March 17, 1998

BRAIN AWARENESS WEEK RECEPTION

DATE:	**Wednesday, March 18, 1998**
TIME:	**6:00 - 6:35 pm**
PLACE:	**Dirksen Senate Office Building**
FROM:	**Nicole Rabner**

I. PURPOSE

To receive the 1998 Decade of the Brain Award from the Society for Neuroscience, and underscore the President's commitment to increased investments in research.

II. BACKGROUND

Brain Awareness Week

The Capitol Hill reception which you will attend is part of Brain Awareness Week, an annual public information campaign created in 1996 by the Dana Alliance for Brain Initiatives to focus public attention on the importance of the brain and brain research. The campaign includes over 350 organizations, including scientific institutions, patient-advocacy and service groups, outreach organizations, professional groups, universities, and teaching hospitals.

Brain Awareness Week programming takes place throughout the United States, engaging school children, community groups, policy makers and scientists in a wide range of activities, including lectures, classroom activities, workshops, and conferences.

The Decade of the Brain Award

Since 1990, the Society for Neuroscience has presented the Decade of the Brain Award annually to recognize outstanding individual efforts on behalf of neuroscience research. You are being honored with the 1998 Decade of the Brain Award for your sponsorship of *The White House Conference on Early Childhood Development and Learning: What New Research on the Brain Tells Us About Our Youngest Children*. The award has traditionally been presented to a legislator; past recipients are: Sen. Tom Harkin (1997); Sen. Arlen Specter (1996); Rep. John Porter (1995); Sen. and Mrs. Pete Domenici (1994); Rep. Steny Hoyer (1993); Sen. Ernst Hollings (1992); the late Rep. William Natcher (1991); and the late Silvio Conte (1990).

One of the principal organizers of Brain Awareness Week activities, the Society for Neuroscience promotes brain-related research and the exchange of information among scientists world-wide, and works to inform the public about the results and implications of the new research. Dr. Carla Shatz, past President of the Society for Neuroscience and member of the Brain Awareness Week Steering Committee, was a presenter at the White House Conference.

Capitol Hill Event

The speaking program for the reception is as follows: Mr. David Mahoney, Chairman of the Dana Alliance, will make brief welcoming remarks and serve as master of ceremonies. Mr. Mahoney will first introduce Dr. Harold Varmus, who will speak about the Administration's new initiatives in support of medical research, and then call on Dr. Leon Cooper, Nobel Laureate in Physics, to make brief remarks. Mr. Mahoney will then turn to the Decade of the Brain award presentation: Dr. Carla Shatz, past president of the Society for Neuroscience and presenter at the *White House Conference on Early Childhood Development*, will comment on your involvement in children's issues and your sponsorship of the White House Conference. She will then ask Dr. Lorne Mendell, current president of the Society, to join her at the podium to present the 1998 Decade of the Brain Award to you. You will accept the award, make remarks and conclude the program.

The reception you will attend concludes an afternoon session of presentations by scientists and legislators, including Dr. Benjamin Carson and other researchers, and Members of Congress such as Rep. Nancy Pelosi (D-CA) and Rep. John Porter (R-IL). Following the speaking program, a song will be performed by musician David Bailey, who has become an advocate for brain research through his battle with terminal brain cancer. He be featured tonight (Tuesday) on CBS's primetime program *48 Hours*, which is hosted by Dan Rather and features Americans who are "Beating the Odds."

The 21st Century Research Fund

The neuroscience community is extremely pleased with the President's commitment to research, as evidenced in his FY 1999 budget request and State of the Union Address (they took particular note of your being seated next to NIH Director Harold Varmus). As you know, the President has proposed creating an historic "21st Century Research Fund" with unprecedented increases in biomedical research at the NIH. The President's budget contains a $1.15 billion increase in biomedical research for FY 1999, and proposes an increase in NIH funding of more than 50 percent over the next five years. Under the President's proposal, the NIH will devote over $20 billion to biomedical research in 2003.

New Developments in Brain Research and Early Childhood Development

Attached please find a memorandum from Dr. Duane Alexander, Director of the NICHD, outlining recent research discoveries and investigations in the area of early brain development. He also encloses a recently-funded grant application to study a question that the President posed at the White House Conference: How much language input does it take to produce language learning and do we know if this input can come from radio or TV to be effective?

III. PARTICIPANTS

Program Participants:
The First Lady
Mr. David Mahoney, Chairman of the Dana Alliance for Brain Initiatives

Dr. Harold Varmus, Director of the National Institutes of Health
Dr. Leon Cooper, Dana Alliance member and Nobel Laureate
Dr. Carla Shatz, past President of the Society for Neuroscience, Dana Alliance member, and presenter at the White House Conference
Dr. Lorne Mendell, President of the Society for Neuroscience

Audience:
Approximately 200 people, including Brain Awareness Week partners (professional organizations, advocacy groups, universities, teaching hospitals, educators) and policy-makers.

IV. SEQUENCE OF EVENTS

- YOU will greet the stage participants: Dr. Lorne Mendell, Mr. David Mahoney, Dr. Carla Shatz, Dr. Harold Varmus, and Dr. Leon Cooper.
- YOU will proceed to stage with the program participants.
- Mr. David Mahoney, Chairman of the Dana Alliance, gives welcoming remarks and introduces and introduces Dr. Harold Varmus, NIH Director.
- Dr. Harold Varmus gives brief remarks.
- Dr. Leon Cooper, Nobel Laureate in Physics, gives brief remarks.
- Dr. Carla Shatz, past President of the Society for Neuroscience, gives brief remarks and invites Dr. Lorne Mendell, current President of the Society for Neuroscience, to make the award presentation.
- Dr. Mendell presents the Society for Neuroscience 1998 Decade of the Brain Award to YOU.
- YOU accept the award and give brief remarks.
- Upon conclusion of your remarks, Mr. Mahoney announces the start of the reception and YOU depart.

V. PRESS PLAN

Open Press.

VI. REMARKS

Provided by Christy Macy.

Preliminary Timeline
Capitol Hill Progress Report Event and Reception
Dana Alliance for Brain Initiatives
March 18, 1998

Progress Report Event
4:00 - 6:00 PM

4:00	**Introduction: Barbara Gill**, Executive Director, Dana Alliance
4:02-4:09	**Greetings: David Mahoney**, Chairman, Charles A. Dana Fdn. **Rep. Connie Morella** (R-MD)
4:10	**Floyd Bloom, M.D.** Topic: *Delivering Results:an overview of the advances in brain research and the tools and new understanding that make this possible.*
4:20	Policy remarks by **Rep. Vernon Ehlers** (R-MI)
4:25	**Benjamin Carson, Sr., M.D.** Topic: *The Developing Brain: What is research telling us about the early development of a child's brain and why is it important?*
4:35	Policy remarks by a member of Congress
4:40	**Kay Jamison, Ph.D.** Topic: *Advances and Challenges in Mental Health Research*
4:50	Policy remarks by **Rep. Nancy Pelosi (D-CA)**
4:55	**Michael Kuhar, Ph.D.** Topic: *The Science of Addiction*
5:00	Policy remarks by a Member of Congress
5:05	**Guy McKhann, M.D.** Topic: *Parkinson's Disease, Injury and Stroke: New Insights and Treatment Strategies Result from Research*

5:15 **Dennis Selkoe, M.D.**
Topic: *What We Know About How People Learn and Remember: Health and Disease*

5:25 **Dr. Bloom**
Topic: *Brain Research: An Agenda for the Next Five Years*

5:30 Questions and Answers

5:45 Policy remarks by **Rep. John Porter (R-IL)**

5:52 **Dr. Bloom**
Acknowledgements and Introduction of David Bailey and Douglas Ebert/notbychance. (David Bailey is a three-year survivor of a glioblastoma; he is a folk-singer who will be featured in a *48 Hours* special with Dan Rather on Tuesday, March 17.)

5:55 Two songs by Bailey and Ebert

NOTE:
We are still awaiting final word from schedulers as to the appearance times for Senators Olympia Snowe (R-ME), Arlen Specter (R-PA); and Ted Stevens (R-AK).

6:00 Reception

DAVID J. MAHONEY

Bio

David Joseph Mahoney was born in the Throgs Neck section of the Bronx on May 17, 1923. Mr. Mahoney is chairman and chief executive officer of the Charles A. Dana Foundation, the Eleanor Naylor Dana Charitable Trust, the Dana Alliance for Brain Initiatives and David Mahoney Ventures. Additionally, he serves on a number of corporate boards including the Dreyfus Corporation, Intracoastal Health Systems, Inc., Research!America and the Raymond F. Kravis Center for the Performing Arts, Inc. Mr. Mahoney is also on the Advisory Board of the American Paralysis Association.

Mr. Mahoney served as chairman of the board and chief executive officer of Norton Simon, Inc. from 1970 to his retirement in 1983. He played a key role in the formation of the corporation when, in 1968, it consolidated Canada Dry, Hunt Foods, and the McCall Corporation.

At Norton Simon, Inc., Mr. Mahoney was responsible for the 24-hour take-it-or-leave-it buyout of Avis for $174 million. He also oversaw the purchase of Halston Enterprises, Max Factor, Glass Container Corporation, and United Can Company. During his tenure, Norton Simon sales rose from $900 million to $3 billion with 35,000 employees in 150 countries.

Mr. Mahoney has had a life-long commitment to health and to medical research. In 1983, he endowed the David Mahoney Institute of Neurological Sciences at the University of Pennsylvania, where he is a trustee emeritus. In 1990, he established the Harvard Mahoney Neuroscience Institute and currently chairs its governing council at the Harvard Medical School.

A former trustee of both the Fletcher School of Law and Diplomacy at Tufts University and of the Tuskegee Institute, Mr. Mahoney is also a former director of the NYNEX Corporation, the National Urban League and Phoenix House. He is also chairman emeritus of the American Health Foundation. In 1970, President Richard M. Nixon appointed Mr. Mahoney chairman of the American Revolutionary Bicentennial Commission. In 1979, he was invited to join President Jimmy Carter at Camp David to help analyze the direction of the administration.

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Mr. Mahoney's professional career spans more than five decades. After serving as a Captain in the infantry in Okinawa and Japan in World War II, Mr. Mahoney joined Ruthrauff & Ryan advertising agency where, at age 25, he soon became the youngest vice president on Madison Avenue.

In 1951, at the age of 28, he formed his own advertising agency, David J. Mahoney, Inc. Five years later, he sold his agency to become president of the Good Humor Company, and, five years after that, became executive vice president of Colgate Palmolive, a billion dollar company. In 1966, Mr. Mahoney became president of Canada Dry, the soft drink and liquor company in which Norton Simon's Hunt Foods and Industries had a large stake.

A graduate of the LaSalle Military Academy and the Wharton School of Business at the University of Pennsylvania, Mr. Mahoney holds honorary degrees from Manhattan College, Sacred Heart University, St. John's University, Suffolk University and Rutgers University.

Mr. Mahoney is the recipient of the Columbia Presbyterian Health Sciences Advisory Council Dean's Award for Distinguished Service; the Life Line Award from the American Health Foundation; the Public Leadership in Neurology Award from the American Academy of Neurology Education and Research Foundation; and the Society for Neuroscience Public Service Award.

Mr. Mahoney currently resides with his wife Millie in Palm Beach and Switzerland. He has a daughter, Barbara, and a son, David, from a previous marriage, as well as two stepsons.

# # #

June 1997

Harold Varmus, M.D., Director, National Institutes of Health

Dr. Varmus has been the Director of the National Institutes of Health (NIH) since November 1993. Previously he was professor of microbiology, biochemistry, and biophysics at the University of California, San Francisco. Dr. Varmus shared the 1989 Nobel Prize in Physiology or Medicine with Dr. Michael Bishop for demonstrating that cancer genes (oncogenes) can arise from normal cellular genes.

July 1997

Leon N. Cooper, Ph.D.

A member of the Dana Alliance and Director of the Institute for Brain and Neural Systems, Dr. Cooper is also a Professor in the Department of Physics and Neuroscience at Brown University. He was awarded the Nobel Prize in Physics with two colleagues in 1972 for what is now known as the BCS theory of superconductivity.

Dr. Cooper has been the recipient of many other awards and honors, including the Comstock Prize of the National Academy of Sciences. He is a fellow of the American Physical Society, American Academy of Arts and Sciences, and is a member of the National Academy of Sciences.

SOCIETY FOR NEUROSCIENCE
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Background: Carla J. Shatz, Ph.D., Past President, Society for Neuroscience

Dr. Shatz is a foremost authority on neural development. She is a Professor of Neurobiology at the University of California, Berkeley, and an Investigator of the Howard Hughes Medical Institute. A past president of the Society for Neuroscience, Dr. Shatz is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

Dr. Shatz is author of some 125 publications and has been the recipient of numerous awards including the 1992 MERIT Award (National Eye Institute, NIH), the 1993 Silvio Conte Award (National Foundation for Brain Research), and the 1995 Charles A. Dana Award for Pioneering Achievement in Health and Education.

Dr. Shatz received her B.A. in Chemistry from Radcliffe College (1969), her Master's in Physiology from University College, London (1971), and her Ph.D. in Neurobiology from Harvard University (1976). As a graduate student at Harvard, she worked with Nobel Laureate Dr. David Hubel and as a postdoctoral fellow with Nobel Laureate Dr. Torsten Wiesel. She rose from Assistant to full Professor at Stanford University School of Medicine (1978-1991) before assuming her current Professorship at University of California, Berkeley, in 1992.

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Biosketch: Dr. Lorne Mendell, President, Society for Neuroscience

Dr. Lorne Mendell, a native of Canada, received his Ph.D. at MIT, did postdoctoral work at Harvard Medical School, and taught and did research at Duke Medical Center before moving to the State University of New York at Stony Brook where he is currently Distinguished Professor and Chairman of the Department of Neurobiology and Behavior. His research is centered on the following areas:

1) neural mechanisms involved in the generation of pain such as that associated with inflammation,

2) extent of adjustments in neural function in the spinal cord after injury to peripheral nerves, and

3) mechanisms of plasticity in neuronal connections.

He currently holds three NIH research grants and a training grant to train Ph.D. students.

He has consulted for several granting agencies, has served on several editorial boards, has acted as advisor to many educational and research organizations, and has been active in the Society for Neuroscience over the years.

FROM Dr. Duane Alexander, Director, NICHD

NIH Research Sheds Light on Early Brain Development

Researchers Learn More About Normal and Early Brain Development

- Researchers already know that laying the groundwork for a healthy brain starts early and is a very complicated process. One trillion nerve cells must make about 100 trillion connections. These events have been compared to establishing telephone connections, first between cities and then to the proper address. The brain runs test patterns to see which connections are correct -- these are strengthened. Connections which are incorrect are eliminated.

  Now researchers are learning how the axons of the nerve cells are able to grow along appropriate pathways and make these orderly connections. Recently, they identified a chemical substance in the brain that acts as a "guidance label" for the neuronal axons. This chemical acts as a repellent, discouraging axons from making the wrong connections. Conversely, investigators assume that chemicals exist that also act to attract and guide the neuronal axons to their proper connections.

Researchers Learn More About Reading, Learning, and Brain Function

- Researchers have pioneered a brain-mapping procedure, called functional magnetic resonance imaging (fMRI), which allows them to see different patterns in brain activity. The non-invasive technology provides images of internal brain structures in fine resolution, while highlighting which parts of the brain are most active at a specific time. The fMRI works by showing differences between blood carrying oxygen and blood that is depleted of oxygen. Because active areas of the brain use oxygen-rich blood, the technology has literally unlocked the windows to the brain, allowing researchers to 1) identify which parts are actively involved in learning and reading and which ones may be implicated in such disorders as dyslexia; and 2) study how interventions may help overcome or prevent these disabilities by influencing brain function and new brain pathways.

- Using these advanced technologies, researchers have just identified the neural pathway that is responsible for causing dyslexia, a condition that causes great difficulty in reading, and is estimated to affect 80 percent of all individuals labeled "learning-disabled." This newest study clearly demonstrates which systems in the brain are critical for reading function, and that brains of dyslexic subjects show very little activity in areas known to be important in linking written forms of words to their phonological components. Thus, this research provides the first neurologic evidence that persons with dyslexia lack phonologic awareness--or the ability to break words down into their component sounds--a critical step in learning to read. It also provides researchers and clinicians with an important neurological benchmark that could, in the future, help them identify children with dyslexia before the cycle of school failure is permanently established.

- Scientists have discovered that many children with language-based learning impairments have difficulty recognizing some rapidly presented sounds of speech or other sound stimuli. If the sounds are slowed down, however, then these children can learn to better distinguish them. Wonderfully demonstrating how scientific discoveries can help children, researchers designed a computer game, based on these findings, to improve a child's ability to recognize brief and fast sequences of speech and non-speech stimuli. Just hours of training markedly improved what was once thought to be a permanent, language-based deficit.

- Similarly, scientists have made great progress developing interventions to prevent serious reading difficulties among children at-risk for such failure. One extremely promising intervention is specifically designed to aid a child's ability to process phonemes, or individual bits of sound. These approaches, which have been tested in major cities nationwide, initially teach children that words are composed of sounds and that the letters in words stand for these sounds. Then, children are taught how these letter-sound combinations can be used to read text rapidly and fluently. Studies show that children who learn a combination of phoneme awareness, phonics, and literature-based reading make the greatest gains in reading and fare better than children taught with only one method at the exclusion of the other.

Researchers Learn More About Social Situations That Affect Early Brain Development

- Scientists have mounting evidence that early experience can alter the region of the brain controlling the release of stress hormones. In a recent study, researchers looked for natural variants in maternal rat behavior, and found that rat mothers who spontaneously lick their pups a great deal, produce pups that also have a reduced response to ordinary stress throughout life. This finding shows how the environment of a developing animal can alter brain functions, producing lifelong physiologic consequences. The data also help scientists better understand the neurologic mechanisms that may influence how children respond to stressful events--as children who are depressed and suffering ongoing psychological abuse have been observed to be significantly less capable of "switching off" their stress hormone responses, compared with other children.

- An important nationwide study of early child care is following more than 1,300 families, from diverse backgrounds, and their newborn infants over three years. The study is designed to show if child care itself--after controlling for many complicating variables such as the family income, children's gender and temperament, and mothers' psychological well-being and intelligence--adds to or subtracts from a child's development. Among the most consistent findings, the research shows that a mother's positive involvement with or sensitivity to her child, and the level of a child's engagement with his or her mother, are associated with higher cognitive and language scores. In addition, the study shows that, overall, family environment, maternal education, and family income are more influential than day care in determining an infant's cognitive and language development. A consistent and modest relationship

continues to exist, however, between the quality of day care during the first three years of life and the development of cognitive and language skills.

Researchers Learn More About Medical Conditions That Affect Early Brain Development

- A child who is born too early or with a very low birth weight is at higher risk for brain impairment than babies born at full term. One reason is that these very tiny babies are susceptible to bleeding in the brain, which may be associated with lifelong developmental impairment. Recently, scientists showed that a medication, called indomethacin, reduced the risk of bleeding in the brains of very low birth weight, newborn infants, and decreased their likelihood of lifelong cognitive and motor impairment. These children are now being followed to assess how well they do on subsequent measures of motor skills and school readiness.

- The fragile brains of premature infants may also sustain damage that leads to such lifelong debilitating conditions as cerebral palsy. But NIH research is offering new hope, such as a collaborative project with the state of California on birth defects, which shows that children born prematurely were much less likely to have cerebral palsy at three years of age, if their mothers received a medication, magnesium sulfate, just before giving birth. Based on these initial findings, a new collaborative, scientifically-controlled, clinical trial is underway to test whether this medication effectively reduces both the risk of infant mortality and cerebral palsy in premature babies.

- Researchers are finding that some drug-exposed infants show attention difficulties early in life that may, in turn, affect how the infants interact with their environments and how they learn. Other, long-term consequences for cognitive abilities can be subtle and may not appear for years. For instance, scientists using sophisticated measurement techniques are finding that some prenatally drug-exposed children suffer from learning deficits that may only appear years later when they enter school.

- For the first time, scientists have also demonstrated a possible biological basis for some of the difficulties experienced by children who are prenatally exposed to cocaine. A recently published study demonstrates the presence of cocaine receptors in the brains of fetal rats and showed that cocaine can bind directly to these brain sites. The scientists suggest that, as this binding occurs, brain development may be modified in ways that could later influence important behaviors. Researchers hope that this new information about cocaine receptors will increase their understanding of the biological impact of cocaine on the developing brain and, subsequently, lead to interventions that could prevent or reverse these harmful effects.

- Recently, scientists compared developmental changes in how dopamine, an essential neurotransmitter, is concentrated in selected brain regions of the rat, after being exposed--in utero and through lactation--to one of two similar polychlorinated biphenyl compounds (PCBs). PCBs, themselves, were used extensively in electrical manufacturing and have been associated with cognitive and motor reflex dysfunctions in humans. The study

showed that, not only were dopamine levels affected to substantially different degrees by these related, but slightly different compounds, but these effects were observed using doses lower than previously tested in similar research and, thus, are more relevant to levels that occur through environmental exposures. The data suggest that the significant and persistent reductions in brain dopamine concentrations following perinatal exposure to one of the PCBs probably reflects the effects of this PCB on brain development.

- Researchers have found that some forms of self-injurious and aggressive behavior are neurologically based. Once established, these behaviors are resistant to change and often pose lifelong difficulties for children and families. A potential avenue for changing these behaviors, however, became evident when scientists noted that these children also had great difficulty in communicating. In response, the researchers developed a simple communication system using a combination of hand gestures and pictures that allowed the children to express their needs and wants. Parents were taught to use the system and how to teach it to their preschool children. This elegant concept, based on developing systems to enhance parent-child communications, dramatically reduced self-injurious and destructive behavior, while improving the quality of life for the children and families involved.

UNIVERSITY OF WASHINGTON

SEATTLE, WASHINGTON 98195

Dr. Patricia Kuhl
Chair, Speech and Hearing Sciences

William P. & Ruth Gerberding Professor
University of Washington

October 30, 1997

To: Felix Delacruz
From: Patricia K. Kuhl
Re: The President's Question

Dear Felix,

On April 17, 1997, the President and Mrs. Clinton hosted a White House Conference on "Early Childhood Development and Learning: What New Research on the Brain Tells Us About Our Youngest Children." This was an extraordinary day for scientists, for the public, and for the National Institutes of Health. The Conference provided concrete evidence that scientific findings, funded by the NIH, were relevant to the American people — to parents raising children, to educators teaching those children in schools, and to lawmakers making policy decisions that affect us all.

I was one of six scientists invited to make a presentation at the White House Conference. This request for research support stems from a question addressed to me by President Clinton. Duane Alexander asked that I address the question.

My NIH-sponsored work demonstrates that exposure to language in the first year of life alters the infant brain in a way that assists language development. My initial experiments, published in Science in 1992, showed that by six months of age, early language listening has increased infants' abilities to perceive distinctions that are relevant in their native language, and reduced this ability for foreign-language sounds. In a new study, published in Science on August 1, 1997, my colleagues and I further demonstrated that parental language input to infants is structured to enhance the brain's analysis of incoming speech information. The effect was verified across three very diverse languages.

The discoveries I described at the White House Conference, and in Science this summer, were picked up by most major news organization and television stations in the country. Foreign news organizations (radio and TV) also covered the story. Apparently, the public has great interest in the message that federally-funded research is of value to the public.

I am writing now to ask your assistance in responding to the President's question. At the White House Conference in April, President Clinton asked me two questions:

- How much language input it takes to produce language learning?
- Would language develop if input were delivered via a radio or television?

Both questions were aimed at defining what is needed during the "critical period" when the brain's "plasticity" makes it optimally receptive to language experience. What kind of language input, and at what age, is sufficient to cause language learning?

President Clinton landed on a key question. Not only do basic scientists need the answer, but all those concerned with prevention and intervention efforts need an answer to this question. When a young child is at-risk for language deficits, or has been identified as having a language problem at an early age, we need to know whether and what kind of prevention/intervention efforts are effective. We know that brain plasticity is maximum during the first three years. Yet research has not examined the effect of language stimulation at this early age, nor determined what kind of language experience would be sufficient to make a difference.

I told President Clinton that the available data did not allow me to answer his question, and that I could only speculate about the answers to the important issues he had identified.

I am now requesting that I be allowed to conduct research that would provide some information relevant to President Clinton's question. I am proposing a study that uses an intervention model to answer the question. Basically, the study determines whether a specified quantity and quality of language experience, before the end of the first year of life, is sufficient to alter the brain's language structures.

The information gleaned from the study will not only tell us something about the basic brain mechanisms that underlie language, but would also provide data on the value of intervention strategies with young children. The study will address the issue of critical periods in development, as well as the notion that if appropriate stimulation is presented at the right time, the brain is sufficiently plastic to benefit from the intervention.

The study, outlined in the following pages, requires an international research team and testing in two countries. I have previously assembled the team and we have already worked together collaboratively. The study can be accomplished in a one-year time frame.

This as an opportunity to further our understanding of the value of intervention strategies for developmental disabilities. It also provides an example of science responding to the concerns of non-scientists, in this case the President of the United States.

Please let me know if I can provide you with any further information.

Best regards,

Patricia K Kuhl

Patricia K. Kuhl, Ph.D.

cc: Marie Bristol, Duane Alexander

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Background:

During the last decade, research on infant learning and the brain has produced a number of remarkable discoveries, many of which were highlighted at the White House Conference. In the area of language development, these new findings focus on early speech learning (Kuhl, 1994).

It has been known for some time that typically developing infants are born with a keen sensitivity to the sounds of human speech, and that infants are very interested in listening to speech, suggesting that infants come into the world with certain innate biases that promote language acquisition. However, recent studies have taken a new approach. The new approach has focused our attention on *learning*, more specifically, at infants' response to language experience.

The studies reveal that very early in development, infants show dramatic effects of exposure to a specific language. For example, a cross-language study I completed in 1992 showed that by six months of age, infants growing up in the United States listening to English and those growing up in Sweden listening to Swedish perceive speech sounds very differently (Kuhl et al., 1992). In both countries, listening to a specific language had caused infants to show more sophisticated categorization abilities for sounds contained in that language as opposed to a foreign language. The implication was that simply listening to language in the crib was sufficient to alter the brain mechanisms underlying language. In a second study published this August (Kuhl et al., 1997a), I led an international team in showing that across three very diverse languages, mothers talk to infants in a way that enhances the brain's ability to code the sounds of human speech.

The concept that the brain is being sculpted by simply listening to language came as a surprise. The finding demonstrates an important point: Early learning often has no outward manifestation. It is not evident in infant's everyday behavior. Yet the research demonstrates that listening to language produces a kind of "map" in the brain of the information contained in speech. These data are consistent with those provided by neurobiologists who have shown (using animal models) that the pattern of neural connections in the brain depends on experience. In the case of language, infants' acquisition of the ability to communicate critically depends on language input.

Preliminary Studies Leading to This Proposal:

My laboratory studies on early learning of speech have been conducted on infants from many different cultures (Kuhl et al., 1992; Kuhl et al., 1997a). I have assembled international research teams to examine language development in infants being raised in the United States, Japan, Russia, Sweden, and Finland. Currently, the most interesting work is taking place in Japan. American English and Japanese are very different languages. The sound structure of the two languages varies greatly, which allows us to conduct experiments on infants that examine both the innate and learned aspects of speech development.

We recently completed a set of studies on infants and adults in the two countries. We examined the perception of two sets of consonant contrasts, one a phonetic contrast that is used in both languages (/b/ versus /g/ as in the American English words "bet" and "get"), and the other a contrast that is only used in American English (/r/ versus /l/ as in the words "rake" and "lake") (Kuhl et al., 1997b). Both American and Japanese adults distinguished /b/ from /g/, but Japanese adults can not distinguish American English /r/ and /l/. Japanese does not contain the sound /l/ (only /r/) , and Japanese adults often confuse the two in speech perception and production, even after a great deal of instruction and practice in the United States (e.g., Miyawaki et al., 1975).

The adult findings raised questions about infants. Do Japanese infants initially show /r-l/ discrimination and then lose the ability at some point? Or do they never show discrimination of the contrast? In general, research on infants had confirmed the fact that early in development infants are capable of discriminating a wide variety of phonetic contrasts, even sounds not contained in their native language (e.g., Streeter, 1975), and that with exposure to a specific language, the ability to discriminate foreign-language contrasts is lost (Werker & Tees, 1984). No one, however, had tested Japanese infants.

We recently conducted tests in Japan that answered these questions. In collaboration with my Japanese colleagues (Kuhl et al., 1997b), I conducted a cross-language study on American and Japanese infants using two phonetic contrasts, /b-g/ and /r-l/. Infants were tested at two ages, 6-8 months and 10-12 months. The findings of the new study showed two things about the perception of /r/ and /l/: (a) at an early age, Japanese infants discriminate /r-l/ just as well as American infants, even though they have not been exposed to these two American sounds, and (b) the critical window when Japanese infants lose the ability to discriminate /r-l/ is between the ages of 8 and 10 months. Our tests show that between 6 and 8 months of age, American and Japanese infants are capable of discriminating both contrasts, /b-g/ and /r-l/. However, two months later, a dramatic change has occurred in the Japanese infants. By 10-12 months of age, Japanese infants' performance on /r-l/ drops to near chance (59%), while their performance on /b-g/ remains high (approximately 85% correct). American infants continue to discriminate both /b-g/ and /r-l/ at high performance rates (approximately 85% correct). The study confirms that within a two-month window, speech perception is transformed by language experience.

An important question is raised by the data: Would intervention between the ages of 8 and 10 months prevent the decline in speech perception allowing Japanese infants to retain the ability to distinguish /r/ from /l/? And if so, what kind of intervention (in this case, language input) would be sufficient? The intervention treatment proposed for the study is a story that contains large numbers of /r/ and /l/ items. Guided by our recent discovery regarding maternal language input to infants ("Parentese") (Kuhl et al., 1997a), the story will provide high-quality language input, input that mimics mothers' speech to infants. Recent work suggests that intervention would be ideal because at this age infants: (a) pick up statistical regularities in speech (Saffran, Aslin & Newport, 1996), (b) attend to phonetic properties rather than phonetic-semantic mappings (Stager & Werker, 1997), and (c) remember items in a story that has been read to them (Jusczyk & Hohne, 1997).

Specific Goals:

The purpose of the proposed study is to use an intervention strategy between 8 and 10 months of age to determine whether a specific amount of linguistic experience is sufficient to reverse the decline in speech discrimination that we have observed in Japanese infants. A child's story will be developed that includes a large number of English words beginning with /r/ and /l/. The story, narrated by an American woman, is approximately 15 minutes in length. Japanese infants assigned to the "live story" group will hear the story in the laboratory three times per week for 6 weeks when they are between the ages of 8.5 and 10 months. A second group of infants will come into the laboratory on the same schedule, but the story (spoken by the same American woman) will be played from a tape recorder. This group will help determine the extent to which language stimulation from a disembodied source (a tape recorder) is as effective as that from a live person. A third group of infants will come into the laboratory on the same schedule but not hear the story. When infants reach 10 months of age, all three groups will come into the laboratory for identical tests on their ability to discriminate the American English /r-l/ stimuli.

Implications for Remediation and Intervention

Language learning is thought to occur during a critical or sensitive period in development when the brain is receptive ("open") to exposure to ambient language. The hypothesis tested in the proposed study is that the language system is sufficiently plastic during early childhood to respond to a relatively small quantity of input (15 minutes, three times per week for 6 weeks), that is of high quality (delivered in a style that mimics parental language input during parent-infant interaction). We hypothesize that Japanese infants who hear the story from a live speaker will show significantly increased performance in /r-l/ discrimination when compared to the group not exposed to the story. If this hypothesis is confirmed, the study would provide a benchmark finding on brain plasticity for language. We would show that relatively limited exposure to speech at this age is sufficient to reverse the observed decline in speech perception.

The proposed work has important implications for remediation and intervention. Research on young children with developmental disabilities, such as children with autism, dyslexia, or other nonspecific language impairments, has established that phonetic perception is greatly reduced in these populations (e.g., Dawson, et al., 1988; Kraus et al., 1996; Tallal, et al., 1996,). Phonetic perception appears to be a potential "bottleneck" for these children. My NIH-funded project on young children with autism (NIH - NICHD P01 HD/DC35465), is examining the early precursors to language in this population. The hypothesis is that children with autism have speech perception deficits. If the proposed study shows that intervention at an early age is sufficient to alter the speech perception abilities of typically developing infants, this would encourage early diagnosis and intervention strategies with impaired populations.

If the experiment is successful, it is noteworthy because the intervention strategy it employs is low-cost, requires no technology, and could be done easily in a variety of settings, including underdeveloped countries. The work we published this August on maternal language input to infants (Kuhl et al., 1997a) included Russian mothers as subjects. My Russian collaborators pointed out how important it is for scientific findings on child development to be applicable to people from underdeveloped countries. Although this experiment is being conducted in Japan, a successful outcome would have implications for people from all countries, especially those in which only low-cost interventions would be feasible, because the intervention involves a simple, "low-tech" strategy.

The study will also determine whether language input from a human interacting with an infant is more effective than exposure to language that is delivered from a machine via a tape recording. This informs us about the kinds of social environments that support learning. If a voice on tape stems the decline in speech perception, then simply hearing the speech information is sufficient. If language learning requires social interaction with real people, then listening to the tape will not have the same effect.

Methods and Procedures

The study employs the same design, the same equipment, the same personnel, and the same laboratory setting as used in our recently completed cross-language tests on infants in Tokyo, Japan and Seattle, Washington (Kuhl et al., 1997a). The tests in Japan are conducted in the laboratory of Dr. Toshisada Deguchi of Gakugei University where Dr. Shigeru Kiritani of Tokyo University is a collaborator. The tests employ a Head-Turn Conditioning technique that I have used in laboratory tests with infants since 1979 (e.g., Kuhl, 1979, 1983, 1985).

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Remarks for Hillary Clinton Award

DAVID MAHONEY

Makes brief remarks about award and introduces Dr. Shatz.

CARLA SHATZ

Thank you David.

Mrs. Clinton, this is a wonderful time for neuroscience and a wonderful moment in the history of our field. The past 25 years have seen an explosion in knowledge of the workings of the brain, thanks to the hard work of thousands of brain scientists and the tremendous foresight of our federal government in providing funding for biomedical research over these years. Neuroscientists have gained fundamental knowledge into the molecules that make nerve cells tick --allow them to communicate with each other: about molecules for memory and learning, about growth factors for the repair of the nervous system. Using fantastic new imaging methods, we can look into the functioning human brain non-invasively and begin to learn, for the first time, how our own brains process information.

The advances in neuroscience have also made for a revolution in our understanding of how the brain wires itself up during development. We know that a baby's brain is not just a miniature version of the adult, but a dynamic, evolving structure in which experiences of the world are encoded indelibly in the circuitry of the brain. Neuroscientists have discovered that during early critical periods, learning is easier than at later times -- a good example of this is in language learning. We know why this is the case: because at these early times, the brain is still very busy forming it's connections and wiring itself up. And, we know that during these times, experience can influence brain wiring. The early interactions between mother and child are essential for normal emotional development. And alas, we know from animal models that growing up in deprived environments can have a profound influence on the formation of normal brain wiring.

Mrs. Clinton, I know that you too have been acutely aware of these important neuroscience discoveries, and their profound implications for raising healthy children in our society. Ever since you were First Lady of the State of Arkansas, you have been passionate about the importance of the early years, about the quality of education and the quality of the interactions between parents, other caregivers and children. Among other things, you introduced a pioneering program called the Arkansas Home Instruction Program for Preschoolers, which trains parents to work with their children in preschool preparedness and literacy.

Now, as First Lady of our nation, you have continued to work tirelessly on behalf of our children to improve the environment in which they can learn and grow and become productive members of our society. In recognition of the importance of the early years, you and President Clinton have worked to:

1) extend health care coverage to up to 5 million children who might otherwise fall between the cracks,
2) guarantee Medicaid coverage for 9 million children under six years of age,
3) protect mothers and children by increasing access to prenatal care. Your efforts have resulted in a historic low of less than eight deaths per 1000 live births in 1995, and an increase in the proportion of mothers getting early prenatal care to 81%, and
4) reduce the number of tragic deaths from Sudden Infant Death Syndrome by 30% by launching the Back to Sleep program which recommends putting babies to sleep on their backs rather than on their tummies.

You have made major contributions to promoting early learning, by:

1) increasing participation in Head Start,
2) enhancing family literacy through the Even Start Program which provides educational opportunities for children and parents in low-income areas of the country,

3) promoting Parent as Teachers, in recognition of the importance of interactions between parents and children in the early years of learning, and

4) increasing funding for child care to assist low-income families working their way off welfare to obtain child care so they can work or attend school.

All of these efforts have resulted in a profound benefit for children!

Last spring, I had the extraordinary opportunity to participate in a unique event that you organized to apply what neuroscientists have learned about brain development to maximize the early life experiences and learning of our children. This event was the White House Conference on Early Childhood Development and Learning: It brought together scientists, child development experts, educators, and policy makers to discuss how parents and other caretakers could maximize the potential of our children by applying the basic knowledge gleaned from neuroscience research. For me personally, it was an incredible moment when I saw the hard work that neuroscientists have been doing applied directly to our society in the benefit of children.

Mrs. Clinton, you have helped to underscore the importance of early childhood experience to millions of American families, and you have helped to educate the American public about the complex interplay between nature and nurture -- genes and environment -- in brain development and learning. Your efforts have made it household knowledge that experiences during the first few years after birth are especially

important for brain wiring. We cannot thank you enough for your efforts -- and I am happy to now introduce Dr. Lorne Mendell, President of the Society for Neuroscience, to present you, Mrs. Clinton, with the Society's Decade of the Brain Award in recognition of your extraordinary contribution to neuroscience and the American public. **(Dr. Shatz remains at podium next to Dr. Mendell.)**

LORNE MENDELL

As Carla so eloquently expressed, this is indeed a most memorable day for brain research. I am honored to be here on behalf of the 27,000 members of the Society for Neuroscience to personally recognize our First Lady for her ardent support and innovative work on behalf of neuroscience education and health care.

Mrs. Clinton has done no less than put the findings of modern neuroscience at the service of the American people through this extraordinary coupling of biomedical research and public policy! And what more worthy a cause than our young people, the future of this country. We owe it to our children to nurture their intellect just as we nourish their bodies, and all of us within the neuroscience community are deeply grateful to you, Mrs. Clinton, for helping us to put this important body of research to work. **(Dr. Mendell takes out award from under the podium and begins to open the case as he speaks. Mrs. Clinton approaches the podium to accept award.)**

(Dr. Mendell holds up award for audience to see.)

Mrs. Clinton, we are most fortunate to have such an effective advocate for brain research at the White House -- and it is my pleasure to present you with the Decade of the Brain award from the Society for Neuroscience in recognition of the long-lasting mark you have left on neuroscience education and the health, intellectual potential, and emotional well-being of generations to come. Congratulations! **(Dr. Mendell hands award to Mrs. Clinton. He and Dr. Shatz shake hands with Mrs. Clinton. Drs.**

Mendell and Shatz remain briefly at First Lady's side for photos and then they return to their seats.)

Mrs. Clinton makes remarks.

Thank you and acknowledgments: Dr. Lorne Mendell [MEN-del], president of the Society for Neuroscience; Dr. Harold Varmus, director of NIH; Mr. David Mahoney, chair of the Dana [DAY-na] Alliance for Brain Initiatives; Dr. Carla Shatz (who participated in the White House Conference on Early Childhood Development and Learning); Dr. Leon Cooper; Members of Congress, distinguished guests.

I also want to acknowledge the wonderful performance of David Bailey and Douglas Ebert -- who many of you have just heard. David, as many of you know, is a 3-year survivor of a rare brain tumor. He's literally a miracle -- and an inspiration to us all.

Thank you very much to the Society for Neuroscience for this great honor, and to the Dana Alliance for your steadfast commitment to promoting the importance of the study of the brain, and for your leadership, along with so many other partners, in organizing "Brain Awareness Week" activities in schools and communities across the nation.

It's on the basis of much of the work that you've accomplished over the past few years -- and the potential for scientific breakthroughs in the not so distant future -- that this Administration wants to dramatically expand this nation's investment in basic research. As you know, the President has proposed the largest funding increase in history for the National Institutes of Health, the National Science Foundation, and the National Cancer Institute. In urging the creation of the "21st Century Research Fund" in his State of the Union, the President called this historic increase in scientific research "part of our gift to the next Millennium."

I want to thank all of you for giving so many "gifts to the future" -- through your expertise and leadership in the field of neuroscience. I cannot think of a better way to fulfill the promise of our nation than by helping to fulfill the promise of every child, and every citizen -- a goal so many of you have dedicated your lives to achieve. Thank you for your tireless commitment to scientific research and exploration, and for the work that you will do in the months and years ahead, as you continue to push back the frontiers of science to improve the quality of life for all people.

Today, we stand at the convergence of a new century and the next Millennium -- a milestone in human history. The President and I have been working on ways to use this historic opportunity to explore our history, our culture, and our discoveries. The theme of the White House millennium initiative is "Honor the past, imagine the future." And the President has invited all Americans to give "gifts to the future," and leave behind something meaningful to enrich future generations.

That theme is surely reflected in what we're doing here today -- and what you've accomplished in the area of scientific research over the years. This is a time to look back and celebrate the extraordinary progress that has been made in the field of neuroscience and biomedical research. You've continued to expand our knowledge of how the brain works. But perhaps more importantly, you've helped strengthen the vital connections between research and both public policy and people's everyday lives.

In particular, I want to thank you for the advances in neuroscience that have helped us understand and focus on early childhood development. Thanks to progress in this field -- parents, doctors, teachers, and care givers are changing and improving how they care for children -- especially during their formative years. And here, I'm proud that the federal government has been instrumental in funding research that leads to better understanding of children's needs -- and in adopting policies shaped by that scientific knowledge. As a result, more of America's children are getting a better, healthier start in life.

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March 23, 1998

First Lady Hillary Rodham Clinton
The White House
Old Executive Office Building
Room 100
Washington, DC 20500

Dear Mrs. Clinton:

We're still glowing from your appearance last week to accept the Society for Neuroscience's Decade of the Brain Award. It was an honor to have the opportunity to personally recognize you for your outstanding work on behalf of neuroscience education. We were equally honored that you shared with us so eloquently and insightfully your vision of neuroscience's critical role as we approach the new millennium. Your remarks were an inspiration to all of us within the neuroscience community and a heartening signal that brain research has support from the highest level of government.

On behalf of the 28,000 members of the Society for Neuroscience, I extend my deepest gratitude to you for your leadership in putting the findings of neuroscience at the service of the American public. We are extremely fortunate to have such an extraordinary advocate in the White House, as are American families whose children will benefit from the knowledge that you have helped to impart.

Very truly yours,

Lorne Mendell

Lorne Mendell, Ph.D.
President
Society for Neuroscience

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NEUROSCIENCE NEWSLETTER

1998 Abstract Postmark Deadline Is Monday, April 27

The deadline to submit abstracts for the Society for Neuroscience 28th Annual Meeting in Los Angeles, Calif., is a **postmark of Monday, April 27, 1998.** The Society can make **NO EXCEPTIONS** for the postmark deadline.

Please note that only Society members who are authors on an abstract are eligible to sign the abstract. Student Members and Foreign Student Members are eligible to sign only those abstracts in which they appear as first (presenting) author. Each member of the Society may sign only one abstract. Look for complete rules for abstract submission in the 1998 *Call for Abstracts*, which was mailed in mid-February.

Hillary Rodham Clinton to Accept Decade of the Brain Award

First Lady Hillary Rodham Clinton is the recipient of the Society's 1998 Decade of the Brain Award. The First Lady will be recognized for her sponsorship of last spring's White House Conference on Early Learning and the Brain. The highly publicized event helped to educate the public about the role of nature in brain development and underscored what parents and teachers can do to maximize the intellectual growth of children in the first three years of life.

The award will be presented to Mrs. Clinton at a special Capitol Hill reception during Brain Awareness Week, March 16–22. In addition to national Brain Awareness events such as the Decade of the Brain award, Society members across the United States and Canada will spotlight the promise and progress of neuroscience research with lectures, lab tours and other public events on a grassroots level. Watch the next issue of *Neuroscience Newsletter* for details.

Society for Neuroscience President Dr. Lorne M. Mendell provides insight to the House Appropriations Labor–HHS subcommittee during a hearing on the progress of biomedical research (see page 11 for related story). Seated to the right is the Society's Government Relations Representative Frankie L. Trull, president, Policy Directions Inc. The complete text of the Jan. 28 Society testimony can be viewed on the Society's Legislative Web site (http://www.sfn.org/legislative/policy/mendell.testifies.html).

Photo by Roger A. Whiteside

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