

Biography

R. W. Sperry was born August 20, 1913, in Hartford, Connecticut, and received his primary and secondary education nearby in Elmwood and West Hartford. He attended Oberlin College in Ohio on a four-year Miller Scholarship where he majored in English literature and varsity athletics. Influenced by courses in psychology with R. H. Stetson and L. E. Cole at Oberlin, he switched from humanities to psychology for graduate work and obtained his MA degree in psychology at Oberlin in 1937. During these initial graduate years under Stetson, he obtained a background in theory and philosophy that provided a life-long guideline to subsequent work on the brain and behavior.

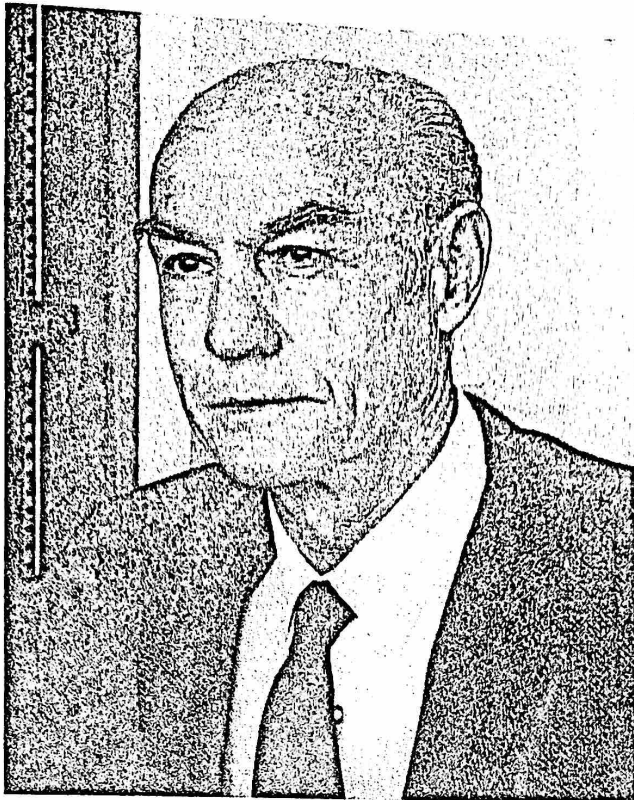
In 1938, he went to the Department of Zoology at the University of Chicago for doctoral work in order to study under Paul Weiss whose research findings were at that time posing a strong challenge to fiber connection theories of neural integration and raising issues basic to brain models for learning, memory, perception, and other higher functions that by now had become Sperry's major interest. Other mentors at Chicago included Sewall Wright in genetics, Ajax Carlson in physiology, Moore in endocrinology, Gerard in neurophysiology, Klüver in psychology, Polyak in vision, and Bartelmez in neurology. His doctoral research on reeducation following surgical interchange of nerves and muscles led to a basic correction of neurological doctrine on central nervous plasticity and the functional interchangeability of neuronal connections.

On a National Research Council postdoctoral fellowship, he moved in 1941 to the laboratory of K. S. Lashley at Harvard University where he began studies on the selective growth of brain connections. After the year in Cambridge, he moved with Lashley as a research associate to the Yerkes Laboratories of Primate Biology in Orange Park, Florida. The relative isolation of the Florida station was much ameliorated by laboratory colleagues such as D. Hebb, A. Riesen, H. Nissen, W. Young, G. Clark, R. Blum, and J. Semmes in addition to Lashley himself and the many visiting investigators. During World War II, he participated in an OSRD Medical Research project between Chicago and Orange Park on the surgical repair of nerve injuries. Meanwhile, evidence on the critical importance of specific fiber connectivity in brain organization had been consistently confirmed, and

ROGER WOLCOTT SPERRY

Citation

"For his now classic studies of sensory and motor integration, and his bold and original work with the split-brain preparation, both simian and human. His early work is still definitive with respect to the organization of vision in the amphibian, independent of experience, and with respect to the restoration of motor control following nerve injury in mammals. It is not too much to say that his recent studies of patients with section of the corpus callosum are epochal. Following this disconnection of the two hemispheres, he has been able to communicate separately with the two halves of the brain of the same person; though only one half (the left) can talk, the right has some language comprehension and thinks for itself. Sperry has shown that separate thoughts and perceptions occur in the two halves, and in effect there are two minds now in one head. These are fundamental contributions to our knowledge of the nature of man."



ROGER WOLLCOTT SPERRY

his interests turned to focus on the question of how the precise patterns of neural connections for behavior become established initially in development.

He returned to the University of Chicago in 1946 as assistant professor in the Department of Anatomy, attracted by Bartelmez, Polyak, and the tradition of C. J. Herrick. In 1952, he became a Sectional Chief in the National Institute of Neurological Diseases and Blindness with a joint appointment as associate professor of psychology at the University of Chicago. By this time, the general issues on how a brain is able to inherit and grow its own functional wiring had been largely resolved, and his investigations turned to tests of connectivity versus electric field theory in perception and to studies on the corpus callosum that in particular appeared to present at the highest cerebral levels an outstanding exception to preceding conclusions on neural plasticity. The fine-scale microscopical surgical techniques used earlier were applied to the large brains of mammals to open new experimental potentials including the so-called split-brain preparation. From the late 1940s on, his studies were conducted also in sojourns at various Marine Stations at Bimini, Bermuda, Beaufort,

Miami, Galveston Medical Center, and Sea Life Park in Hawaii, mainly on regeneration and selective growth of brain connections.

In 1954, he joined George Beadle's group at Caltech to become the Hixon Professor of Psychobiology. He and his associates in the Laboratory of Psychobiology have since continued to pursue a broad range of projects focused around the growth of brain circuits, consolidation of the memory trace, and a variety of problems in cerebral organization. The latter came to be centered largely around "split-brain" procedures as a basic approach, first in animals and later used in a group of commissurotomy patients of P. J. Vogel and J. E. Bogen.

Sperry was cited by Oberlin College in their original group of Distinguished Alumni in 1954; was elected to the National Academy of Sciences in 1960; and to the American Academy of Arts and Sciences in 1963. In 1969, he was awarded the Warren Medal of the Society of Experimental Psychologists. He is a member of many professional societies, has served as Chairman of the Experimental Psychology Study Section of the National Institutes of Health, on the Fellowship Committee of the National Science Foundation, on the Corporate Visiting Committee for Psychology at MIT, and on the editorial boards of *Experimental Neurology*, *Brain Research*, *Neuropsychologia*, and *The International Journal of Neuroscience*.

Scientific Publications

1939

Action current study in movement coordination. *Journal of General Psychology*, 20, 295-313.

Functional results of muscle transplantation in the hind limb of the Albino rat. *Anatomical Record*, 75(Suppl.), 51. (Abstract)

1940

The functional results of muscle transposition in the hind limb of the rat. *Journal of Comparative Neurology*, 73, 379-404.

With P. WEISS. Unmodifiability of muscular coordination in the rat, demonstrated by muscle transposition and nerve crossing. *American Journal of Physiology*, 129, 492. (Abstract)

1941

With J. M. SNODGRASS. Mammalian muscle action potentials of less than a millisecond. *American Journal of Physiology*, 133, 455. (Abstract)

The effect of crossing nerves to antagonistic muscles in the hind limb of the rat. *Journal of Comparative Neurology*, 75, 1-19.

Functional results of crossing nerves and transposing muscles in the fore and hind limbs of the rat. Unpublished doctoral dissertation, University of Chicago.

1942

Fixed persistence in the rat of spinal reflex patterns rendered extremely maladaptive by cross union of sensory nerves. *Anatomical Record*, 84, 483. (Abstract)

Reestablishment of visuomotor coordinations by optic nerve regeneration. *Anatomical Record*, 84, 483. (Abstract)

Transplantation of motor nerves and muscles in the forelimb of the rat. *Journal of Comparative Neurology*, 76, 283-321.

1943

Effect of 180 degree rotation of the retinal field on visuomotor coordination. *Journal of Experimental Zoology*, 92, 263-279.

Functional results of crossing sensory nerves in the rat. *Journal of Comparative Neurology*, 78, 59-90.

With K. S. LASHLEY. Olfactory discrimination after destruction of the anterior thalamic nuclei. *American Journal of Physiology*, 139, 446-450.

Visuomotor coordination in the newt (*Triturus viridescens*) after regeneration of the optic nerve. *Journal of Comparative Neurology*, 79, 33-35.

1944

Optic nerve regeneration with return of vision in anurans. *Journal of Neurophysiology*, 7, 57-69.

1945

Centripetal regeneration of the 8th cranial nerve root with systematic restoration of vestibular reflexes. *American Journal of Physiology*, 144, 735-741.

Fixed persistence in the rat of spinal reflex patterns rendered extremely maladaptive by cross union of sensory nerves. *Federation Proceedings*, 4, 67. (Film abstract)

Horizontal intracortical organization in the cerebral control of limb movement. *Proceedings of the Society for Experimental Biology and Medicine*, 60, 78-79.

Restoration of vision after crossing of optic nerves and after contralateral transplantation of eye. *Journal of Neurophysiology*, 8, 15-28.

The problem of central nervous reorganization after nerve regeneration and muscle transposition. *Quarterly Review of Biology*, 20, 311-369.

1946

Ontogenetic development and maintenance of compensatory eye movements in complete absence of the optic nerve. *Journal of Comparative Psychology*, 39, 321-330.

1947

Cerebral regulation of motor coordination in monkeys following multiple transection of sensorimotor cortex. *Journal of Neurophysiology*, 10, 275-294.

Effect of crossing nerves to antagonistic limb muscles in the monkey. *Archives of Neurological Psychiatry*, 58, 452-473.

Nature of functional recovery following regeneration of the oculomotor nerve in amphibians. *Anatomical Record*, 97, 293-316.

1948

Orderly patterning of synaptic associations in regeneration of intracental fiber tracts mediating visuomotor coordination. *Anatomical Record*, 102, 63-75.

Patterning of central synapses in regeneration of the optic nerve to teleosts. *Physiological Zoology*, 21, 351-361.

1949

With N. MINER. Formation within sensory nucleus V of synaptic associations mediating cutaneous localization. *Journal of Comparative Neurology*, 90, 403-423.

With E. CLARK. Interocular transfer of visual discrimination habits in a teleost fish. *Physiological Zoology*, 22, 372-378.

Reimplantation of eyes in fishes (*Bathygobius soporator*) with recovery of vision. *Proceedings of the Society for Experimental Biology and Medicine*, 71, 80-81.

1950

Myotypic specificity in teleost motoneurons. *Journal of Comparative Neurology*, 93, 277-287.

Neural basis of the spontaneous optokinetic response produced by visual inversion. *Journal of Comparative and Physiological Psychology*, 43, 482-489.

Neuronal specificity. In P. Weiss (Ed.), *Genetic neurology*. Chicago: University of Chicago Press.

With N. MINER. Observations on the genesis of cutaneous local sign. *Anatomical Record*, 106, 317. (Film abstract)

1951

Developmental patterning of neural circuits. *Chicago Medical School Quarterly*, 12, 66-73.

Mechanisms of neural maturation. In S. S. Stevens (Ed.), *Handbook of experimental psychology*. New York: Wiley.

Regulative factors in the orderly growth of neural circuits. *Growth, Symposium*, 10, 63-87.

1952

Neurology and the mind-brain problem. *American Scientist*, 40, 291-312.

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1953

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Regeneration studies and learning. *Proceedings of the XIX International Congress on Physiology*, Montreal.

1954

With N. MINER. Pattern perception after implantation of dielectric plates in the visual cortex. *Anatomical Record*, 118, 330. (Abstract)

1955

- Functional regeneration in the optic system. In W. F. Windle (Ed.), *Regeneration in the central nervous system*. Springfield, Ill.: Charles C Thomas.
- On the neural basis of the conditioned response. *British Journal of Animal Behavior*, 3, 41-44.
- Problems in the biochemical specification of neurons. In H. Waelsch (Ed.), *Biochemistry of the developing nervous system*. New York: Academic Press.
- With N. MINER & R. E. MYERS. Visual pattern perception following subpial slicing and tantalum wire implantations in the visual cortex. *Journal of Comparative and Physiological Psychology*, 48, 50-58.
- With N. MINER. Pattern perception following insertion of mica plates into visual cortex. *Journal of Comparative and Physiological Psychology*, 48, 463-469.

1956

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- Experiments on perceptual integration in animals. *Psychiatric Research Reports*, 6, 151-160.
- The eye and the brain. *Scientific American*, 194(5), 48-52.
- With N. DEUPREE. Functional recovery following alterations in nerve-muscle connections of fishes. *Journal of Comparative Neurology*, 106, 143-161.
- With J. S. STAMM & N. MINER. Relearning tests for interocular transfer following division of optic chiasm and corpus callosum in cats. *Journal of Comparative and Physiological Psychology*, 49, 529-533.

1957

- With H. L. ARORA. Myotypic respecification of regenerated nerve-fibres in cichlid fishes. *Journal of Embryology and Experimental Morphology*, 5, 256-263.
- Brain mechanisms in behavior. *Engineering and Science*, 20, 24-29.
- High order integrative functions in surgically isolated somatic cortex in cat. *Anatomical Record*, 127, 371. (Abstract)
- Review of C. Judson Herrick, *The evolution of human nature*. *Engineering and Science*, 20, 6-10.
- With J. S. STAMM. Function of corpus callosum in contralateral transfer of somesthetic discrimination in cats. *Journal of Comparative and Physiological Psychology*, 50, 138-143.

1958

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- Concepts re a concept. A review of D. B. Harris (Ed.), *The concept of development: An issue in the study of human behavior*. *Contemporary Psychology*, 3, 76.

- Corpus callosum and interhemispheric transfer in the monkey, *Macaca mulatta*. *Anatomical Record*, 131, 297. (Abstract)
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- Physiological plasticity and brain circuit theory. In H. F. Harlow & C. N. Woolsey (Eds.), *Biological and biochemical bases of behavior*. Madison: University of Wisconsin Press.

1959

- With M. GLICKSTEIN. Contralateral transfer of somesthetic discriminations in monkeys after section of major hemispheric commissures. *American Psychologist*, 14, 385. (Abstract)
- With M. GLICKSTEIN. Intermanual transfer of somesthetic discriminations in split-brain Rhesus monkeys. *Physiologist*, 2, 45-46. (Abstract)
- With A. M. SCHRIER. Visuomotor integration in split-brain cats. *Science*, 129, 1275-1276.
- Discussion in M. A. B. Brazier (Ed.), *The central nervous system and behavior*. New Jersey: Madison Print.
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1960

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1961

- Cerebral organization and behavior. *Science*, 133, 1749-1757.
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- Some developments in brain lesion studies of learning. *Federation Proceedings*, 20, Part I, 609-616.
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1962

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1963

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With D. G. ATTARDI. Preferential selection of central pathways by regenerating optic fibers. *Experimental Neurology*, 7, 46-64.
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With M. GLICKSTEIN. Visuo-motor coordination in monkeys after optic tract section and commissurotomy. *Federation Proceedings*, 22, Part I, 456. (Abstract)
Chemoaffinity in the orderly growth of nerve fiber patterns and connections. *Proceedings of the National Academy of Sciences*, 50, 703-710.
Evidence behind chemoaffinity theory of synaptic patterning. *Anatomical Record*, 145, 288. (Abstract)
Recovery of sight after transplantation of eyes and regeneration of retina and optic nerve. In L. L. Clark (Ed.), *Proceedings of the International Congress on Technology and Blindness*. Vol. II. New York: William Byrd Press.

1964

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With M. S. GAZZANIGA. Some comparative effects of disconnecting the cerebral hemispheres. *Federation Proceedings*, 23, Part I, 359. (Abstract)
The great cerebral commissure. *Scientific American*, 210, 42-52.
With S. M. GREEN. Corpus callosum and perceptual integration of visual halffields. *Anatomical Record*, 148, 339. (Abstract)
Problems outstanding in the evolution of brain function. James Arthur Lecture. New York: American Museum of Natural History.
With R. F. MARK. Bimanual coordination in monkeys. *Proceedings of the Australian Physiological Society*, May. (Abstract)

1965

With M. S. GAZZANIGA. Language in human patients after brain bisection. *Federation Proceedings*, 24, No. 2, 522. (Abstract)

Corpus callosum and intermodal visuo-tactile integration in the monkey. *Anatomical Record*, 151, No. 3, 476. (Abstract)
With M. S. GAZZANIGA & J. E. BOGEN. Observations on visual perception after disconnection of the cerebral hemispheres in man. *Brain*, 88(Part II), 221-236.
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Embryogenesis of behavioral nerve nets. In R. L. Dehaan & H. Ursprung (Eds.), *Organogenesis*. New York: Holt, Rinehart & Winston.
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With H. L. ARORA. Studies on nerve growth and selective nerve muscle connections in fishes. *American Zoologist*, 5(4), 163.
Mind, brain, and humanist values. In J. R. Platt (Ed.), *New views of the nature of man*. Chicago: University of Chicago Press.

1966

Brain bisection and mechanisms of consciousness. In J. C. Eccles (Ed.), *Brain and conscious experience*. Heidelberg: Springer-Verlag.
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With M. S. GAZZANIGA. Visuomotor control in monkeys following brain lesions. *Federation Proceedings*, 25, 396.
With E. LEE-TENG. Intermanual stereognostic size discrimination in split-brain monkeys. *Journal of Comparative and Physiological Psychology*, 62, 84-99.
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Split-brain approach to learning problems. In Quarton, Melnechuk, & Schmitt (Eds.), *The neurosciences: A study program*. New York: Rockefeller University Press.

1968

- With R. SAUL. Absence of commissurotomy symptoms with agensis of corpus callosum. *Neurology*, 18, 307.
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- Metal unity following surgical disconnection of the cerebral hemispheres. The Harvey Lectures. Series 62. New York: Academic Press.
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- With E. HIBBARD. Regulative factors in the orderly growth of retino-tectal connexions. In G. E. W. Wolstenholme & M. O'Connor (Eds.), *Ciba Foundation, Symposium on Growth of the Nervous System*. London: J. & A. Churchill, Ltd.
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- With B. MILNER & L. TAYLOR. Lateralized suppression of dichotically presented digits after commissural section in man. *Science*, 161, 184-186.
- With J. LEVY-AGRESTI. Differential perceptual capacities in major and minor hemispheres. *Proceedings of the National Academy of Sciences*, 61, 1151.

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- With H. W. GORDON. Lateralization of olfactory perception in the surgically separated hemispheres in man. *Neuropsychologia*, 7, 111-120.
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- With J. E. BOGEN & P. J. VOGEL. In Jasper, Ward, & Pope (Eds.), *Commissural section and the propagation of seizures*. *Basic mechanisms of the epilepsies*. Boston: Little, Brown.
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- With R. D. NEBES. Variations of the human cerebral commissurotomy syndrome with birth injury in the dominant arm area. *Anatomical Record*, 163, 235.
- With R. GAVALAS. Integration of visual half fields in split-brain monkeys. *Brain Research*, 15, 19-107.

1970

- Cerebral dominance in perception. In F. A. Young & D. B. Lindsley (Eds.), *Early experience in visual information processing in perceptual and reading disorders*. Washington, D.C.: National Academy of Sciences.
- Perception in the absence of the neocortical commissures. *Association for Research of Nervous and Mental Diseases*, 48, 123-138.
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- With P. J. VOGEL & J. E. BOGEN. Syndrome of hemisphere deconnection. In P. Bailey & R. E. Fiol (Eds.), *Proceedings of the Second Pan-American Congress of Neurology*, Puerto Rico. Department of Public Education of Puerto Rico.
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- Plasticity of neural maturation. In M. Locke (Ed.), *The emergence of order in developing systems*. New York: Academic Press.
- With J. LEVY. Crossed temperature discrimination following section of forebrain neocortical commissures. *Cortex*, 6, 389-396.
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- With R. NEBES. Superiority of the right hemisphere of man for perception of part-whole relations. *Proceedings of the Psychonomic Society*. (Abstract)

1971

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