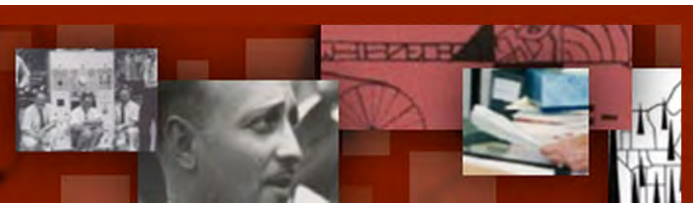
The Creation of Neuroscience

The Society *for* Neuroscience and
the Quest for Disciplinary Unity
1969-1995

SOCIETY *for* NEUROSCIENCE



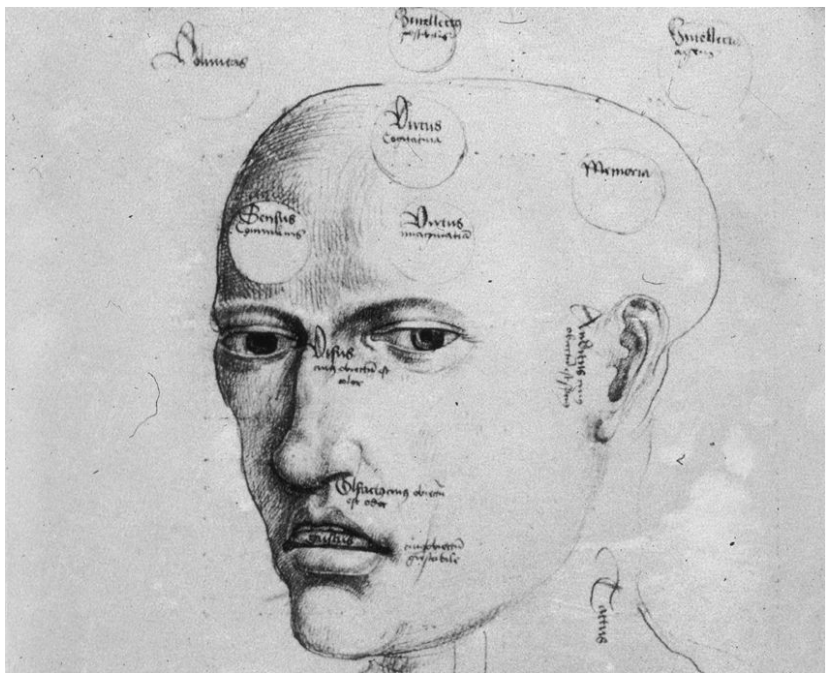
Introduction

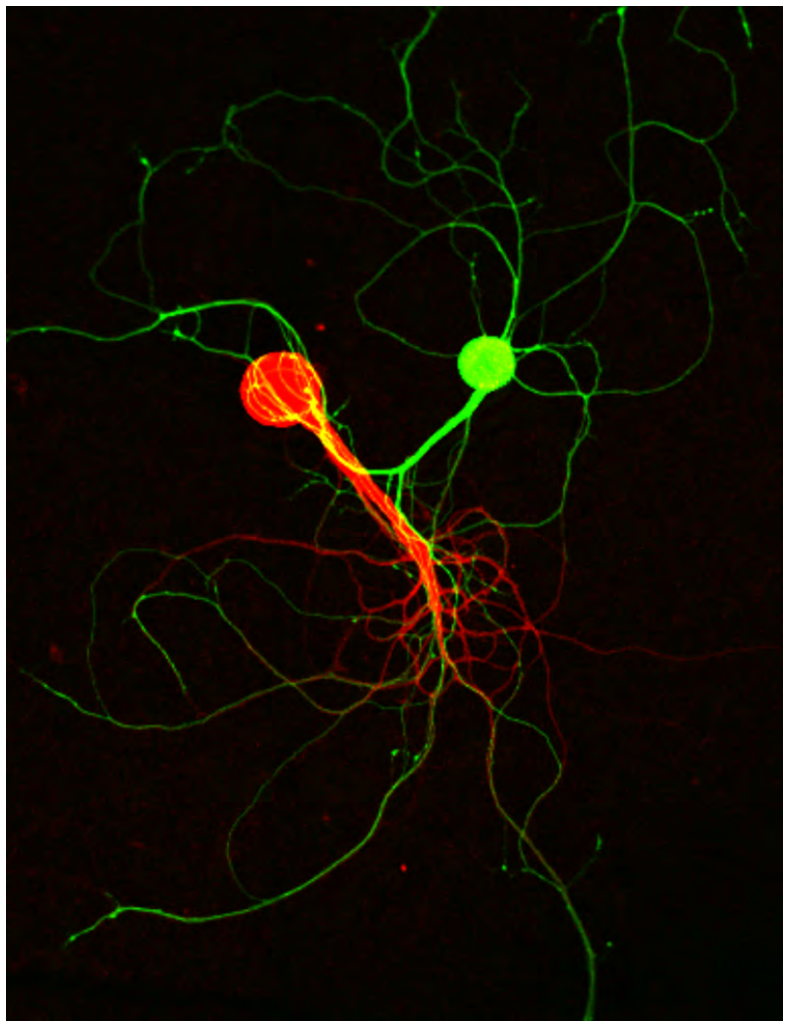
From the molecular biology of a single neuron to the breathtakingly complex circuitry of the entire human nervous system, our understanding of the brain and how it works has undergone radical changes over the past century. These advances have brought us tantalizingly closer to genuinely mechanistic and scientifically rigorous explanations of how the brain's roughly 100 billion neurons, interacting through trillions of synaptic connections, function both as single units and as larger ensembles. The professional field of neuroscience, in keeping pace with these important scientific developments, has dramatically reshaped the organization of biological sciences across the globe over the last 50 years. Much like physics during its dominant era in the 1950s and 1960s, neuroscience has become the leading scientific discipline with regard to funding, numbers of scientists, and numbers of trainees. Furthermore, neuroscience as fact, explanation, and myth has just as dramatically redrawn our cultural landscape and redefined how Western popular culture understands who we are as individuals. In the 1950s, especially in the United States, Freud and his successors stood at the center of all cultural explanations for psychological suffering. In the new millennium, we perceive such suffering as erupting no longer from a repressed unconscious but, instead, from a pathophysiology rooted in and caused by brain abnormalities and dysfunctions. Indeed, the normal as well as the pathological have become thoroughly neurobiological in the last several decades. In the process, entirely new vistas have opened up in fields ranging from neuroeconomics and neurophilosophy to consumer products, as exemplified by an entire line of soft drinks advertised as offering "neuro" benefits.

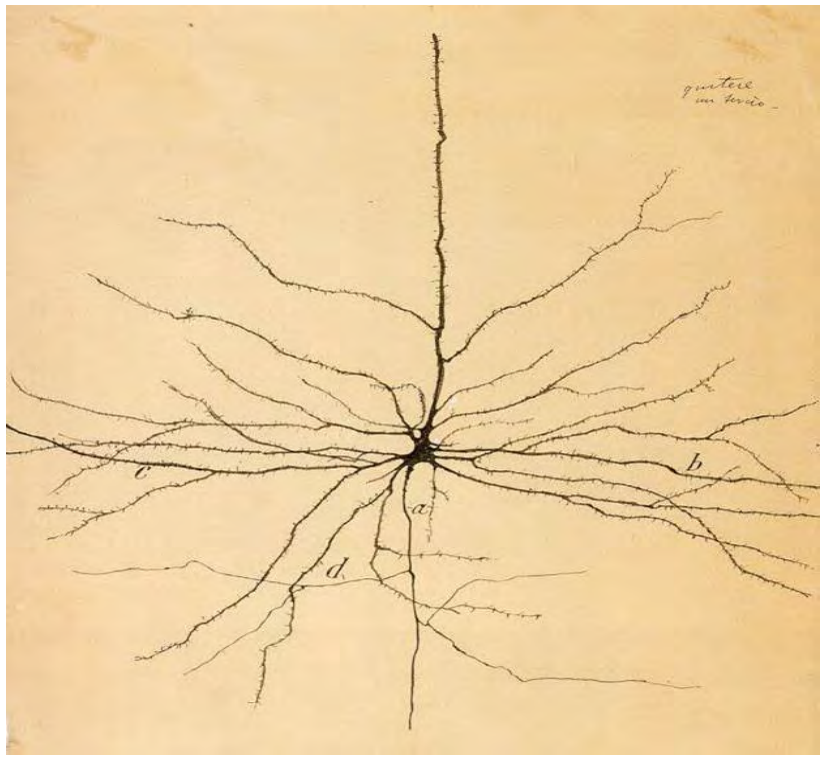
From its founding moment in 1969 to the present, the Society for Neuroscience (SfN) has played a critical role in creating this brave new neuroscientific world. In this essay, we will explore the Society's work and influence through 1995. It is worth noting from the outset that SfN represents something unique as a scientific society, especially for the 20th century. In contrast to most modern professional societies, SfN played a major role not only in the actual creation of the discipline, but also in developing the science and scientific community represented by that discipline. It also is worth emphasizing what we mean by the creation of neuroscience as a discipline. Of course, scientists have observed, dissected, and performed innumerable experiments on various parts of the nervous system for centuries. However, the idea that the study of the nervous system constituted a separate discipline apart from traditional fields of study such as anatomy, pathology, and physiology, did not emerge until the 1960s and 1970s. The founding of SfN forged a new and distinct field by bringing together scientists trained in a variety of established disciplines under the common banner of neuroscience. SfN founders and early leaders con-

sciously sought to make a new community of scientists that eschewed traditional parochialism and disciplinary isolation and, instead, embraced the idea of an intellectually and methodologically open field in which no one approach was privileged over the other. The founding ideals of SfN bear the stamp of the time and place of its birth, in so far as the founders believed that the scientific field it founded in its own image would flourish with egalitarian and democratic institutions.

First and foremost, this is a story of how SfN created unity out of an enormous diversity of approaches and disciplinary traditions and a complicated narrative that involves numerous individuals, institutions, new technologies, new biological discoveries, and changing social, economic, and political contexts. While we do not try to tell the full history of SfN, we have tried to relate the stories and events of its first 25 years that we think have the most relevance for the present. Neuroscience in its short life has become one of the largest and most exciting fields within biomedicine. While this is an achievement worth







Top left illustration is a fifteenth-century illustration depicting Aristotle's four regions of the brain (UCLA). The bottom right illustration comes from Ramon y Cajal. The image on the right is a cultured Aplysia sensory and motor neurons. The sensory neuron was labeled with a green Alexa Fluor and the motor neuron was labeled with a red Alexa Fluor (Kelsey Martin).

celebrating, there are also major challenges that lay ahead. We hope this history can help provide some context and perhaps even some guidance for those challenges.

Chapter I: Neuroscience Before Neuroscience, WWII to 1969

The founding of the Society for Neuroscience, at a crucial time in the development of the brain sciences, can be seen as the consequence of three intersecting factors that continue to shape the current contours of the field. First, the 1950s and 1960s witnessed a dramatic explosion of new technologies and neuroscientific findings that redefined and enlarged the possible range of questions that neuroscientists could and did ask. Second, largely because of the rapidly changing landscape of neuroscientific facts, researchers increasingly sought to create forums for communication and collaboration. Lastly, a number of institutions sought to transform these newly emerging relationships into concrete, tangible institutions that allowed laboratory researchers and medical professionals to communicate not only with each other but also with the public about their field.

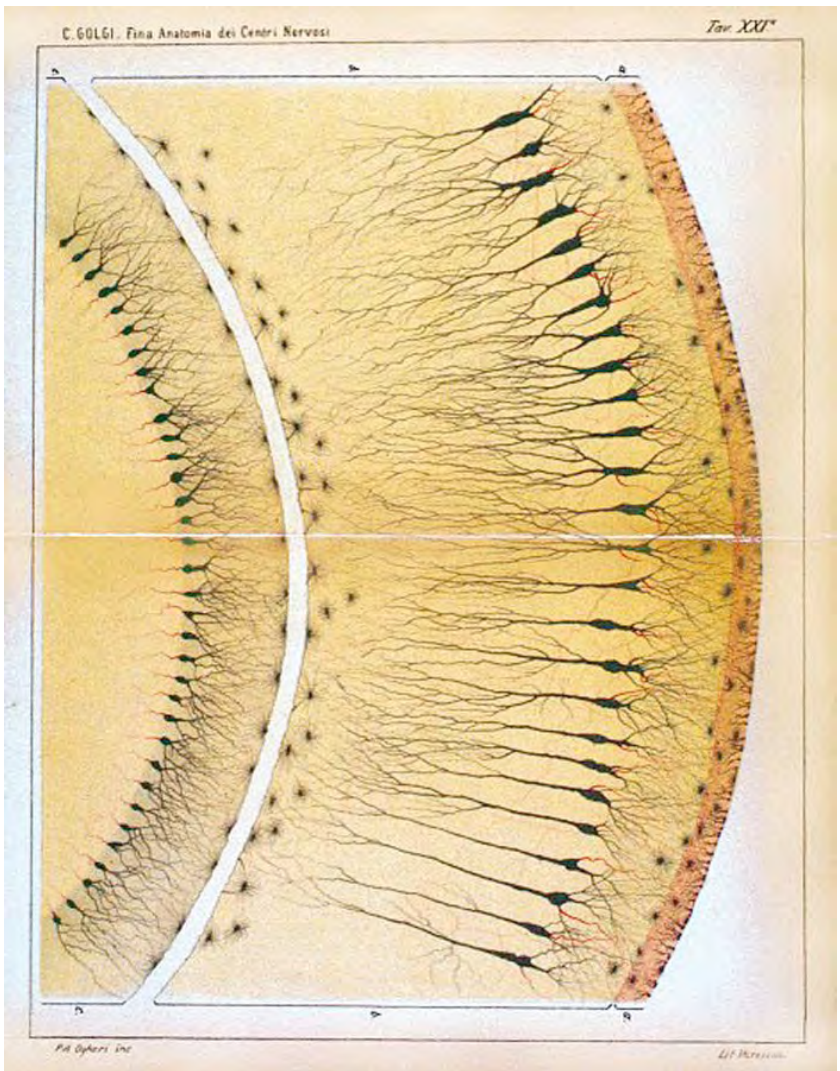


Figure 1 Hippocampus. Golgi, C. Sulla fina anatomia degli organi centrali del sistema nervoso. Reggio-Emilia: S. Calderini e Figlio; 1885. Reprinted in: On the fine structure of the pes Hippocampi major (with plates XIII–XXIII). *Brain Research Bulletin*, Vol. 54, No. 5, p. 481 (2001).

The study of the nervous system has always posed special problems when compared to other organ systems. Indeed, even the centrality of the brain in cognition, emotions, sensation, and movement is not necessarily self-evident. Aristotle, for example, did not believe that the brain was critically involved in emotion, sensation, and movement; he instead attributed these functions to the heart, a view that ancient Egyptians also held. In contrast, Hippocratic physicians, despite their complex theory of humors as determinate of temperament, did attribute intellectual functions to the brain.

The physical nature of the brain made it especially difficult to study. On gross visual inspection, the brain looks like a gelatinous mass. The invention of the microscope at the end of the 17th century did little to help scientists visualize the inner substrates of neurons and glia. After the development of achromatic microscopes and better staining methods in the 19th century, botanist Matthias Jakob Schleiden

in 1838 proposed that cells were the fundamental building blocks of plant life. Zoologist Theodor Schwann made the same claim for animals the following year. But neurons were less visible than other cells even to the improved microscopes of the early 19th century. The application of the cell theory to nervous tissue proved to be among the most vexing problems for early histologists. In 1871, Josef von Gerlach proposed that cells were not the fundamental unit of the brain. Instead, he claimed that individual nerve cells anastomosed with each other, creating a diffuse interconnected protoplasmic network. Two years later, Camillo Golgi perfected his silver staining method that allowed for the visualization of neurons with light microscopy (Figure 1).

As Santiago Ramon y Cajal wrote in 1917: “I expressed the surprise which I experienced upon seeing with my own eyes the wonderful revelatory powers of the chrome-silver reaction and the absence of any excitement in the scientific world aroused by its discovery.”[1] Despite the clarity with which Golgi could now visualize neurons, he did not believe that they were distinct, individual cells, and held throughout his career to a modified version of von Gerlach’s reticular theory.

Figure 2 Self-portrait of Ramon y Cajal in his laboratory, 1887 (public domain).

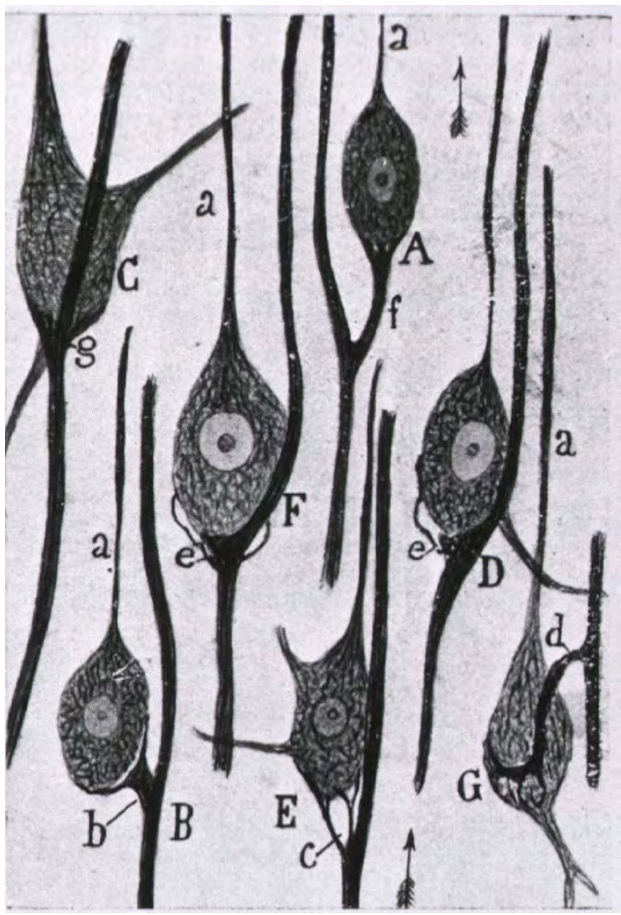


Figure 3 From Cajal's 1888 paper proposing that neurons are independent cells. (Courtesy of the National Library of Medicine).

Even in his Nobel lecture of 1906, as he accepted the Prize shared with Cajal, Golgi clung to his belief in the “anatomical and functional continuity between nerve cells.”[2] Cajal (Figure 2), having improved upon Golgi’s staining methods, famously demonstrated (within the limits of light microscopy) the anatomical unity of the neuron in a series of pioneering publications in the late 1880s and early 1890s (Figure 3). The day after Golgi spoke, Cajal defended the neuron theory in his own Nobel lecture: “The nerve cells are morphological entities, neurons…The nerve elements possess reciprocal relationships in contiguity but not in continuity.”[3]

A series of international achievements in brain science followed in the first half of the 20th century, drawing on the seminal observations of Golgi and Cajal, particularly the latter’s recognition of the neuron as a single independent cell. The research and ideas of Charles Sherrington and Edgar Adrian characterized the nature of the synapse and the action potential, while the acetylcholine work of Otto

Loewi and Henry Hallett Dale suggested the importance of neurotransmitters. These early observations revealed the centrality of the synapse and its role in the neural control of voluntary and voluntary activity, but also highlighted the promise of interdisciplinary collaboration and of new applications of technology. After John Carew Eccles demonstrated in 1951 that most communications between neurons were chemical in nature, a series of reports revealed the complicated and diverse roles of neurochemicals, including Arvid Carlsson's discovery that dihydroxyphenylalanine (DOPA) reversed Parkinson-like symptoms, James Austin's finding that chronic inflammatory neuropathy responded to prednisone, and Julius Axelrod's demonstration that monoamine oxidase inhibitors increased catecholamine levels at the nerve terminal. Each of these developments highlighted the ways in which biochemists could elucidate the physiological mechanisms of the nervous system and how both neurophysiologists and neurochemists, working with clinicians, could contribute to neurology and psychiatry. Meanwhile, Alan Hodgkin and Andrew Huxley had used classical neurophysiological methods, as well as mathematical modeling, to explain the ionic mechanism of action potential signaling in the giant squid axon. But, by the time Hodgkin and Huxley accepted their Nobel Prize in 1963, Bengt Falck and Nils-Åke Hillarp were using fluorescence histochemistry to trace neuronal projections while Michael Kidd and Robert Terry were identifying the plaques and tangles of Alzheimer's disease with the electron microscope. Novel technologies were potential keys to mapping the complexity of the brain and the central nervous system.

Throughout the 1960s, in departments of anatomy, biochemistry, neurology, physiology, and pharmacology, researchers around the world followed up on these clues, using new ideas and methods to ask more ambitious sets of questions about the brain and behavior. They mapped neural pathways and systems, identified and characterized neurotransmitters and studied phenomena such as memory, movement, pain, and vision in a range of organisms. As scientists deepened their understanding of the mechanisms and physicochemical interactions that linked biology to behavior, they transgressed established disciplinary boundaries more and more, until these lines began to dissolve and were replaced by a coherent spectrum that could be called "brain science."

These new methods and cooperative projects opened up the possibilities of addressing fundamental questions about the mind-brain relationship through new interdisciplinary collaborations. As groups of scientists began to think about how they could collaborate most effectively to further their understanding of the brain and the nervous system, they had to consider what structure such collaborations would have and how they would work: How should we define brain science? Who belongs in this field? What common ideas and goals characterize our work and how can we borrow and share methods and techniques? How can we improve public understanding and attract or maintain public interest support? What roles would a professional organization serve for its members and for society? In the late 1950s and 1960s, both sets of questions – scientific and organizational – were vigorously debated in a number of local and ad hoc groups.

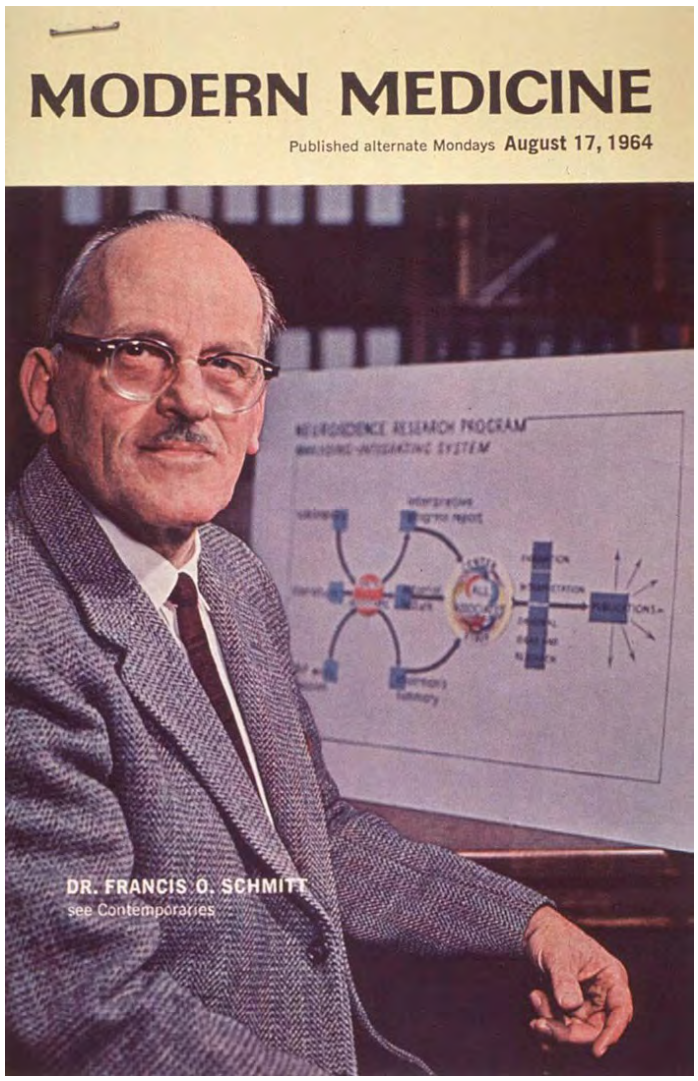


Figure 4 Francis O. Schmitt (From http://ihm.nlm.nih.gov/luna/servlet/view/search?q=B029913). (Courtesy of Advanstar Publications).

Some brain scientists experimented with novel approaches to research and collaboration at their home institutions. In 1953, for example, University of Pennsylvania anatomy professor Louis Flexner founded the Institute of Neurological Sciences (now known as the Mahoney Institute for Neurosciences). Other major academic institutions, such as Cambridge University in the U.K., McGill University in Canada, and Columbia University and UCLA in the U.S., created similar institutions to foster collaboration between researchers studying various aspects of the brain and nervous system. In 1962, Francis O. Schmitt set up the Neurosciences Research Program (NRP) in available space at the Massachusetts Institute of Technology, with support from the National Institutes of Health (Figure 4).[4] Schmitt did not intend the NRP to be a laboratory but explicitly described his creation as an interdisciplinary research program, bringing together the various "physical, biological and neural sciences … to attack a single goal," to understand the connections between mind, brain, and behavior.[5] He visualized NRP scientists from a range of areas of expertise gathering together at collaborative "Work Sessions" that would produce "workable hypotheses [and] new theories" to stimulate researchers around the world.[6] Under Schmitt's direction, the NRP held a series of meetings of national and international researchers that generated books and journal articles about neuroscience problems and findings linking biology and behavior; it became a source of educational innovation and provided crucial interdisciplinary contact for brain researchers at its work sessions and through its *Bulletin*. However, the NRP was too limited in scope to provide extensive coordination across multiple campuses and departments – one of the key functions that SfN would later fulfill. Neal Miller, one of SfN's founders, later credited Schmitt with "laying the foundation and in bringing the field to the point at which such a Society would be possible." Understanding that the NRP and SfN filled two different and non-competing roles for neuroscientists, Schmitt "lent his characteristically warm and generous support to the Society."[7] Many NRP members moved into the SfN leadership and 10 out of the first 12 SfN presidents were NRP Associates.[8]

Outside their academic grounds, individual brain researchers had long coordinated their own informal associations to present their work to interested colleagues from other disciplines.[9] Starting in 1954, Karl Frank[10] of NIMH invited several hundred researchers to gather on the first Sunday afternoon of the meeting of the Federation of American Societies for Experimental Biology (FASEB). As Novera Herbert Spec-

tor recalled, these colloquia featured three invited speakers and “then dissolved into a free-for-all social and scientific gossip session … of the highest level.”[11]

In the 1960s, similar groups proliferated. In the US, scientists studying neurons or the brain would convene at the Western Nerve Net, the Know Nothing Club at Johns Hopkins, the Bay Area Neuroscience Group (BANG), the Neurophysiology Club in Washington DC, or with the Axonologists in Chicago, who usually met in tandem with the American Physiological Society.[12] Although many continued to participate in the scientific umbrella societies of their home disciplines, they felt that the smaller, more focused meetings gave them additional opportunities to learn from one another.

The penultimate step in the establishment of an independent organization for brain science, however, was the National Academy of Sciences’ decision in 1965 to create a committee to respond to an international call for a global survey of brain research. The origins of this international effort began in 1958 with the Moscow meeting of the International Federation of Electroencephalography and Clinical Neurophysiology. Members in attendance unanimously endorsed the formation of an International Brain Research Organization (IBRO) to improve communication and promote international cooperation among scientists interested in the brain, which became a reality in 1960 under the auspices of UNESCO. An international coterie of basic researchers, including the French neurophysiologist Henri Gestaut, Russian physiologist Ivan Beritashvili, and Herbert Jasper, an American working in Canada, believed that advances in brain sciences merited an independent organization. In a rare instance of Cold War scientific cooperation, the founders created IBRO in the hope that it would foster collaboration in these developing fields that did not fit into existing clinical disciplines.

Committee on Brain Sciences, 1965-1969	
R. W. Gerard	F. O. Schmitt
S. S. Kety	K. R. Unna
N. E. Miller	R. D. Adams
Frank Morrell	David Bodian
Eugene Roberts	V. H. Denenberg
Carl Pfaffmann	E. V. Evarts
D. B. Lindsley	W. W. Magoun
W. A. Rosenblith	

One of IBRO’s first major projects was to request that each of its member countries conduct a survey of the existing laboratories, research groups, and institutional support, as well as the resource needs, of eight subfields of brain science research, defined as “Neuroanatomy, Neurochemistry, Neuroendocrinology, Neuropharmacology, Neurophysiology, Behavioral Sciences, Neurocommunications and Biophysics, and Neuropathology.” In 1965, the National Academy of Sciences-National Research Council (NAS-NRC) formed the Committee on Brain Sciences (CBS) to direct the U.S. survey; in retrospect, the CBS can be seen as the first operational step toward the founding of the Society for Neuroscience.[13]

Ralph Gerard, a physiologist from the University of California, Irvine, led the committee, which consisted of a relatively small group of scientific leaders (see Table).

Figure 5 Ralph Gerard. With permission of the University of Chicago Libraries.

Though no women were members of the committee, the NAS staff person assigned to the Committee on Brain Sciences, Louise Marshall, was an energetic scientist and administrator who played an important organizational role in both the IBRO survey and the founding of SfN.[14]

From 1965 to 1969, the committee met every few months, rotating the leadership and responsibilities and developed an understanding of the challenges posed by integrating the multiple strands of brain research. The committee quickly discovered that, while the American brain research community was vibrant and active, it was widely scattered and lacked focus or impact.[15] Its report on “Research Facilities and Manpower in Brain Sciences in the United States” appeared in two volumes during 1968 and 1969 (Figure 6) and the findings awakened the committee to the need to develop a more formal national institution to link scientists, share knowledge of practices and findings, recruit government and foundation support, and disseminate the potential meaning and importance of the emerging brain-behavior connections.[16]

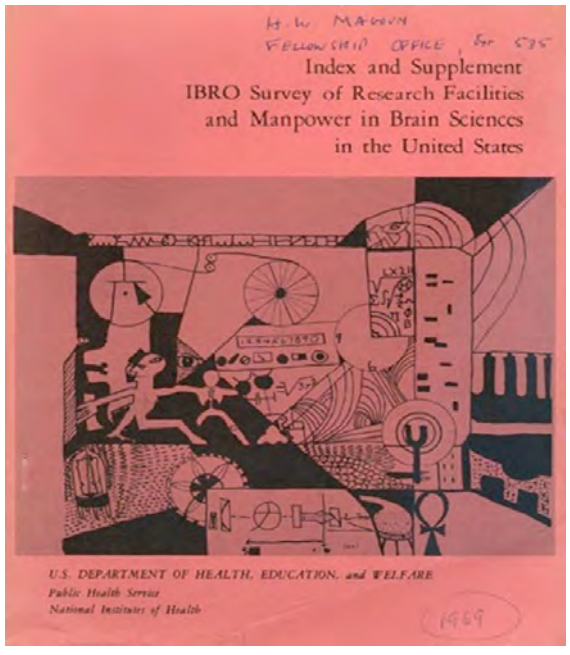


Figure 6 IBRO Survey of Research Facilities and Manpower in Brain Sciences in the United States. Supervised by the Committee on Brain Sciences, Division of Medical Sciences, National Research Council. 1969.

As Robert Doty of the University of Rochester recalled, the committee “came to recognize the diffuseness of neuroscience, a part of many disciplines but lacking a focus of its

Neuroscience as a vocation

The IBRO survey underlined what many already knew; namely, neuroscience was already an important and rapidly growing area of scientific interest. The training of new scientists provides an illustrative window into this growth. Assessing dissertation titles and abstracts completed between 1960 and 1976, Louise Marshall and Horace Magoun tabulated the number of neuroscience dissertations.[1] They found that between 1960 and 1969, the number of doctoral dissertations on neuroscience topics increased by a factor of six from 50 to 301, compared to a 2.4-fold increase for all dissertations in the biological sciences...more

own….The idea began to crystallize that a single society along the multidisciplinary lines of IBRO itself might substantially strengthen the many disparate studies of the nervous system."[17]

Endnotes

1. Recuerdos de mi vida, Vol. 2, Historia de mi labor científica. Madrid: Moya, 1917, p. 76. quoted in:http://en.wikipedia.org/wiki/Golgi%27s_method.
2. Golgi, quoted in López-Muñoz, Francisco, Jesús Boya, and Cecilio Alamo. "Neuron Theory, the Cornerstone of Neuroscience, on the Centenary of the Nobel Prize Award to Santiago Ramón Y Cajal." Brain Research Bulletin 70, no. 4-6 (2006): doi:10.1016/j.brainresbull.2006.07.010, p. 400.
3. Cajal, quoted in Lopez-Munoz, p. 401.
4. Judith P. Swazey, "Forging a Neuroscience Community: A Brief History of the Neurosciences Research Program" in Frederic G. Worden, Judith P. Swazey, and George Adelman, eds. *The Neurosciences: Paths of Discovery* Cambridge: MIT Press, 1975, p. 529-546
5. George Adelman, "The Neurosciences Research Program at MIT and the Beginning of the Modern Field of Neuroscience" *Journal of the History of the Neurosciences: Basic and Clinical Perspectives* 19:1 (2010), 15-23, p. 16.
6. Adelman, "The NRP," p. 17-19.
7. Letter from Neal Miller to Louise Marshall, March 17, 1981, Letter to CBS members re: Society for Neuroscience 1981 Folder, Louise H Marshall Papers, Neuroscience History Archives, UCLA.
8. Adelman, "The NRP," p. 21.
9. "Evolution of the Axonologists" *NN* 3:2, June 1972, p. 6; Candace Hsieh, "The Founding of the Society for Neuroscience" Unpublished research paper, June 1998, courtesy of Candace Hsieh and Bernice Grafstein.
10. Karl Frank (1916-1993) was the Section Chief of the Section on Spinal Cord of the NIMH Laboratory of Neurophysiology and one of the first to observe and report presynaptic inhibition.
11. Novera Herbert Spector, "Comment" *NN* 17:6, December 1986, p. 5. See also "Evolution of the Axonologists."
12. Robert Doty, "Neuroscience" in *The History of the APS: The First Century, 1887-1987*, American Physiological Society, 1987, pp. 427-434, p. 428; Ed Perl, "Society for Neuroscience – A History of Beginnings" *NN* 17:6, July/August 1986, p. 1, 3-5, p. 3.
13. Louise H. Marshall, et. al, " Historical Report: Early History of IBRO: The Birth of Organized Neuroscience" *Neuroscience* Volume 72, No. 1, 1996, p. 283-306; Robert Doty, "Neuroscience" in *The History of the APS: The First Century, 1887-1987*, American Physiological Society, 1987, pp. 427-434, p 430; Susan Cozzens, "IBRO in National and International Perspectives" in Marshall "Early History of IBRO" *Neuroscience* Volume 72, No. 1, 1996, p. 283-306, p. 302.
14. Louise Henson Marshall (1908-2005) was educated at Vassar and at the University of Chicago, where she received her Ph.D. in physiology in 1935. After some years teaching and raising a family, she joined the wartime Aviation Medicine Unit at NIH, and then conducted renal physiology research for twenty years at the National Institute of Arthritis and Metabolic Disorders, before joining the NAS-NRC staff in 1965. In 1975, she moved to UCLA, where she served as the editor of *Experimental Neurology* and co-founded the Neuroscience History Archives with Horace W. Magoun in 1980, serving as the Archives Director until her death.
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16. G. Krauthamer, "World Survey of Resources and Needs in Brain Research" in Marshall

“Early History of IBRO” *Neuroscience* Volume 72, No. 1, 1996, p. 293-298.

17. Doty, “Neuroscience” p. 430.
18. Marshall, L H, J A Rivera, and H W Magoun. "The Institutional Base for Education and Research Neuroscience." *Experimental Neurology* 49 (1975): 14-23.

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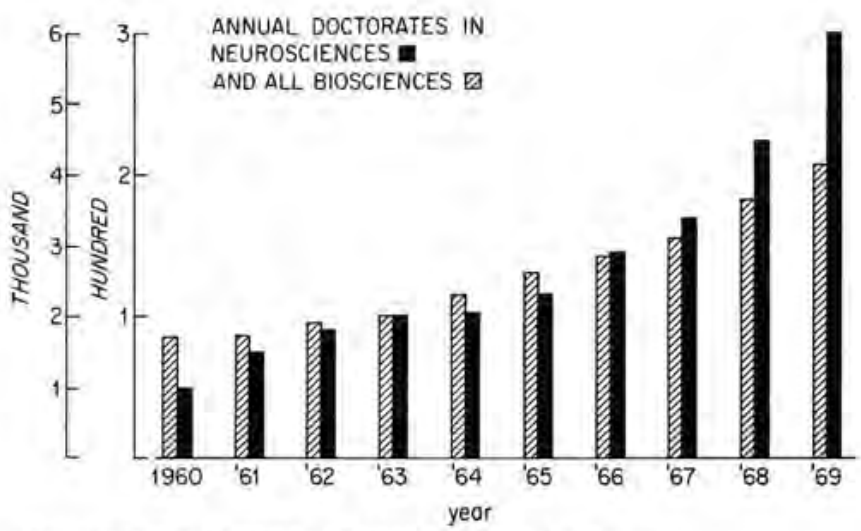


Figure 7 Neuroscience dissertation topics vs bioscience.

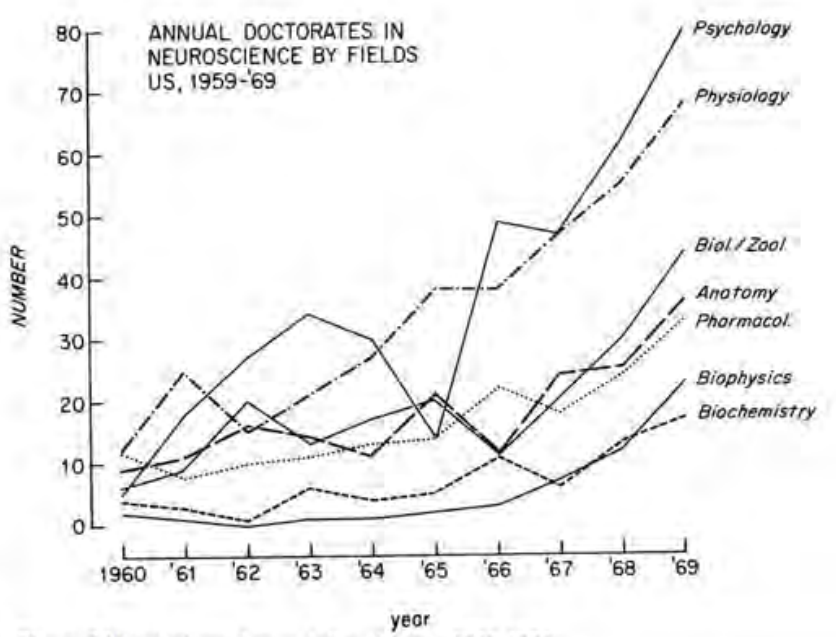


Figure 8 Neuroscience focused dissertations, 1970-1976.

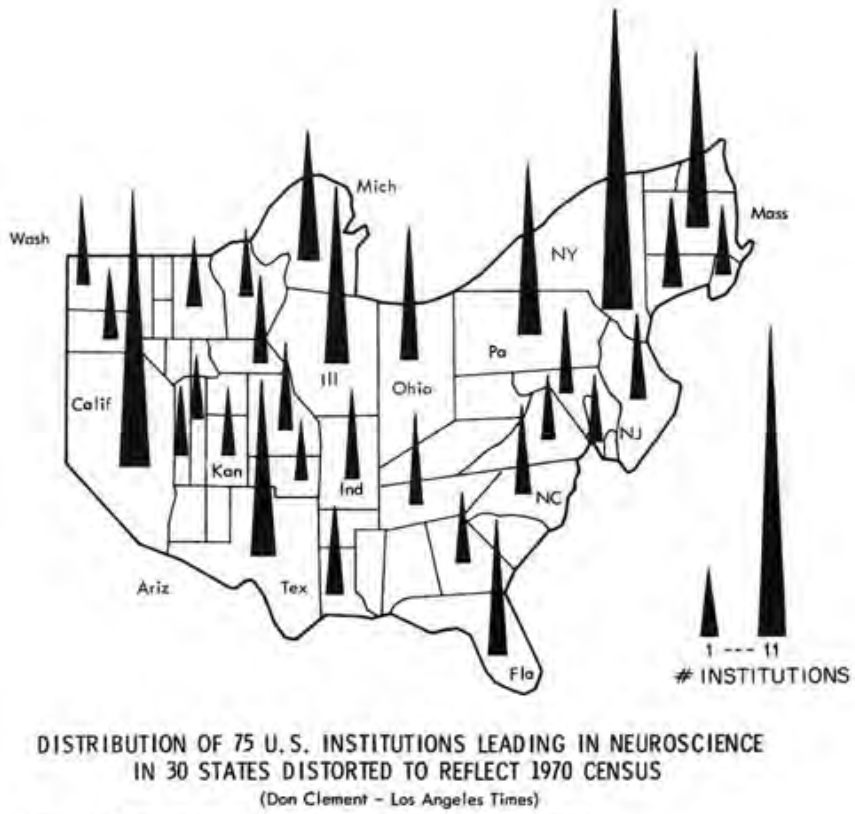
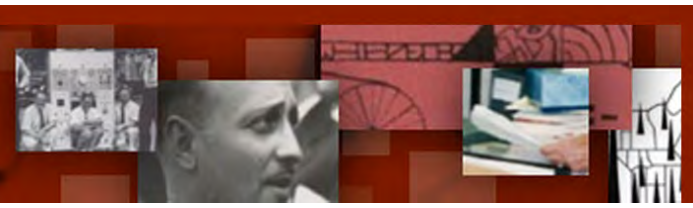


Figure 9 Neuroscience Institutions in 30 states, 1970.



Chapter II: Establishing the Society for Neuroscience, 1968-1970

The Committee on Brain Sciences' realization that collaborative work in brain science in the U.S. was alive and well, but without strong recognition, support, or communications, made a strong case for an organization that could articulate the interests of this new generation of scientists who, armed with increasingly sophisticated methods, were often transgressing the traditional disciplinary boundaries in understanding brain and nervous system function. As early as June 1967, the committee agreed that a "formal organization of brain scientists in this country was desirable and feasible at this time, and that the emphasis should be on innovative means of communicating with students and integrating the brain research specialties."[18] CBS members had ambitious goals for the new entity: to "help direct attention to the importance of neurosciences for the future intellectual and emotional well-being of this country."[19] They believed that recent findings and research providing insights into vision and memory and suggesting therapies for Parkinson's, stroke, and mental illness would attract public interest and build support for increased institutional and academic funding, as well as facilitate educational recruitment and scientific collaboration.

The question of *how* to design and establish such an organization preoccupied the CBS in 1968 and 1969. On the one hand, a network of existing local and regional groups, under a name such as the "Federation of American Brain Research Organizations," could be most easily and quickly established and would attract ready support from those who were already involved in scientific collaborations. But some, such as Robert Doty, doubted whether a network would have the public impact of a single organization, recruit new scientists who had been working in isolation, or adequately "unite the many disparate strands." Ultimately, the plan to create a single, independent organization won out, after Doty conducted a survey of representative scientists that expressed "a groundswell … in favor of better vehicles for scientific exchange than existing organizations offered."[20]

The mandate for the new society was clear; as Perl recalled in 1986, "there were pleas for an organization to promote the public image of work on the nervous system and to enhance financial support for it."[22] Over the winter months of 1969, Perl drafted a constitution and bylaws for this new organization and enlisted Louise Marshall to request institutional assistance and initial operating funds from NAS.[23] The Executive Group shared drafts of the constitution and bylaws — which put no limits on members from any subdiscipline — with 200 colleagues they had identified as potential members. Interest in the new society began to build.[24]

The Founding Members	
Edgar A. Bering, NINDS	Charles U. Lowe, NICHD
A.T. Bever, NSF	Louise H, Marshall, NAS-NRC
John M. Brookhart, NSF	Neal Miller, Rockefeller University
James H, Brown, NSF	Edward R. Perl, University of Utah
Robert W. Doty University of Rochester	Alfred Pope, McLean Hospital
Fred Elmadjian, NIMH	Vernon Rowland, Case Western Reserve University
Daniel X. Freedman, Pritzker School of Medicine	James M. Sprague, University of Pennsylvania
Ralph Gerard, UC Irvine	Eliot Stellar, University of Pennsylvania
Lore Heinlein, Elsevier	Robert L. Thompson, Hunter College
Richard T. Louttit, NIMH	John E. Wilson, University of North Carolina

On June 16, 1969, at the NAS building in Washington, DC, the Committee on Brain Sciences held the crucial meeting that would bring the new Society into being. Psychologist Neal Miller of Rockefeller University, as the chair, reviewed the survey findings and the proposed constitution and bylaws submitted by Perl and his Executive Group. “Miller waved his long yellow pencil” and “all 20 of those at the conference table … being qualified neuroscientists, became founding members.” The eight members of the Steering Committee, with Gerard, Miller, and Marshall, declared themselves the first acting Council of the Society, authorized to serve until there were enough members to hold a formal election. Perl was named acting president and Marshall was designated acting secretary-treasurer, until elections could be held.[25]

A Rose by Any Other Name: Naming the Society

Conjuring up an appropriate name raised fundamental questions about the nature of neuroscience — issues that, to this day, have remained relevant. First and foremost, the founders wanted a name that underscored the expansive scope that they envisioned for the field. But then should the name emphasize the disparities or the perceived unities within the American brain science community? And what of the word “brain”? Was it essential, or would it deter some potential members whose work did not fall so readily under the umbrella of “brain” sciences? Further, was there a group of words that could encompass all the methods and problems on which U.S. researchers were working? Was it possible to bring together, within a single society, researchers who focused on the molecular biology of single cells and those who worked on diseases, like schizophrenia, that involve not only the brain but just as intimately an afflicted individual’s social and psychological world?

The “Neurobiological Society” was deemed “just a little narrow to psychiatrically and behaviorally oriented members” while some felt that the word “American” should be in the name to clarify its affiliative role in IBRO.[26] As Perl recalled the discussion:

> *Some … favored putting “Brain” into the title, and there also were*

> *arguments in favor of including "Behavior" in the title. The majority of the Executive Group believed that the term "Brain" would tend to inhibit interest in membership by investigators interested in axons, ganglia, the spinal cord, or molecular processes. This, so it seemed to us, would defeat the notion of interdisciplinary contacts. Certain early proposals for names were awkward –for example, "Society for Research on the Nervous System." … "American Neurosciences Society" disturbed several of the Executive Group. "American" implied more than the United States and its immediate neighbors to the north and south, and the use of "Neuroscience" as an adjective for "Society" appeared ungrammatical, although efficient.*[27]

Other discussions revolved around whether "Neuroscience" should be singular or plural. Gerard and Marshall both adamantly preferred "Neuroscience" because it denoted a single, unified field.[28] Eliot Stellar recalled that the singular "could more readily include all "neuro" fields equally" while the plural "would imply an amalgamation of old fields."[29]

In the end, as David Bodian explained, "the word 'science' was indispensable, and 'Neuroscience' told it all. I believe it was Frank Schmitt who first visualized an organization in which scientists of every description, from mathematics to psychiatry, could contribute to each other's understanding of the workings of the nervous system."[30] Finally, the broad and simple name, "Society for Neuroscience", was approved.

Thus the Society chose to define neuroscience in the broadest terms as unbounded. The Council further articulated three major goals, which remain the core of the Society's mission and again reflect the founders' intentions to develop an interdisciplinary field, promote scientific work, and establish public support through emphasis on the importance and benefits of self-governing scientific research: "1) To advance understanding of nervous systems and their role in behavior; 2) To promote education in the neurosciences; 3) To inform the general public on results and implications of current research."[31]

Based on these goals, the Council also began to define its priorities for the immediate future. These priorities reflected the Council's definition of neuroscience as a field that spanned multiple traditional disciplines and, as such, would require an unusually diverse membership, new forums for communicating, and funding organizations (especially NIH) sympathetic to the expanded definition of neuroscience and the interdisciplinary methods necessary to address questions posed by this new cadre of neuroscientists. The Council also realized that federal funds would have to be justified through presentation of the future tangible social benefits of neuroscientific knowledge (e.g., the cure of diseases) made possible by improved understanding of the relationships between biology and behavior. Thus, the initial priorities for

SfN were to secure the Society's viability by building membership and attracting external funding; to build interdisciplinary ties through a dynamic annual meeting and a regular newsletter; to introduce neuroscience and its potential benefits to the government and the public through the media; and to build collaborative links with other organizations and institutions.

The Council had a strong belief that science flourished best within democratic organizations and it fashioned the Society's governance after Western principles of democracy. This conviction was especially evident in the Council's decisions regarding membership criteria and officer selection. The Council recognized that it needed not only to recruit a diverse cadre of scientists as members but also to assure them that all groups would have representation in Society governance and programs, and through the Society, a voice in public policy. Moreover, while established leaders in the various fields would be important in attracting funding and public interest, younger scientists, trained to think across disciplines, would over time contribute most to the scientific work and maintain the Society's multidisciplinary character. As Perl later commented, he and others were "dismayed by the tendency of scientific societies to be governed by … a dynasty of older individuals who were no longer active in the laboratory and promoted one another for leadership positions."[32] The Society founders anticipated that more democratic policies would promote the fertile scientific collaborations and major public impact envisioned for the new organization.

Reflecting the above concerns, the questions that Council debated at its first formal meeting at the NAS building, on October 26, 1969, included: What disciplines and age groups should SfN recruit? What criteria should be established for nomination to the Council and admission to the Society? And how could the Society ensure a wide geographic representation? The minutes noted that "the younger potential members of the Society have expressed concern that membership should be determined democratically and in a manner to counteract any tendency toward stagnation of the Society. 'Operators' in peripheral professions or disciplines would perhaps be most likely to promote their self interest rather than the best interests of the neurosciences. Because the Society is promoting interdisciplinary interests among its members it was felt that even those known to have a narrow outlook should be included."[33]

SfN was not unique in trying to fashion a democratic identity; the idea that scientific societies should reflect democratic values of openness and majority rule was a feature of many scientific institutions in the Cold War era, particularly in the US.[34] But because the SfN founders were redrawing scientific boundaries to form a new discipline at the same time that they were establishing a new organization, a democratic approach was also the best way to ensure that neuroscience would remain an independent and open field. The early Council members deliberately established nominating procedures for Society offices that helped to ensure a democratic organization, specified that future leaders would be drawn from both biological and behavioral disciplines, and invited younger members, those under 45, to run for Council positions. The Council divided the United States into four geographic regions: Baltimore South, Philadelphia North, Pittsburgh Rocky Mountain, and West Coast. It also divided disciplines into two cate-

gories: neurobiological and behavioral, and left it to the next Council to “rectify any unbalance between biological and behavioral disciplines” in future elections.[35] As Perl recalled in 1986, “Our wish was to attract to the new society investigators interested in the neural basis of behavior, but we wanted to insure that the new organization would be dominated by neither the behaviorally nor the biologically inclined.”[36]

These established needs and priorities — membership growth, financial support, promotion of interdisciplinarity, public information, and institutional collaboration — would shape activities for the next 25 years.

Endnotes

18. Minutes, Committee on Brain Sciences No 5, 15-16 June 1967, p. 4. Neuroscience History Archive.
19. Letter from Sidney Ochs to Ralph W. Gerard, June 7, 1968, Organization of Brain Scientists: 1st meeting 1967-1969 Folder, Louise Marshall Papers, UCLA.
20. Robert Doty “Dear Colleague” letter, July (?) 1969 Organization of Brain Scientists: 1st Meeting 1967-1969 Folder, Louise Marshall Papers, UCLA; Ed Perl, “Society for Neuroscience – A History of Beginnings” *NN* 17:4, July/August 1986, p.1, 3-5, p, 1.
21. Doty, “Neuroscience” p. 431.
22. Perl, “A History,” p. 3; Doty, “Neuroscience” p. 431
23. Letter from Ed Perl to Nancy Beang, May 30, 1995, SfN Archive
24. Perl, “ A History,” p. 3.
25. Perl and Marshall later quibbled over minor details of this description, but their basic recollections are consistent. Letter from Louise Marshall to Stan Mims, March 21, 1995, SfN – Early History – Schatz, Mims 1995 Folder, Louise Marshall Papers, UCLA; Perl, “A History,” p. 4 and Letter from Ed Perl to Nancy Beang, May 30, 1995, SfN Archive
26. Letter from Ralph W Gerard to Sidney Ochs, July 31. 1968, Organization of Brain Scientists: 1st Meeting 1967-1969 Folder, Louise Marshall Papers, UCLA; Perl to Beang letter, May 30, 1995, p. 4; Perl, “A History,” p.4
27. Perl, “A History,” p. 4
28. Hsieh, “The Founding of the Society for Neuroscience” p. 11; Letter from Victor Denenberg to LHM June 12, 1981, Letter to CBS members re: Society for Neuroscience 1981 Folder; Louise Marshall History of Society for Neuroscience Notes October 14, 1984, and LHM’s account of NS history/autobiography [on reading the current issue of NS Newsletter] 11/21/94, History of the Society for Neuroscience, 1968-1994 Folder, Louise Marshall Papers, UCLA.
29. Eliot Stellar to LHM April 3, 1981, Letter to CBS members re: Society for Neuroscience 1981 Folder, Louise Marshall Papers, UCLA.
30. David Bodian to LHM April 1, 1981, Letter to CBS members re: Society for Neuroscience 1981 Folder, Louise Marshall Papers, UCLA.
31. First Council Meeting Minutes, October 1969.
32. Edward R. Perl, in Larry R. Squire, ed., *History of Neuroscience in Autobiography, vol. 3.* Society for Neuroscience, 2001: pp. 399.
33. First Council Meeting Minutes, October 1969.
34. See for example, Rena Selya, “Defending Scientific Freedom and Democracy: The Genetics Society of America's Response to Lysenko” *Journal of the History of Biology* 45 (2012): 415-442.
35. Second Council Meeting Minutes, January 22, 1970. SfN Archives.
36. Ed Perl, 1986 NN article.

Chapter III: Fostering a New Interdisciplinary Approach to Problems of Brain and Behavior, 1970-1974

In the early 1970s, the nascent Society set up an office with NAS support and concentrated on fostering a new interdisciplinary approach to brain and behavior research. This was an exciting period for the field, with such developments as the isolation of the opioid receptors in the brain, which heightened public interest in “natural highs” and solutions to the problems of pain and addiction; the fields of learning and memory enhanced by Tim Bliss and Terje Lomo’s description of long-term potentiation and Eric Kandel’s findings that habituation and sensitization altered the strength of synaptic connections, which enhanced the fields of learning and memory; and the introduction of CT, MRI, and PET scanners which made the interior of the brain visible *during behavior* (Figure 10). The newly christened field had the opportunity to capitalize on these findings to build support and funding for such interdisciplinary work and for the ideal of a diverse, but collaborative and self-governing, enterprise.

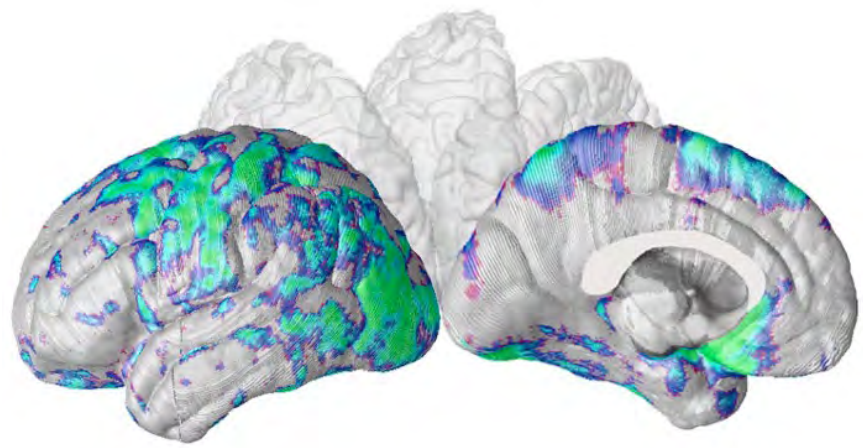


Figure 10 MRI map of the language network in patient with Alzheimer's disease. Image courtesy of Dr. Liana Apostolova, Department of Neurology, David Geffen School of Medicine, UCLA.

The major issues confronting the Society at this time were: 1) to promote scientific communication and collaboration; 2) to ensure and perpetuate interdisciplinary representation in membership and governance; 3) to promote public interest and understanding through informational programs and the creation of a logo. The Society organized around its annual meetings in the fall, where members presented and discussed their work and extended their professional and scientific networks; the annual meeting was also the Society’s major expenditure and a source of ongoing income. The Council met two or three times each year to plan the annual meetings and to consider questions of membership and finance; the quarterly *Neuroscience Newsletter* acted as the adhesive cementing long-distance and transdisciplinary ties in between the annual gatherings.

In setting membership rules and leadership criteria, the early leaders of SfN shaped the Society in ways that reaffirmed their definition of an expansive neuroscience that explicitly addressed questions across multiple domains. They declared membership open to any scientist in North America who demonstrated "serious interest in research evidenced by publication" and "a sincere interest in an interdisciplinary approach to problems of brain and behavior." To facilitate the approval process, members could sponsor their colleagues and students[37] and dues were set low, at $15 per year, and $3 for students.[38] This strategy proved immediately successful. By December 1969, six months after its founding moment, 500 individuals, representing disciplines ranging from biochemistry to clinical psychology, had joined the Society and formed six local chapters. Each subsequent Council meeting brought the approval of new chapters, which continued to form all over the country. By the time the Society met for its first annual meeting in October 1971, there were 25 approved chapters in 18 states, as well as two in Canada.[39] The chapters often met monthly to share results and techniques and to engage in interdisciplinary seminars.

Although SfN began under the aegis of U.S scientific leadership at the NAS, the founders recognized the importance of building a scientific community that extended beyond the borders of the United States. They were particularly keen on embracing Canadian and Mexican neuroscientists. Neuroscience was well established in Canada, where the Montreal Neurological Institute was a pioneering leader in the nascent field, and emerging in Mexico, which was developing its own school of integrative neurobiology.[40]

Even more than geographic diversity, the Council valued intellectual diversity, especially if neuroscientists were to successfully grapple with the most compelling questions of the relationships between brain, behavior, and mind. To this end, from the beginning, the Council ensured that the leadership reflected a field that spanned the biological and behavioral disciplines.

This was not necessarily an easy task. For example, in March 1972, Louise Marshall noted a "danger … that the more self-aware, self-assured disciplines may run away with the Society. For example, with the […1971] election, the Council has a preponderance of neurophysiologists." In that year, therefore, the Council amended the bylaws so that officers would only serve one-year terms instead of two. Marshall and others expressed concerns about changing the bylaws so soon, fearing that the Council and Society would be changed based on youthful whims, but these fears proved unfounded.[41]

The SfN leadership maintained the commitment to supporting an interdisciplinary atmosphere. The Membership Committee again expressed diversity concerns in 1975, when it noted the minority of clinical researchers among members and requested advice from the Research Society of Neurosurgeons and the International Neuropsychologists Society on how to attract more members whose "primary identification may not be as neuroscientists," but who nevertheless would find interdisciplinary collaborations useful and productive.[42]

The first Council was elected from a slate of leaders created "with careful consideration given to geographic and disciplinary distribution of candidates."[43] With 57 percent of the new Society voting, members chose neurophysiologist Vernon Mountcastle of Johns Hopkins as the first elected president, Neal Miller as the president-elect, and Mountcastle's biophysicist colleague Martin Larrabee as secretary-treasurer. The eight Council members included biophysicists, neurophysiologists, neuroanatomists, and an experimental psychologist, representing a diverse array of institutions, including NIH, Albert Einstein Medical School of Yeshiva University, Indiana University, the University of Rochester, and the University of California, San Diego.[44] The first elected Council gathered in Atlantic City, New Jersey, on April 15, 1970, and began organizing its workload by creating committees on membership and chapters, the annual meeting, affiliations, and budget and finance. The Council, in appreciation for their contributions to the establishment of SfN, named Ralph Gerard honorary president for two years and Louise Marshall special consultant to the Council, "until such time that it is determined by her or a future Council that the need for consultation no longer exists."[45]

The First Council Members
Wilfrid Rall (biophysics, NIH)
Theodore Bullock (neurophysiology and electroreception, UCSD)
William Neff (experimental psychology, Indiana)
Dominick Purpura (medicine and neuroanatomy, Albert Einstein and Yeshiva University,)
Edward Evarts (neurophysiology, NIMH) Lawrence Kruger (neuroanatomy, UCLA)
Sidney Ochs (neurophysiology, Indiana) Robert Doty (neurophysiology, Rochester)
Wilfrid Rall (biophysics, NIH)
Theodore Bullock (neurophysiology and electroreception, UCSD)

SfN Standing Committees 1970-1995	
Committee	**Date established**
Membership	1970
Chapters	1970 (Changed to Chapters and Communication 1991)
Annual Meeting/Program	1970
Nominations	1970
Budget and Finance	1970

...more

Marshall was instrumental in maintaining the connection between the new Society and the NAS-NRC's Committee on Brain Sciences through this transition period. She described "the current relationship" at this juncture as "the umbilical cord has been cut but the infant not yet weaned."[46] With crisp prose peppered with her character-


NEUROSCIENCE NEWSLETTER

ELECTION RESULTS

COUNCIL MEETING

PROGRESS REPORT

Figure 11 First issue of the *Neuroscience Newsletter*, 1970. UCLA-NHA.

istic acerbic wit, she also edited and wrote for the *Neuroscience Newsletter* from 1970 until 1977 (Figure 11), providing the single most extensive chronicle of SfN's early struggles and aspirations. The first issues of the *Newsletter* underscore the Society's preoccupation with a democratic science, one that embraces multiple perspectives and that eschews elitism. Declaring the *Newsletter* the "conservator of the founding spirit of the Society," Marshall wrote that the Society would shape the field by "its pluralism of disciplines connecting to form new insights, and its freedom from elitism," and promised that "No one meeting, workshop, or publication (excepting the Society's own) would be featured without equal space to others" [47] in the publication's pages. Her editorial introducing the goals and scope of *Newsletter* concluded, "As a healthy organism, the *Newsletter* aims to survive through its capacity to perceive and respond to the environment, which in turn depends on the quality of the feedback it receives. This first issue, for which the Editor takes full responsibility, should serve as a stimulant."[48]

Imagining Neuroscience

The effort to find a suitable logo illustrates the Society's determination to forge an identity that ignored traditional disciplinary boundaries and gave a clear visual meaning as to what "neuroscience" meant as a field and as an endeavor. Each early issue of the *Neuroscience Newsletter* featured a different logo for the Society, submitted by scientists or graphic artists in anticipation of the 1972 annual meeting when members were to vote on their favorite submission. The first logo to appear in the *Newsletter*, submitted by graphic designer Percy Martin, featured an eye in the center with neurons radiating outward, circumscribed by what appears to be a petri dish. (Figure 12) The

Figure 12 First Proposed Logo April 1970 (top) and Second Proposed Logo Oct 1970 (bottom). UCLA-NHA.

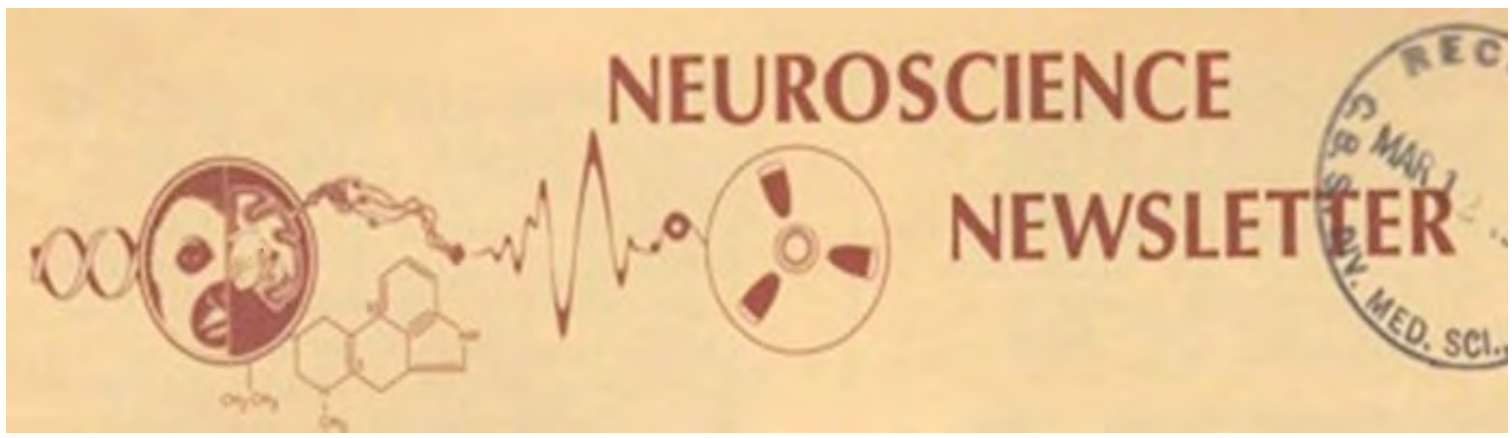


Figure 13 Third Proposed Logo, Dec 1970. UCLA-NHA

Figure 14 Proposed Logos from March 1971 (top); June 1971 (bottom L) and December 1971 (bottom R). UCLA-NHA.

second design, created by Julian Maack, an artist at the University of Utah with input from Ed Perl, was a silhouette of a human head, with nerve cells and EEG readouts flowing out of the brain (Figure 12). The third option, designed by artist Timothy Volk for a neurobiology conference at the University of Wisconsin, graphically depicts some of the laboratory tools neuroscientists could use in their experiments, including DNA, primates, chemicals, EEG recordings, and video tapes (Figure 13).

A fourth logo, from June 1971, dispensed with scientific imagery, but proposed a graphic of "Neuroscience" and "Newsletter" (Figure 14) that "refers to the normal and the skewed distributions (natural, behavioral, statistical) basic to all work of neuroscience."[49] Other options featured representations of the brain, neurofiber bundles, and an EEG readout forming the N in Neuroscience (Figure 14).

Submitted by Vernon Rowland, of Case Western Reserve University School of Medicine, the winning logo (Figure 15) reaffirmed the leadership's vision of neuroscience as a synthetic scientific field. And, as the most abstract of the submissions, it was a safe choice, while still privileging the brain over other sites of neuroscientific investigation. However, this was far from Rowland's intention. He explained his logo (Figure 16) as follows: "The brain of a neuroscientist, in trying to encompass some other brain, must frag-

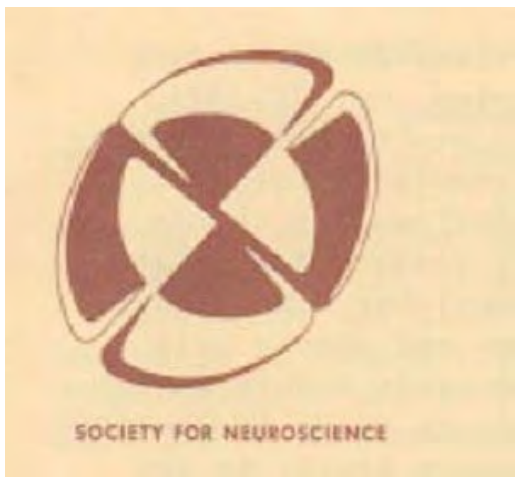


Figure 15 The Winning SfN Logo, September 1971. UCLA-NHA.

Figure 16 Rowland's explanation of his logo design. UCLA-NHA.

ment it (analysis). The brains of neuroscientists form a Society for Neuroscience in order to put it back together (synthesis)."[50] This compelling image appeared on Society publications from 1972 until November 1983.[51]The logo's multiple perspectives cleverly reflected the duality of the researcher as both the observing and observed brain.

A Society Realized

The Society held its first annual meeting in October 1971 in Washington, DC, with a structure that changed little over the ensuing decades. Symposia, lectures, poster sessions, and public outreach gave reality to the Council's efforts to create a vibrant community, enhanced by an intimate setting; all activities took place at the Shoreham Hotel. Innovations included three simultaneous morning paper presentation sessions, and the social program featured a performance of "Candide" at the Kennedy Center.[52] The Planning Committee, chaired by Henry Wagner of the National Institute of Neurological Diseases and Stroke (NINDS),[53]included an educational program, on the brain, consciousness, and the control of behavior. The program was directed at students, but open to the public, "to involve scientists, laymen and students in a discussion of … brain in behavior that is open to the temper of the times."[54] The public session was the first in a series of annual meeting events designed to introduce the public and interested students to "information on and about the broad range of the neurosciences," what neuroscientists studied, what they learned, and how their findings could benefit society."[55]

Early Annual Meetings (video)

SfN Annual Meeting Locations 1971-1995	
1971	Washington, DC
1972	Houston, Texas
1973	San Diego, California
1974	St. Louis, Missouri
1975	New York, New York

...more

The reactions of the 1,395 scientists (including 390 students) who attended this first meeting were overwhelmingly positive. Marshall noted that many were "pleasantly surprised neuroscientists — surprised to see so many others from contingent disciplines with mutual interests, and surprised at the high quality of the sessions."[56] Planning Committee member Maxwell Cowan, a neurobiologist at Washington University in St. Louis, expressed relief that "many of the problems which I and others had foreseen just did not materialize." He noted that the morning sessions were seen as "the most successful innovation in the program. … The only criticism of these sessions was that in some cases the material dealt with got lost in experimental detail."[57]

The table above lists the sites of the annual meetings through 1995. Although all but

Figure 18 SfN Annual Meeting Attendance, 1971-1979, (Joel Braslow).

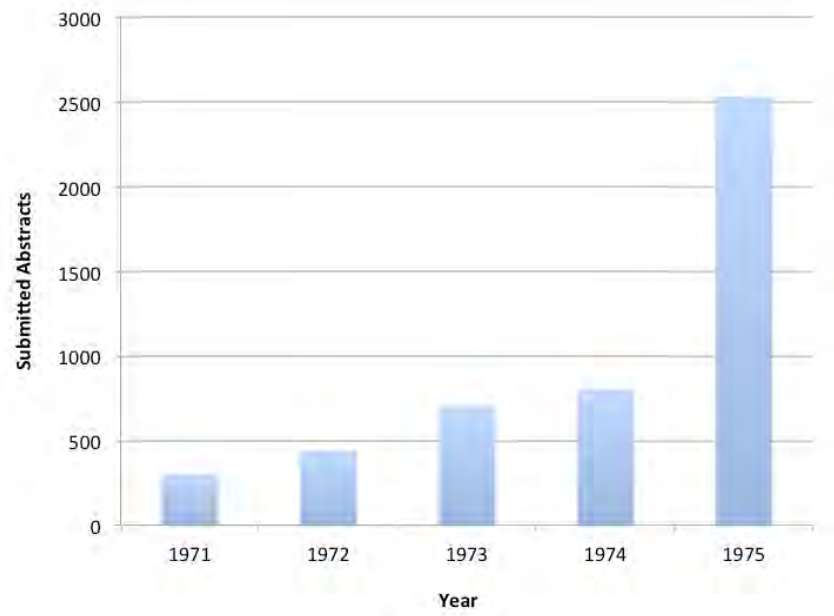
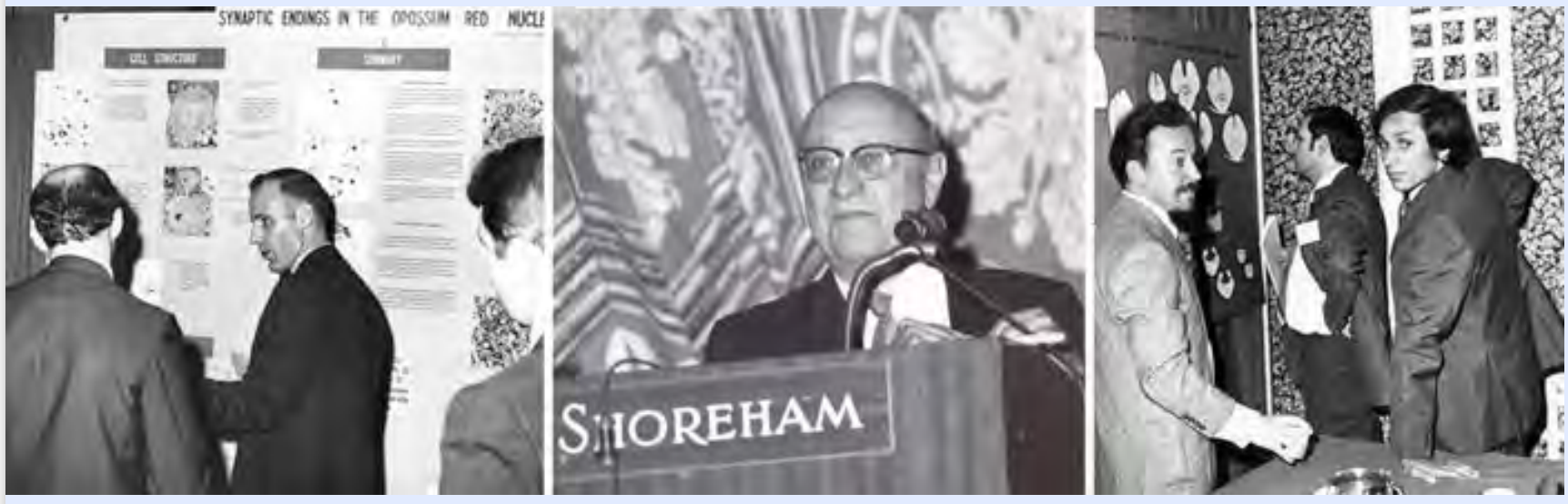


Figure 19 Annual Meeting Abstracts 1971-1975, (Joel Braslow).

two meetings were held in the US, the leadership encouraged attendance from throughout North America and tried to select the most accessible locations. In 1976, the annual meeting was held in Toronto and featured a special symposium, “Prospects in Neuroscience: A View From Three Nations.”[58] The first president from outside the US, Albert Aguayo, an Argentinian-Canadian working at McGill, served in 1987-88.Annual meeting attendance certainly is one core measure of a society’s success. From this perspective, SfN was spectacularly successful. As shown by Figure 18, annual meeting attendance during the 1970s rose far more rapidly than any of SfN’s founders could have imagined. A respectable number of 1,400 individuals attended the 1971 meeting. By the end of the decade, attendance had increased to almost 6,000, and abstract submissions (Figure 19) were about to exceed 3,600.

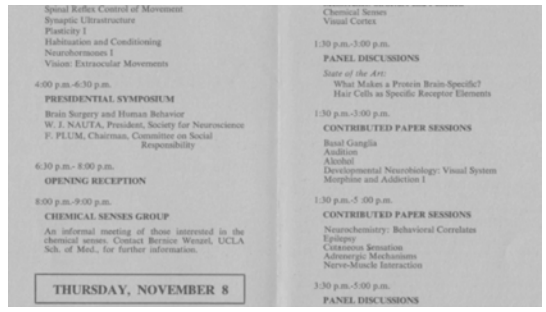
Annual Meeting Highlights



The 1972 meeting was scheduled for Houston and again included a public lecture on “Neuroscience in the Public Interest.” Although Floyd Bloom and other Society leaders saw the meeting as a valuable resource for neuroscientists across the country, they were concerned that members might be unwilling to make transcontinental journeys every year...more

To succeed in its early years, the Society faced two seemingly contradictory hurdles. On the one hand, the founders hoped to tie together a disparate group of scientists with the conceptual thread of neuroscience, which at times seemed extremely slender. On the other hand, they saw the organization's diversity as its strength and foresaw a society that fostered a kind of scientific "melting pot," marbling together multiple national and disciplinary traditions and practices, reflecting the cultural ethos of its American birthplace. Efforts to maintain both diversity as well as unity would occupy much of the SfN leadership's energies throughout the 1970s and beyond. Of course, other issues also occupied the Society during these early years, such as defining the organization's stance on public issues — those in which neuroscientists had specialized expertise, such as lobotomy, as well as those that involved members as citizens of the world, such as the problem of Soviet dissident scientists.

Third Annual Meeting, San Diego, 1973 (video)


Spinal Reflex Control of Movement
Synaptic Ultrastructure
Plasticity I
Habituation and Conditioning
Neurohormones I
Vision: Extraocular Movements

4:00 p.m.-6:30 p.m.
PRESIDENTIAL SYMPOSIUM
Brain Surgery and Human Behavior
W. J. NAUTA, President, Society for Neuroscience
F. PLUM, Chairman, Committee on Social Responsibility

6:30 p.m.- 8:00 p.m.
OPENING RECEPTION

8:00 p.m.-9:00 p.m.
CHEMICAL SENSES GROUP
An informal meeting of those interested in the chemical senses. Contact Bernice Wenzel, UCLA Sch. of Med., for further information.

THURSDAY, NOVEMBER 8

Chemical Senses
Visual Cortex

1:30 p.m.-3:00 p.m.
PANEL DISCUSSIONS
State of the Art:
What Makes a Protein Brain-Specific?
Hair Cells as Specific Receptor Elements

1:30 p.m.-3:00 p.m.
CONTRIBUTED PAPER SESSIONS
Basal Ganglia
Audition
Alcohol
Developmental Neurobiology: Visual System
Morphine and Addiction I

1:30 p.m.-5 :00 p.m.
CONTRIBUTED PAPER SESSIONS
Neurochemistry: Behavioral Correlates
Epilepsy
Cutaneous Sensation
Adrenergic Mechanisms
Nerve-Muscle Interaction

3:30 p.m.-5:00 p.m.
PANEL DISCUSSIONS

Taking Positions on Public Issues

As part of SfN's mission to represent neuroscience to the general public as socially beneficial and responsible, the Social Issues Committee alerted the Council to public debates, issues and controversies that were particularly relevant to neuroscientists or to international issues that affected the scientific community. The psychosurgery debate at the third meeting in 1973 was SfN's first such foray into public issues. Though largely abandoned by the 1980s, psychosurgery had become the topic of intense public scrutiny in the 1970s, and was one of the most publically visible issues confronted by SfN in this early period.[59] As with later issues, the SfN approach included expert discussion, consensus polling of the membership, and the readiness to present itself as the scientific authority. The Presidential Symposium featured a debate over a ban on the practice, proposed by the Potomac Chapter, that was covered in *The New York Times*.[60] In the membership vote that followed, 89% of respondents rejected "the idea of using psychosurgery for the solution of social problems, 73 percent thought it should be available with safeguards, 82 percent wanted more research with adequate safeguards, and 76 percent favored the establishment of a commission to promulgate guidelines."[61] In 1977, Robert Doty submitted this poll in testifying on behalf of the Society before the National Commission for the Protection of Human Subjects in Biomedical and Behavioral Research, and he presented SfN's recommendation "that psychosurgery be made available as a procedure of last resort for the desperately afflicted patient, but only in a context where careful evaluation is possible over a long period of time."[62]

Other examples of SfN response to public issues included a 1972 debate at the business meeting of a member-proposed resolution regarding the Soviet Union's emigration policy for Jewish scientists. These discussions forced the SfN leadership to define the boundaries of its democratic identity as they considered moral and ethical issues that were not strictly scientific but nonetheless had an impact on the scien-

tific community at large.[63] Although the Council voted to approve the statement, it also created a Resolutions Committee to vet such politically charged proposals in the future.[64]

The spectacular growth of SfN during the 1970s reflects the self-reinforcing confluence of several factors. First, leaders of SfN brilliantly encouraged diversity while, at the same time, creating a unified identity. Second, federal funding for neuroscience rose rapidly during this period, a fact not unrelated to SfN efforts. Using the NINDS budget as an example of the growth in neuroscience funding, Congressional appropriations to this Institute increased from $97 million in 1970 to nearly $242 million in 1980.[65] Third, neuroscientists had made a number of fundamental discoveries during this period of time. These discoveries not only merited Nobel Prizes within a few years, but also demonstrated the power of interdisciplinary efforts to understand the relationships between brain and behavior. The early SfN leadership wisely capitalized on this growing research capacity and scientific interest in neuroscience and thoughtfully invested it in programs that would further solidify and diversify the field. By the end of the decade, the stage was set for the new discipline to come of age.

SfN Central Office and Staff

The Washington, DC area was the logical location for SfN headquarters and the organization relied on its close link to the National Academy of Sciences during its initial startup period. For two years, the SfN central office was located at the National Academy of Sciences on Constitution Avenue, before moving to offices in the Federation of American Societies for Experimental Biology (FASEB) building in Bethesda, Maryland. FASEB provided SfN with logistical support, particularly for the annual meeting, until the Society moved back into Washington, to 11 Dupont Circle, in January 1984. Three years later, SfN moved into larger quarters in the same building, remaining there until 2006, when the Society purchased its current building on 14th Street NW...more

SfN Budgets and Financial Growth 1970-1990

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Endnotes

37. Minutes of Second Council Meeting, January 22 1970, p. 1, SfN Archive
38. Minutes of Third Council Meeting, April 15, 1970, p. 3.
39. "New Committee on Chapters," *NN* 2:2, June 1971, p. 4; "Chapter Activities" *NN* 2:4, December 1971, p. 4-5.
40. Society for Neuroscience By-Laws, Article II: Membership, p 1, June 16, 1969. SfN Archives.
41. "Taking Stock – An Editorial" *NN* 3:1, March 1972 p. 2; LHM October 14, 1984 handwritten notes for talk in Anaheim – 2nd Draft, History of the Society for Neuroscience, 1968-1994 Folder.
42. "Membership Committee" *NN* 7:1, March 1976, p. 2, 4.
43. "Progress Report" *Neuroscience Newsletter* Volume 1 Number 1, April 1970, p. 2.
44. "Election Results" *Neuroscience Newsletter* Volume 1 Number 1, April 1970, p. 1.
45. "Council Meeting" *Neuroscience Newsletter* Volume 1 Number 1, April 1970, p. 1
46. "Progress Report" *Neuroscience Newsletter* Volume 1 Number 1, April 1970, p. 2
47. Letter from Louise Marshall to David Cohen, February 11, 1977, Society for Neuroscience To File 1977-1993 Folder, UCLA
48. "Editorial" *Neuroscience Newsletter* Volume 1 Number 1, April 1970, p. 2
49. "The Logo" *NN* 2:2, June 1971, p. 2.
50. "The logo" *Neuroscience Newsletter* Volume 2 Number 3, September 1971, p. 3 and 8.
51. "The logo" *Neuroscience Newsletter* Volume 2 Number 4, December 1971, p. 8. The last issue of Volume 14 has a new layout and title banner.
52. "First Annual Meeting" *Neuroscience Newsletter* Volume 1 Number 3, October 1970, p. 1.
53. The National Institute of Neurological Diseases and Stroke (NINDS), founded in 1948 as the National Institute of Neurological Diseases and Blindness, was renamed in 1968 when the National Eye Institute became a separate entity. From 1975, it was known as the National Institute of Neurological and Communicative Disorders and Deafness (NINCDS) and then became the National Institute of Neurological Disorders and Stroke (again NINDS) in 1988, when the National Institute of Deafness and other Communicative Disorders was founded.
54. "First Annual Meeting" *Neuroscience Newsletter* Volume 1 Number 3, October 1970, p. 1.
55. "Taking Stock: An Editorial." *Neuroscience Newsletter* 3:1, p. 2.
56. Ibid.
57. Letter from Maxwell Cowan to Fred Worden, November 15 1971, Early SfN annual meetings 1969-1973; 1986 notes folder, Box: SfN early. LHM Papers.
58. Program, Society for Neuroscience Sixth Annual Meeting, November 7-11, 1976, p. 102.
59. Constance Holden, "Psychosurgery: Legitimate Therapy or Laundered Lobotomy?" *Science* New Series Volume 179, Number 4078, March 16, 1973, pp. 1109-1112, p. 1110.
60. Harold M. Schmeck, "Research Backed in Psychosurgery" *The New York Times* November 9, 1973;
61. "Brain Death and Psychosurgery" and "Draft Position Paper on Psychosurgery" *NN* 4:3, p. 2-3; "Psychosurgery's Torturous Path" *NN* 4:4, December 1973, p. 3; "Psychosurgery Finale" *NN* 5:2, June 1974, p. 6;
62. Testimony of Robert W. Doty (Society for Neuroscience) in "Use of Psychosurgery in Practice and Research: Report and Recommendations for the Protection of Human Subjects of Biomedical and Behavioral Health" *Federal Register* Vol 42 NO 9 Part III, May 23, 1977, p. 26328
63. Correspondence between Walle Nauta and Lawrence Kruger, October 31 and November 7 1972, Society for Neuroscience 1972 Folder, Lawrence Kruger gift to UCLA Biomedical Library.
64. Minutes of the 7th Council Meeting, November 7, 1973, p.1-2
65. http://www.nih.gov/about/almanac/appropriations/part2.htm. Accessed August 1, 2014.

SfN Standing Committees 1970-1995	
Committee	**Date established**
Membership	1970
Chapters	1970 (Changed to Chapters and Communication 1991)
Annual Meeting/Program	1970
Nominations	1970
Budget and Finance	1970
Affiliations	1970
Education	1971
Communications	1972-1980
Publications	1972
Social Issues	1973
Public Information	1974
Resolutions	1978
Minority Education, Training and Professional Advancement	1985 (Subcommittee of Social Issues 1979-1984)
Governmental and Public Affairs	1980 (Ad hoc Committee on Research Resources 1977-79)
Animal Research	1985 (Ad hoc 1981)
Neuroscience Literacy	1991 (Ad Hoc Committee on Secondary Education 1990)
Development of Women's Careers in Neuroscience	1998 (Ad hoc 1991)
History of Neuroscience	1994 (Ad hoc 1992)

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SfN Annual Meeting Locations 1971-1995	
1971	Washington, DC
1972	Houston, Texas
1973	San Diego, California
1974	St. Louis, Missouri
1975	New York, New York
1976	Toronto, Canada
1977	Anaheim, California
1978	St. Louis, Missouri
1979	Atlanta, Georgia
1980	Cincinnati, Ohio
1981	Los Angeles, California
1982	Minneapolis, Minnesota
1983	Boston, Massachusetts
1984	Anaheim, California
1985	Dallas, Texas
1986	Washington, DC
1987	New Orleans, Louisiana
1988	1988 Toronto, Canada
1989	1989 Phoenix, Arizona
1990	St. Louis, Missouri
1991	New Orleans, Louisiana
1992	Anaheim, California
1993	Washington, DC
1994	Miami Beach, Florida
1995	San Diego, California

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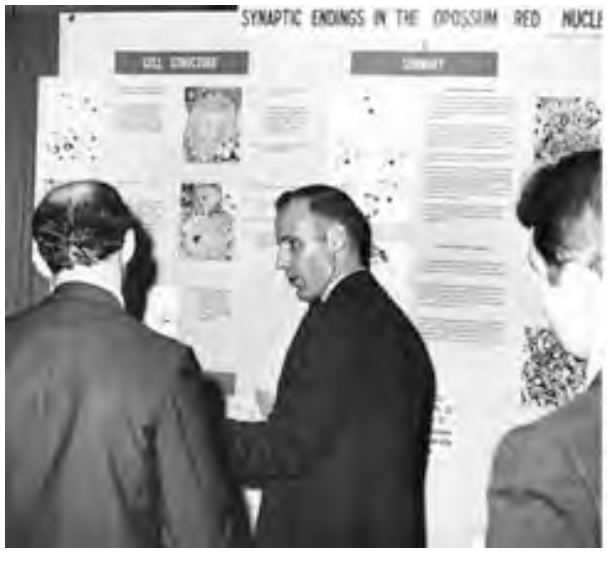
Annual Meeting Highlights



The 1972 meeting was scheduled for Houston and again included a public lecture on “Neuroscience in the Public Interest.” Although Floyd Bloom and other Society leaders saw the meeting as a valuable resource for neuroscientists across the country, they were concerned that members might be unwilling to make transcontinental journeys every year.[1] Under the direction of F. G. Worden, the Houston Program Committee experimented with different types of presentations such as demonstrations, panel discussions of precirculated materials, and poster sessions, since “the launching of a new society offers an opportunity to try to rescue the scientific community from the strait jacket of the traditional format.”[2]The majority of the proposed abstracts, however, were for the traditional 10-minute presentation format, so the Program Committee adjusted the schedule so as to accommodate both traditional and more “experimental” formats.[3] They planned nearly a full day of physiological and behavioral demonstrations, and arranged for a “Women’s Hospitality Room” at the Shamrock Hotel where “social registrants” could relax and socialize during the day while their spouses attended the scientific sessions.[4] Despite these attractive features, attendance in Houston was slightly lower than at the Washington meeting the year before.

The 1973 Program Committee, chaired by Floyd Bloom, nevertheless determinedly planned a full docket at the third meeting, scheduled for November in San Diego.[5] In addition to the usual presentations and public lectures, they also set aside time for special interest dinners, identifying a dozen different scientific subspecialties within neuroscience. There were clinically oriented groups, such as EEG, neuroendocrinology, sensorimotor integration, vision, and psychopharmacology; groups focused on experimental techniques, such as tissue culture and neuromodeling, and groups focused on brain function, chemistry, and structures: motivation, neurochemistry, neurotransmitters, memory, and morphology.[6] The Program Committee’s efforts were an outstanding success; so many neuroscientists came to San Diego that a large number of sessions were standing room only and SfN President Walle Nauta asked Bloom to apologize to the attendees.[7]

The Program Committees of the 1970s continued to experiment with new forms of presentations, including poster sessions, workshops, and demonstrations.[8] By 1975, the meeting was large enough (3,775) that the Education Committee sponsored two neuroscience symposia, on neurotransmitters, hormones, and receptors: novel approaches. Seven papers were presented and then published by the Society.[9] To continue the Society's goal of giving neuroscience a public face, the planners regularly planned events for high school students and teachers at the meetings, and extended invitations to local journalists.

The Council also began work on a prize program to recognize outstanding achievements and to promote public interest and attendance. The first of these awards, introduced in 1978, were the Donald Lindsley Prize for Young Investigators and the Ralph W. Gerard prize for Lifetime Achievement. In November 1976, a short course on neuroplasticity and recovery of function was presented the day before the SfN meeting in Toronto. This required a separate registration, and 285 members participated.[10] 400 people attended the 1978 short course on neuroanatomic techniques and another 200 had to be turned away. Copies of the syllabus "cookbook" were available for $4 from the SfN central office.[11] SfN continued to offer short courses in conjunction with the main program, and added innovative programs such as the neurobiology of disease workshop in 1989, seminars and Continuing Medical Education programs.[12]

SfN meetings began to take on a more international dimension during this period. The 1976 Toronto meeting also featured a tri-nation symposium, addressing the prospects of neuroscience in Canada, Mexico and the United States, and at the 1978 meeting in St. Louis, SfN and IBRO jointly sponsored a symposium on reticular formation.[13]

The annual meeting was a clearinghouse for job seekers, and until 1977, there was a free bulletin board in the registration area that was always covered with job announcements. At the 1977 meeting in Anaheim, SfN started a more formal Placement Service where, for a fee, employers and job seekers could register and schedule interviews.[14] "Although the Society had to subsidize the first Placement Service by some $1,500, its success in assisting employers and candidates to fill job openings was so pronounced that the Council decided to continue it."[15]

The annual meeting relied on new technologies for efficiency and novel forms of communication. At the 1977 meeting, Floyd Bloom coordinated the first satellite symposium, linking speakers in Anaheim with an audience in Washington, DC, "Ato show that you didn't actually have to physically travel to meetings in the future. You could actually attend by use of electronic means."A[16] As the Society grew, the Program Committee's task became more and more complicated, as the number of abstracts and themes increased from year to year.[17] SfN was one of the first organizations to offer a way to search the abstract database electronically; for the 1989 meeting, members could dial in to the database via modem and search by keyword, author, institution or session title.[18]

The annual meeting was an opportunity for interdisciplinary contact, but it was also a chance for special interest groups to meet and share ideas and techniques. Groups on circadian rhythms, software, and reptile research met at one or more meetings. In 1985, the process was formalized and the special interest meetings and dinners were once again organized around more clearly defined scientific topics.[19]

Other special interest groups explored the less formal side of neuroscience. At the Cincinnati meeting, a few members met with a local folk dance group. “Looking ahead to the Los Angeles meeting, they anticipated that a fair number of registrants who are active, closet, or potential folk dances might be interested in establishing sensorimotor interactions with other neuroscientists.” They hoped to schedule a neuroscience folk dance evening workshop, and asked any interested parties to contact Andy Hoffer at NINDS with information about experience and which country’s dances they prefer and/or would like to teach.[20] 70 dancers attended the event, led by neuroscientists John Garti and Bob Lloyd. “Participants ranged from experienced dancers who often had a chance to test out rusty cerebellar circuitry established decades earlier, to raw beginners.”[21]

Some neuroscientists chose to stimulate their gustatory neurons. At the 1982 meeting in Minneapolis, there was an ancillary special interest dinner to explore “Capsaicin Burns at Both Ends: An evening of Sri Lankan Curry Cuisine … to introduce neurobiologists to one of the delightful uses of capsaicin practiced in Sri Lanka” followed by “a discussion of the present understanding of the neurotoxic effects of capsaicin on nociceptive transmission.”[22] And after the 1989 meeting, Reuven Gellman organized a kosher neuroscience club so that those members who observed the kosher dietary laws could arrange for appropriate meals at the annual meetings.[23]

66. Interview with Floyd Bloom, May 6, 2014
67. “Second Annual Meeting” *Neuroscience Newsletter* 3:1, March 1972, p. 1, 3.
68. “Committees” *NN* 3:2 June 1972, p. 3.
69. Second Annual Meeting Announcement and Press Release, September 15, 1972, SfN Archives. Preliminary Program, NHA, UCLA
70. 1229 people were registered at the Second Meeting, compared to 1394 at the first.http://www.sfn.org/Annual-Meeting/Past-and-Future-Annual-Meetings/Annual-Meeting-Attendance-Statistics/AM-Attendance-1970s
71. “Special Interest Dinners” *NN* 4:3, September 1973, p. 1.
72. Interview with Floyd Bloom, May 6, 2014.
73. Programs, Interview with Floyd Bloom, May 6, 2014.
74. Order Form for Neuroscience Symposia Volume 1, *NN* 7:2, June 1976, p. 7.
75. “Highlights of the Toronto Council Meetings” *NN* 7:4, December 1976, p. 2.
76. “1978 Short Course Syllabus: Neuroanatomical Techniques” *NN* 9:4, December 1978, p. 7.

77. Edward A. Kravitz, “Neurobiology of Disease Workshop” *NN* 12:1, p. 3-4.
78. “1976 SN Annual Meeting Highlights” *NN* 7:3, p. 1; “SN 1978 Annual Meeting Announcements” NN 9:3, September 1978, p. 6.
79. “Annual Meeting Notes: Placement Service” *NN* 8:3, September 1977, p. 6.
80. “Society News” *NN* 9:4, December 1978, p. 7-8.
81. RS interview with Floyd Bloom, May 6, 2014.
82. Email exchange with Jack Diamond, January 9 and 13, 2014.
83. “Searching the 1989 Neuroscience Abstract Database” *NN* 20:5, September/Oct

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SfN Central Office and Staff

The Washington, DC area was the logical location for SfN headquarters and the organization relied on its close link to the National Academy of Sciences during its initial startup period. For two years, the SfN central office was located at the National Academy of Sciences on Constitution Avenue, before moving to offices in the Federation of American Societies for Experimental Biology (FASEB) building in Bethesda, Maryland. FASEB provided SfN with logistical support, particularly for the annual meeting, until the Society moved back into Washington, to 11 Dupont Circle, in January 1984. Three years later, SfN moved into larger quarters in the same building, remaining there until 2006, when the Society purchased its current building on 14th Street NW.[1]

From the beginning, the diverse and rapidly growing Society required a significant amount of clerical and organizational assistance. In the fall of 1969, Louise Marshall hired an executive secretary, the first and, for some time, the only paid staff member. The initial responsibilities of this job included keeping the minutes at Council meetings, coordinating communications for the annual meeting, and maintaining membership applications. The first executive secretary served for 11 ½ years, hiring new staff to assist her as the workload increased; she was much beloved by the SfN leadership and members, and was awarded honorary membership in 1980 in recognition of her devotion and hard work.[2]

The Central Office Moves Up in the World

The Society's central office has moved up — up four stories, that is — to new headquarters at 11 Dupont Circle, *Suite 500*. The move has allowed expansion of our working space to better serve the Society's growing membership. Society members are invited to visit the new office.

Among the many activities conducted by the central office during the year are the following:

Publications: *Call for Abstracts, Preliminary Program, Program, Abstracts* Volume, *Short Course Syllabi, Restaurant Guide, Neuroscience Newsletter, Neuroscience Training Programs in North America* handbook, *Membership Directory, Chapter Manual, Annual Reviews, The Journal of Neuroscience.*

Committees: 14 Standing Committees, annual Ad Hoc Committees.

Awards and Lectures: Young Investigator Award, Donald B. Lindsley Prize in Behavioral Neuroscience, Ralph W. Gerard Prize in Neuroscience, Grass Foundation Lecture, Warner-Lambert Lectureship for Distinguished Foreign Scientist, Presidential Symposium, Presidential Special Lectures, Special Lectures.

Chapters: Grass Traveling Scientist Program.

Public Information: Science Writers' Seminar, Annual Meeting Press Room services.

Special Projects: Short Courses, Neurobiology of Disease Workshop, Minority Travel Fellowship, BITNET, MINDEX, Annual Meeting Exhibits, Placement Service, IBRO Travel Grants to Budapest, Sustaining Associate members, Audiovisual Tapes/Slides/Cassettes, Continuing Medical Education. Also: sessioning 6,762 abstracts; collecting 11,300 membership dues and numerous *Journal* subscriptions; administrating private grants and contracts; arranging local events at Annual Meeting host cities, satellite and ancillary events, and special interest events; and selling publications.

The Central Office Staff (front row, left to right): Fatima McClearn, Receptionist; Vanessa Springfield, Membership Assistant; Lois Morris, Special Projects Coordinator; Nancy Smith, Legislative Aide; (back row, left to right) Nancy Beang, Executive Director; Sharon Debose, Membership Director; Ramona Sawyer, Executive Secretary; Anne Sundermann, Editor/Meeting Assistant; Helen Tus, Annual Meeting Manager; Tracy Bailey, Administrative Assistant; Arunas Pemkas, Accountant/Bookkeeper; Marianne Glass Duffy, Public Information Manager.

Figure 20 Society for Neuroscience Central Office Staff Photo, *Neuroscience Newsletter* Volume 18 Number 4, July/August 1987, p. 3. UCLA-NHA.

As the Society expanded, the staff grew along with it. By 1980, the staff included a membership director/bookkeeping manager, a publications director/newsletter managing editor, an administrative secretary, and a membership secretary. The executive secretary was replaced by an executive director with professional administrative experience, and a special projects coordinator came on board to work with the Committee on Animal Research and the Governmental and Public Affairs Committee. By 1987, there were a dozen individuals working in the central office at Dupont Circle. (See photo)

84. *NN* 2:2, p. 2; *NN* 15:2

85. *NN* 12:3 May 1981 p. 7; Minutes of November 13, 1980 Council Meeting

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The Society treasurer's annual reports, which were regularly published in the Neuroscience Newsletter, reveal the challenges of a growing organization. SfN in its first year, 1969-70, collected only $8,470 in member dues and relied heavily on a $20,000 grant from the National Academy of Sciences. Fortunately, its expenses were meager, only $6,288 for personnel and another $9000 for office costs.[1] Another grant from the Sloan Foundation provided an additional cushion the following year, which was needed since the first annual meeting set the Society back $4,736, and the second around $10,000. Beginning with San Diego in 1973, though, the annual meeting became a revenue generator, earning $20,000 for SfN that year. By 1975, with dues revenues at nearly $60,000 and meeting registrations at $53,000, Treasurer Martin Larrabee report confidently that the Society had become independent of grant support and was able to maintain a 20 percent reserve.[2]

Building and investing a reserve became critically important in the late 1970s; although registration income continued to grow, the cost of printing the meeting program and abstracts book and distributing these to all members also grew, exceeding annual meeting revenues. In Fiscal Year 1980, for example, Treasurer Bernice Grafstein reported that the costs of annual meeting and related publications resulted in a $19,000 deficit, which had to be covered from the capital reserve fund. Dues, grants, and other income from regular operations adequately covered regular operating expenses.[3]

Over the next decade, continued membership growth, income from exhibitors and increasingly professional management put the Society on a more stable footing, despite fluctuations. In 1989, the Treasurer was able to report an excess of $332,239 in revenues over expenses, and in 1990, the lower but still healthy figure of $159,858. Membership dues and annual meeting revenues were nearly equal contributors to the total revenue of $3.8 million, but general operations expenses now exceeded annual meeting costs by $500,000, with printing and mailing costs outweighing even salaries.[4]

1. Treasurer's Report, *Neuroscience Newsletter* 1:3, October 1970: 3.
2. Martin Larrabee, *Neuroscience Newsletter* 7:1, March 1976: 3.
3. Bernice Grafstein, Treasurer's Report, *Neuroscience Newsletter*, 12:2, March 1981: 1.
4. Treasurer's Report, *Neuroscience Newsletter*, 22:6, November/December 1991:2.

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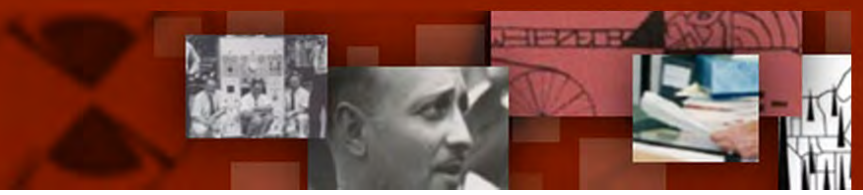

Chapter IV: Disciplinary Consolidation, the mid-1970s to the early 1980s

By 1975, SfN was a successful society with a large and rapidly growing membership, and a vibrant annual meeting, and stood as a growing force within academia and the federal government. Neuroscience, nevertheless, was still developing its disciplinary identity within the larger scientific community. The Society and its leadership worked hard to create an integrated disciplinary identity that, at the same time, allowed for multiple perspectives, experimental approaches and practices, and levels of analysis.

The Society's work in this period may be seen as comparable to that of the professionalization of medicine and the creation of medical specialties in the early 20th century. A profession is usually defined by the degree to which it is able to control entry into its ranks (through definition of educational standards and licensure); control of its working practices, conditions, and standards; and socialization of its members (through education and the creation of ethical and professional codes). Medicine is considered the most successful example of a profession; other professions, such as law, nursing, accounting, and engineering also meet the criteria, depending on the degree to which they are able to exercise control over working practices and conditions.[66] The status of neuroscience as a true profession may be debated as no one is licensed to pursue this occupation and practitioners must generally seek work in academia, government, or industry (today often true of physicians as well).

The founding of SfN, however, and its creation of a leadership group, an annual meeting and eventually a journal enabled the members of the field to achieve a measure of professional control. The meetings played an important role in socializing young scientists, through introductions to mentors and collaborators, and through tacit instruction in the meaning and scope of "neuroscience" and the topics, practices, and productions that would gain legitimacy in the field. The leadership helped to give intellectual and ethical definition to the idea of a neuroscientist by becoming "the public face of Neuroscience," ensuring access to scientists from all demographic groups, taking stances on both social and scientific issues, publicizing the important contributions of the field and, in particular, championing the prerogatives of its members to pursue research on their own terms, with adequate funding and governance over their work practices. All these strategies helped the Society to avoid fragmentation and allowed members who were pursuing diverse lines of research to see their work as integrated into a larger whole.

Educating Future Neuroscientists

Standardizing educational principles are, of course, a key feature of disciplinary consolidation. The Society, early on, took this as an important aspect of its mission. The Society sponsored surveys of interdisciplinary programs and contributed to manpower studies of neuroscience. The Education Committee, created in 1971, provided resources for setting up new departments of neuroscience at leading academic institutions and produced a directory of neuroscience programs every two years. In 1972, the committee offered its suggestions for recommended subjects for preparing for graduate study in neuroscience, suggesting that students study not only biochemistry, physiology, and experimental psychology, but also statistics and molecular and cell biology.[67] Such rigorous recommendations did not deter students from entering the field. The Society and the field were growing rapidly; neuroscience-related doctorates had increased by about 10 percent a year from 1970 to 1974.

The number of newly minted neuroscience related PhDs continued to rise throughout the 1980s and 1990s. As with the 1960s and 1970s, PhDs in neuroscience rose more rapidly than other bioscience PhDs. This was especially the case for those PhDs supported by NIH. Figure 21 compares major fields

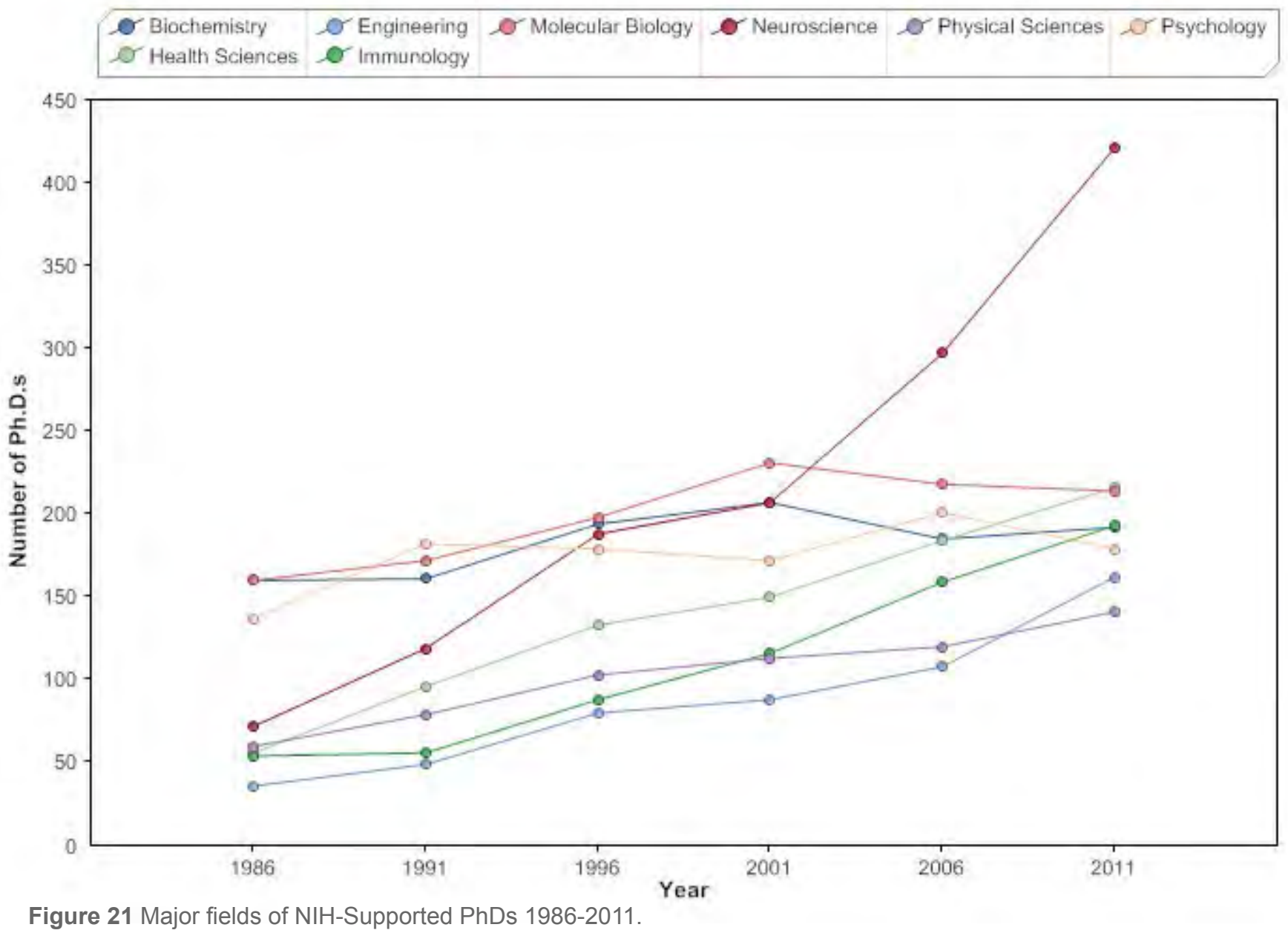

Figure 21 Major fields of NIH-Supported PhDs 1986-2011.
http://report.nih.gov/NIHDatabook/Charts/Default.aspx?showm=Y&chartId=267&catId=21

of study of PhD recipients supported by NIH from 1986 to 2011. As can be seen, the number of neuroscience based PhDs supported by the NIH increased more rapidly than any other field. By the early 2000s, neuroscience surpassed all other NIH-supported PhDs. Underscoring the importance of neuroscience in the first decade of the 21st century, the number of neuroscience dissertations exceeded molecular biology dissertations, the second most frequent NIH-supported dissertation topic, by a factor of two.[68]

By 1979, membership had soared to more than 6,000. This dramatic expansion is attributable at least in part to mentoring by Society leaders and elder members, to an expanding funding base, and to the growing excitement of new scientific discoveries, marked by seven Nobel Prizes for neuroscience research in that decade.[69] Both established and young neuroscientists were able to explore the brain and nervous system more deeply in the mid-to-late 1970s, making use of new technologies in imaging, including fMRI and PET scanning. Other innovative methods were used in molecular biology and chemistry, to identify the opioid receptors and the enkephalins and to analyze the acetylcholine receptors as well as in basic neurophysiology, where the patch-clamp technique made possible the recording of subcellular activity. Researchers of the early 1980s revealed the great versatility of the nervous system by clarifying some of the mechanisms of long-term potentiation and neuroplasticity that underlie learning and memory. These new methodologies and approaches opened up research into many neurological diseases — a good example being the targeted efforts of the Hereditary Disease Foundation team that identified the genetic locus of Huntington's disease in 1983.

SfN Nobel Laureates 1970-2014

Julius Axelrod (1912-2004)

1970 Julius Axelrod, along with Sir Bernard Katz and Ulf von Euler, was awarded the 1970 Nobel Prize in Physiology or Medicine and "for their discoveries concerning the humoral transmitters in the nerve terminals and the mechanism for their storage, release and inactivation," (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1970/).

D. Carleton Gajdusek (1923-2008)

1976 D. Carleton Gajdusek and Baruch S. Blumberg were awarded the 1976 Nobel Prize in Physiology or Medicine "for their discoveries concerning new mechanisms for the origin and dissemination of infectious diseases." (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1976/).

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For SfN, managing this remarkable rate of growth entailed efforts to promote and facilitate investment in education and research. In September 1978, SfN hosted a three-day meeting in Arlington, Virginia, bringing together representatives of 57 federal and academic organizations with 21 neuroscientists to discuss "Projecting Future Needs of Neuroscience." The conveners announced: "The Society, with an expanding membership that will exceed 6,000 by 1979, is now recognized as the primary professional organization in the basic brain sciences in North America. The phenomenal growth of the Society reflects the explosive development of neuroscience, which promises to remain at the forefront of the life sciences and to make exciting contributions for some years to come." SfN leaders encouraged universities and the federal government to plan for significant investment in the field and felt "obligated to con-

tribute to such planning by utilizing its resources to provide information on the status of the field and to project the future thrusts and needs of neuroscience."[70] Conference participants noted that data on the number of neuroscientists working in the field was still fragmentary, an inadequacy due in part to "the interdisciplinary nature of the field and the fact that 'neuroscience' has not been clearly defined."[71] The field was expanding so fast and its members and research programs were moving in such varied directions that a simple definition remained elusive.

Planning Ahead

By 1981, SfN President David Cohen recognized that although SfN's governance to that point had been characterized by "an imaginative flexibility tempered by an appropriate sense of stability," ongoing self-evaluation was essential to avoid the threat of "over-institutionalization and stagnation" faced by organizations as they reached a certain size. Cohen organized a Long-Term Planning Project in which 43 members participated on nine task forces to review the Society's achievements and activities in the previous 10 years and recommend strategies for the future. Their proposals and recommendations were reviewed and in some cases amended by a steering committee, including Cohen, Floyd Bloom, Jack Diamond, and Dominick Purpura.[72] The committee reported to the Council in November 1983 with a Long-Range Planning Report, which reaffirmed many of the existing policies and programs. The key recommendations, most of which were implemented, included the following:

1. Augmenting the participation of non-North American scientists at meetings and enhancing communication with the leaders of international neuroscience organizations.[73]
2. Expanding educational activities in several areas, including training in new methods for members; lectures, workshops, and travel grants for undergraduates; and short lab-based courses for medical students.[74]
3. More specific guidelines for symposia and special lectures and "smaller, more diverse social gatherings" at the annual meetings. Strategies for limiting the number of abstract submissions to 3,600 were considered but no consensus was reached. The balance of basic and clinical science topics "should be permitted to self-regulate."[75]
4. Expansion of the Council to include three ex-officio members, one each from Canada, Mexico, and the U.S., to represent the needs of members within their country, and investigation of mechanisms to ease restrictions on the use of federal grant funds for scientific travel, particularly between Mexico and the U.S.[76]
5. Development of a pool of senior neuroscientists to assist the Governmental and Public Affairs Committee in providing congressional testimony and similar advocacy. The task force did not recommend the hiring of a lobbyist.[77]
6. Review of the current committee structure and better definition of the activities of the Social Issues Committee, which was thought to have "languished" for some years, although recently more active.[78]

On balance, the steering committee found that the task forces' recommendations "would lead the Society in an orderly evolution toward better service to its membership and increasingly effective representation of the field of neuroscience," and it hoped that such "regular, thoughtful self-evaluation" of the Soci-

ety's work and governance would continue.[79] The task forces also made recommendations regarding publications, finance, the central office, regional and sectional issues, and governance structure and membership, in most cases approving the status quo but suggesting ongoing review.[80]

Recommendations of the Long-Range Planning Task Forces 1983

1) The International Activities Task Force (chaired by Floyd Bloom) recommended augmenting the participation of non-North American scientists at US-based meetings and enhancing communication with the leaders of international neuroscience organizations.[1]...more

A Discipline "Free of Bias"

From its inception, the SfN founders had believed the Society would be an integrating force for neuroscience not only in the United States but also globally. Such a society would include members of both sexes and all ethnicities, reflecting their vision of a neuroscience not restricted by disciplinary, national, or demographic boundaries. The social realities of American racial and gender disparities made it especially difficult to create a society that met these aspirations, and both leaders and members worked toward this visionary goal.

SfN was founded at a transformative time of growing feminist and ethnic consciousness in many parts of the world. Responding to the civil rights and feminist movements of the 1950s and 1960s, the American scientific community confronted the problem of female and minority participation in science. Scientific societies examined the role of women in their disciplines, universities struggled to account for the lack of female faculty members, and female scientists helped to found the National Organization of Women. In the early 1970s, U.S. educators and policymakers took concrete steps to encourage more women and racial minorities to study and practice science, culminating in the 1972 passage of the Equal Employment Opportunity Act, which included the famous Title IX, banning sex discrimination in any part of an institution receiving federal funds.[81]

Neuroscience researchers meanwhile compared the percentage of women in their field to their participation in comparable biological and behavioral fields. A 1974 National Research Council survey found that women received 20 percent of PhDs in neuroscience in 1973, double the rate of 10 years earlier, and comparable to the 21.5 percent receiving PhDs in all the biosciences.[82] In 1976, Louise Marshall, in her inventory of American neuroscientists conducted with Sloan Foundation support, found that women

made up “12% of the entire personnel pool” of neuroscience, but 22 percent of the graduate students. Female students at that time were earning 23 percent of all biomedical degrees and 33 percent of behavioral science doctorates.[83]

While the bylaws did not explicitly state it, the Society for Neuroscience did not discriminate against women or minorities; membership was open to any scientist, regardless of race or gender, who was conducting research on the brain and behavior. Women remained approximately 20 percent of SfN membership throughout the 1970s. In 1977, however, the Society was asked to take a more public stance. Mary-Lou Cheal, a researcher from the McLean Hospital in Massachusetts, introduced a resolution at the business meeting in Anaheim, California, suggesting that starting in 1980, the Society only meet in states that had ratified the Equal Rights Amendment (ERA), passed by Congress in 1972. This would prevent the Society from meeting in several large cities, such as Las Vegas, Chicago, and Atlanta. The National Organization of Women had suggested this boycott in an attempt to apply economic pressure on states to ratify the ERA, and several scientific societies including the American Psychological Association and the American Association for the Advancement of Science had chosen to participate.[84]

In response to Cheal’s resolution, the SfN Council “reaffirm[ed] and resolve[d]” its commitment to equal employment opportunity and all official business would continue to be “transacted in the spirit of this principle.”[85] But since only a small proportion of the membership had attended the business meeting, the Council decided to poll members though the *Neuroscience Newsletter* before acting on a proposal that would have practical and economic effects on the Society. Less than 12 percent of SfN members responded to this poll, a “disappointing” return, but the majority favored restricting the annual meeting to ERA states. Some members expressed “concern about the Society’s becoming involved in any form of political activity.” Council “delayed taking any formal action on the resolution,”[86] but, after another round of polling, adopted this requirement in 1977 for choosing cities to host the annual meeting. SfN met only in ERA states from 1984 until 1987 (the locations for 1980-83 had been scheduled prior to the Council action).[87] The deadline for legislative ratification passed in 1982, and by the late 1980s, it had become impractical for the burgeoning Society to avoid non-ERA states. The Long-Range Planning Committee recommended that the rule be dropped after 1987.[88]

At the 10th annual meeting in Cincinnati, meanwhile, more than 200 female neuroscientists attended a reception sponsored by the Association for Women in Science, which “turned out to be both a serious scientific meeting and a group therapy session.”[89] This group “unanimously voted to formalize their desire for a women’s caucus,” to be known as Women in Neuroscience (WiN),[90] and selected five women to serve on an executive committee with Candace Pert of NIMH serving as chair. In part, the group was motivated by some SfN-sponsored “special interest” events at previous meetings, in which inappropriate gender-based humor had been the special interest on the agenda. In addition to protecting the interests of female neuroscientists and students in the field, WiN also sought to emphasize the importance of

women as subjects of scientific study in neuroscience research. The group planned to sponsor several professional development events and provide childcare resources at future annual meetings.[91]

After sponsoring their own special interest dinner and discussion at the Los Angeles meeting, the WiN Executive Committee focused its attention on “the paucity of women in the upper echelons of the Society for Neuroscience as well as in academic neuroscience.”[92] They compiled a national directory to assist federal agencies, universities, and corporations to identify appropriate female candidates for open positions in neuroscience.[93] WiN sponsored scientific and practical programs at every SfN meeting after 1981, conducted its own analysis of SfN’s 1982 membership survey and, in 1983, published “A Profile of Women in the Society for Neuroscience.” They found that 60 percent of women held PhD degrees, while only 4 percent had medical degrees; that men were almost twice as likely to have postdoctoral trainees working for them; and that women were more reliant on “soft money” funding sources than men. The WiN analysis concluded that the trends for women in neuroscience were consistent with trends for women in academia in general, with major gains in training and employment since the early 1970s, and a basis for cautious optimism that more women would fill professional and Society roles in the future.[94]

Throughout the 1980s, women held several leadership positions in the Society. Bernice Grafstein served as the first female president, and women served on the Council and all of SfN’s committees. Nevertheless, during these years, women remained a minority in the field. Although 43 percent of the Society’s graduate student members were women, by 1990 National Research Council survey of doctorates found that women received 36 percent of neuroscience PhDs and 38 percent of postdoctoral fellowships between 1985 and 1990, while data compiled by the Association of Neuroscience Departments and Programs (ANDP) indicated that women made up only 18 percent of applicants and hires for tenure-track positions.[95] This dropoff through the scientific pipeline, studied in depth by SfN members Linda Spear and Michael Zigmond, was similar to other fields of science; none of the challenges to women’s success were unique to neuroscience. In 1991, SfN created an *ad hoc* Committee on the Development of Women’s Careers in Neuroscience, to examine this problem in greater detail.[96] This Committee was instrumental in shaping the 1995-96 SfN member survey, which found that women composed 30 percent of the total membership.[97]

The status of racial and ethnic minorities in neuroscience did not attract as much attention in the early years of the Society, although they too were underrepresented in every survey. The 1974 Department of Health, Education and Welfare manpower study had found that the vast majority (94 percent) of neuroscientists were white; 4.2 percent were Asian, 0.7 percent African American, 0.9 percent were Hispanic and 0.2 percent were Native American. These statistics were consistent with other scientific and academic fields, and state and national lawmakers implemented various educational programs to try to increase the proportion of these minorities in the U.S. professional labor force. In particular, educational initiatives

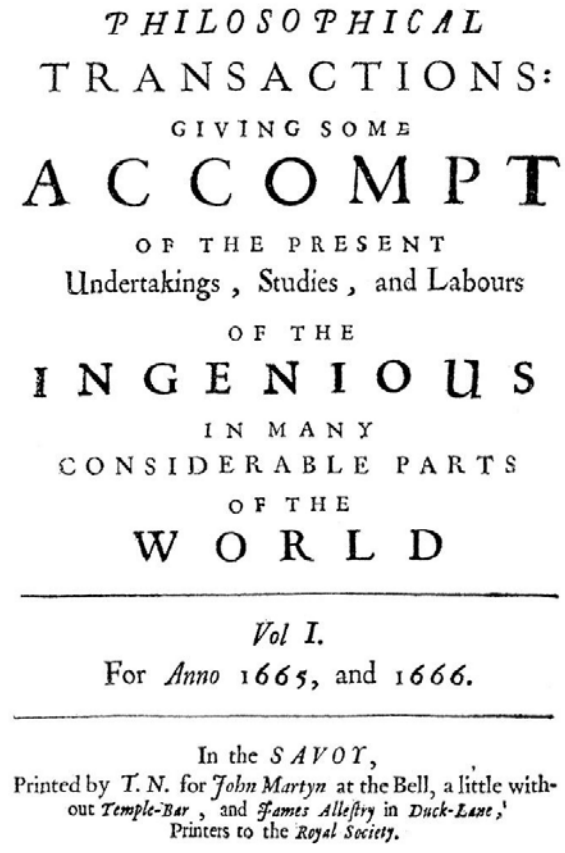
to encourage African American students to study science and pursue graduate degrees were proposed as a way to increase scientific manpower for the United States.[98]

In September 1979, SfN President Torsten Wiesel outlined the steps that "we, as members of the Society for Neuroscience, can do to interest young minority students in our field." He listed several NSF and NIH programs designed to support and encourage minority scientists, but he noted that "it will always be the personal effort and commitment of individual members that will make the difference."[99] At the annual meeting that year in Atlanta, the Social Issues Committee established a Subcommittee on Minority Affairs, chaired by Catherine Cornwell-Jones, to recruit minority members to the field and the Society and to "expand the role of minorities in the policymaking processes of the Society."[100] These efforts culminated in the establishment of the Minority Traveling Fellowship in 1981, which continued into the 21st century as the Neuroscience Scholars Program.[101]

Despite these efforts, minorities have been persistently underrepresented in neuroscience, as in nearly all scientific fields. A 1982 report showed that the percentage of minority SfN members had not changed significantly in the past 10 years. 5 percent of members were of Asian descent, 2 percent were Hispanic, 0.5 percent African American and 0.2 percent Native American.[102] African American scientists flowed out of all disciplines through a "leaky pipeline" as did women, although the greatest attrition was apparently at the high school level.[103] In 1999, an ANDP survey found again that Asian Americans consistently made up 3-4 percent of the neuroscience community, while only 1.9 percent of predoctoral students, 0.7 percent of postdoctoral researchers and 0.6 percent of faculty were African-American, still far below parity with levels in the general population.[104] SfN's commitment to advancing diversity through the Neuroscience Scholars Program since 1981 has successfully patched the pipeline for some 600 scholars from minority backgrounds.

Coming of Age: The Founding of *The Journal of Neuroscience*

The Scientific Revolution of the 17th century transformed natural philosophers into scientists. The scientific journal was critical to this metamorphosis. Founded in 1660, The Royal Society of London for Improving Natural Knowledge was the first society committed to the discussion of science and the practice of experimentation. The first publication of the *Philosophical Transactions of the Royal Society*, under the editorship of German-born Henry Oldenburg (Figure 23), followed five years later, making it the first journal exclusively devoted to science. Though our modern understanding of what it means to be a scientist (and the word itself) would not come into


PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD

Vol I.
For Anno 1665, and 1666.

In the SAVOY,
Printed by T. N. for John Martyn at the Bell, a little without Temple-Bar, and James Allestry in Duck-Lane,
Printers to the Royal Society.

Figure 23 First issue of the *Philosophical Transactions*, 1666,

existence for another 200 years, the *Philosophical Transactions* and the scientific journals that followed played critical roles in creating a social and cultural space for the full-time devotion to an understanding of the natural world through observation and experimentation.

Establishment of the *Journal of Neuroscience*

The Society for Neuroscience leadership was well aware of the importance of a journal both as a means of communicating scientific findings and as the necessary glue that would cement disciplinary identity and cohesion. From the beginning, the SfN Council foresaw the need for a journal devoted to an expansive definition of neuroscience.105 In 1979, President Torsten Wiesel, President-elect Sol Snyder, and Eric Kandel jointly proposed to the Council that the time was right. They felt "it would be better to start afresh with a truly interdisciplinary journal of the highest quality," but they also wanted to ensure that the new journal would not compete with smaller subspecialty journals. Wiesel, Snyder, and Kandel recommended as the first editor-in-chief Maxwell Cowan,[106] a neurobiologist whose own work integrated neurochemistry, neuroanatomy and neurophysiology, and the highly regarded editor of *The Journal of Comparative Neurology*.[107]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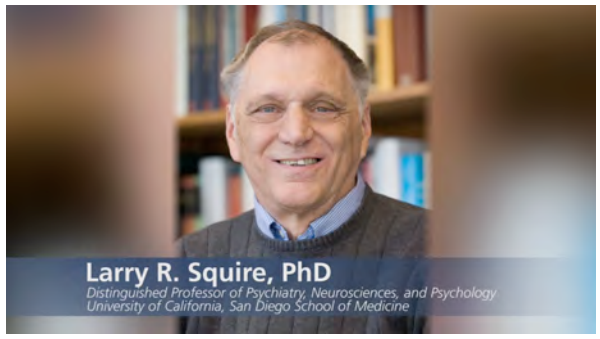
Instructions to Authors appear in the January and July issues only. Copies of the Instructions can be obtained by writing The Society for Neuroscience, 9650 Rockville Pike, Bethesda, MD 20014.

Figure 24 First issue of *The Journal of Neuroscience*, 1981 (SfN).

Nearly an entire issue of *Neuroscience Newsletter* was devoted to the call for papers for the first issue of *The Journal of Neuroscience*. The new publication, for which SfN partnered with an external publisher, would include papers representing all areas of the field, and authors were encouraged to submit their papers for review to one of the five section editors: Solomon Snyder, molecular neuroscience; Michael Bennett, cellular neuroscience; Gerald Fischbach, developmental neuroscience; Eric Kandel, behavioral neuroscience; and Edward Evarts and R.W. Guillery, neural systems. These divisions "collectively cover the entire spectrum of neuroscience and reflect the broad, interdisciplinary character of the Society," as it had evolved since 1969 and demonstrate the importance of *The Journal of Neuroscience* as an integrative force in the field.[108]

Although *The Journal of Neuroscience*, under Cowan's leadership until 1987, soon "became recognized as one of the premier periodicals in the field, and most importantly, the one for which many members reserved their best work," both the external publisher and the Society initially sustained financial losses from its publication. After several months of negotiation and consideration, the Society signed a new contract with Oxford University Press that would reduce subscription costs to individual members and provide more revenue to the Society. This contract remained in force until the Society developed the capabil-

Taking the Journal in House and Online (video)



ity for in-house publication and brought *The Journal of Neuroscience* under its own wing in 1996.

Creating the Self in American Culture: Neuroscience and the Media

By any measure, the public exposure to neuroscientific findings increased dramatically over the 1970s and 1980s. Figure 25 depicts the occurrences of the word "neuroscience" in *The New York Times* from 1960 to 1999. "Neuroscience" as a word first appeared in *The New York Times* in a 1965 article titled, "Experts Disagree on a Worm's I.Q," reporting on the work of James McConnell. Using *planaria* as his model organism, McConnell claimed that regenerated flat worms retained conditioned learning after they had been severed in half. Despite the frivolous appearing title, the article portends to a new vision of how American culture understands the self. The reporter, addressing what would later be taken for granted by educated readers but was far from obvious in the psychologically minded 1950s and 1960s, outlined the importance of this research: "The discovery raised some startling possibilities. Previous theories were expressed in purely psychological terms unrelated to physical structures in the brain." The "startling" finding, according to the article, was that "memory" was *embodied*, "that the act of learning produced a discreet physical change throughout the body."

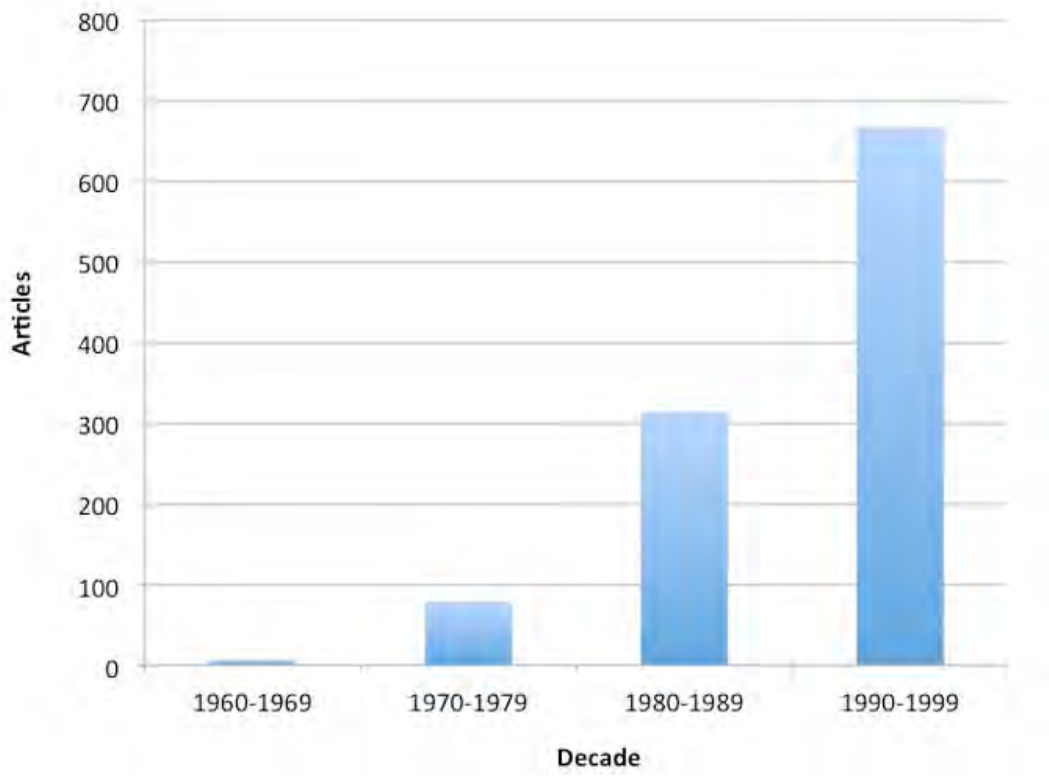


Figure 25 The number of articles that mention the word "neuroscience" in the *New York Times*, 1960-1999, (Joel Braslow).

If mention in *The New York Times* can be taken as a barometer of cultural and popular significance, the importance of neuroscience grew enormously over the three decades from 1970 to 1999. As the 1965 article suggests, neuroscientific knowledge and the popular diffusion of this knowledge had a deeper significance than simply adding another layer of complexity to Americans' understanding of their brains. The new neuroscience helped to radically remake how the self was (and is) understood. This transformation was graphically illustrated on the covers of *Time* magazine. Sigmund Freud's first appearance on the cover of *Ti-*

*me*in 1924 reflected a growing American romance with psychoanalysis that reached a peak by the mid-to-late-1950s. American psychiatrists and émigré European psychoanalysts initiated and then fostered the American embrace of psychoanalysis. In the early decades of the 20th century, the American profession had held fairly diverse views regarding the nature of psychological suffering and had no overarching, dominant theory to guide practice. Psychoanalysis, in contrast, provided psychiatry with a grand synthesis, linking the instinctual drives of the body and individual suffering and the psychosocial world of relationships, meaning, and social life. In short, psychodynamic psychiatry provided a framework that merged, however uneasily, both somatic and psychosocial orientations toward psychiatric illness. For the public, a simplified version of Freud's tenets provided post-World War II Americans with a new and interesting language by which to understand and explain ordinary miseries of everyday life, a discourse that also offered a hopeful solution through psychotherapy and insight.

The last time Freud graced the cover of *Time* was in November 1993 with the question, "Is Freud Dead?" Though psychoanalysis had been quite marginalized over the previous 20 years, this particular depiction of Freud, with his head falling to pieces and the query about his passing, underlines a cultural shift in how Americans understood the self. The *Time* cover of December 3, 2007 leaves little doubt as the direction of this shift — depicting the mysteries of human behavior, from the soaring heights of Mahatma Gandhi to the depths of Adolf Hitler's depravity, as problems to be solved directly within the brain.

The decline of psychoanalysis from the American cultural landscape has multiple causes. But these images from *Time* suggest, one of the most significant or — at the very least, most visible sources of the near extinction of psychoanalysis — has been the spectacular rise of neuroscience as an identifiable and powerful discipline with an exponentially growing store of new facts at hand to explain behavior as brain based.

This is a story in which SfN played a critical, if not the major, role, always in the background, providing the stage and organizational context by which individual scientists and their findings could become powerful cultural resources as well as pieces of an increasingly complicated neuroscientific puzzle.

SfN leaders presciently realized that the Society could "help direct attention to the importance of neuroscience for the future intellectual and emotional well-being of this country."[111] The Society's officers understood that the support of a broad public was essential not just to ensuring funding, but to maintaining public confidence and preserving the freedom of scientists to manage those resources, through research, for the public benefit. Neal Miller in particular, as president 1971-72 and subsequently as chair of the Public Information Committee, took steps to increase public understanding of neuroscience through the careful cultivation of media relationships.

In 1975, the Society hired a public relations consultant to highlight neuroscience achievements through press releases and press conferences, as well as to manage publicity for public events.[112] Realizing the importance of science literacy for accurate news reporting on neuroscience, Miller's committee sponsored the first Science Writers' Seminar in 1976, funded by the Alfred P. Sloan Foundation and the John and Mary R. Markle Foundation, at Airlie House in Virginia.[113] "In an atmosphere conducive to relaxation and unhurried contemplation of science," 25 writers from newspapers and magazines spent three days learning about specific topics in neuroscience from 16 SfN representatives.[114] The journalists responded enthusiastically; within two weeks, several articles on neuroscience topics appeared in national publications such as*Newsweek*, *The National Observer*, and *Science News*.[115] As Figure 25 illustrates, "neuroscience" became a regular news topic soon after SfN began its efforts to educate and intrigue reporters. Thanks to the success of this seminar and those that followed, journalists from a range of media outlets regularly attended the annual meetings and identified SfN as the best resource for information about breakthroughs in the field.[116] The 1986 annual meeting was particularly successful in this regard; 109 journalists attended and were directed to stories about recent innovative scientific work.[117] Once again, the practical applications of neuroscience attracted the most attention. Major news outlets such as *The New York Times* featured reports of the discovery by Peter Davies and Benjamin Wolozin at Boston University of a possible antibody test to detect Alzheimer's disease.[118]

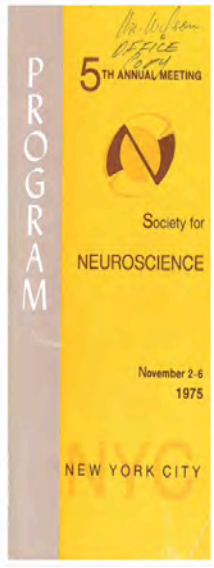
Neuroscientist as Citizen

For SfN, shaping a positive cultural image in the popular media was not simply a public relations exercise. Despite the aspirations of the 17th-century pioneers — men such as Rene Descartes, Robert Boyle, Henry Oldenburg and Isaac Newton — who originated the principles of experimental science to devise a method unsullied by the social world, scientists have always been in an active struggle with and sometimes against the larger world in which their practices are embedded.[119] The 20th century made this an especially painful and unavoidable fact. With its horrors of race hygiene, genocide, and the creation of an ever-present specter of mass annihilation by nuclear weapons, World War II elevated this truism to potentially nightmarish proportions. The social and cultural turbulence of the 1960s added a new twist to scientists' involvement with social causes, whether it was the Vietnam War, civil rights, the "war on poverty," or nuclear disarmament.

Neuroscientists were not immune to these larger cultural currents and SfN members used the annual meeting as an opportunity to examine social issues. Under the chairmanships of Louis Irwin, Linda Hall, and Stephanie Bird in the 1980s, the Social Issues Committee ran roundtable discussions for members, with experts from various disciplines speaking on socially and politically sensitive topics, such as torture as a public health threat, life and death decision making, cognitive enhancers, the clinical use of fetal tissue, and neurotoxins in the diet. The Committee alerted the SfN Council to public debates that were relevant to neuroscience, such as psychosurgery, or to international events that affected the

scientific community.[120]

Fifth Annual Meeting, New York, 1975 (video)



The Cold War also stirred concerns among Society members. In 1980, the Council authorized Sol Snyder to send a telegram to the USSR Academy of Science on behalf of SfN to protest the treatment of Andrei Sakharov, the Nobel Peace Prize winning physicist who was being held under house arrest in Gorky. Not surprisingly, the rationale for intervening on Sakharov's behalf reflected both scientific and Western political cultural values: "This cynical treatment of a world-renowned scientist will further suppress the universality of knowledge and the fundamental rights of human beings at a time of international tension."[121]

On other occasions, the resolutions were purely humanitarian in nature. For example, in 1979, Janice Stevens introduced a resolution in response to the recently reported genocide in Cambodia. Her proposal was brought to the floor and the business meeting voted unanimously to send a telegram to President Jimmy Carter urging him to "save what is left of the Cambodian people."[122]

Neuroscientists Under Siege

The Society's activism on larger social questions did not significantly alter the nature of either the Society or the practice of science. But in the 1980s, the growing animal rights movement aimed directly at the heart of scientific practice, not just the work of neuroscientists but of all researchers whose work involved the use of non-human animals. With this battle, the Society found itself forced to redefine and defend its carefully burnished cultural image, while taking a strong political stance to protect the work and independence of its members.

Though antivivisection has been intertwined with the prevention of cruelty toward farm, circus, and companion animals, the effort to end animal experimentation has its own unique history. The modern history of antivivisectionism has its origins in mid-19th century Europe with the growth of laboratory-based medical science. The wife of French scientist Claude Bernard, a major exponent of animal experimentation, publicly opposed the practice. In 1876, the antivivisectionists persuaded the British Parliament to pass the Cruelty to Animals Act, though the bill was significantly weaker than they had originally hoped because of the organized medical profession's strong opposition. As the U.S. lacked a strong research base in the 19th century, opposition was less strident there than in Europe. During and immediately after World War II, public confidence in science was high, reflecting the introduction of drugs like penicillin and

cortisone, life-saving heart and cancer surgeries, and vaccines for polio and other infectious diseases. The rebellious 1960s saw a resurgence of antivivisectionist activity, adapting tactics from the antiwar and civil rights movements. The movement intensified in the 1980s as, with rising stridency, groups such as People for the Ethical Treatment of Animals (PETA) used legal tactics and sophisticated use of media to draw public attention to animal experimentation, while other organizations, including the Animal Liberation Front, willingly broke the law in order to steal data and release laboratory animals. And as the United States grew into the global center of medical research, the country became the epicenter of antivivisectionism.

The growing visibility of neuroscience and the resonance of animals used as models in pain or spinal injury research made neuroscientists frequent targets of a growing antivivisectionist movement, which described itself as pro-“animal rights.” These groups often targeted neuroscientists who used mammals such as primates, dogs, or cats in their research. Some members of the SfN leadership felt that “neuroscientists have a special responsibility to join the discussion of animal rights because of our special knowledge of the nervous system, perception, and behavior.” The members of the Social Issues Committee and other SfN groups planned “a serious response” to the practical and philosophical questions raised by the animal rights movement.[123]

However, the Taub case of the 1980s, in which Maryland behavioral researcher Edward Taub was charged with 119 counts of animal cruelty and failure to provide veterinary care for 17 macaque monkeys used in his studies of the sensorimotor system, forced the Society to react to unanticipated challenges rather than to attempt to set the tone for a national conversation about the treatment of animals.[124] The Society was unprepared for the ferocity of the animal rights movement and its skilled use of media. The Taub case vividly highlights the methods of the animal rights movement, which included lab break-ins, seizure of data and animals, and the distribution of graphic and often inaccurate photographs to the media.

Taub was exonerated of all charges by the courts and his NIH funding was restored after SfN marshaled resources for his defense and enlisted 66 scientific organizations to join a statement of support. He moved to the University of Alabama, where his research findings became the basis for constraint-induced movement therapy, based on the ability of the central nervous system to remap and functionally readapt, or neuroplasticity, which has often helped stroke victims to regain the use of long-paralyzed limbs. The Society continued to publicly support Taub, citing his work in 2007 as one of the top 10 translational neuroscience accomplishments of the 20th century. The Taub case, however, was a public relations victory for PETA, which has persisted in demonizing NIH and other federal funding sources as the financial backers of cruelty to animals, leveraging the negative publicity to persuade lawmakers to pass strict antivivisection laws on the state and national levels.

Adapting a proactive strategy, SfN formed the Committee on Animals in Research (CAR) as a standing committee in 1985.[125] SfN also joined other organizations, including the Scientists' Center for Animal Welfare, American Association of Medical Colleges, Incurably Ill for Animal Research, and the National Association for Biomedical Research (and later its advocacy arm, the Foundation for Biomedical Research), in presenting animal research as a positive, necessary part of modern scientific and medical practice. Council members contacted leaders of other organizations, particularly disease and clinical organizations, to urge them to publicize the importance of animal research.[126] The Society joined amicus briefs for legal cases and provided congressional testimony on proposed legislation that would limit access to animals or tighten existing laws against animal cruelty.[127] SfN's initiatives in educating students and the general public about the field were also important strategies to counter the claims of the animal rights activists.

Animal Research Protests Involving SfN Members, 1984-1993

Date	Location	Researcher	Attack
1982-1984	Behavioral Research Institute, Silver Spring, MD	Edward Taub	PETA infiltrated lab and monkeys were removed.
1984-1985	University of Pennsylvania Head Injury Clinic, Philadelphia, PA	Thomas Gennarelli	ALF broke into the lab, removed videotapes removed and computers and destroyed research data. PETA created "Unnecessary Fuss" video from the footage they stole.

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87. Minutes of 17th Council Meeting, November 5, 1978, p. 3
88. “Preliminary Report of the Steering Committee for Long-Range Planning” November 1983, p. 8. SfN Archives.
89. Laurel L. Haak, “Women In Neuroscience (WIN): The First Twenty Years” *Journal of the History of the Neurosciences* 11 (2002): 70-79, p. 70.
90. In its early days, Women in Neuroscience used the acronym “WIN”. “WiN” is the current acronym.
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92. Nancy Oley, “Women in Neuroscience” *NN* 13:5, September/October 1982, p. 6.

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98. Manpower in Basic Neurologic and Communicative Sciences, p. 73; Adolph Y. Wilburn, “Careers in Science and Engineering for Black Americans” *Science* 184 (June 14, 1974): 1148-1154.

99. Torsten Wiesel, “Neuroscience Programs for Disadvantaged Students” *NN* 10:3, September 1979, p 3, 9. See also Minutes of 19th Council Meeting, April 17, 1979, p. 9-10 and Minutes of 20th Council Meeting, November 2, 1979, p. 6.

100. “Social Issues Committee” *NN* 10:4, December 1979, p. 4-5.

101. http://www.sfn.org/~/media/SfN/Documents/Professional%20Development/NSP/NSP_brochure_cover.ashx.

102. William Hodos, “A Profile of the Society for Neuroscience” *NN* 13(6), November/December 1982, p. 1-2.

103. Willie Pearson, Jr., “The Flow of Black Scientific Talent: Leaks in the Pipeline” *Humboldt Journal of Social Relations* Vol 14 (1/2 Black America in the 1980s) 1987: 44-61.

104. Zigmond and Spear, “Neuroscience Training” p. 379; Daniel G. Solorzano, “The Doctorate Production and Baccalaureate Origins of African Americans in the Sciences and Engineering” *The Journal of Negro Education*, Vol. 64, No. 1 (Winter, 1995): 15-32.

105. See for example Minutes of 7th Council Meeting, November 1973, p. 9; 8th Council Meeting, October 20, 1974, p. 9-11;

106. Minutes of 20th Council Meeting, November 2, 1979, p. 16-17.

107. “Dr. W.M. Cowan, 70, Scientist with Hughes Medical Institute, Dies,” *The New York Times,* July 8, 2002. Accessed May 23, 2014.

108. “Journal of Neuroscience Instructions to Authors,” *Neuroscience Newsletter* Volume 11 Number 2, June 1980, p.1, 3.

109. Dale Purves, “Society Chooses New Publisher for *The Journal of Neuroscience” NN* 16:4, July/August 1985, p. 1-2, 6.

110. “Search for New Editor-In-Chief of *The Journal of Neuroscience*” *NN* 19:1, January/February 1988, p. 5; William J. Willis, Jr., “W. Maxwell Cowan and *The Journal of Neuroscience*” and “*The Journal of Neuroscience in Transition” NN* 19:2, March/April 1988, p. 6-7.

111. Sidney Ochs to Ralph W. Gerard, June 7, 1968, Organization of Brain Sciences, 1st Meeting, 1967-69 Folder, Marshall Papers, UCLA.

112. Fifth Annual Meeting Publicity Materials, SfN Archive; “Public Information Committee” *NN* 7:1 March 1976, p.4.

113. “Science Writers’ Seminar – Reverberations” *NN* 7:3, September 1976, p. 6.

114. “SN Science Writers’ Seminar – Success” *NN* 7:2, June 1976, p. 4.

115. Matt Clark, “Drugs and Schizophrenia,” *Newsweek,* May 17, 1976; Patrick Young, “Natural Painkiller”*The National Observer* May 15, 1976 (both cited in “Science Writers’ Seminar – Reverberations” *NN* 7:3, September 1976, p. 6.); “Pain as a Passion” *Science News* Volume 109, Number 20, May 15, 1976, p. 309-310; “Neuroscience: An Explosive Arena” *Science News* Volume 109, Number 21, May 22, 1976, p. 330

116. Barry H. Smith, “Seminar for Science Writers” *NN* 12:3, May 1981, p. 6; Barry H. Smith, “1983 Science Writers’ Seminar” *NN* 14:3, May/June 1983, p. 4; “New Annual Science Writers’ Seminar” *NN* 18:1, January/February 1987, p. 4.

117. Thomas Woolsey and Marianne Glass Duffy, “Press at the Meeting: Meeting the Press” *NN* 18:1, January/February 1987, p. 1-2.

118. Lawrence K. Altman, “Doctor’s World: Alzheimer’s Progress in the Midst of Despair” *The New York Times*- November 18, 1986; Deborah M. Barnes, “Neurosciences Advance in Basic and Clinical Realms: A Possible Diagnostic Test for Alzheimer’s?” *Science* New Series, Vol 234, December 12, 1986, p. 1324; Interview with Benjamin Wolozin, November 2013.

119. Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*, Princeton University Press, 1985; Steven Shapin, *The Social History of Truth: Civility and Science in Seventeenth-Century England,* University of Chicago Press, 1994.

120. Stephanie J. Bird, “Life and Death Decisions: A Role for Neuroscience?” *NN* 17:5. September/October 1986, p. 6-7, 13; Linda M. Hall and Martin Chalfie, “Social Issues Committee Urges Neuroscientists to Join Campaign to Abolish Torture.” *NN* 16:5, September/October 1985, p. 8. Next draft: Transcripts from SfN 2013 interviews

121. “SN Protests Action Against Sakharov,” *NN* 11:1, March 1980, p.1.

122. “Cambodian Resolution,” *NN* 10:4, p. 2.

123. Louis Irwin and Key Dismukes, “Animal Welfare: Public Issues and Scientists’ Concerns” *NN* 12:6, November 1981, p. 2.

124. Working at the Institute of Behavioral Research in Silver Spring, Maryland, Taub ligated the sensory afferent ganglia linking the monkeys’ arms to their brains and was attempting to train them to use the limbs despite the lack of sensation. PETA member Alex Pacheco had been working undercover at the lab and provided the information leading to the police raid, seizure of the monkeys and charges against Taub. After some ten years in limbo, after the Supreme Court rejected PETA’s final appeal, the remaining monkeys were sacrificed and dissected. Major cortical remapping was found in their brains; Taub was able to use this data to develop constraint-induced movement therapy in his new research, leading to the rehabilitation of stroke and paralysis victims.

125. 1984-5 Committee on Animals in Research Report to Council, June 1985, CAR Files, SfN.

126. Memorandum from William D. Willis to SfN Council, July 30, 1985, CAR Files, SfN Archive.

127. For examples, see: Testimony of Donald J. Reis, published in *Neuroscience Newsletter* 17:3, May/June 1986, p. 1, 3-6.

SfN Nobel Laureates 1970-2014

Julius Axelrod (1912-2004)

1970 Julius Axelrod, along with Sir Bernard Katz and Ulf von Euler, was awarded the 1970 Nobel Prize in Physiology or Medicine and "for their discoveries concerning the humoral transmitters in the nerve terminals and the mechanism for their storage, release and inactivation," (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1970/).

D. Carleton Gajdusek (1923-2008)

1976 D. Carleton Gajdusek and Baruch S. Blumberg were awarded the 1976 Nobel Prize in Physiology or Medicine "for their discoveries concerning new mechanisms for the origin and dissemination of infectious diseases." (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1976/).

Roger Guillemin (b. 1924)

1977 Roger Guillemin and Andrew V. Schally were awarded the 1977 Nobel Prize in Physiology or Medicine "for their discoveries concerning the peptide hormone production of the brain." (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1977)

David H. Hubel (1926-2013)

1981 David H. Hubel and Torsten N. Wiesel (b. 1924) were awarded the 1981 Nobel Prize in Physiology or Medicine "for their discoveries concerning information processing in the visual system," (shared with Roger W. Sperry) (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1981).

Rita Levi-Montalcini (1909-2012)

1986 Rita Levi-Montalcini and Stanley Cohen were awarded the 1986 Nobel Prize in Physiology or Medicine "for their discoveries of growth factors," (http://www.nobelprize.org/nobel_prizes/medicine/laureates/1986).

H. Robert Horvitz (b. 1947)

2002 H. Robert Horvitz, Sydney Brenner and John Sulston were awarded the 2002 Nobel Prize in Physiology or Medicine "for their discoveries concerning genetic regulation of organ development and programmed cell death," (http://www.nobelprize.org/nobel_prizes/medicine/laureates/2002).

Paul Greengard (b. 1925)

Eric R. Kandel (b. 1929)

2000 Arvid Carlsson, Paul Greengard and Eric R. Kandel were awarded the 2000 Nobel Prize in Physiology or Medicine "for their discoveries concerning signal transduction in the nervous system." (http://www.nobelprize.org/nobel_prizes/medicine/laureates/2000)

2014 John O'Keefe, May-Britt Moser, and Edvard I. Moser were awarded the 2014 Nobel Prize in Physiology or Medicine "for their discovery of cells that constitute a positioning system in the brain," (http://www.nobelprize.org/nobel_prizes/medicine/laureates/2014).

John O'Keefe (b. 1939)

May-Britt Moser (b. 1963)

Edvard I. Moser (b. 1962)

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Recommendations of the Long-Range Planning Task Forces 1983

1) The International Activities Task Force (chaired by Floyd Bloom) recommended augmenting the participation of non-North American scientists at US-based meetings and enhancing communication with the leaders of international neuroscience organizations.[1]

2) The Education Task Force (chaired by Lorne Mendell) proposed expanding educational activities in several areas, including a new Medical Education Committee to compile and assess medical school and post-graduate training in neuroscience; training courses in new methods for members (if the need were documented by a member survey); a fund to assist young neuroscientists; expansion of the Grass Travelling Lectureships; a summer laboratory information bank, as well as lectures, workshops and travel grants for undergraduates; and short lab-based courses for medical students.[2]

3) The Annual Meeting Task Force (chaired by Dale Purves) contributed an extensive set of recommendations, in balance "endors[ing] the *status quo* with a gradual evolution toward something better." The group felt strongly that the Program Committee should assume more responsibility in ensuring "the scientific quality" of the meetings.[3] In particular, the existing procedures for scheduling symposia appeared "too haphazard." The Task Force suggested that each Program Committee member generate two symposium proposals; that one symposium focus on "a specific neurological disorder;" and that historical and "other more imaginative" topics be encouraged. The group thought special lectures, including presidential lectures, should be coordinated by the Program Committee, although the Steering Committee advised that the president and Program Committee should consult together.[4] Similarly, the Task Force proposed that the Program Committee oversee awards, but the Steering Committee insisted that this responsibility be retained by the Council. Finally, "smaller, more diverse social gatherings" at the annual meetings were suggested.[5]

Strategies for limiting the total number of abstract submissions to 3,600 and restricting members from submitting multiple abstracts were considered by the Task Force and by the Steering Committee, but no consensus was reached, save the proposal that no member be allowed to sponsor an abstract submitted by another member.[6] The Task Force recommended maintaining the existing mix of platform and poster presentations and allowing that the balance of basic and clinical science topics "should be permitted to self-regulate."[7]

4) The Regional and Sectional Issues Task Force (chaired by Donald Humphrey) endorsed continuing and strengthening the existing "mature and successful" chapter structure. This task force also tackled the problems of representation of Canadian and Mexican members, although recognizing that "no mechanism" existed for the Society to fully address these. However, the group proposed the expansion of the Council to include three ex-officio members, one each from Canada, Mexico, and the U.S., to rep-

resent the needs of members within their country, and investigate mechanisms to ease restrictions on the use of federal grant funds for scientific travel, particularly between Mexico and the U.S. The Steering Committee, however, felt the addition of *ex officio* members to the Council to be inappropriate and suggested as an alternative the creation of an ad hoc committee, including several members from the non-U.S. countries."[8] Some Canadian members had the previous year proposed forming a separate society, which would address in particular research funding for neuroscience by their government. The Council had been very concerned by this possibility and expressed its commitment to Canadian (and Mexican) representation on the Council.[9] Addressing the needs and concerns of scientists in the neighboring nations has remained an SfN priority.

5) The Central Office Organization Task Force (chaired by Bruce Smith) conducted a thorough analysis of the Office's existing structure and functions and made a strong case for its professionalization, including a flexible budget; increased discretionary powers for the executive director; increasing the staff over 5 years and improving salaries and benefits; automating many central office tasks and broadening its functions to include those now handled by standing committees, allowing the committees to concentrate on policy; expanding the office space to 2500 square feet and periodically reviewing the option of purchasing dedicated space. The Task Force also suggested creating a liaison group of three senior members to review and consult with the central office staff and liaise with the council and committees. The Steering Committee pointed out that "the Officers of the Society have such a liaison as an important part of their responsibility" and should continue in this role.[10]

6) The Social and Public Policy Task Force (chaired by Daniel Freedman and Robert Dismukes) noted that the work of the Governmental and Public Affairs Committee was "considered crucial," but had up to that time relied on "the loosely coordinated but skilled and energetic efforts" of a few. The Task Force recommended more consultation with Society leadership, a closer liaison with the public information office and, in particular, the development of a pool of senior neuroscientists to assist the Governmental and Public Affairs Committee in providing congressional testimony and similar advocacy. The group did not recommend the hiring of a professional lobbyist. This Task Force also recommended more careful consideration of appointees to and questions to be addressed by the Social Issues Committee, to improve the usefulness of that committee, which was thought to have "languished" for some years, although recently more active."[11]

7) The Governance Structure and Membership Task Force (chaired by Michael Bennett) reaffirmed the open membership policy; re-emphasized "the importance of intense involvement" of the Council in all Society business and of regular communication with the standing committees; and recommended review of the current committee structure and periodic review of the bylaws.[12]

8) The Publications Task Force (chaired by Gerald Fischbach) noted that *The Journal of Neuroscience* had "become a respected forum in a remarkably short period of time." The group suggested imposing "even more demanding criteria for acceptance," but also endeavoring to include more non-U.S. papers, and suggested possible expansion of *The Journal* to two publications, one on molecular and one on systems neuroscience. Finally, it was recommended that the *Neuroscience Newsletter* be published more frequently and develop "more newsy and scientific" content.[13]

9) The Finance Task Force (chaired by Bernard Agranoff) offered three major recommendations: to extend the treasurer's term to three years, create an office of treasurer-elect and appoint one member of the Finance Committee to liaison with the central office. The Steering Committee however felt that this "liaison" member would create possible conflicts with the treasurer and suggested that the president, an*ex-officio* member of the Finance Committee, would better fill this role.[14]

1. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 2.
2. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 5.
3. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 6.
4. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 7.
5. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 8.
6. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 6.
7. "Preliminary Report of the Steering Committee for Long-Range Planning," pp. 6-8.
8. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 12-13.
9. Minutes of Council Meeting, November 13, 1980, pp. 3-4.
10. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 9.
11. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 15.
12. "Preliminary Report of the Steering Committee for Long-Range Planning," pp. 17-18.
13. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 3.
14. "Preliminary Report of the Steering Committee for Long-Range Planning," p. 4.

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Animal Research Protests Involving SfN Members, 1984-1993			
Date	**Location**	**Researcher**	**Attack**
1982-1984	Behavioral Research Institute, Silver Spring, MD	Edward Taub	PETA infiltrated lab and monkeys were removed.
1984-1985	University of Pennsylvania Head Injury Clinic, Philadelphia, PA	Thomas Gennarelli	ALF broke into the lab, removed videotapes removed and computers and destroyed research data. PETA created "Unnecessary Fuss" video from the footage they stole.
1985	National Institutes of Health, Bethesda, MD		PETA broke in to NIH offices and occupied them for two days to protest the Penn Head Injury Clinic
1987	Cornell Medical College, New York, NY	Michiko Okamoto	Protests outside of her lab and university pressure on Dr. Okamoto to refuse a federal grant for her research.
1987-1988	University of Oregon, Eugene, OR	Barbara Gordon-Lickey and Richard Marrocco	ALF broke into two laboratories and stole more than 125 animals and caused $50,000 in property damage.
1988	University of California, Berkeley, CA	Richard Van Sluyters	Public relations attack on Van Sluyters.
1989	California Institute of Technology, Pasadena, CA	Terry Takahashi	
1990	University of Pennsylvania, Philadephia, PA	Adrian Morrison	ALF vandalized Dr. Morrison's lab and office and stole files, computer discs and other materials
1991	Uniformed Services University of the Health Sciences, Bethesda, MD	Sharon Juliano	Protests outside of her home, threats to her family.
1993	University of Pittsburgh Pittsburgh, PA	Robert Schor and Allen Humphrey	
1993	Boston University, Boston, MA	Bertram Payne	

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Chapter V: Neuroscience Ascendant, mid-1980s to 1995

The Society flourished throughout the 1980s. Figure 26 charts attendance at the annual meetings from 1980 to 1994. As can be seen, the size of the meetings increased substantially each year except for a slight drop in 1994. The graph reveals a three-fold increase in attendance over those 15 years. SfN continued its significant growth during the 1980s, even as several more established biological societies experienced periods of stagnation. From 1979 to 1989, individual membership more than doubled from 6,351 to 13,433, and the number of chapters grew from 67 to 97.[128] Neuroscience departments and programs flourished as well, increasing from 29 in 1978 to 47 in 1986.[129]

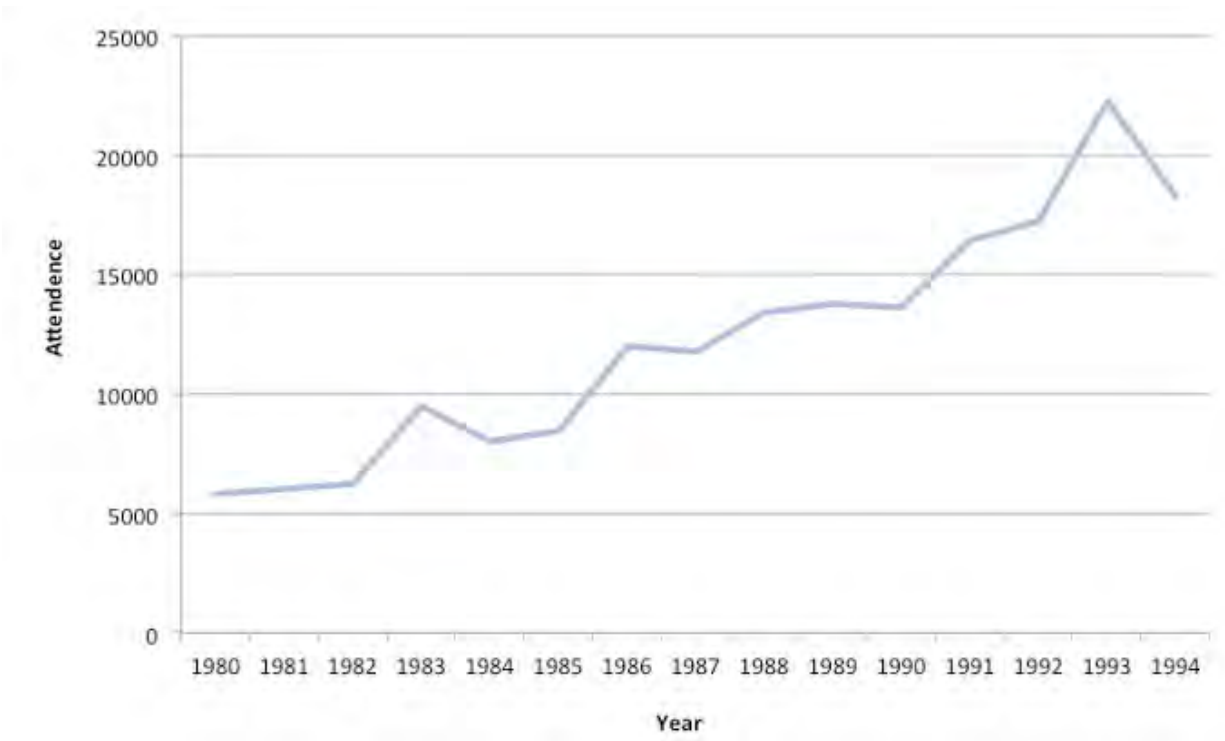


Figure 26 Attendance at SfN Annual Meetings, 1980-1994. (Joel Braslow)

The makeup of the field was changing and becoming ever more diverse. In January 1982, more than 4,000 SfN members (60 percent of the total membership) responded to a membership profile questionnaire. This data provided some surprising information about the scope of the field: The vast majority (92 percent) of neuroscientists worked in at least two broad areas of neuroscience, and received research support from a diverse array of governmental institutions. Approximately half of the field positions at hospitals or at veterinary or medical schools, while 34 percent were affiliated with a university or college basic or social science department. The authors of the questionnaire had “greatly underestimated the breadth of departments,” listing only 50 choices. However, 376 members reported “other” as their primary departmental affiliation, citing “a profusion of departments ranging from Algology and Allied Health Therapies through Family Medicine, Kinesiology, and Marketing to Physiological Acoustics, Quality Sciences and Women’s Studies.” Non-primate mammals were the most common research organism (40 percent) studied by members, followed by humans (16 percent), vertebrates other than mammals (11 percent), and cell and tissue cultures (10 percent); only 9 percent were using nonhuman primates. Fi-

nally, it was not unexpected that, despite the Society's interest in ethnic and gender diversity, 79 percent of the respondents were men, and 91 percent were caucasian.[130]

The physiological psychologists, who saw their work in one of the oldest "brain sciences" as a bridge between behavioral and the newer molecular neuroscience, were concerned "that behavior and psychological processes were being relegated to a rather secondary status within the Society," while the cellular, genomic, and molecular work dominated public and academic interest. A group of these researchers wrote an open letter to the Council in 1982, urging it to support better interdisciplinary education and to avoid polarizing the field,[131] and five years later the group reported in *Neuroscience Newsletter* that they were continuing a series of "semi-informal meetings … where the topic of discussion was the direction of the neurosciences and the role that psychology will play in this new discipline." When they analyzed their own participation in the annual meetings, and their collaborations with diverse colleagues, these researchers found "a strong and growing relationship between physiological psychology and neuroscience. Subjective impressions of neuroscience as solely a molecular and reductionist discipline are not supported."[132]

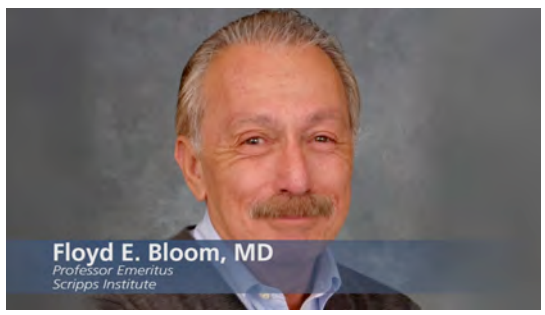
Funding Discovery

The important promise of neuroscience research is that it will unlock fundamental secrets about who we are as biological organisms and as a species whose intellectual capacities separate us from the rest of the biological world; and about how we can correct the disabling neurological disorders that deprive victims of part or all of their human identity. By the late 1980s and early 1990s, some of the keys to those secrets appeared to be within reach, as fMRI and PET imaging opened up the study of human cognitive functions, even emotional learning, and laboratory technologies clarified the processes of neurogeneration and axonal outgrowth. At the molecular level, the field continued to be energized by breakthroughs such as the discoveries of the genes for Huntington's disease and Duchenne muscular dystrophy and the elucidation of the biological substrates of Alzheimer's and the spongiform encephalopathies. The use of methylprednisolone was one of the first steps toward improved rehabilitation of spinal cord injury victims.

Nevertheless, significant funding for the brain sciences has never been a forgone conclusion and has required major advocacy efforts on the part of individual scientists and of the Society as their premier organization. NIH has provided the bulk of biomedical research dollars over the past 50 years and supported the lion's share of neuroscience research. NIH's extramural grant program originated after World War II, when a small group of medical research grants was transferred from the Office of Scientific Research and Development to the still rudimentary institute. Under the leadership of Directors Rolla Dyer and later James Shannon, NIH evolved the peer-review mechanism to validate the distribution of its largesse as impartial and driven by scientific standards, while using the same rhetoric and the memory of major scientific achievements such as penicillin and polio vaccine to obtain ever larger

appropriations from Congress. Other federal agencies, such as NSF and the Department of Energy, followed its example, but NIH always led the pack. In the expansive era of the 1950s and 1960s, total NIH funding increased from $52 million to more than $1 billion. These grants built research laboratories, and funded young scientists to start their careers, at universities all over the country. Although appropriations never decreased in the 1970s and 1980s, the annual percentages of increase were reduced as successive Republican administrations began calling for fiscal restraint. As young scientists started their own labs and hired their own students, they found themselves in tighter competitions for fewer dollars. The Society quickly recognized the need to take a strong stance in focusing government attention on neuroscientific objectives and achievements, to maintain, and if possible increase, the share of appropriated funds to the National Institute of Neurological and Communicative Disorders and Stroke (NINCDS) and the National Institute of Mental Health (NIMH).

Funding for Neuroscience (video)



Soon after Floyd Bloom became SfN president in November 1976, neuroendocrinologist David Hume called to tell him that his NIH training grants were in peril because of congressional budget cuts.[134] An SfN poll conducted a few months later revealed that 95% of the membership received more than 50 percent of their research support from the federal government; for 82 percent, federal support constituted more than 80 percent of their budget. NINCDS contributed the bulk of the funding, while NIMH funded an additional 12 percent. “The data at hand clearly indicate that the funding for fundamental research is clearly inadequate for the pressure of the field and the growth of its research potential.”[135] The institute directors were themselves members of SfN, and they also encouraged the Society to take a more active role. In June 1977, David Tower, the director of NINCDS, used the *Neuroscience Newsletter* to address a passionate plea for neuroscientists to articulate the political and social significance of neuroscience. In “Understanding the Nervous System: Man’s Last Frontier,” Tower exhorted his fellows to “engage intelligently at the interface between research and its application to the delivery of health care and services … [along the] continuum from the most basic, the most theoretical to the very practical human disease problems.”[136]

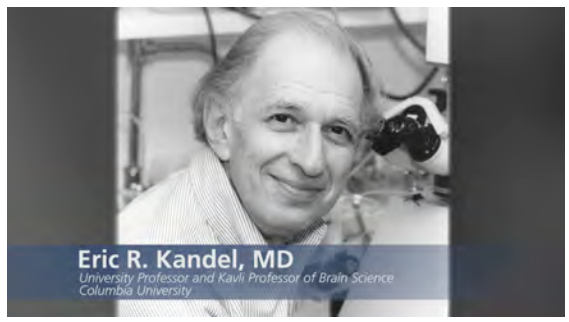
Bloom was already in action. He had sent an open letter to SfN members on March 29, 1977, asking them to contact the Senate and House Appropriations Subcommittees and express concern over the lack of funds for basic research. He encouraged them to describe their own work, and to explain exactly how a decrease in funding would “halt scientific progress.” Bloom also suggested that local chapters invite their members of Congress to attend a chapter meeting, to impress upon them the importance of neuroscience research and to foster a working relationship. These were the talking points: “The work we are doing is important, the quality and rate of progress in the neurosciences has never been greater, and to impair this process through illogical funding practices is intolerable.”[137] SfN members

responded enthusiastically, and reported that their letters had had “unquestionable impact” with congressional staff members. [138]

On April 19, 1977, Bloom and David Cohen testified before Joseph Foley, chairman of the National Committee for Research in Neurological and Communicative Disorders, part of the House Subcommittee on Appropriations for HEW/Labor. They expressed concern about “the erosion of federal support for neuroscience … at a time when research into the basic mechanisms of brain organization is in the midst of its most exciting and productive period.” Bloom and Cohen argued for the unique scientific and clinical importance of neuroscience, stressing that fundamental neuroscience research was the key to understanding neurological and mental disorders, which affected some 165 million Americans.[139] This effort was successful, and the subcommittee recommended to the full Appropriations Committee that the NINCDS FY1978 budget be increased to $175 million, $14 million more than President Carter had requested.[140] This represented a 15 percent increase for the institute, compared with a 12 percent increase for NIH overall.

The following year, Cohen took up the torch and reported to the SfN Council that, although he was heartened by “the reversal of the negative attitude towards basic research … [and] a thrust toward greater emphasis upon and support for fundamental science,” he did not foresee that FY1979 would be “a ‘bumper’ year for federal support for neuroscience.”[141] The Council appointed Cohen, Bloom and Maxwell Cowan to an ad hoc committee on research resources, which was renamed the Governmental and Public Affairs (GPA) Committee in 1980.[142] The committee’s charge was to maintain contact with the heads of the various funding agencies, to advocate with Congress to maintain or increase neuroscience appropriations and to encourage members to write letters and speak to their own legislators.

Government and Public Affairs (video)



Cohen stressed the urgency and importance of their efforts, writing in *Neuroscience Newsletter* that “while we cannot look forward to a year of real prosperity [in FY1980], we can expect a year of reasonable support; unhappily this is not the case for the biomedical research enterprise as a whole… .Our efforts had a genuine impact on this year’s appropriations, and in this regard our thanks are due those Society members who contributed so valuably to educating our national legislators with respect to the importance of brain research.”[143]

Cohen, Bloom, and Dominick Purpura led the GPA Committee’s efforts through the 1980s. As SfN president in 1981-2, Cohen acted to formalize the committee’s advocacy efforts.[144] After his presidency, the three leaders continued to devote considerable time to “Washington-watching,” petitioning lawmakers

and testifying before Congress on appropriations for neuroscience research.[145] They sounded again and again the call for help to the mentally ill and neurologically impaired and reminded their listeners of the promise of insights into human consciousness and behavior. Cohen regularly published updates on federal funding levels in *Neuroscience Newsletter*, and invited the directors of the relevant agencies, including NINCDS, NIMH, and NSF to use the newsletter as vehicle for communicating with the SfN membership. Because “legislative tracking [was] … a persistent, moment-by-moment task,” Cohen urged the Council to consider hiring a legislative aide as soon as the central office budget allowed for another staff person.[146]

The GPA Committee took advantage of the Society’s location in Washington, DC, to great effect and built coalitions with other groups with similar concerns, such as the National Committee for Research in Neurological and Communicative Disorders, NSF’s Interagency Working Group in Neuroscience, the American Association of Medical Colleges and the Inter-Society Council for Biology and Medicine.[147] SfN representatives joined members of the Association of Neuroscience Departments and Programs each spring to visit members of Congress to discuss the importance of neuroscience funding, a program that by the 1990s was known as “Capitol Hill Day.” Although few lawmakers were in the city during the 1986 annual meeting, which was held in Washington immediately after the mid-term elections, the GPA Committee took the opportunity to sponsor special neuroscience education events for congressional staff members, in the hope that they would facilitate relationships with members of the legislature.[148]

This person-to-person activity relied heavily on a handful of active scientists and GPA members who were in easy commuting distance of Washington. But political issues with neuroscience implications could arise in any part of the country; in 1987, SfN launched a grassroots program to encourage more neuroscientists to inform and stay engaged with local politicians and the media.[149] At the same time, Cohen, Bloom, Purpura, and their colleagues urged the Council to consider contracting with professional advocates; even the most politically savvy scientist could not always be attuned to unanticipated political problems or take the time to represent the Society’s needs.[150] In 1989, SfN was one of 66 founding members of Research!America, a non-profit education and advocacy alliance of universities, professional organizations, foundations, and medical manufacturers that works to make health-related research a higher national priority.

Decade of the Brain

The GPA Committee’s crowning achievement was to gain federal recognition, of the importance and value of neuroscience through the proclamation of the “Decade of the Brain,” which they hoped would be attached to major funding increases. In 1987, the National Coalition for Research in Neurological and Communicative Disorders (NCRCD) invited the GPA Committee to collaborate with an NINDS Advisory Council on a proposal that would “set forth basic science and clinical research priorities and establish a

Decade of the Brain (video)

framework for a multi-year effort to capitalize on the tremendous progress in brain and nervous system research in recent years."[151] This proposal persuaded Representative Silvio Conte and Senator Donald Riegle to introduce legislation to significantly increase neuroscience funding. At the hearings on the bill, Purpura offered oral testimony on behalf of NCR and SfN. After outlining the most significant advances in treatment of neurological diseases, he warned that recent significant budget cuts would force the scientific output of the United States to fall behind that of other countries. He urged Congress to support the "Decade of the Brain" initiative, not only to "improve the quality of life for countless millions who suffer from neurological disorders," but also because "neuroscientists are persuaded that understanding [the] brain as the organ of mind and the source of our humanity is the highest priority that humankind has for its own survival."[152] In July 1989, President George H.W. Bush signed a joint congressional resolution designating the 1990s as the "Decade of the Brain."

President Bush signs the "Decade of the Brain" resolution with (l-r) Sen. Pete Domenici (R-NM), Sen. Donald Riegle, Jr. (D-MI), Secretary Sullivan, Dr. Lewis Judd, and Rep. Silvio Conte (R-MA, sponsor of the bill).

1990 Begins the Decade of the Brain

Figure 27 President George Bush signs the "Decade of the Brain" resolution, 1989, (*Neuroscience Newsletter*, from UCLA-NHA).

For SfN, the Decade of the Brain (DOB) was an affirmation of the advocacy work of the Government and Public Affairs Committee, and an impetus to strengthen its existing relationships with lawmakers. It was also the perfect occasion for a series of public events showcasing the importance of neuroscience. The Council created an ad hoc DOB Committee to coordinate a Decade of the Brain Symposium for members of Congress every spring, to be followed by a "Capitol Hill Day" of congressional office visits.[153] At each symposium, SfN would honor appropriate members of Congress with a DOB award for their support of neuroscience. Honorees included Rep. Silvio Conte (1990), Rep. William Natcher (1991), Sen. Ernest F. Hollings (1992), Rep. Steny Hoyer (1993), Sen. Pete Domenici and his wife Nancy Burk Domenici (1994) and Rep. John Porter (1995). Meanwhile, SfN contracted with Frankie Trull, founder and president of the Foundation for Biomedical Research, to coordinate SfN's contacts in Congress and with other government agencies and policymakers.[154]In 1995, SfN's Public Information Office began publishing *Brain Waves*, a quarterly bulletin for congressional health aides, to communicate "the far-reaching impact of neuroscience research and … the Society's interests to policymakers and other significant lay audiences."[155]

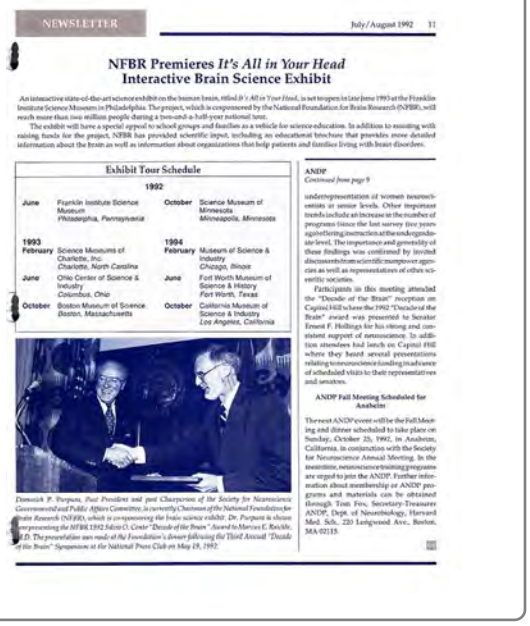
The Decade of the Brain became a powerful rhetorical tool when urging legislators to in-

crease science funding. Purpura invoked the DOB's promise twice in testimony before the Senate Appropriations Committee, arguing that the president could put his political weight behind such an initiative, even if fiscal necessity forced him to propose cuts in relevant NIH funding. In 1990, he dramatically predicted that if there was adequate research support, then the Decade of the Brain could be "a prelude to the Century of Man, in which humankind will be emancipated from the dread of disability and the stigma of dehumanization that attends dissolution of the human spirit in dementia."[156] His 1991 testimony described the neuroscience community in equally vivid language as "thousands of superbly trained investigators prepared to answer the most important question of the Cosmos — How does the Brain Work?" and insisting that the Decade of the Brain mandated "a level of support that no single health sciences' institute or agency can provide within the current framework of appropriations."[157] A proclamation was not enough; neuroscientists needed secure support if they were to deliver on the promises of the Decade of the Brain. And unfortunately, despite the publicity, significant increases in NIH funding for neuroscience did not materialize during the decade.

Neuroscience Literacy

In the early 1990s, SfN also launched a new series of public education initiatives focused intensely on the benefits of neuroscience research, thereby ensuring that the voting public would continue to fund neuroscience even after the Decade of the Brain was over. As SfN President Robert Wurtz explained in 1991, "The concerns of many of us in the Society now extend beyond communication within our science to the survival of our science….Two interacting issues require our attention: the attack on the use of animals in research and a level of funding that lags the growth of neuroscience….The solution to these problems requires long-term effort: the education of the public on the methods, achievements, and benefits of neuroscience."[158]

In April 1989, for the first time, the Council approved a proposal to ask members to contribute $5 for a special Public Education Fund in addition to their annual dues.[159] This income would support a professional director of public education, who would be responsible for preparing scientific material for lay audiences and for coordinating publicity at the annual meeting and throughout the year.[160] Within six months, more than 90 members had contributed over $2000 toward the program and the Council was confident enough in the new initiative to hire an experienced science writer.[161] The new director produced *Brain Facts*, an educational booklet on basic brain and nervous system anatomy for science reporters and the public; regular updated editions followed and electronic and audio versions have been added to the SfN website (culminating in the*BrainFacts.org* website in 2013). He also worked closely with the Committee on Animals in Research to produce special materials for elementary and high school teachers on the importance of animals in research.[162]


NEWSLETTER

July/August 1992 11

NFBR Premieres *It's All in Your Head*
Interactive Brain Science Exhibit

An interactive state-of-the-art science exhibit on the human brain, titled *It's All in Your Head*, is set to open in late June 1993 at the Franklin Institute Science Museum in Philadelphia. The project, which is cosponsored by the National Foundation for Brain Research (NFBR), will reach more than two million people during a two-and-a-half-year national tour.

The exhibit will have a special appeal to school groups and families as a vehicle for science education. In addition to assisting with raising funds for the project, NFBR has provided scientific input, including an educational brochure that provides more detailed information about the brain as well as information about organizations that help patients and families living with brain disorders.

Exhibit Tour Schedule

1992

June	Franklin Institute Science Museum *Philadelphia, Pennsylvania*	October	Science Museum of Minnesota *Minneapolis, Minnesota*

1993

February	Science Museums of Charlotte, Inc. *Charlotte, North Carolina*	February	Museum of Science & Industry *Chicago, Illinois*
June	Ohio Center of Science & Industry *Columbus, Ohio*	June	Fort Worth Museum of Science & History *Fort Worth, Texas*
October	Boston Museum of Science *Boston, Massachusetts*	October	California Museum of Science & Industry *Los Angeles, California*

ANDP
Continued from page 9

underrepresentation of women neuroscientists at senior levels. Other important trends include an increase in the number of programs (since the last survey five years ago) offering instruction at the undergraduate level. The importance and generality of these findings was confirmed by invited discussants from the scientific meetings of other agencies as well as representatives of other scientific societies.

Participants in this meeting attended the "Decade of the Brain" reception on Capitol Hill where the 1992 "Decade of the Brain" award was presented to Senator Ernest F. Hollings for his strong and consistent support of neuroscience. In addition attendees had lunch on Capitol Hill where they heard several presentations relating to neuroscience funding in advance of scheduled visits to their representatives and senators.

ANDP Fall Meeting Scheduled for Anaheim

The next ANDP event will be the Fall Meeting and dinner scheduled to take place on Sunday, October 25, 1992, in Anaheim, California, in conjunction with the Society for Neuroscience Annual Meeting. In the meantime, neuroscience training programs are urged to join the ANDP. Further information about membership or ANDP programs and materials can be obtained through Tom Fox, Secretary-Treasurer ANDP, Dept. of Neurobiology, Harvard Med. Sch., 220 Longwood Ave., Boston, MA 02115.

Dennick P. Purpura, Past President and past Chairperson of the Society for Neuroscience Governmental and Public Affairs Committee, is currently Chairman of the National Foundation for Brain Research (NFBR), which is co-sponsoring the brain science exhibit. Dr. Purpura is shown here presenting the NFBR 1992 Edwin C. Conte "Decade of the Brain" Award to Marcus E. Raichle, M.D. The presentation was made at the Foundation's dinner following the Third Annual "Decade of the Brain" Symposium at the National Press Club on May 19, 1992.

Figure 28 "Franklin Institute exhibit demonstrates 'It's all in your head. (Reprinted in the *Neuroscience Newsletter* from UCLA-NHA).

The ad hoc Committee on Secondary Education initiated a working partnership with National Association of Biology Teachers (NABT) to train high school biology teachers in neuroscience methods and develop supplemental curricula on the brain. NABT members received copies of *Brain Facts* and SfN representatives attended the NABT annual meeting to discuss specific issues of animals in research and teaching.[163] In April 1991, the Council signaled its support for these programs by designating the ad hoc committee as a standing Committee on Neuroscience Literacy.[164] The 1991 and 1992 meetings in New Orleans and Anaheim included "Education Day Workshops" on how to talk to children in schools and how to talk to the media.[165]

SfN also worked closely with other institutions and organizations on educational programs. The Society co-sponsored a traveling exhibit titled "It's All in Your Head" developed by the Franklin Institute in Philadelphia (Figure 28)[166] and partnered with the Dana Alliance for Brain Initiatives (Figure 29) to reach a larger adult audience for its educational programs.[167] Council member Bruce McEwen was particularly impressed with the alliance's "town meeting" style programs, and he helped to schedule a public forum on "Brain Fitness for Life" at the Salk Institute in San Diego, during the 25th annual meeting celebration.[168] Ray Suarez of National Public Radio moderated the panel discussion

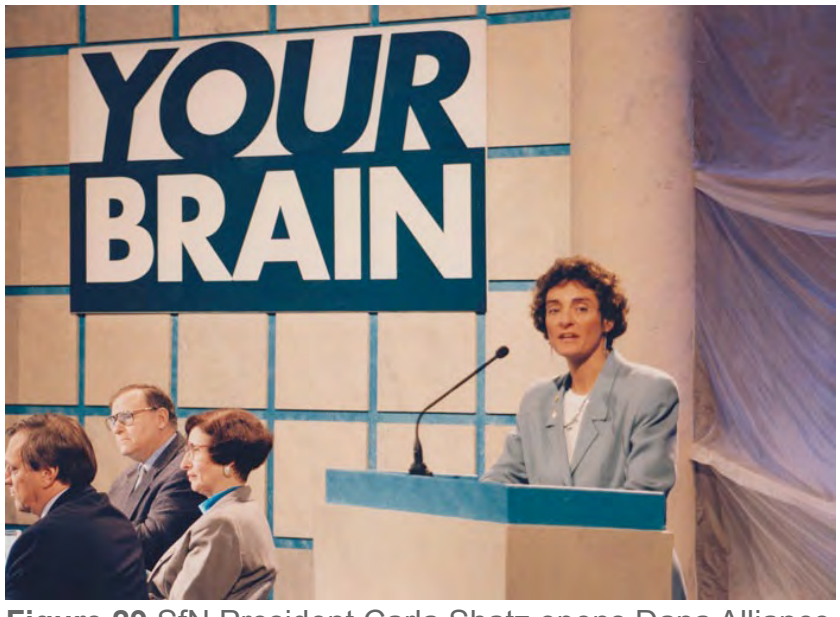


Figure 29 SfN President Carla Shatz opens Dana Alliance Event, 1995 (Photo courtesy of Carla Shatz).

Dana Alliance (video)

The Dana Alliance for Brain Initiatives

20 Years of Education & Outreach

brain development and adaptation that took place before more than a thousand attendees and was recorded for broadcast by WHYY, a PBS station in Philadelphia.[169]

‘Celebrating 25 Years of Progress’

What did the Society for Neuroscience look like as it reached its silver anniversary in 1995? Its membership had exploded to 23,000, including many scientists working outside North America. Membership Committee Chairs Michael Zigmond and Israel Hanin and President Larry Squire proposed another membership survey, the first since 1981, to collect demographic data and understand current needs, as well as to help SfN plan for the future by identifying problems or barriers in training and research. The Membership Committee obtained NIMH funding for a two-part survey; the second part was a detailed statistical sample focusing on career development and issues facing women and minorities.[170] Few major changes were reported by the 75 percent of members who responded: 20 percent identified as underrepresented minorities (up from 9 percent in 1981), 30 percent were women (up from 21 percent), and one-

Figure 30 Past Presidents of SfN, 1996. Seated from Left to Right: Solomon Snyder, Patricia Goldman-Rakic, Ira Black, Carla Shatz, Lorne M. Mendell, David Hubel, Bruce McEwan, Vernon Mountcastle, Torsten Wiesel, Dominick Purpura. Standing, L-R: Floyd Bloom, Eric Kandel, Larry Squire, Mortimer Mishkin, Robert Doty, William Willis, Albert Aguayo, Robert Wurtz, Bernice Grafstein, Ed Perl, (SfN).

third now worked in countries outside the US. The median age had increased from 37 to 41, but students and postdoctoral researchers now accounted for 29 percent.[171]

SfN President Carla Shatz chose the theme “25 Years of Progress” for the 25th anniversary meeting in November 1995. On the first night of the meeting, fireworks lit San Diego Bay “to mark the virtual explosion of discoveries that has characterized the past 25 years of neuroscience” and the concurrent growth of the Society, which now encompassed a rich, diverse, and ever-growing set of subdisciplines and research approaches within a single field.[172]

The Society for Neuroscience established and ensured the disciplinary unity of neuroscience by facilitating communication of novel approaches and techniques while maintaining a clear focus on the brain and behavior. Neuroscience is unique among the life sciences because it is simultaneously basic and applied; the emphasis on the structure and function of the brain cuts across techniques and traditional scientific and medical disciplines. Moreover, although it began as the U.S. affiliate of IBRO, SfN has transcended its American origins by welcoming members from around the globe. Neuroscience and the Society matured together, and the emphasis at the 25th anniversary celebration was on how the Society had changed and matured to serve the needs of its members, from creating formal and informal communication opportunities at the annual meeting, to creating an integrated publication resource in *The Journal of Neuroscience*, to making the case to Congress for the recognition and funding of neuroscience research, to creating a meaningful public face for the neuroscience enterprise. SfN’s educational and political initiatives ensured that the status and visibility of neuroscience in international science and culture would continue to grow as the 21st century dawned.

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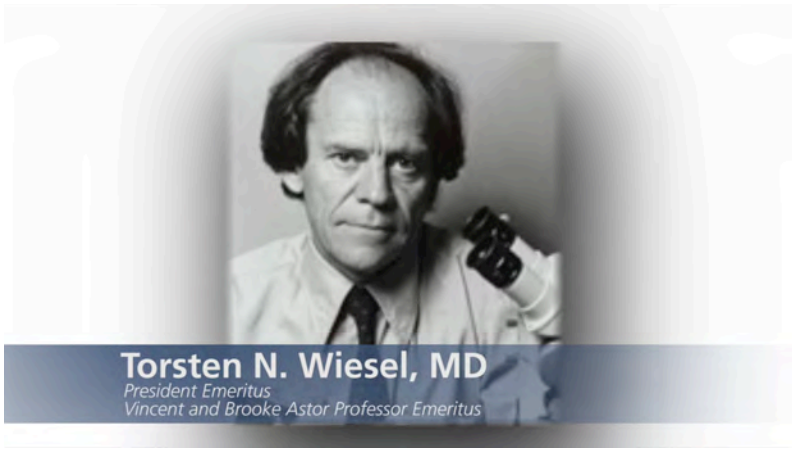
Conclusion

It is easy to forget how much the neuroscience world changed during SfN's first quarter-century, from 1969 to 1994, during SfN's first quarter-century, from 1969 to 1994, and to lose sight of the role that SfN played in helping to forge this new world. Even the fact that we can now speak of "neuroscience" as a unified field having a history owes much, as we have seen, to the efforts of SfN, its leadership, and its rapidly expanding membership during these formative years. By any measure, these short 25 years witnessed a major epochal shift in the nature of brain sciences. The radical changes of this quarter-century included an unprecedented growth in the science itself, coupled with the meteoric growth of a new scientific discipline with newly created neuroscience institutes, graduate programs, and departments, and, arguably most important, with the creation of a new cultural sensibility of what it means to be human, one that dissolved the Freudian-hued understanding of the mind and replaced it with a sharper neurobiological lens. These changes depended upon a community of brain scientists in the late 1960s and early 1970s who were committed to understanding how the mind emerges from the brain and convinced that such an effort required a fundamental reordering of scientific practices, institutions, and affiliations.

What is Neuroscience? (video)



In 1962, Francis O. Schmitt coined the word "neuroscience" when he established the Neurosciences Research Program at MIT. His vision of this new neologism was a discipline that could answer the fundamental question of *how* the brain gave rise to the mind. Of course, philosophers have pondered this question for millennia. In the more recent past, 19th-century German psychiatrists argued for the unity of mind and brain in the understanding of psychiatric disease. In his 1847 psychiatric textbook, *Principles of Medical Psychology*, Ernst von Feuchtersleben wrote: "Mental disease must therefore be deduced, neither from the mind nor the body, but from the relation of the each to the other."[173] Wilhelm Griesinger, the most famous of the 19th-century German materialist psychiatrists, wrote in 1868: "It is only from a neuropathological standpoint that one can try again to make sense of the symptomatology of the insane."[174] Over the following century, re-

searchers made repeated efforts to understand the biological basis of insanity as well as normal mental states, though with little or no success.

Prior to the 1950s, scientists had lacked the intellectual and material tools to link brain and mind compellingly and rigorously. However, major scientific breakthroughs during the postwar era dramatically altered what was possible. Most notably, James Watson and Francis Crick's 1953 discovery of the double helical structure of DNA, combined with an unprecedented number of major neurobiological discoveries (ranging from Hodgkin and Huxley's discovery of the action potential to understanding of the chemical nature of synaptic transmission) and new technologies (such as the electron microscope), transformed questions about the ways in which mind and brain interconnect into scientifically tractable problems. In 1963, a year after he first coined the term "neuroscience," Schmitt wrote: "It now seems possible to achieve…revolutionary advances in understanding the human mind…By making full use of [the approaches of physiology and behavioral sciences] and by coupling them with the conceptual and technical strengths of physics, chemistry, and molecular biology, great advances are foreseeable."[175] In contrast to earlier claims, Schmitt's prediction that understanding the biology of mind was just over the horizon was significantly more plausible given a decade or so of dizzyingly rapid advances in biology. Presciently, Schmitt and the founders of SfN realized the critical importance of creating a fundamentally new infrastructures for training, professionalization, and funding if this new interdisciplinary effort were to succeed on such a grand scale.

Nearly 50 years later, in the 2010s, neuroscientists continued to grapple with understanding how the unity of the mind emerges from the complex, interwoven biology of genes, proteins, neurons, and circuits. Nevertheless, these early pioneers succeeded beyond their wildest dreams in fashioning a new discipline, held together not by a set of common methods or theories but by the common drive toward understanding how the brain and nervous system worked. SfN founders and early leaders made this possible by emphasizing a kind of intellectual democracy and egalitarianism that self-consciously enforced inclusiveness regardless of a researcher's disciplinary background, favored organism, or methodological approach. All were welcome in the melting pot of neuroscience, a metaphor that aptly underscores the particularly postwar American stamp that shaped SfN.

Indisputably, the conditions for such a perfect storm were already swirling about the biological sciences at the end of the 1960s. But, as we saw, it took the active energy and foresight of brain scientists, such as Schmitt, Ralph Gerard, and Vernon Mountcastle to shape these forces into what would become the single largest biomedical research discipline on the globe. From the beginning, SfN was the engine of this growth. Figure 31 underscores this point. In its first decade, the Society grew to nearly 5,000 members. Over the next 15 years, the Society had grown nearly fivefold. Exceeding 23,000 members by 1994, SfN had become one of the largest scientific societies in the world. By 2014, SfN had grown to nearly 40,000 members, dramatically eclipsing the other more established biological research societies. For example, the American Physiological Society, founded in 1887, now counts about

10,500 members. Breaking off from the American Physiological Society in 1906, the American Society of Biological Chemists (renamed the American Society for Biochemistry and Molecular Biology in 1987 as a concession to restive molecular biologists), has a slightly larger membership of 12,000. The American Society for Microbiology is the nearest to SfN in size, at over 39,000.

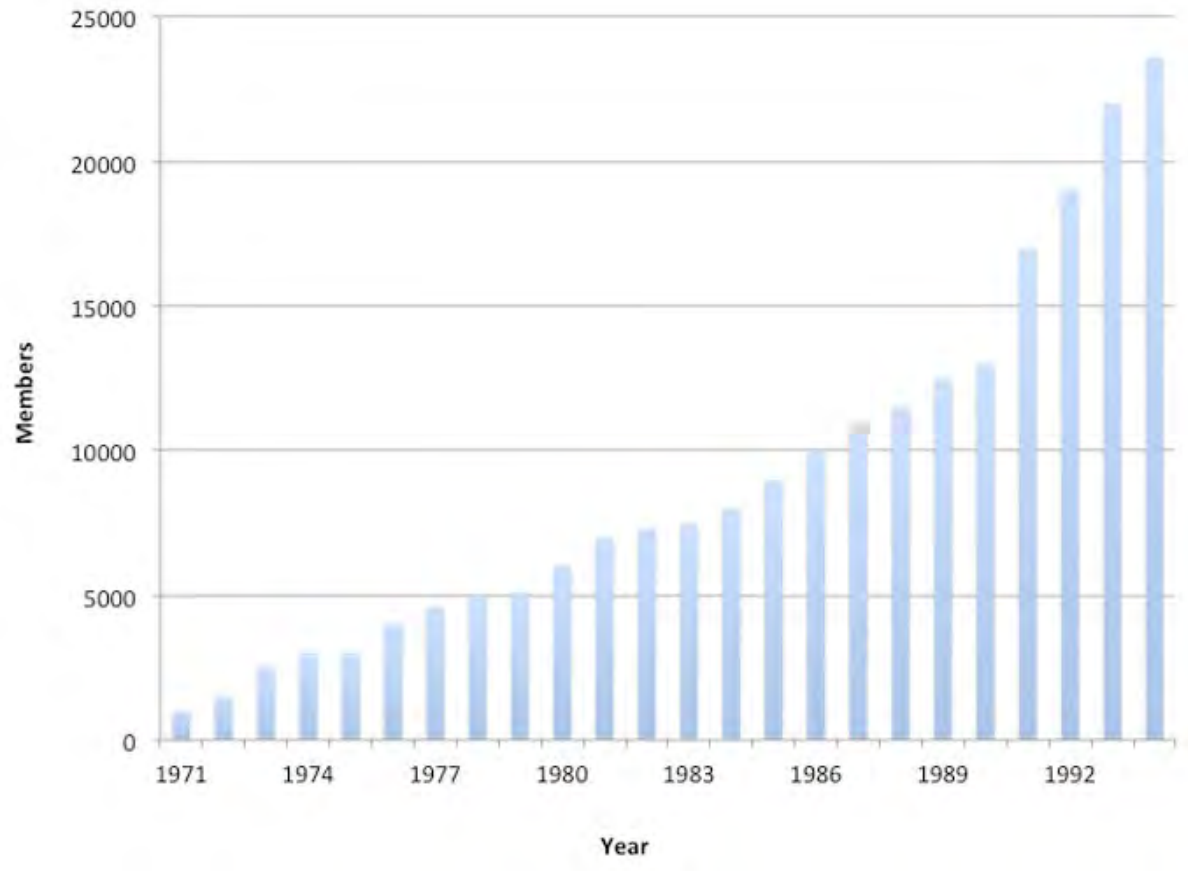


Figure 31. SfN Membership Growth, 1971-1993, (Joel Braslow).

The growth in neuroscience PhDs tells a similar story. In 1968, an estimated 238 doctoral dissertations were awarded in neuroscience related fields. Less than a decade later, in 1976, U.S. biological science departments graduated 521 PhDs in neuroscience.[176] By the early 1990s, American and Canadian institutions were awarding about 1,000 PhDs per year in neuroscience related fields.[177] SfN also played an important role in the creation of neuroscience departments and interdepartmental neuroscience programs that offered PhDs specifically in neuroscience. In 1978, there were 29 interdepartmental neuroscience programs and, by 1986, this number had increased to 47.[178] The growth of these programs led to the creation of the Association of Neuroscience Departments and Programs (ANDP) in 1981 to help develop curricular standards and track their development. In 2009, reflecting its long-standing role in neuroscience graduate education, SfN merged with the ANDP and created the Committee on Neuroscience Departments and Programs (CNDP), “charged with recommending and managing programs, activities, and initiatives that advance education and research training in academic neuroscience.”[179]

This explosive growth of the field would not have been possible were it not for the rapid expansion of federal funding, in which, SfN leadership played an especially critical role. Of course, neuroscience was not unique as federal funding for all biomedical research grew at an unprecedented rate following World War II. As we noted earlier, in the postwar years, NIH became the single largest source of biomedical science funding not only in the United States but also globally. While the rise in federal funding for neuroscience mirrored this larger context, SfN leaders helped to convince Congress of the importance of directing funds toward neuroscience. While the 1990s Decade of the Brain may not have led to the wished-for scientific or funding breakthroughs, it did underline the increasing power of SfN leadership to garner national attention and helped lay the groundwork for President Barack Obama’s Brain Research Through

Advancing Neurotechnologies (BRAIN) Initiative. The National Institute of Neurological Disorders and Stroke (NINDS) budget (see Figure 32) illustrates the federal commitment to neuroscience. Though the NINDS budget represents only a fraction of federal neuroscience expenditures, it illustrates the growing importance and consolidation of the field, especially from the mid-1970s onward. One would be hard pressed to imagine these gains without the advocacy of SfN and its Governmental and Public Affairs Committee.

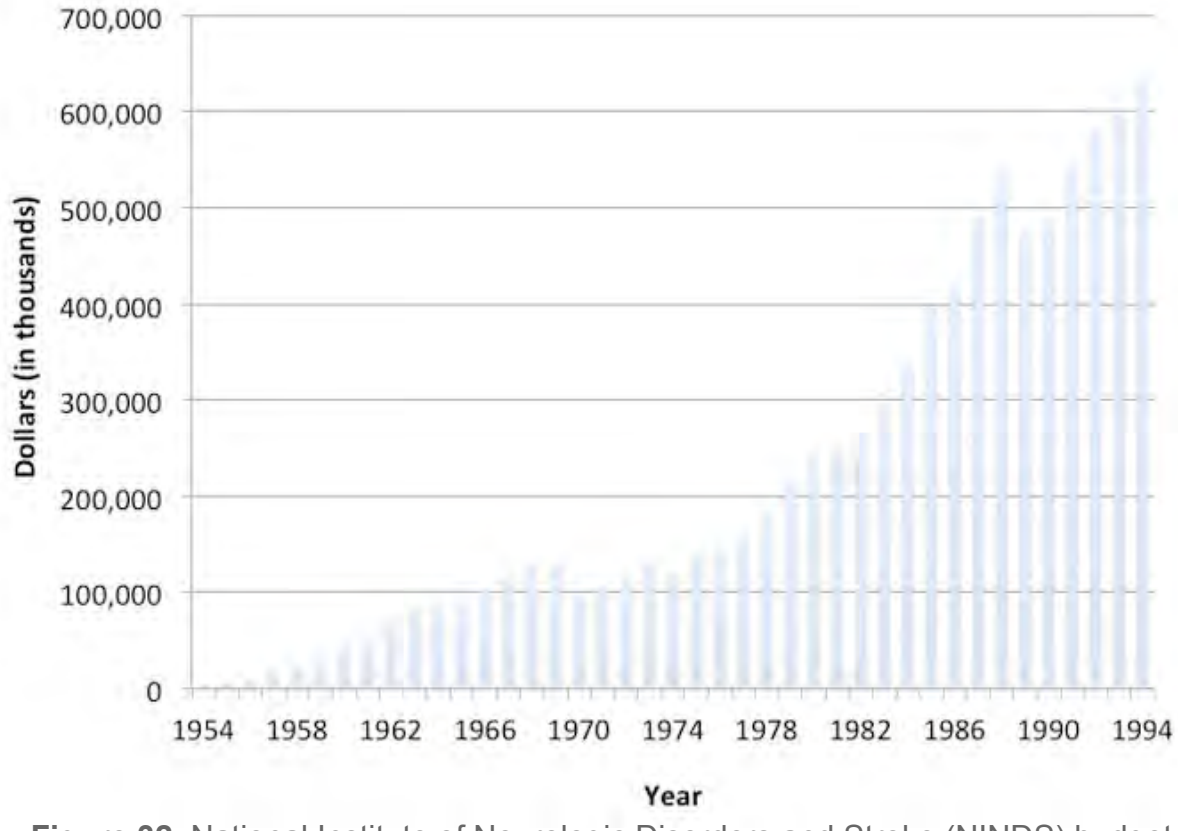


Figure 32. National Institute of Neurologic Disorders and Stroke (NINDS) budget, 1954-1994. (Joel Braslow)

The first 25 years of SfN was largely an American story, though, from the beginning, SfN leadership envisioned a global society that spoke for all of neuroscience, not just for the parochial interests of neuroscientists in a single country. Given the U.S. dominance of science throughout much of the latter half of the twentieth century, it is not surprising that North American institutions, laboratories and scientists drove the development of neuroscience. For example, between 1999 and 2003, the US accounted for 26 percent of the global output of scientific articles. This figure roughly reflects the US share of global research and development expenditures. In 1996, the US share was nearly 40 percent. Over the last decade and a half, the US share has declined. In 2011, the US accounted for 30 percent of global expenditures. Accompanying this, the proportion of US publications to the global total between 2004 and 2008 declined to 21 percent. SfN membership has reflected these shifts. In 2001, international members comprised 31percent of the total. Over the following decade, international membership growth consistently outpaced that of North America, and by 2012, the proportion of international members had grown to 39 percent.

In the 2012 edition of *Principles of Neuroscience*, Eric Kandel and his co-authors Thomas Jessell, Steven Siegelbaum, and A. J. Hudspeth reflect on the major changes within neuroscience since the publication of the textbook's first edition in 1981. Echoing Schmitt, they see the ultimate task of neuroscience is to "understand how the flow of electrical signals…gives rise to mind." The 1981 edition could only consider addressing the major questions of neuroscience with the methods of cellular biology. The 2000 edition had caught up with the seismic changes in neuroscience brought about by the mo-

lecular biological revolution. Arguably, molecular biological explanations have provided a new intellectual "super glue" to hold the disparate field of neuroscience together. While few neuroscientists have been molecular biologists, molecular biology offered a powerful intellectual resource for investigating and understanding the linkages from gene expression to complex human behaviors, thoughts, and feelings.

By the 2010s, new motifs had begun to animate the *Principles of Neuroscience*. According to the authors: "Although the cellular and molecular biological approaches emphasized in the previous editions will certainly continue to yield important information, knowledge of the function of assemblies of neurons in defined circuits must be attained to arrive at a comprehensive cognitive neuroscience."[180] The increasing emphasis on circuits also has been accompanied by the growth of larger and larger data sets of genomic, proteomic, and multi-electrode recordings to name a few. Slightly more than 50 years after Schmitt believed neuroscience was on the verge of "revolutionary" breakthroughs, the shift toward circuits and systems has given rise to new promises of fundamental discoveries. The final report of the BRAIN Advisory Committee to the NIH director, released in June 2014, reads: "Over recent years, neuroscience has advanced to the level that we can envision a comprehensive understanding of the brain in action, spanning molecules, cells, circuits, systems, and behavior." As enthusiasm builds for this shift toward larger systems and network biology, and a growing reliance on complex methods of analysis of observational data sets, the discipline of neuroscience will face new challenges. How SfN responds to these challenges will shape, not only the future of the discipline, but also the potential of neuroscientists to fulfill, at least partially, some long-overdue promises.

From the moment of its founding, SfN's leaders believed that scientific truth flourished best within a democratic meritocracy and egalitarian milieu. They consciously worked to make these values a core part of the Society, which accounts in large part for the Society's ability to forge unity in the face of enormous diversity of methods and interests. A number of challenges could put this founding spirit to the test. For example, will the shift toward systems neuroscience preclude other, equally productive, avenues of investigation?

Ironically, the phenomenal success of American biomedical science since World War II poses another threat to the research community in general and the neuroscience research community in particular. The entire American research enterprise has been driven by the continual uninterrupted expansion of research dollars. However, since 2003, NIH funding has declined by an estimated 25 percent in constant dollars; fundamental structural problems have come to the fore as the number of researchers has expanded in the face of a contracting pool of research dollars. The contraction of fully supported tenure-track and tenured faculty positions has further accentuated an already competitive and increasingly insecure research environment.[181]Similar to the growing chasm between rich and poor in American society, biomedical science in the U.S. faces a similar problem in which fewer and fewer scientists control the

vast amount of resources. The ways in which the Society will address these trends will have significant consequences for the future of neuroscience.

Since the early 1800s, each generation of brain scientists has hoped to unlock the mysteries of human consciousness and to cure psychiatric disease. The same promises prodded Congress to open federal coffers during the past 50 years. Recall Dominick Purpura's 1990 prediction that if Congress provided neuroscientists adequate funding: "Humankind will be emancipated from the dread of disability and the stigma of dehumanization that attends dissolution of the human spirit in dementia." Nearly a quarter-century later, the BRAIN Advisory Committee made similar claims that neuroscience was perched on the verge of revolutionary advance: "We are at a unique moment in the history of neuroscience—a moment when technological innovation has created possibilities for discoveries that could, cumulatively, lead to a revolution in our understanding of the brain."[182] Comparing the current moment in neuroscience history to other revolutions in the history of science, the Advisory Committee promises even more than simply a revolution in understanding:

> *"Like other great leaps in the history of science—the development of atomic and nuclear physics, the unraveling of the genetic code—this one will change human society forever. Through deepened knowledge of how our brains actually work, we will understand ourselves differently, treat disease more incisively, educate our children more effectively, practice law and governance with greater insight, and develop more understanding of others whose brains have been molded in different circumstances."*

SfN's founding president, Ed Perl, just before he died in 2014 at the age of 87, and the Society's first elected president, Vernon Mountcastle, who turned 96 in that year, could have felt enormously proud of the organization that they helped birth. Rooted in a non-dogmatic, though rigorously mechanistic, view of neuroscience, SfN has played a major role in assuring that federal policy makers budgeted for the basic research that has proved productive in understanding our most precious organ and has clearly articulated to the public why brain science mattered. Finally, and just as importantly, SfN made an intellectual home for a new species of scientist, the neuroscientist. SfN's strengths flowed from promoting an intellectually democratic view of neuroscience in which facts and rigorous experimentation ultimately won out over any particular fashion, method or discipline. As the world becomes more complex, especially if funding priorities of the federal government continue their current trajectory, SfN's role will become even more important if we ultimately hope to better understand, in Mountcastle's words, "what makes man human."

Endnotes

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