorphism and General Theory" Remedy*.—Von Bertalanffy¹¹ suggests the existence of an isomorphism between the constructs of psychology and neurophysiology and alludes hopefully to the possibility that some superordinating theory will generate constructs that are applicable to both fields.

In review it may be said that each of these analyses correctly senses the nature and origin of cartesian dualism. They are alright as far as they go. However, they all suffer (except Razran) from a failure to replace the mind-

body model with a more useful and superordinate model which is at once capable of construing the (to common sense) obvious and unique separation of mind and body and also construing the monism which is also believed to be present in human existence. As suggested by Bertalanffy,¹¹ a liberating concept¹² is needed to further transcend and synthesize behavioral events.

THE SYNTHESIZING CONCEPT OF ATTENTION

The purpose of this communication is to present a concept of attention which may prove useful in resolving the mind-body problem.

Introduction.—Attention has been conceptualized many different ways by various investigators.¹²⁻¹⁹ All seem unanimous only in the opinion that attention is a “pesky gadfly,” or a skeleton in the psychological closet that is chronically neglected and deserves more investigation. In spite of a long history of chronic neglect, attention recently has been receiving the attention it so richly deserves.

Probably the first thing to get straight on the subject of attention is that it is a real, existing event. It is not a heuristic fiction. The word attention refers to a tangible phenomenon, an indicant, existing in the biologic universe. It can be measured quantitatively in many ways.

Many concepts of attention have been noted in the literature and the subject has been reviewed by theorists and experimenters alike. As noted by Berlyne,¹³ the word “attention” has had more varied usages than any other in psychology. It has however commonly been thought of as something with both intensive and selective aspects.¹

On the one hand, it has been used to refer to processes that determine an organism's degree of alertness or vigilance (how effectively behavior is being controlled by the stimulus field as a whole). This general arousal aspect of attentive activity is mediated by the caudal portion of the ascending reticular activating system and is concerned with quick startle and arousal responses as well as the general transitions from sleep to waking.¹⁴ The notion of a stream of consciousness is being replaced by that of a volley of conscious-

ness.¹⁵ This general impression of continuous awareness seems to cover a series of time—quanta of units of attention [in this connection, see Hebb's definition of attention as the immediate facilitation from one phase, or assembly action, on the ensuing one—“this very brief central facilitation” p. 152¹].

On the other hand, the term attention has been applied to the selective process that determines which elements of the stimulus field (including the person) will exert a dominating influence over behavior. Thus Pillsbury wrote¹⁶ that attention “means largely that some one element of consciousness is picked out from the others and given advantage over them.” Solley and Murphy¹⁷ note that “at any given moment in time an individual is immersed in a sea of stimuli; he is incessantly receiving stimulation, each new source of stimulation, each new input struggling for dominance.”

“Selectivity, the Keel of Thought,”¹⁸ a function of switching and fluctuations of attention, has been construed by Broadbent's filter theory¹⁹ and Deutsch's²⁰ theory of levels of attention.

The transition from mere awakening and arousal to a state of differential responsiveness, to focusing selectively on a single perceptual mode and focusing attention within that mode, seems anatomically related to reciprocal feed-back actions between the ascending reticular activating system, the non-specific nuclei of the thalamus and the diffuse thalamo-cortical projection system.¹⁴

OTHER ASPECTS OF ATTENTION

A cursory glance at the literature reveals that attention has been implicated in much more than the arousal, awakening, alerting, and selective focusing aspects of behavior.

Attention and Emotions.—From the James-Lange theory of emotions, as well as other considerations, it is possible to deduce the hypothesis that emotions arise in feed-back transactions between bodily processes and attention. Specifically, attention to physiologic changes is necessary for the experience of emotion. Indeed, it is not unreasonable to speculate that patterns of physiologic responsiveness reflect, at the visceral level, selective patterns of attention distribution and that

physiologic changes occur with variations in attention.

The "harmonious mechanism which may elaborate the functions of central emotion as well as participate in emotional expression,"²¹ viz., the rhinencephalic structures of the limbic system,²² is activated and inhibited through circular (feed-back) transactions with the ascending reticular activating system. In this connection, it is well to know that "the hypothalamus is, after all, the rostral part of the reticular system."²³

Attention and Thinking.—In a similar way, Freud noted that for a thought to become conscious means that the thought receives attention cathexis.²⁴ Attention is the scanning process which scans for symbolic representations in the circumspective phase of thinking.

Attention and Motor Actions.—Though attention is most often construed in the context of sensory events, it may also be construed in the motor context as well. Attention is involved, at several levels, in proprioception, kinesthesia, and feed-back information about the progress of motor acts.²⁵ Attention "inaugurates the movements that accompany perceptions, images or ideas; afterwards these movements, which frequently are intense, return to the brain by way of the muscular sense as sensations of movement; the latter increase the quantity of available energy, which on the one hand serve to maintain or to reinforce consciousness, and on the other, returns to its original starting point in the form of a fresh movement."²⁶

Attention either is of energy or controls energy distribution in the initiation and maintenance of motor actions.¹⁷

Attention and Will Power.—Just as Federn²⁷ notes that ego is both its own subject and object, so attention, in all hierarchies and sub-spheres, is its own subject and object, viz., like the introspectionists I attend to the attention that attends to the attention etc., simultaneously on multiple levels. A simple model for this can be experienced in a clothing store by placing oneself in between two mirrors and seeing multiple images fading into the distant perspective. Consciousness probably arises as a result of the summation of multiple levels of attention and in this

summation process certain groups of levels become more or less autonomous. This gives rise to the phenomenon of self-observation.

Will power consists precisely of the ability of one level of attention to control the selective distribution of other levels of attention. This arises when information on one level of attention commands or patterns energy on another level. Will power arises in the control of selective and specific attention.

Attention and Perception.—This subject is reviewed by Vernon,²⁵ and Solley and Murphy.¹⁷

It is to the subject of attention that we focus our attention in order to find a liberating concept capable of freeing us from the confines of the mind-body shackles.

THE WORLD OF ATTENTION IS ROUND

Perhaps in a delirium, perhaps in a dream of the waves of time, it seemed that attention appeared as a series of evolving concentric spheres (Fig. 1). In this pattern, it seemed as if all things, all being, including perception, acts, volition, hope, expectancy, emotions, mind, body, even life itself, were but small specks, aspects, partial processes of this evolving pattern of attention; all parts of this monistic, integrative, behavioral event.

In this pattern, a universal symbol of information and communication, mind and body fit as subspheres (perhaps energy shells) of the evolving attentional event. One can then construe a mental subsphere, separate and distinct, yet interpenetrated and fused, with the somatic subsphere of attentive activity. Both mind and body (and all else) are construed as subordinate to the evolving human awareness, an evolving pattern of attention. This model assumes that attention is of information and energy and transcends all behavioral events while simultaneously responding to all subordinate subspheres in a never-ending reciprocal feed-back.

Attention and Energy.—Attention may be abstractly construed for theoretical purposes as a particular kind of information—as a node of coded information in a universal sea of messages. Just as Wiener²⁹ said: "Information is information and not matter or energy." MacLean²² said: "Psyche is information, not matter or energy." To this we add, "Attention is

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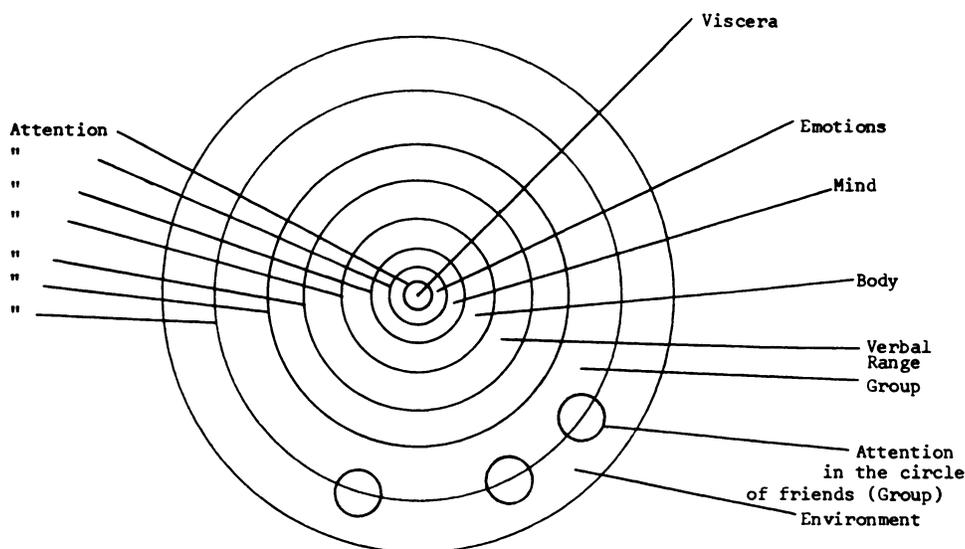


Fig. 1. Cross section of a model of attention, useful for resolving the mind-body problem. From this model, one deduces that attention is a boundary phenomenon, which unites and separates its several subspheres.

information," but also note that a feed-back process is involved between information and energy, making them (hopefully) integral aspects of the same process. The current upsurge in the scientific investigation of attention may be attributed to the advances in the study of information along with the investigations of the reticular activating system. Perhaps behavioral scientists are engaged in decoding attention in much the same way others are decoding the nucleic acids.

DISCUSSION

The pattern suggested as a model of attention is ubiquitous. It confronts the observer when he looks at his own eye, and in a cross-section of the eye. It can be seen in the cross-section of a tree and presumably in a cross-section of the earth. As a model it has served well in astronomy and physics. It appears in x-ray diffraction studies of the cross-section of nucleic acid. One speculates if this pattern, observed so frequently in nature, is a reflection of our observational methods and constructs, or are we faced with an isomorphism

between observed and observer in attributing this model to attention?

There are many spheres and subspheres of attention and this pattern can be complicated beyond the endurance of imagination by the addition of autonomous sub-nuclei; semi-autonomous subspheres, attention bound in selected patterns of distribution, interspherical transportation and communication channels, etc. But in its most simple form, this pattern serves as a model which views mind and body as separate aspects of one indivisible monistic event.

Attention is thus the synthesis for the mind-body problem.

SUMMARY

Conceived in the fertile imagination of Rene Descartes, in the separation of psychology and physiology from religion, the mind-body problem has posed a serious conceptual barrier in medical thinking. The mind-body problem tends to separate human beings into atomistic categories and limits productive thinking on the problem of how human beings

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holistically relate to the environment of which they are at once an integral segment.

Recent developments in the study of the reticular activating system of the central nervous system and information theory have led to a reawakening of interest in the old field of attention. The ultimate synthesis of theory and facts about attention will provide a unified theory of human behavior, subject-object transactions, and allow for a comprehensive view of organism-environment relations.

In this communication, a simple structural model of attention is described which is useful in resolving the mind-body problem. In this model, mind and body are viewed as separate and integral subspheres of the monistic evolving attentional event. In this model, based upon defining attention for abstract theoretical purposes as information, many other behavioral variables are included. The model affords a structural basis for comprehending relationships between these multiple variables.

It is hoped that this more comprehensive model will allow for the development of a behavioral science not limited by the conceptual barriers imposed by the mind-body dualism.

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