

The Graduate Students of Roger W. Sperry at Caltech

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Abstract

How many people do you know would question whether or not they had made a difference in the history of psychology, when they were appointed the Nobel Prize in Medicine/Physiology? Having received professional appointments, having committee service credited to his name, and numerous honors and awards, who could not have benefited from Roger W. Sperry's wisdom. Roger Sperry had an extraordinary impact on the history of psychology and his graduate students today, carry on his legacy. Upon reflections of his studies at Caltech, a listing of Roger Sperry's graduate students was compiled by Chuck Hamilton (Trevarthen, 1990). This paper is an expansion upon what these graduate students studied under Sperry, what and where they are currently doing their research, and how Sperry's impact influenced them.

HOW many people do you know would question whether or not they had made a difference in the history of psychology, when they have 35 honors and awards credited to their name, one of which was the Nobel Prize in Medicine/Physiology? This man was born on August 20, 1913 and grew up in an upper-middle class family in Hartford, Connecticut. At the age of **11**, Roger Wolcott Sperry, was already exhibiting signs of his intellectual questioning when he checked out a book of William James, the father of Modern Psychology, from the library (Puente, **1994**).

Roger Sperry received his Bachelors Degree in English from Oberlin College in **1935**. It was here that he was very fortunate in taking a class from R. H. Stetson, which set the stage for the rest of his career. His quest for information centered on the issues of consciousness and nature vs. nurture. He received his Masters from Oberlin College in 1937, in Psychology. Having a deep interest in motor movements, Sperry went to study under Paul Weiss, a neuro-embryologist, in the Zoology department at the University of Chicago. It was here that he was influenced by Weiss's neurosurgical techniques. Sperry explored, through experimentation, muscle transplantation, muscle transposition, and nerve crossings in the frontal and hind limbs of rats. Sperry's conclusions, contradictory to Weiss's, revealed that motor fibers were genetically hardwired (Puente, **1994**).

After Sperry received his Ph.D. in Zoology in **1941** at the University of Chicago, he became National Research Council Fellow at Harvard. From **1942** to **1946**, Sperry continued his

experimentation on motor and sensory nerves at Yerkes laboratories of Primate Biology in Florida, where he was Biology Research Fellow. He furthered his research by exploring sensory organs and testing electrical waves in the dorsal region of the cerebral cortex. These experiments included mammals, amphibians, and fish. Through these motor fiber experiments, Sperry concluded that nerves were genetically hardwired and assigned a task early on in life (Puente, 1994).

with original reference

From **1946** to 1952, Roger Sperry was Assistant Professor of Anatomy at the University of Chicago. Sperry did not think he would get tenure (Puente, January 26, **1995**, Lecture), so he transferred to the Psychology department in 1952 where he was Associate Professor until **1953**. During his studies at the University of Chicago, Sperry challenged the unmodifiability of nerve regeneration. His studies proved that specific fiber layouts are genetically controlled and fiber identification must be identical with corresponding fiber destinations, thus nature was the controlling factor, not behavior as was assumed (Puente, 1994).

In 1952, Sperry was Section Chief of Neurological Diseases and Blindness at the National Institutes of Health. up to **1953** Sperry was clarifying his mind ideals. Then in 1954, Sperry was located in Pasadena at the California Institute of Technology, where he received an appointment to Hixon Professor of Psychobiology, and in **1984**, he received the professional appointment of Board of Trustees Emeritus. It was during this time that Sperry became interested in the interhemispheric

reference

communication through the corpus callosum, the fiber system that connects the two hemispheres of the brain together. By cutting the corpus callosum in monkeys, cats, and severe epileptic humans who weren't responding to medication, Sperry's experiments determined that the right and left side of the brain had specific functions. Through thorough intuitive experimentation over the years, Sperry determined that the two hemispheres do not work alone but both must work as a unified whole. This emerging quality, in turn, has a descending effect that directs the brain to achieve its purpose. This research lead to a better understanding of values, and brought forth Sperry's -second major question, What is consciousness? This major contribution to neuroscience was recognized by Sperry receiving the Nobel Prize in Medicine/Physiology in 1981 (Puente, 1994).

Having received seven professional appointments, having committee service credited to his name, and numerous honors and awards, who could not have benefited from Roger Sperry's wisdom. Upon reflections of his studies at Caltech, Roger Sperry's direct impact influenced, greatly, the graduate students which studied underneath him, initialing their own life long accomplishments. Hence, his impact is still engrossing neuro-philosophy science today.

Roger Sperry had an extraordinary impact on the history of psychology and his graduate students, today, carry on his legacy. A listing of Roger Sperry's graduate students at Caltech was compiled by Chuck Hamilton in 1990 (Trevarthen, 1990).

I will take this listing (Table 1), and expand upon what these graduate students studied under Sperry, what and where they are currently doing their research, and how Sperry's impact influenced them.

Graduate Students of Roger W. Sperry at Caltech

Table 1

* Graduate Students	Date *
Nancy Miner/McCurdy	Chicago
Ronald E. Myers	Chicago
Ivan Jean Mayfield/Weiler	1956-60
Colwyn B. Trevarthen	1956-62
Charles R. Hamilton.	1959-64
Michael S. Gazzaniga	1961-65
Jerre Levy	1965-70
Robert Nebes	1966-71
Larry I. Benowitz	1967-73
Harold W. Gordon	1967-73
Cary Lu	1967-70
Ronald L. Meyer	1968-73
J. Geoffrey Magnus	1968-71
James R. Carl	1970-75
Margaret Y. Scott	1971-76
David S. Isenberg	1972-76
Karen F. Greif	1973-78
Betty A. Vermeire	1974-81
Sheila G. Crewther ♥	1975-80
Larry E. Johnson	1975-80
Karen E. Gaston	1975-81
Alice Cronin-Golomb	1979-84
Jay J. Myers	1979-84

According to a class lecture in History and Systems of Psychology, on January 31, 1995, I was given the impression that Sperry's first graduate student at Caltech was Ronald E. Myers. However, my research has uncovered that Ronald E. Myer's

was a graduate student at the University of Chicago, while Sperry was a Associate Professor of Psychology there (Sperry, Curriculum vitae; Trevarthen, 1990). Sperry and Myers published two abstracts while at the University of Chicago (Miner, Myers, Zartman, & Sperry, 1952; Myers & Sperry, 1953). Ronald E. Myer's joined Sperry's lab at Caltech in 1954 as a postdoctoral fellow (Trevarthen, 1990).

Ivan Jean Mayfield/Weiler came to Sperry's lab in 1956 (Trevarthen, 1990). On March 8, 1995, I received a letter from Ivan Jean, in which, she states the reason she came to Sperry's lab was her interest in embryological experiments. Today, Ivan Jeanne's use of unconventional questioning can be directly attributed to Roger Sperry and being part of his lab in the 1950's.

Ivan Jeanne Weiler is currently doing research on synaptic influences on the control of protein synthesis with Beckman Institute at the University of Illinois (Weiler, March 7, 1995, Letter).

According to the listing, compiled by Chuck Hamilton, of graduate students at Caltech (Trevarthen, 1990), Colwyn B. Trevarthen was listed as a graduate student in Sperry's lab during 1956. I found this to be incorrect, because, according to Colwyn's own words, in his letter he wrote for the scrapbook honoring Roger Sperry, he explained, "I remember that it was a comment from my professor in New Zealand, himself a renowned neurophysiologist, that led me to apply for post-graduate work with Sperry at Caltech," (Scherick, 1994, p. Colwyn Trevarthen).

Charles R. Hamilton was a graduate student in Sperry's lab around **1959**. During this time, the lab was investigating interhemispheric comparison of color in split-brain monkeys (Hamilton, Hillyard & Sperry, **1968**). Monkeys were trained on visual discrimination that required specific hemispheric sensory integration. Monkeys, of various split-brain procedures, were unable to discriminate these learned joint hemispheric tasks, yet they were able to successfully perform tasks in which each hemisphere was tested separately. These results were echoed by shock avoidance methods tested in cats. These experiments concluded that the nerve fiber tracts from one hemisphere to the other are utilized for long and short term memory processes.

Sperry's extraordinary influence upon Charles Hamilton is indisputably shown in his unequivocal actions, as he became one of Sperry's last Senior Research Fellows from **1971** through **1984** when Sperry's lab closed down (Trevarthen, **1990**).

Michael S. Gazzaniga was fortunate in being accepted to study in Roger Sperry's lab in **1961** (Trevarthen, **1990**). It was during this time that human studies evolved demonstrating the consistency of the previous animal experiments. In a experiment involving Gazzaniga, Bogen, and Sperry (1962), they studied a 48 year old man who was suffering from grandmal convulsions, for **15** years, from a war injury that occurred in **1944**. The frequency of these convulsions ranged from one per week to **10** per day. There were several visual, tactical, and motor tests applied prior to the surgery, in which the patient's corpus callosum was severed. He was found to be right handed,

have a IQ. of **113**, and no notable impairments were found with these tests. After surgery the convulsions were eliminated and the patient stated that he hadn't felt better in years. Postoperative testing revealed that right side body functions, controlled by the dominant left hemisphere, had no significant impairments. However, the left side revealed drastic changes in similar testing.

Gazzaniga was so influenced by Roger Sperry's split-brain studies that he stayed on as a postdoctoral fellow till **1967** studying cerebral disconnections (Gazzaniga, Bogen, & Sperry, 1967). Recent studies (Luck, Hillyard, Magnun, & Gazzaniga, **1994**; Ladavas, Del-Pesce, Magnun, & Gazzaniga, **1994**) confirm Gazzaniga's commitment to research in the separated hemispheres of split-brain patients evoked-by Roger Sperry.

In **1965**, Robert Nebes joined Sperry's lab and stayed on for five years (Scherick, **1994**). In a letter I received from Mr. Nebes (March **10**, 1995), he stated that Sperry's research teaching was nondirective. Sperry wanted him to think through experiments, and postulate the results, to make sure the methods he proposed actually answered his hypothesis. Sperry's random questions made him rethink what he was doing and conduct his research not read about it. Instead of looking for a question you could answer, Sperry pushed his students by asking, "What's the question?", forcing them to write an introduction and answer the questions posed prior to conducting the experiment (Nebes, March **10**, **1995**, Letter).

Robert Nebes was involved in a experiment, with Jerre Levy

and Roger Sperry (Levy, Nebes & Sperry, 1971), in which two subjects underwent cerebral commissurotomy due to cryptogenic epilepsy. Their focus, of study, was to show how much linguistic expression existed in the disconnected minor hemisphere. Their results found that the major hemisphere took over the minor hemisphere, suggesting that the minor hemisphere could probably talk more if it wasn't for the dominance of the major hemisphere over the motor channels for speech. This was confirmed by hypnosis, when nonverbal visual stimuli was presented to both hemispheres resulting in the minor hemisphere dominance over motor mechanisms.

Roger Sperry gave Robert Nebes the tools and rules for writing precise scientific compositions, which he consults today (Scherick, 1994). Currently Robert Nebes is a Professor of Psychiatry, with the Western Psychiatric Institute and Clinic, at the University of Pittsburgh Medical Center, where he is involved in studying the effects that depression and Alzheimer's disease, has on memory and attention (Nebes, March 10, 1995, Letter).

According to a letter I received from Jerre Levy, wrote on February 27, 1995, she transferred from the University of Miami to study under Roger Sperry at Caltech in January of 1966. At first, Jerre was not open to investigating human split-brain patients and limited herself to working on animals, especially cats. It was Sperry who made her realize how inadequate this was by the question he posed to her, "Why would you prefer to spend five years asking a cat a question, rather than spending

five minutes asking a more interesting question of people?" (Levy, February 27, 1995, Letter). This question made Jerre cast aside her interest on animals and, like so many others, turned to humans to solve implanted questions.

According to several articles Jerre published with Sperry (Levy, Nebes, & Sperry, 1971; Levy & Sperry, 1968; Sperry & Levy, 1971), I found that Jerre Levy studied patients who had undergone lateralization of the brain for therapeutic reasons, due to traumatic head injuries or advance intractable epilepsy. Their results, in each of these articles, repeatedly found that the right cerebral hemisphere was the superior and dominant brain for recognition and comparison of visual objects, patterns, and motor performances. The left hemisphere, on the other hand, is strongly involved in the language centers. Even with this knowledge, they still pose the question, "How does a disconnected hemisphere know it's superior?" (Sperry & Levy, 1971, p. 9). These studies, and this question, mesmerized and compelled Jerre into her doctoral dissertation on the limits of language and the specialized spatial abilities of the isolated right cerebral hemisphere.

According to Jerre Levy's letter, dated February 27, 1995, Sperry's influence did not end on her as a graduate student. His questioning demeanor stimulated Jerre Levy's research into the functions of the right and left hemispheres, emphasizing the interhemispheric integration, and the role of the corpus callosum, in regulating attention and cerebral activation. Ironically, today Jerre Levy is a studying Professor with the

Committee on Biopsychology at the University of Chicago, where Roger Sperry first questioned Weiss.

From the years **1967** to **1973**, Larry I. Benowitz (Trevvarthen, **1990**) was allowed to study in Roger Sperry's lab even with his limited knowledge in biology. Like most of Sperry's students, Larry started out doing experiments with split-brain patients but quickly moved to studying the explanations of memory in chicks. Being influenced by Sperry's suggestion that chicks are born with a blank slate and may define single experience training well, Larry attempted to localize the living neural tissue and its psychological purpose (Scherick, **1994**).

Larry explains that it wasn't the research that influenced him, but the atmosphere and the colleagues of Sperry's lab - the constant issues of biological determinants of neuronal organization, brain circuitry behavior, and the nature of consciousness (Scherick, **1994**). A listing of Larry Benowitz publications (Scherick, **1994**) reveal that he is currently doing experiments with the protein Gap-43 and its numerous effects on the mind.

Around the same time that Larry Benowitz was joining Sperry's lab so was Harold W. Gordon. Gordon was there from **1967** to **1973**, in which time he earned his Ph.D. (Trevvarthen, **1990**). Gordon's first published article, Lateralization of Olfactory Perception in the Surgically Separated Hemispheres of Man (Gordon & Sperry, 1969), reveals that he was working with split-brain epileptic patients, in an attempt to demonstrate the olfactory perceptions and there interrelated activities

upon one or the other hemispheres. The results of this study indicates that the olfactory perception is similar to vision and stereognosis in that it is confined to the respective hemispheres.

Harold Gordon is currently conducting research with the Department of Psychiatry, at the University of Pittsburgh School of Medicine (Scherick, **1994**). Upon a review of Harold W. Gordon publicized listing, indications are that his current studies are centered around cognitive functions, revealing that his emphasis has departed from Sperry's original split-brain studies (Scherick, **1994**).

According to the list compiled by Chuck Hamilton (Trevarthen, 1990), Cary Lu was suppose to have been a graduate student at Caltech from **1967** through 1970. However, according to a letter I received from Cary Lu dated February 27, **1995**, he was never a graduate student of Sperry's.

Ronald L. Meyer joined Sperry's lab as a graduate student in 1968 and went on as a postdoctoral fellow in **1977** (Trevarthen, **1990**). Unlike many of Sperry's students, Ronald L. Meyer choose to pick up research of nerve connections once studied by Sperry in the **1940's** (Meyer, February 28, **1995**, Letter).

I think it is important to note that Sperry's latitude and support of graduate students was unforeseenably liberal, in that he allowed numerous students into his lab with little or no psychological background. Sperry reinforced this practice by allowing his students to follow their interests freely, encouraging them to take credit by publishing their research

independently. It couldn't be more obvious in Ronald L. Meyer's case where his previous training for the priesthood and undergraduate studies in scholastic philosophy were inadequate for the research atmosphere at Caltech (Scherick, 1994).

Like so many other students, Roger Sperry influenced Ronald L. Meyer by enforcing the importance of the question rather than the sophistication of the experiment. This is echoed in Ronald's work today, with the University of California Developmental Biology Center where he is a researching Professor and continues to work on nerve connections (Meyer, February 28, 1995, Letter).

In 1968, J. Geoffrey Magnus joined Sperry's lab and went on as a postdoctoral fellow in 1971 (Trevarthen, 1990). During this time, Magnus studied whether amnesia could be induced in chicks. His results confirmed the, "consolidation-interruption" hypothesis (Weaver & Magnus, 1969, p. 266). Further research shows that Magnus continued on after leaving Sperry's lab at the University of Pennsylvania where he was working on animal psychology (Beauchamp, Magnus, Shmunes, & Durham, 1977).

James R. Carl joined Sperry's lab in 1970, where he remained until 1975 (Trevarthen, 1990). Due to lack of publicized literature, I am unable to determine what James Carl's studies were while he was at Caltech. However, publicized materials in 1987, from NIH National Eye Institute, Lab of Sensorimotor Research, in Bethesda, Maryland, and from 1990, University of Calgary's School of Medicine, Alberta, Canada, indicates that J. Geoffrey Carl is focusing his research on ocular responses

(Carl & Cellman, 1987).

In 1971, Margaret Y. Scott (Scherick) joined the lab at Caltech (Trevvarthen, 1990). While there she conducted research on the various visual aspects of goldfish (Scherick, 1994).

Sperry's influence on Marge provided her with the internal fortitude to seek out her own goals and follow her own path which lead her away from the research atmosphere (Scherick, 1994).

In 1972 David S. Isenberg joined Sperry's lab and stayed on until 1976 (Trevvarthen, 1990). During this time, Isenberg's research was on cerebral dominance in reading disabled 5th-7th graders. David took 19 good and 19 poor readers, and compared their performance on digit listening tests and visual half-field presentation of digits and numerals tests. After testing, Isenberg found that poor readers encountered a left visual field deficit, that may have been due to a diminished processing in the right hemisphere or a diminished right to left hemisphere transfer (Yeni-Komshian, Isenberg, & Goldberg, 1975).

After a review of Roger Sperry's curriculum vitae, I found no articles that David Isenberg published with Sperry. This is a representation of Sperry's latitude, as Isenberg's topic deviated from the main research topic of that time - split-brain. This influence allowed Isenberg to go on and do further research in similar areas of learning aptitudes at Haskins Labs in New Haven, Connecticut, in the early eighties (Lieberman, Isenberg, & Rakerd, 1981; Dorman, Raphael, & Isenberg, 1980).

Karen F. Greif was very influenced in the years she spent

in Sperry's lab at Caltech (Scherick, 1994). She joined the lab in 1973 and earned her Ph.D. in 1978 (Trevvarthen, 1990). Karen's research in the lab first focused on memory processing in chicks, which Sperry had directed her to. After having troubles with her project and a lack of guidance from Sperry, Karen's research turned to intra- and interocular memory transfer, with which she interacted with Margaret (Marge) Scott-Schriek (Greif, March 1, 1995, Letter). During this time, Karen published an abstract with Sperry, dealing with the survival of visual discrimination learning, after the surgical removal of the trained tectal area, in goldfish (Scherick, 1994).

Today Karen Greif is a Professor and Chair of the Department of Biology, Bryn Mawr College, Bryn Mawr, Pennsylvania (Greif, March 1, 1995, Letter). Sperry's influence on Karen was two fold. The impact that Sperry had on Karen, with his noncommitment to her work, has lead Karen to resolve never to treat a student like that. Sperry's positive influence on Karen, however, is directly related to her current research and teaching in synaptic development, in which she uses Sperry's chemospecificity hypothesis (Greif, March 1, 1995, Letter).

In 1974, Betty A. Vermeire joined Sperry's lab and went on as a postdoctoral fellow in 1982 (Trevvarthen, 1990). Her studies during this time centered around split-brain monkeys hemispheric learning comparisons, in which she tested for differences in abilities based on visual stimuli. Betty found that there was no advantages for either hemisphere, however, she did find that one hemisphere could learn faster than the

other, based on handedness (Hamilton & Vermeire, 1982).

In the late 1980's Betty Vermeire was still doing research on split-brain monkeys at Caltech (Hamilton & Vermeire, 1988). It is my opinion that Sperry's influence on Betty has been great, when you take into account the time she has spent at Caltech.

Sheila G. Crewther joined the lab in 1975 and stayed until 1978 (Trevvarthen, 1990). Sheila did research on the visually guided behavior of kittens, with rotated eyes, and the perceptual effects of surgical eye rotation (Peck & Crewther, 1975). Sheila went on to do further studies with Sperry on split-brain cats (Peck, Crewther, & Hamilton, 1979). This was followed up with research, out of the University of Western Australia, on the visual acuity of cats native to Northern Australia (Harmen, Nelson, Crewther S., & Crewther D., 1986).

The same time Sheila Crewther was joining the lab so was Larry E. Johnson. Larry was part of the lab from 1975 to 1980, at which time he earned his Ph.D. (Trevvarthen, 1990). At first, due to Sperry's interest in the mind rather than split-brain research, Larry had limited contact with Sperry, and gained most of his support from Charles Hamilton (Scherick, 1994).

Larry's graduate research focused on visual cross integration in split-brain patients (Scherick, 1994). Two journal articles appeared in 1984 from Larry's research at Caltech (Johnson, 1984a, 1984b). Larry introduced letters, words, colors, and patterns to the right and left visual fields in commissurotomized and normal adults. Larry hypothesized that the severed brain halves were not as independent as once thought, by virtue of

test results, in which he feed information to the left commissurotized brain and was able to retract responses from the right hemisphere.

After receiving his Ph.D. from Caltech, and more so by Sperry's influential sarcasm, Larry joined the U.S. Army Airborne Rangers to prove to himself and others, that he was much more than athletic (Scherick, 1994). Larry went on to get his medical degree in Chicago, and did his fellowship out of UCLA, in geriatric medicine.

Today Larry Johnson is part of the faculty in the Department of Family Medicine, at the University of Cincinnati Medical Center, whkre he is still involved in researching the problems ederly's face with nutrition (Scherick, 1994).

Karen E. Gaston arrived in Sperry's lab in 1975, around the same **time** that Larry Johnson and Sheila Crewther were there. Karen transferred into the lab with a major in English and her research focused on the memory of newborn chicks (Scherick, 1994). Unlike Karen Greif, who switched from memory processing in chicks to intra- and interocular memory transfer, Karen Gaston finished out her studies in the memory of chicks. Karen published several articles on visual and taste discriminations, in an attempt to show avoidance learning. Her studies first proved that chicks negotiated through visual, not taste cues (Gaston, 1977). Karen went on to show that one eye avoidance training had no effect on food aversion conditioning (Gaston, 1978). Prior to leaving for Pitzer College, Karen proved that the seeing and nonseeing hemispheres can acquire an illness

induced avoidance to food through visual and taste prompts (Gaston, 1978).

Last indications suggest that Karen Gaston is working on the bindings of specific proteins to DNA fragments containing nucleotide sequences. Karen found the union between the DNA fragments, with the nucleotide sequence, and the Escherichia coli CRP protein, closely correspond to dissociation tests over two hour conditions. Variations in nucleotide sequence and the naturally occurring CRP protein sights, permits accelerated dissociation of CRP-DNA-complexes. The inverse relationship between the CRP bindings suggest that the inclusion of glucose in the tighter binding sights can not be repressed in the medium growth centers (Gaston, Kolb, & Busby, 1989). This-indication suggests Karen Gaston deviated from her original studies under Sperry at Caltech.

From 1979 till 1984, Alice Cronin-Golomb and Jay J. Myers were the last graduate students in Sperry's lab (Trevarthen, 1990). They were present with Chuck Hamilton when Roger Sperry was awarded the Nobel Prize (Scherick, 1994).

At the time of her doctoral and postdoctoral fellowship at Caltech, Alice Cronin-Golomb was working with Charles R. Hamilton, then a Senior Research Associate (Trevarthen, 1990), studying nonverbal information processing in split-brain patients. Taking particular interest in the right hemispheres comprehension of abstract concepts, and how information is transferred subcortically between separated hemispheres (Cronin-Golomb, March 7, 1995, Letter). Alice continued similar

studies at the Clinical Research Center, Massachusetts Institute of Technology (Cronin-Golomb, 1986a, 1986b, **1986c**). It was shortly after this time, at the Massachusetts Institute of Technology, that Alice's research turned to Alzheimer's Disease (Cronin-Golomb, 1987a, 198733).

Today, Alice is an Assistant Professor at the University of Boston, where her research is now directed towards age related neurodegenerative disorders - Alzheimer's disease, Parkinson's disease and Down Syndrome (Cronin-Golomb, March 7, **1995**, Letter).

According to Alice, Sperry's influence was phenomenal. She further explains that Sperry's incredibly high standards in everything he did, was demanded in his students, from research, "pick only the most challenging problems that address the biggest questions," to writing, "**17** million rewrites of everything before it was considered ready to submit for publication," (Cronin-Golomb, March 7, **1995**, Letter). Alice tries to impress these standards on to her students today.

Jay J. Myers was the last graduate student of Caltech to publish with Roger Sperry (Sperry, Curriculum vitae). Jay J. Myers started out by researching techniques for obtaining lateralization of visual input that enabled extended viewing (Myers & Sperry, **1982**). Myer's continued his research by reviewing the inconsistencies of Michael Gazzangi's research (Myers, **1984**) and developed his own hypothesis, that emotional and semantic information transfers between split-brain patients through either midbrain or brain stem pathways (Myers & Sperry, **1985**).

After Jay J. Myers received his Ph.D., he went on to do his postdoctoral fellowship at the University of California, where he continued his research with split-brain patients (Ramachandran, Cronin-Golomb, & Myers, 1986).

To say that Roger Sperry's influence on these fortunate graduate students was by chance would be a grave injustice. Roger Sperry was an intellectual researcher, experimenter, and questioner. His uncanny ability to impel his students to seek the most difficult, by indirectly implanting the questions that needed to be answered into their subconsciousness. Roger Sperry's name has been on people's lips for some fifty years and his legacy is now being carried on through the research of his graduate students.

References

- Beauchamp, G. K., Magnus, J. G., Shmunes, N. T. & Durham, T. (1977). Effects of olfactory bulbectomy on social behavior of male guinea pigs (*Cavia porcellus*). Journal-of-Comparative-and-Physiological-Psychology. 91, **336-346**.
- Carl, J. R. & Gellman, R. S. (1987). Human smooth pursuit: Stimulus-dependent responses. Journal-of-Neurophysiology. 57, **1446-1463**.
- Cronin-Golomb, A. (1986a). Subcortical transfer of cognitive information in subjects with complete forebrain commissurotomy. Cortex. 22, **499-519**.
- Cronin-Golomb, A. (1986b). Comprehension of abstract concepts in right and left hemispheres of complete commissurotomy subjects. Neuropsychologia. 24, 881-887.
- Cronin-Golomb, A. (1986c). Figure-background perception in right and left hemispheres of human commissurotomy subjects. Perception. 15, **95-109**.
- Cronin-Golomb, A. (1987a). International study group on the pharmacology of memory disorders associated with aging. Neurobiology-of-Aging. 8, 277-282.
- Cronin-Golomb, A. (1987b). Alzheimer's disease: Advances in basic research and therapies. Neurochemistry-International. 11, **347-350**.
- Cronin-Golomb, A., March 7, 1995, Letter.
- Dorman, M. F., Raphael, L. J. & Isenberg, D. (1980). Acoustic cues for a fricative-affricate contrast in word-final

- position. Journal-of-Phonetics. 8, 397-405.
- Gaston, K. E. (1977). An illness-induced conditioned aversion in domestic chicks: One-trial learning with a long delay of reinforcement. Behavioral-and-Neural-Biology. 20, 441-453.
- Gaston, K. E. (1978). Interocular transfer of a visually mediated conditioned food aversion in chicks. Behavioral-and-Neural-Biology. 24, 272-278.
- Gaston, K. E. (1980). Evidence for separate and concurrent' avoidance learning in the two hemispheres of the normal chick brain. Behavioral-and-Neural-Biology. 28, 129-137.
- Gaston, K. E., Kolb, A. & Busby, S. (1989). Binding of the Escherichia coli cyclic AMP receptor protein to DNA fragments containing consensus nucleotide sequences. Biochemical Journal. 261 , 649-654.
- Gazzaniga, M. S., Bogen, J. E. & Sperry, R. W. (1962). Some functional effects of sectioning the cerebral commissures in man. National Academy of Sciences. 48, 1765-1769.
- Gazzaniga, M. S., Bogen, J. E. & Sperry, R. W. (1967). Dyspraxia following division of the cerebral commissures. Archives of Neurology. 16, 606-612.
- Gordon, H. W. & Sperry, R. W. (1969). Lateralization of olfactory perception in the surgically separated hemispheres of man. Neuropsychologia. 7, 111-120.
- Gordon, H. W. & Kravetz, S. (1991). The influence of gender, handedness, and performance level on specialized cognitive functioning. Brain-and-Cognition. 15, 37-61.
- Gordon, H. W. & Lee, P. -A. (1993). No difference in cognitive

performance between phases of the menstrual cycle.

Psychoneuroendocrinology. 18, 521-531.

Greif, K. F., March 1, 1995, Letter.

Hamilton, C. R., Hillyard, S. A. & Sperry, R. W. (1968).

Interhemispheric comparison of color in split-brain monkeys.

Experimental Neurology. 21, 486-494.

Hamilton, C. R. & Vermeire, B. A. (1982). Hemispheric differences in split-brain monkeys learning sequential comparisons.

Neuropsychologia. 20, 691-698.

Hamilton, C. R. & Vermeire, B. A. (1988). Complementary hemispheric specialization in monkeys. Science. 242, 1691-1694.

Harmen, A. M., Nelson, J. E., Crewther, S. G. & Crewther, D. P. (1986). Visual acuity of the northern native cat (*Dasyurus hallucatus*): Behavioral and anatomical estimates.

Behavioral-Brain-Research. 22, 211-216.

Johnson, L. E. (1984a). Vocal responses to left visual stimuli following forebrain commissurotomy. Neuropsychologia. 22, 153-166.

Johnson, L. E. (1984b). Bilateral-visual cross-integration by human forebrain commissurotomy subjects. Neuropsychologia. 22, 167-175.

Ladavas, E., Del-Pesce, M., Magnun, G. R. & Gazzaniga, M. S. (1994). Variations in attentional bias of the disconnected cerebral hemispheres. Cognitive-Neuropsychology. 11, 57-74.

Levy-Agresti, J. & Sperry R. W. (1968). Differential perceptual capacities in major and minor hemispheres. Proc. National

Academy Science. 61, 1151 (Abstract).

Levy, J., Nebes, R. S. & Sperry, R. W. (1971). Expressive language in the surgically separated minor hemispheres. Cortex. 7, 49-58.

Levy, J., Trevarthen, C. & Sperry, R. W. (1972). Perception of bilateral chimeric figures following hemispheric deconnexion. Brain. 95, 61-78.

Levy, J., February 27, 1995, Letter.

Liberman, A. M., Isenberg, D. & Rakerd, B. (1981). Duplex perception of cues for stop consonants: Evidence for a phonetic mode. Perception-and-Psychophysics. 30, 133-143.

Lu, c., February 27, 1995, Letter.

Luck, S. J., Hillyard, S. A., Magnun, G. R. & Gazzaniga, M. S. (1994). Independent attentional scanning in the separated hemispheres of split-brain patients. Journal-of-Cognitive-Neuroscience. 6, 84-91.

Meyer, R. L., February 28, 1995, Letter.

Miner, N., Myers, R. E., Zartman, H. & Sperry, R. W. (1952). On brain field forces in visual pattern perception. Anatomical Records. 112, 433 (Abstract).

Myers, J. J. & Sperry, R. W. (1982). A simple technique for lateralizing visual input that allows prolonged viewing. Behavior Research Methods & Instrumentation. 14, 305-308.

Myers, J. J. (1984). Right hemisphere language: Science or fiction? American-Psychologist. 39, 315-320.

Myers, J. J. & Sperry, R. W. (1985). Interhemispheric communication after- section of the forebrain commissures.

Cortex. 21, 249-260.

Myers, R. E. & Sperry, R. W. (1953). Interocular transfer of a visual form discrimination habit in cats after section of the optic chiasm and corpus callosum. Anatomical Records. **115**, 351-352 (Abstract).

Nebes, R. D., March **10**, **1995**, Letter.

Peck, C. K. & Crewther, S. G. (1975). Perceptual effects of surgical rotation of the eye in kittens. Brain-Research. **99**, 213-219.

Peck, C. K., Crewther, S. G. & Hamilton, C. R. (1979). Partial interocular transfer of brightness and movement discrimination by split-brain cats. Brain-Research. **163**, 61-75.

Puente, A. E. (1994). Roger Wolcott Sperry: Obituary. Psychology Records, In Press.

Ramachandran, V. S., Cronin-Golomb, A. & Myers, J. J. (1986). Perception of apparent motion by commissurotomy patients. Nature. 320, 358-359.

Scherick, M. S. (1994). Roger W. Sperry: A celebration - August 14, 1994. Scrapbook.

Sperry, R. W., Curriculum vitae.

Sperry, R. W. & Levy, J. (1971). Minor hemisphere function in the human commissurotomy patient. Acta cient Venezolana. **22**, 32.

Trevarthen, C. (1990). Brain circuits and functions of the mind: Essays in honor of Roger W. Sperry. Cambridge University Press.

Weaver, T. A. & Magnus, J. G. (1969). Effect of unconditional stimulus linked subconvulsive current in chicks. Psychonomic Science. 16, 265-266.

Weiler, I. J., March 7, 1995, Letter.

Yeni-Komshian, G. H., Isenberg, D. & Goldberg, H. (1975). Cerebral dominance and reading disability: Left visual field deficit in poor readers. Neuropsychologia. 13, 83-94.

2843 Bougainville Drive
Tarawa Terrace, N.C. 28543
February 20, 1995

Alice Cronin-Golomb
Department of Psychology
Boston University
64 Cummington Street
Boston, MA 02215

Dear Ms. Cronin-Golomb:

I am a undergraduate student with the University of North Carolina at Wilmington. I am currently enrolled in History and Systems of Psychology, in which a research project is required on Roger Sperry. I am interested in finding information on Sperry's graduate students of Caltech. I am focusing on the subjects you studied under Sperry and what you are currently working in. I would like your opinion on how Sperry influenced your studies at Caltech and how that influence effects you today. I appreciate your help on this urgent matter.

Sincerely,

Judy L. Reynolds

Judy L. Reynolds
(910)353-6686

March 7,

1995

Judy -

Sorry this will have to be short + scrawled - I'm in the middle of a thousand projects, including a new baby! I worked in Sperry's lab from 1979-1984, when I got my PhD. I studied nonverbal information processing in the separated hemispheres of the split-brain patients. I was interested in how the right hemisphere understands abstract concepts ('time', 'justice' etc.), + also in how high a level of information may be transferred subcortically between the surgically divided hemispheres. Currently, I'm an assistant professor at Boston University. I still study high-level cognition, but now in age-related neurodegenerative disorders, mainly →

Phylermer's disease + Parkinson's disease. I also study the relation between basic vision + cognition in Phylmer's disease + Down syndrome.

There was a reunion of Sperry-lab people in August '94 in L.A., in conjunction with the APA meeting. There were several days of symposia in tribute to Sperry. The APA program will have them listed. It'll give you an idea of what his former colleagues are doing now.

As for his influence - phenomenal! He set incredibly high standards in everything he did, + expected you to do the same. This ran from his approach to research (pick only the most challenging problems that address the biggest questions) to even his approach to writing (17 million re-writes of everything before it was considered ready to be submitted for publication). I try to keep to those standards myself, + to keep my current graduate students to them. We succeed in the 2nd (the millions of rewrites) + at least try at the first (the importance of our research questions).

Good luck with your project! Alice Cronin Colon

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B R Y N M A W R

1 March 1995

Ms. Judy Reynolds
2843 Bougainville Drive
Tarawa Terrace, NC 28543

Dear Ms. Reynolds,

In response to your letter, I will try to give you my impressions of Roger Sperry as a mentor and how my experience influences me today. Roger Sperry was a very difficult person; he was private, unpredictable and shy. Some found his eccentricities "interesting" and worked very well with him, others did not. I was one of the latter. For reasons I still do not understand, he did not seem very interested in the work on memory processing that I was doing (even though he directed me to it) and did not give me much support or guidance. He was also quite cruel to me, at times. I ended up going down to UC San Diego to meet with Dr. Larry Squire to discuss difficulties with my project. Eventually I decided to start another project in the lab in collaboration with Marge Scott on intra- and interocular memory transfer. I did not tell Dr. Sperry of my decision until I had accumulated a fair amount of data, because I was uncomfortable dealing with him and feared his opposition to the project. When I wrote my thesis, he gave me no feedback on content, style or presentation. Since he was an extraordinarily fine writer, I was disappointed by his lack of attention. His lack of interest probably contributed also to my decision to switch fields into neural development after completing my degree. All-in-all, I did not get much mentoring!

After earning my doctorate, however, he was charm itself. Although I did not see him often, each time I visited he seemed very interested in my work on neural development and synaptogenesis. We had several stimulating exchanges about this work, to my great astonishment. I did not see him after I moved to Bryn Mawr in 1982. When I was in California, I always found reasons not to visit; the wounds went deep.

I still have tremendous respect for his intellect and creativity. Although I did not have a positive experience with him, he did attract a lab full of people with whom I still have wonderful interactions, both as colleagues and friends. My research on regulation of synaptic development carries a heavy theoretical underpinning from his chemospecificity hypothesis, and I still use his papers on development in both my teaching and research. His other influence today is reflected in my resolve never to treat a student the way he treated me. If I can't be interested in the direction of a student's work, I will be honest about it, and help the student either to redirect his or her research or find another mentor. It's probably not the sort of testimonial he would want!

I hope this helps you in your project. I urge you to contact other members of the lab; for example, Ron Meyer (a Professor at UC Irvine), who can give you a very different picture of Dr. Sperry as a mentor.

Please do not hesitate to contact me if you need more information.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Karen F. Greif".

Karen F. Greif, Ph.D.
Professor and Chair



The University of Chicago
DEPARTMENT OF PSYCHOLOGY

COMMITTEE ON BIOPSYCHOLOGY
5848 SOUTH UNIVERSITY AVENUE
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Feb. 27, 1995

Ms. Judy L. Reynolds
2843 Bougainville Drive
Tarawa Terrace, NC 28543

Dear Judy:

When I first arrived at Caltech (January, 1966) to work as a graduate student in Roger Sperry's lab, I considered myself to be an animal biopsychologist. During my first six months there, my research was restricted to cats. Because I love animals, I used to cry after I had performed split-brain surgery on a cat and sat waiting for him to wake from anesthesia. Sperry was strongly urging me to have a look at human split-brain patients, but (due to prior experiences) I had this deep-seated suspicion that he had a notion that female scientists should only do research with human beings. I therefore rejected his urgings until one day -- about six months after my arrival -- he asked me, "Why would you prefer to spend five years asking a cat a question rather than spending five minutes asking a more interesting question of people?" I had no answer and instantly saw my ridiculous position. It was at this point that I began examining human split-brain patients, became fascinated, and abandoned all studies of nonhuman animals (to which I never returned). The focus of my doctoral dissertation was on the limits of language and the specialized spatial abilities of the isolated right cerebral hemisphere (RH).

So, as a first point, it was Sperry who lured me away from nonhuman animals to people. Second, when I started the human research, it was directed toward specifying the language capacities of the RH. After a few months, Sperry asked, "Why don't you examine functions for which the RH is superior instead of those in which it is inferior?" It was that question that stimulated me to investigate visuospatial functions of the RH. Third, during the oral defense of my doctoral dissertation, after I had stated that the majority (about 70%) of left-handers had language functions specialized to the left hemisphere (LH), Sperry asked, "If language functions are in the left hemisphere, then how do these people regulate writing with the left hand?"

It was an obvious question, but one that had never been posed in the scientific literature and one that I had never considered. I responded that the control was either from the LH across the corpus callosum to the RH and then down the crossed pyramidal tract to the left hand *or* was direct from the LH down unusually large uncrossed motor tracts to the left hand. Said Sperry, "If you have now described the universe of possibilities. But *which* is the actual control route?" Well, neither I nor anyone else knew the answer to that, but Sperry's question stimulated me to pursue (after leaving Caltech) this interesting issue. How did Sperry influence me? By asking me questions!

My current research focuses on the functions of the LH and RH in normal children and adults, with an emphasis (for the last decade) on interhemispheric integration and the role of the corpus callosum in regulating attention and cerebral activation.

Good luck on your project.

Sincerely,


Jerre Levy
Professor

Cary Lu
7334 Champagne Point Road • Kirkland, Washington 98034
206-821-2988

27 February 1995

Judy Reynolds
2843 Bougainville Dr
Tarawa Terrace NC 28543

Ms. Reynolds,

Responding to your request for information about Roger Sperry's graduate students:

I was never a graduate student in Sperry's lab. My thesis adviser at Caltech was Derek Fender. (Why did my name turn up on your list? Probably because I knew many people in Sperry's group.)

Therefore I can't provide any information for your project.

Good luck with your project.

Yours truly,

A handwritten signature in black ink, appearing to read 'Cary Lu'. The signature is fluid and cursive, with a large initial 'C' and a long horizontal stroke extending to the right.

Cary Lu



February 28, 1995

Dear Ms. Reynolds,

I worked with Roger Sperry as a graduate student and as a postdoctoral fellow. While in his lab, I studied the formation of nerve connections using the visual system of the goldfish. Roger was very agreeable to letting people work on whatever they wanted. I selected this problem because it was one he had worked on in the 1940's and was one I found very interesting. I continue to work on this same system today. Although the specific questions I ask are different, the general focus continues to be the same: How do nerves form precise connections? So as you see, Roger did have a major impact on my career.

I hope this helps you.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ronald Meyer".

Ronald Meyer
Professor





University of Pittsburgh
Medical Center

Western Psychiatric Institute and Clinic

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March 10, 1995

Ms. Judy Reynolds
2834 Bouganville Drive
Tarawa Terrace, N.C.
28543

Dear Ms. Reynolds:

You wanted to know about the subjects I studied under Dr. Sperry. Actually, he didn't give formal classes in anything if he could help it. My first year in his lab I asked if I should sign up for his undergraduate course in Psychobiology. He said "Hell no, you're teaching it". And so I did. In terms of teaching me about research, he tended to be very nondirective. He definitely let you stick your neck out and make errors. His way of pointing out that you were spinning your wheels was also nondirective - he would ask a few apparently random questions, that if you really thought about them, made you rethink what you were doing. His view on how to learn to conduct research was not to read about it, but to just start doing it. The one thing he constantly drummed into our heads was to keep in mind the questions you are trying answer. It is very easy to get seduced by the methods, and end up looking for a question you can answer with some new method or technique you have encountered. Sperry constantly brought his students back by asking "What's the question?" One interesting way he had of helping you think about the theoretical issues you were trying to examine was to ask you to write up the results before actually doing the study. That is, you wrote up an introduction discussing the scientific issue, described your methods and what you thought the results would be. You then discussed these results. The advantage of ~~this~~ was that you would often find that the methods you had designed wouldn't really let you answer the question you had posed. You needed to change them or add some other task. In effect he had you carry out a thought experiment before the real one.,

As to what I do now, I have wandered far from the realm of hemispheric differences where I began in Sperry's lab. My work now focuses on the effects that Alzheimer's disease and depression have on cognition, especially memory and attention.

Sincerely,

A handwritten signature in cursive script, appearing to read "Robert D. Nebes".

Robert D. Nebes, Ph.D.
Professor of Psychiatry

Beckman Institute
405 N. Mathews
University of Illinois
Urbana, IL 61801
March 7, 1995

Dear Judy,

As I am sure you know, there was a meeting last August of all the Sperry graduates, and I have very little to add to the letter I wrote for the book that was put out.

Roger Sperry was a very introverted man, even somewhat suspicious. He told me, early on, that he doubted that I could be a good scientist, since I was too "normal". I don't know what that meant, and of course I didn't let it change my direction.

As you know, most of Sperry's students stayed in the direction of psychology and the split brain results for which he was justly famous. I had come to the lab, however, because I was fascinated by his embryological experiments; the best talks we had were those in which we mused about the role of development in affecting nerve fate. I now work on synaptic influences on the control of protein synthesis. There is more biochemistry there than I like or than Roger would have liked; but I like to think that the kind of unconventional questions I am asking, are those he would have appreciated. It was an unconventional time in science, at Cal Tech in the 50's, and it is the atmosphere of all the labs, not only Roger's alone, which influenced me.

I hope this will be a help to you.

Sincerely,

Ivan Jeanne

