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Roger Wolcott Sperry
1913-1994

Roger Sperry died on April 17, 1994 of cardiac arrest following a difficult week fighting pneumonia that had opportunistically invaded his body already weakened by lateral sclerosis of uncommonly long duration. Thus ended a fifty-five year career in neuroscience unparalleled for its intensity, diversity, and accomplishment. Through two decades of increasing disability Sperry continued to work, write, and relax effectively and with remarkable enthusiasm. Much credit for his productivity and happiness goes to his supportive wife, Norma, and their children, Tad and Jan.

Sperry, born and raised in Hartford, Connecticut, was educated in English (B.A.), psychology (M.A.), and athletics (Letters) at Oberlin College, and zoology (Ph.D.) at The University of Chicago - all fields that served him well thereafter. He was employed primarily by The University of Chicago, Harvard University (The Yerkes Laboratories of Primate Biology), and The California Institute of Technology - the latter ideally suited to his needs and talents for forty years. His major research centered on three diverse areas: the embryogenesis of complex neural networks that underlie behavior, the organization of cortical mechanisms for higher cognitive functions, and the relationship of brain to mind and of science to values.

Sperry's work on neural regeneration in fish, amphibians, and mammals showed conclusively that neural connections are reestablished under genetic control following experimental interruption, and also, by implication, during embryonic development (1). In a long series of elegant behavioral, anatomical, and physiological experiments, he demonstrated the exquisite precision with which neural processes find their predetermined targets and thus create working neural networks. This work culminated in his widely accepted chemospecificity theory of neurospecificity which states that neurons have biochemical labels that match in complementary fashion those of appropriate target cells. These fundamental studies in neural development still form the basis for current work seeking the specific molecular genetic mechanisms that, along with associated environmental fine-tuning, generate functional neural circuitry for behavior.

With Sperry's introduction of the split-brain preparation, in which the two cerebral cortices are separated by midline division of the corpus callosum and other commissures, a new era of investigating cortical function with behavioral techniques began (2). The original findings with split-brain cats and monkeys were dramatic. With the cerebral commissures cut and sensory input directed to just one hemisphere, events perceived, learned, and remembered by one side were shown to be unknown, though learnable, by the other. Thus, for cognitive functions, the operation produced two intellectually competent but separate individuals within one body. In the many impressive experiments that followed, key features of interhemispheric communication and commissural function were discovered and understood. Further, basic questions about the singleness of consciousness were clearly raised and answered.

Treatment of otherwise uncontrollable epilepsy by commissurotomy provided a population of split-brain patients that was extensively tested to confirm and vastly extend the basic split-brain findings in animals (3). These studies dramatically emphasized the presence of typically human behavior in each of the two separated hemispheres, forever altering our concept that only one consciousness can exist in one person. They further permitted a direct comparison of the cognitive abilities of the two separated sides of the same brain. The resulting bold interpretation that the left half of most human brains is better at analytic, sequential, and linguistic processing while the right half is superior in holistic, parallel, and spatial abilities, has revolutionized neuropsychology and, less admirably, fueled the fires of pop psychology. Although aspects of cerebral laterality had been recognized for well over a century, a clear, effective statement of its nature and extent was not available until Sperry's remarkable findings and forceful interpretation.

For the last twenty years Sperry was consumed by a passionate need to communicate his antireductionistic view of how mind emerges from brain activity and how it reciprocally influences the brain by means of downward causation (4). To his staunchly reductionistic Caltech colleagues, these ideas often seemed dualistic and mystical. This misimpression likely results because his arguments appeal to novel causal principles that so far lack an adequate physiological mechanism. The principal attraction of his arguments follows from the redirection of voluntary control, or will, to the higher organizational levels of the mental hierarchy and away from the seemingly undirected, collective properties of molecules. These views are receiving increased attention, even from those with a molecular orientation, and surely deserve more serious study. Paradoxically perhaps, other arguments by Sperry emphasize the need to reconstruct our society's system of world-centered values from scientific rather than culturally derived knowledge.

Sperry's research was always well regarded by his peers and frequently recognized by major honors including a Nobel Prize in 1981. His approach to research characteristically incorporated a strongly focused attack on key questions coupled with an equally strong aversion to activities not immediately relevant to his major interests. One important exception was his willingness to work closely with students and others who sought his counsel, and who, in turn, contributed so much to the success of his program. His reserved, initially cool, personality, his strong personal and scientific convictions, and his high ethical standards distanced some colleagues, but to those who persevered, understood his intent, and shared his insights, the rewards were exceptional, the friendship unique.

1. Sperry, R. W. (1963) Chemoaffinity in the orderly growth of nerve fiber patterns and connections. Proc. Natl. Acad. Sci. **50**, 703-710.
2. Sperry, R. W. (1961) Cerebral organization and behavior. Science **133**, 1749-1757.
3. Sperry, R. (1982) Some effects of disconnecting the cerebral hemispheres. Science **217**, 1223-1226.
4. Sperry, R. W. (1993) The impact and promise of the cognitive revolution. Amer. Psychologist **48**, 878-885.