

ESSAY on MIND

D.O. HEBB



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Preface

My hope with this book is to contribute to the understanding of mind and thought. I attempt this as one whose psychological research has been behavioristic and biological in its orientation, concerned with the functions of the nervous system and with such things as the evolution of mental processes or the effect of the early environment—but also as one who has been concerned about the nature of mind or the meaning of consciousness, and the question of lawfulness in the universe and in human behavior. The result is that this book may seem to be a mixture of unrelated topics, partly psychology, partly philosophy.

But the topics are not unrelated, and the book has its own kind of unity. Einstein considered that philosophy is essential for the scientist, a living influence on scientific thought. If that is true in physics it must be at least as true in psychology. The object of my work has been to learn about thought, the central problem of psychology—but also, not less important, to learn how to think clearly about thought, which is philosophy. I have not found the task easy. Modern psychology is professedly objective and scientific, which is its strength, but old habits of thought persist unrecognized. I have dealt with them—to the extent that I *have* dealt with them—only by trying to make explicit my ideas about the nature of mind, about self-knowledge, about determinism and freedom of thought (“free will”). These are topics that may affect psychological research whether the researcher recognizes it or not. Then there is also the effect of the physical-science model of the scientific method. Should we, for example, be trying to establish psychological laws in a way that would parallel the great physical laws?

But I have also found suggestions of a converse effect on philosophy from unrecognized behavioral ideas. Any form of monism or dualism tacitly implies a theory of behavior. Descartes made his theory of behavior explicit, but subsequent generations of philosophers did not. The result is that some modern philosophic views are still influenced by primitive 17th-century conceptions of the nervous system. In the text I have tried to show that there is a logical flaw in philosophic idealism that becomes apparent when the behavioral implications are made explicit. Psychology and philosophy were divorced some time ago, but like other divorced couples they still have problems in common.

Thus I hope to interest both psychologist and philosopher. The level of difficulty is meant to be suitable for the graduate student and the senior undergraduate—and I hope, for the interested layman.

The first three chapters are methodological and philosophic; preparation and perhaps justification for the biologically oriented theory of behavior that is developed in Chapters 4 to 8. These five chapters deal with the evolution of mind, the still-confused nature-nurture question, how the cell-assembly idea originated, the infant's development of thought and language regarded as primarily perceptual learning, and the cell-assembly idea brought up to date in applying it to the understanding of creative thought and Hilgard's recent surprising results with hypnosis.

Chapters 9 and 10 turn finally to the way in which the thought of the physical scientist works in practice (not how the books say it works). This is not because I think scientific thought is all that different from other thought, but because of the available record of practical problem-solving over a period of centuries. The conclusions arrived at seem to fit the thought of laymen as well, and they contain some surprises. For example, it appears that determinism is a logical necessity, not something about which one has a choice. I am more than surprised at having reached such a conclusion, and I will be interested to see the refutation. Finally, it appears in Chapter 10 that a scientist, like other human beings, lives and works in a world of the imagination, never being able to know directly the things he or she is most concerned with, a fact that must be taken into account when considering the meaning of scientific law. Human beings are a thought-dominated species.

The scope of the book is limited, restricted mostly to topics on which it seemed to me that I had a present contribution to make. There is no pretence at a scholarly review of the literature, as the reader will see by looking at my references. These are however ones that are still relevant to fundamental questions.

I am indebted for ideas and valuable criticism to more colleagues and former graduate students than I can mention here. On several occasions an old friend, George A. Miller, has saved me from embarrassing revelations of ignorance. Over a period of years I have had similar help and support from

Dalbir Bindra, Peter Milner, Ronald Melzack, and the late Sam Rabinovitch. It is a pleasure to record my indebtedness. It is also a pleasure to acknowledge the competent skill of a series of secretaries, over the same long period, and particularly Jane Corcoran, Celia Jeffreys, and Audrey Bennett.

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1

Mind as a Biological Problem

This book seeks an increased understanding of the human mind from a biological approach that affects some long-standing philosophic problems as well as psychological ones. Mind is the central psychological problem, although it is no longer fashionable to say so; psychologists prefer to talk about “cognitive processes” instead. They also prefer, most of them, to abstain from discussion of what those processes consist of and how their effects are achieved. But unless one is a dualist one must agree that it is the brain that thinks, and what I try to show here is that it is of interest and even enlightening to ask how the brain does the trick.

This book proposes that such neurologizing adds significantly to our understanding; that mind and thought, consciousness and creativity and free will, are all biologically evident phenomena and seen most clearly in the light of evolutionary ideas; and that looking at human beings as higher animals and mental activity as an activity of the brain does not degrade man but on the contrary enhances one’s respect for that species.

Some of the discussion concerns a specific theory of brain function (that cell-assemblies are the basis of thought) and its meaning for certain classical problems, but we will also be concerned more broadly with aspects of human thought to which the theory makes no specific contribution. However, the behavioral point of view itself, apart from any theory, affects one’s perception of the fundamentals of scientific thought and even of the logic of dualism, or of determinism. It is inaccurate—worse, it is misleading—to call psychology the study of behavior: It is the study of the underlying processes, just as chemistry is the study of the atom rather than pH values, spectroscopes, and test tubes; but behavior *is* the primary source of data in modern psychology

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and looking from that objective point of view at the ideas of philosophic idealism, or the problem of the self and self-knowledge, or the place of law and determinism in scientific thought, lets one see things that as far as I can make out have not been seen before. These are philosophic questions but they are fundamental for psychology too, if psychology is to be a science and avoid the Scylla and Charybdis of outright positivism on the one hand and literary fantasy on the other. All science, from physics to physiology, is a function of its philosophic presuppositions, but psychology is more vulnerable than others to the effect of misconception in fundamental matters because the object of its study is after all the human mind and the nature of human thought, and it is very easy for philosophic ideas about the soul, for example, or about determinism and free will, to affect the main lines of theory. As long as the ideas are implicit they are dangerous; make them explicit and perhaps they can be defused.

In proposing that psychology is the study of the mind, but from a more or less biological stance, I do not for a moment suggest that students of perception, or memory, or language, or motivation and emotion, should change their research interests. On the contrary: These are all avenues to an increased understanding of the processes that control behavior, and *that* is our common objective. I certainly do not propose that all psychologists should be doing comparative animal studies or operating on the brain, or even that the black-box approach to behavior—refusal to take account of the brain in theorizing—should be ruled out, although that approach cannot be the most productive line in the long run. Tolman and Hull in the 30's and 40's were both black-box men, for example, as most cognitive psychologists are today; and ethology, which is by definition the biological study of behavior, has never concerned itself greatly with the brain.

The point is rather that the central body of psychological thought is much closer to ethology, physiology and genetics than to economics or even to sociology. Looked at as one of the social sciences, psychology is conspicuous as the only one that is experimental (one might say narrowly experimental, obsessively concerned with questions of method) and the only one that aims at the study of mechanisms in the individual subject. There is a well-developed specialty called social psychology, which certainly sounds like social science; but social behavior can be considered from a biological point of view. Also, since about 1950, social psychology has become primarily experimental and it has always dealt with the individual in social situations. This is shown by the traditionally close relation of social psychology to personality study, and more recently by "attribution theory" (which is concerned with the determinants of response in social situations). The concern of sociology is with social structures and organizations; that of social psychology with the causes of individual behavior in this or that social situation.

Before going on I must make sure that the reader understands how I use such terms as mind and consciousness. The word *mind* for some psychologists necessarily implies mysticism, but that is wrong. Broadly speaking, the mind is that which controls behavior (the larger aspects of man's behavior, that is, excluding the purely reflexive and not worrying at this point about the question of mind in other higher animals). And broadly speaking, there are two ideas about this something that controls: one that it is spiritual or immaterial, the other that it is a physical activity of the brain. The idea that mind is a spirit is a theory of demonic possession, a form of the vitalism that biology got rid of a century ago. It means that a waking, thinking, conscious human being is conscious because his body is inhabited by a spirit (or daemon, which is how "demon" can be spelled to show that it is maybe a good demon). This is *dualism*, the idea that there are two totally different kinds of existence, mind and matter, and it is—for the present at least—a stumbling-block for the scientific approach to understanding man. As we will see, it cannot be disproved, which means that it may possibly be right; but the scientific procedure nevertheless, in the present state of our knowledge, must be to assume that it is wrong and see how far we can get on that basis.

The alternative is *monism*, the idea that mind and matter are not fundamentally different but different forms of the same thing: in practice in psychology, the idea that mental processes are brain processes. The idea is held tacitly more often than not, but it has been the scientifically productive one in the psychology of this century, and the present essay is an attempt to take that line a step further.

My general position can be put precisely: Mind is the capacity for thought (thus one still has a mind when one is unconscious on the operating table, or in deep sleep): consciousness, a variable state, is a present activity of thought processes in some form; and thought itself is an activity of the brain. I may anticipate the later discussion to the extent of saying that thought is not any brain activity, but one that can occur in the absence of the thing thought about, as for example in the memory image. Another example is invention, when one thinks of something that has not been seen or heard of before. Most thought is directly related to or excited by what is now present, but it is not limited to the present situation, and it always tends to be creative in some degree.

What about the computer? Does it think, and if so does that make it conscious? For the present at least, the answer is that it does not think in the sense that human beings and other mammals think and so is not conscious in the same sense. Furthermore, the mammalian brain is enormously more complex than any present computer, not only in the number of functional elements but also in its connections, the individual neuron frequently having synaptic connection with upwards of a thousand others. What I propose is

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that we have here a parallel with the physicist's concept of a critical mass. Consciousness, that is, depends on a critical degree of complexity of neural action. Probably also it requires the kind or pattern of complexity characteristic of the structure of mammalian cortex. The individual neuron then is not conscious, nor any small group of interacting neurons. Consciousness appeared in evolution when thought became possible, and there is no evidence of thought in lower animals, even those with quite extensive nervous systems. It probably exists in birds such as the crow, but it has not actually been demonstrated except in mammals. In them the cortex is well developed, but vestigial or absent in other animal forms.

The argument then is that a computer built on the plan of the mammalian brain, and of a complexity at least equal to that of the brain of the laboratory rat, might be conscious—given the same capacity to learn and a suitable early experience. This is unlikely, but conceivable.

THE OBJECTIONS TO IDENTITY THEORY

The theory that there is an identity of mind with some activity of the brain may be rejected on the basis simply of common sense, or it may be rejected because of one or other of various disproofs that—apparently—show that the theory is impossible. We will come back, later in this chapter, to the question of how far common sense can be trusted as a criticism of a scientific theory—not very far, it seems, since common sense is a peculiar combination of wisdom and error, fact and fantasy, and science in other fields than psychology is full of ideas that to common sense would seem like nonsense if it were not that they turn out to be true, no matter how peculiar they may have looked at first. That point will be returned to. Here let us consider some of the attempts to give a specific disproof of identity theory.

The trouble with most of these attempts is that they take for granted something that appears not to be true: that there is immediate knowledge of one's own mental processes. We will see in the following chapter what reason there is to doubt that this is so. The critic, however, talks as if one need only consider one's own thoughts in order to see that thought or perception or emotion is not what identity theory implies. What the criticism really does is mistake older theoretical ideas for observed fact. We do of course know something of what goes on in our own minds but—as we will see—the knowledge depends on inference. I look out of the window and perceive a tree, but I do not perceive the perception, to know how perception occurs; I imagine a monster and know what the imagined monster would look like, but not how I imagine it. And so forth. It appears in general that no one can argue that identity theory is not true because we know what our perceptions are like

(or our emotions, and so on), and they are not at all like brain processes. That kind of self-knowledge almost certainly does not exist.

The same difficulty is encountered by some more formal disproofs. What the writer shows is that identity theory does not agree with some idea he has about mental activity, but these ideas are always theoretical ideas and not observable facts.

One writer says that a thought has no locus; since events in the brain obviously do have a locus, a thought cannot be a brain event. To prove that thoughts have no locus, he points out that it would not sound sensible to say that he had just had a thought at a particular point in space, perhaps halfway between his ears or two inches behind the bridge of his nose. The statement would sound silly indeed, but why? It is not that common sense is opposed to localization of thoughts, in view of such ordinary statements as "The idea never entered my head," or "He can't get it into his thick skull" that something or other is so. The reason it would be silly to say that I have a thought near my left ear may be merely that common sense sees no basis for saying just where in the skull a thought exists or perhaps would consider that it has volume instead of being punctate. But rejection by common sense, for whatever reason, proves nothing. Other fields of science are built on propositions that may seem absurd but in fact are true (air is heavy, has weight? water is made up of two gases? the continents are adrift in the oceans?). The idea that mental events have no locus (and perhaps that they are unextended) is really part of an older theory of the nature of the mind. As such it cannot disprove a later theory.

Another attempt at disproof: A writer says that mental events are private, known only to the person in whose mind they occur, whereas brain events are public, in principle observable by anyone; therefore a mental event cannot be a brain event. This apparently cogent argument has two flaws. One, it assumes that mental events are observable; two, it assumes that when something is known privately it cannot also be known publicly.

The example chosen in this case is pain, a favorite in such discussions perhaps because the term pain is ambiguous. It refers both to a distinctive sensation and to a resulting emotional state that tends to produce strong avoidance.¹ If we accept the example, the first point to note is that what a person in pain is directly aware of is not something in his mind, but something happening to or changed in his body. What he perceives is the pinprick or bruised shin or the state of affairs in and around his skull that he calls a

¹Normally the two aspects of pain go together and are not distinguishable but they are separated in certain circumstances. The effect of morphine for example is mostly to reduce the unpleasantness of a pain rather than making the pain unrecognizable as such. Lobotomy for intractable pain does the same thing but more completely. The patient reports that the pain is the same as before—but it no longer bothers him.