

ROSENBLUETH AND HALACY:
A CRITICAL REVIEW

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A joint review of two books:

Rosenblueth, A.: "Mind and Brain, A Philosophy of Science", the MIT Press, Cambridge, MA, and London, England, 1970.

Halacy, D.S. Jr.: "Man and Memory, Breakthroughs in the Science of the Human Mind", Harper & Row, New York, 1970.

Note: An edited version of this review appeared in LEONARDO, Vol. 6, pp. 267-268, Pergamon Press, England, 1973. What follows is the unabridged version.

The Review

From time to time, certain eminent scientists find it appropriate to try to bridge the gap between the world of "revolutionary" conceptual and theoretical "breakthroughs" or discoveries and the more elusive areas of philosophy, epistemology, aesthetics and even life. This act often stems from a scientist's need to philosophically justify his work, either a priori or by retrospection on applications of pure science, or to locate it in relation to that of his close associates, especially concerning its impact on man's future.

Questions of relevance, of what, to what, the limits on man's capability to understand himself or the universe, and indeed, that of any system to know itself and participate in its own evolution, the usefulness of the discriminating intellect, and the debate about intuitionism vs. formalism are major concerns of most avant-garde scientists, a group to which Arturo Rosenblueth certainly belongs. These questions increasingly launch them into speculations on Zen, chance, and the viability of volitional self-maintenance of organized, anti-entropic systems. Readers will immediately be reminded of Werner Heisenberg's classic, "Physics and Philosophy", (1). Rosenblueth's "A Philosophy of Science" is almost a neurophysiological parallel to Heisenberg's book and the famous Copenhagen conference on statistical causality. Rosenblueth is well known as a neurophysiologist, collaborator with Walter B. Cannon, and as organizer of the 1930's seminar on general scientific method that received considerable input from Norbert Wiener.

Rosenblueth's stated concern is with the casual chain that begins with material events and ends with conscious sensations and the pairing of these and intermediary functions to

mental events which, he asserts, are in constant relation to one another but do not interact. He proposes adopting a kind of mind-brain dualism in which structural isomorphism is maintained between mental and neurological events as it is between material events and coded afferent neural messages. This isomorphic mapping, however, does not allow us to make inferences on the “nature” of the universe or the “nature” of mental events from analysis of central neural transformations, but only provides us with a structural equivalency. Indeed then, sensations such as color and pitch are mental inferences and not material characteristics.

In his refutation of Eddington’s theory that a man with one rod in his retina, capable of sending light and darkness differences, should be able to understand all physics and any law of which he cannot be convinced should be rejected, Rosenblueth seems to adopt a structuralist interpretation of sensation and the limits imposed on our knowledge by the structure of our sensory systems. “We can receive information about the material universe only through our sensory systems,” he says, and further, “The purpose of science is to construct a material universe with a structure compatible with our conscious decodings.”

I consider many of these views somewhat unsatisfactory, though they should be read by anyone seriously interested in the contemporary issues. They do represent a beautiful working out of epistemological constructs under which an important scientist is laboring, are backed by interpretations of solid evidence and are presented in formal systematic unfoldings. The one exception is a chapter in which he equates unconscious processes with “spurious ghosts or demons”, angrily denounces any attributing to them of creative capacities as nonsensical and finds even the concept of unconsciousness inadmissible. Interestingly enough it is the only chapter in which he becomes unscientific and emotional. Many of the conclusions, I believe, tend to lead to inconsistencies and to tunnel vision when we decide we need to rationalize present day evidence. For example, when we consider that, at least potentially, all physical or chemical events that develop in living organisms can be shown to be contained in nonliving systems, (Rosenblueth points this out), we are forced to find some other differentiating characteristic than those traditionally held, which may lead only to a further stage of misunderstanding or, more discerningly, to the limits of a particular mode of thought. The age old symbolic equation of fire with the unfolding and perfecting of a life-force is appropriate since both are capable of reproduction, can grow and regress, degenerate chemical into thermal energy, oxidize organic matter, have metabolism and can be readily extinguished. In crystal we see growth, healing, assimilation and specific structures as in living aggregates. Rosenblueth’s choice is to state that for him the only difference is that nonliving aggregates do not have mental events. It seems on closer analysis that the only reason for making this differentiation is that nonliving aggregates do not seem to exhibit behavior such that they could possibly have mental events. For instance, they don’t seem to exhibit behavior that is indicative of an aggregate that is conscious of pleasure or pain. We don’t seem to be able to find a point at which life or mental events appear as a consequence of super-organization. Realizing that analyzing neural events in response to stimuli might reveal much about neurons but little about the concomitant sensation, Rosenblueth contents himself with calling mental and associated physical-chemical events in the brain

different aspects of the same illusive thing, much as a physicist might call gravity a property of space that effects motion surrounding concentration of mass. A more fruitful method might be to question the soundness of the original differentiation of aggregates with and without mental events.

Many of these problems stem from difficulties in the causal chain model and its irreversibility. Alternatively, one might consider consciousness as the performing of integration processes such that potentialities, and there may be coexistent potentialities, are made evident. Resultant behavior may or may not be indicative of “possession of consciousness” by inference from observation on the part of another aggregate. Thus, “living” and “nonliving” lose much of their traditional meaning and become true complementarities, i.e. the increasing precision in definition of one leads to necessary imprecision in definition of the other.

Further, since our inferences about consciousness and mental events are derived from observation of ourselves, they cannot belong to the world of real phenomena but to the world of potentia, of tendencies toward reality. We can look to the truth in the old saw, “A man must, of necessity, disrupt his thoughts in order to scrutinize them.”

Halacy’s book seems insignificant by any comparison. This would be unfair, as it is not meant to cover the same ground. However, it fills an important role for scientific books, that of collecting information about current concerns. Halacy, who appears not to be a scientist but a science journalist, presents essentially a very readable survey of the history of advances in brain science as they relate to studies in memory. The book contains good reportage, some of it in considerable depth, leaving only a few important things out. It does overstep itself occasionally when it attempts to speculate on the theoretical significance of some discoveries, over dramatizes and tries to infer laws. For example, in a chapter on intelligence and memory many misleading definitions of intelligence are assumed and statements like, “And learning is little more than memory”, are made. Intelligence probably depends on processing ability as much as memory and persons with high processing ability will not need to depend as much on rote learning. Their parsimony of information is higher. Similarly, in a chapter on learning, remembering and forgetting, Halacy presents interesting material about perception but states, “...for we generally learn by committing information to memory”. He does not along with this discuss that learning involves association, integration, data reduction and volitional selections and maintenance of perception and recall. Pattern recognition models for perception, data reduction and reconstruction are also not detailed as they should be in a book such as this one. He makes the point in a discussion on the amount of information that is perceived during a lifetime that the number $10^{2,783,000}$, the number of possible combinations of interconnections of one million neurons, probably exceeds all the coded memories of everybody. Of course, this number can be quite efficiently written, stored and remembered as $10^{2,783,000}$,

Some important investigations that were not discussed include such things as studies of the limits on memory and information processing by G.A. Miller (2) and others, (though this was hinted at), and studies on short-term memory by people like G. Sperling (3).

The early parts of the book are devoted to the history of brain research. The brain is defined as the seat of the mind and Descartes is credited with being the first to understand nervous functions, ignoring current controversies over these matters. It has good reporting on research on memory, sleep and dreams, computers and perceptions. There is an excellent chapter on molecular theories of memory and good final chapters on drugs, transfer of learning and future research areas.

References

1. Heisenberg, W.: "Physics and Philosophy", Harper & Row, New York, 1962.
2. Miller, G.A.: THE MAGICAL NUMBER SEVEN, PLUS OR MINUS TWO, Psychol. Rev., Vol. 63, No. 181, 1956.
3. Sperling, G.: SUCCESSIVE APPROXIMATIONS TO A MODEL FOR SHORT-TERM MEMORY, Acta Psychol., Vol. 23, No. 285, 1967.