



NCRAR Newsletter

VOLUME VII, ISSUE I

JANUARY 2007

SPECIAL POINTS OF INTEREST:

- **RR&D Center**
Directors' meeting
held in Portland
- **Article from Nancy**
Vaughan Ph.D.
Speech
understanding isn't
all in the Ear
- **NCRAR Biennial**
Conference
September 27-28
2007

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Message from the Director: Stephen Fausti Ph.D.

The NCRAR Visiting Scientist Program We at the NCRAR are excited to present a new format for our *NCRAR Newsletter*. We intend this quarterly newsletter to be informative about past and future events at the National Center, as well as entertaining and enlightening concerning our research programs and initiatives.

I am pleased to announce that Dr. Pamela Souza will be joining the NCRAR in January for part of her sabbatical. Pam is an Associate Professor in the Department of Speech and Hearing Sciences at the University of Washington in Seattle. Her research focuses on the effects of new amplification technology, including digital hearing aids, on speech recognition; on how age changes the ability to use speech cues, particularly temporal information; and on the effectiveness of hearing screening in auditory rehabilitation programs. These interests are shared by several of the investigators at the NCRAR, who are eager to discuss ideas with Pam, and develop collaborative projects.

Part of the mission of the NCRAR is to serve as a resource for auditory scientists from laboratories and clinics around the world. All of the NCRAR staff benefit from the intellectual stimulation of visiting scientists. Last summer, Dr. Cynthia Fowler, of the University of Wisconsin, spent two weeks at the NCRAR, developing new ideas and working with members of the staff. We anticipate that Dr. Fowler will return next summer as well. We look forward to welcoming other visiting researchers who wish to collaborate and interact with NCRAR investigators.



Speech Understanding isn't all in the Ear by Nancy Vaughan Ph.D.

As a former clinical audiologist, I became particularly interested in my older patients for whom hearing aids provided inadequate benefit. I also found that many of them complained of speech understanding difficulties (on the phone, in crowds, in lecture halls, watching television, etc.) that could not be explained by the degree of hearing loss revealed on the audiograms. Today, with all the advanced hearing aid technology available, clinicians are still struggling with these issues.

When I moved on to my doctoral work, I focused my interest on the changes in speech perception that occur with aging in order to better understand the complaints I had tried to address as a clinician. If the modern advances in hearing aid technology weren't solving the problem of inadequate hearing aid benefit, perhaps there were other areas to explore beyond the inner ear (cochlea) type of hearing loss that could help to explain aging changes in speech perception. There is evidence that processing of auditory stimuli in the brainstem pathways is affected by age, particularly processing involving the timing (temporal) aspects of the auditory signal.

An area of research that has gained increasing attention is the role of cognitive changes in age-related speech understanding difficulties. Over time that research became focused on specific cognitive functions which characteristically change with normal aging, and which might be

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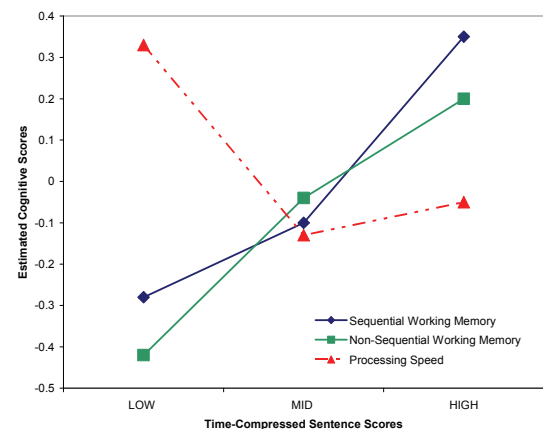
associated with speech understanding changes that also occur naturally with aging. Both types of changes (cognition and speech perception) are highly individualized and do not occur at the same rate in all older people. It is helpful, therefore, to investigate "High" and "Low" performers on various types of speech recognition tests and to look for cognitive differences in these groups.

At the NCRAR, a research program has been developed to investigate the associations between cognitive aging and aging speech perception. In particular, we have focused on the effects of typical age-related changes in mental processing speed and in working memory. This has been a multidisciplinary endeavor involving a clinical neuropsychologist from the Portland VA Medical Center and assistance from our own engineering department to generate files of rapid (time-compressed) speech with normal pitch and prosody. Our goal was to increase the working memory load by increasing the rate of incoming information that would require temporary storage during processing of rapidly incoming information. If age-related slowing were present, the working memory capacity would be overloaded and the simultaneous processing operations would not be fast enough to keep pace with the incoming information.

The results of this research to date are promising. We have found that declines in working memory, especially if it involves sequencing of stimuli such as letters and numbers is strongly associated with speech understanding difficulties. Since speech is a sequence of phonemes, words and sentences, it seems logical that sequencing is an important skill.

Working memory that does not involve sequencing is largely influenced by age. If the scores are

adjusted for age, the association with sentence scores is not as strong. In our study, slower processing speed was associated with low sentence performance, but wasn't as sensitive to middle or high sentence performance scores. The graph below shows the almost linear relationship between working memory and sentence repetition scores. The slower processing speed for the poorer sentence group is shown with the middle and high sentence groups having nearly the same processing speed.



Of course, processing cannot take place without an audible speech signal, so hearing aids have an important role in facilitating speech understanding. There is evidence to suggest, however, that the sophisticated technology in some of the modern hearing aids may actually increase the working memory load by demanding more complex processing functions, particularly temporal processing. We are currently involved in a follow-up study to determine whether working memory performance as indicated by the time-compressed speech test can help to predict hearing aid benefit. If so, one more step will have been taken in the effort to provide clinical audiologists with efficient tools to improve the quality of life of many of our veterans by improving their opportunities to hear better and to obtain the proper listening assistance.

Nancy Vaughan has been a research investigator at the VA National Center for Rehabilitative Auditory Research for the past six years and is interested in facilitating speech understanding in older listeners.



NCRAR Biennial International Conference

Hearing Therapies for the Future

**September 27th & 28th
2007, Portland, Oregon**

This conference will focus on emerging concepts in the prevention, treatment and rehabilitation of noise induced hearing loss and tinnitus. Sessions will highlight current understanding of the complex interaction of noise induced hearing loss and traumatic

brain injury, both of which occur as a result of blast trauma. Recent advances in hearing protection devices will also be discussed.

The goal is to bring together internationally acclaimed scientists and clinicians to expand understanding and facilitate effective treatment of hearing disorders common to OIF/OEF veterans.

There will be presentations from Peter Steyger Ph.D., Robert Dobie, Ph.D., Tom Helfer, Ph.D., Richard Salvi, Ph.D. Jonathan Kil, M.D., Mark Stephenson, Ph.D. Douglas Cotanche, Ph.D., Andrew

Groves, Ph.D., Yehoash Raphael, Ph.D., Henry Lew, M.D., Ph.D. and Michaela Cornis-Pop Ph.D.

In addition to presentations there will be roundtable discussion panels and a poster session.

Up to 8 scholarships will be offered to practicing audiologists. There will be a call for scholarship applications and posters submissions in March 2007.

***For further information now,
and for online registration after
May 20th see***

www.ncrar.research.va.gov

NCRAR News

Welcome to

Frederick "Erick" Gallun, Ph.D. who joined the NCRAR in October 2006 as a Research Investigator. He received his Ph.D. at the UC Berkeley with Dr. Ervin Hafter which was followed by a post-doc at Boston University with Dr. Gerald Kidd. He is supported by an Associate Investigator Award mentored by Drs. Fausti and Leek. His primary research interests involve psychoacoustics and cognitive processes to model the difficulties that hearing-impaired people have in real-world listening situations.

Sarah Melamed Ph.D. who joined the NCRAR in January 2007 as a Research Associate. She recently completed her Ph.D. at University of Illinois, Urbana-Champaign. Her primary research interests are: The perception of sound; objective evaluation of tinnitus; and auditory neurophysiology.

Pamela Souza, Ph.D., Associate Professor, University of Washington, Seattle, who began her sabbatical at NCRAR in January of 2007. She will be collaborating with NCRAR investigators in her areas of interest: Effects of hearing aid processing on speech recognition and on the relationship between age-related changes in temporal processing and alteration of temporal cues by signal processing amplification.

Recent Seminars

Jonathon Kil Ph.D. presented a seminar titled "Reduction of cisplatin ototoxicity and neurotoxicity, potential therapeutic strategies" on October 31, 2006.

Sarah Melamed Ph.D. presented a seminar titled "Objective Measures of Tinnitus in Humans: New Findings" on November 17, 2006.

Other News

The NCRAR hosted the **VA Rehabilitation Research and Development Centers of Excellence Annual Meeting on Oct 23rd and 24th 2006**. Approximately 60 staff from 13 centers attended. Invited speakers were Dr. Lucille Beck, Chief Consultant for Medical Rehabilitation VACO, Col. David Chandler Ph.D., Office of the General Surgeon, Dr. Henry Lew, Staff Physician, Palo Alto VA, and LTC Roger Martin Ph.D., US Army Medical research and Materiel Command.

Gabrielle Saunders Ph.D. Investigator and Deputy Director Education Dissemination & Outreach for NCRAR began her term as President of the Academy of Rehabilitative Audiology in January 2007.

Upcoming NCRAR Events

January 19: NCRAR Research Seminar.
Kelly Tremblay, Ph.D., Dept. Speech and Hearing Sciences, University of Washington, Seattle WA *Hearing aids and the brain: What's the connection?*

February 16: NCRAR Research Seminar. **Pamela Souza, Ph.D.**, Dept. Speech and Hearing Sciences, University of Washington, Seattle, WA.

March 16 : NCRAR Research Seminar.
William Martin, Ph.D., Dept. Otolaryngology/Head & Neck Surgery, Public Health and Preventive Medicine, Oregon Hearing Research Center, Portland OR. *Something fun from the realm of computational physics: Intracranial inhomogeneities as generators of far-field evoked potentials. AKA: When it comes to scalp-recorded potentials, what makes a bump?*

April 5th: DoD Hearing Conservation working group meeting at NCRAR

April 13: NCRAR Research Seminar.
Paula Myers, Ph.D., Dept. Audiology, James A. Haley Veterans' Hospital Tampa FL. *Polytrauma and Audiology at the VA.*

May 1: Early registration for NCRAR conference begins.

May 11th: NCRAR Research Seminar.
George Frye. Frye Electronics, Tigard, OR. *Acoustic reflections. Measurement and Control.*

June 1: Deadline for poster submissions and scholarship applications for the NCRAR conference

June 15: NCRAR Research Seminar.
Joshua Miele Ph.D., Smith-Kettlewell Eye Research Institute, San Francisco CA.

August 17: NCRAR Research Seminar.
Terry Chisolm Ph.D., Department of Communication Sciences & Disorders, University of South Florida.

September 1: Early registration for NCRAR conference ends.

September 27-28: NCRAR Biennial conference: Hearing Therapies for the Future.

October 12: NCRAR Research Seminar.
Arthur Boothroyd Ph.D., Distinguished Professor Emeritus City University of New York, NY & Scholar in Residence San Diego State University CA.

All NCRAR seminars are held in the NCRAR Conference Room, P5F-154 from 12-1PM.

NCRAR Research Studies Funded during 2006

The Ability to Make Multiple Auditory Judgments about Non-Speech Stimuli,
Erick Gallun, Ph.D.
NIH-NIDCD, R03, 2/1/07-1/31/10

Prevention of Cisplatin Ototoxicity with the Antioxidant α -Lipoic Acid,
Debra Willmington, Stephen Fausti Ph.D.
VA RR&D, 1/1/07-12/31/09

Development of an Automated Test to Assess the Presence of Tinnitus,
James Henry, Ph.D.
VA RR&D, 1/1/07-12/31/09

Effect of Training on Central Auditory Function in Multiple Sclerosis,
Dennis Bourdette, Ph.D.
VA RR&D, 1/1/07-12/31/09

Associate Investigator Award, Frederick Gallun, Ph.D.
VA RR&D, 11/1/06-10/31/07

Clinical Applications for Time-Compressed Speech Tests,
Nancy Vaughan, Ph.D.
VA RR&D, 10/1/06-9/30/09

Progressive Intervention Program for Tinnitus Management,
James Henry, Ph.D.
VA RR&D, 10/1/06-9/30/09

Frequency Tuning and Word Recognition Speed in Older Adults,
Dawn Konrad-Martin, Ph.D.
VA RR&D, 7/1/06-6/30/08

Otitis Media Impact on the Inner Ear,
Dennis Trune, Ph.D., Steven Hefeneider, Ph.D.
NIH-NIDCD, R01, 7/1/06-6/30/08

Temporal Resolution of Cochlear and Auditory Nerve Responses in Older Adults,
Dawn Konrad-Martin, Ph.D.
NIH-NIDCD, R03, 5/1/06-4/30/09

Individualized Objective Measures for the Early Detection of Ototoxicity,
Stephen Fausti, Ph.D.
VA RR&D, 4/1/06-3/31/09

Randomized Trial of a Brief Patient-Centered Aural Rehabilitation Model,
Mitchel Turbin, Ph.D., Harvey Abrams, Ph.D.
VA RR&D, 4/1/06-3/31/09

Associate Investigator Award, Michelle R. Molis, Ph.D.
VA RR&D, 2/1/06-1/31/08

Meet the Director

Dr. Stephen A. Fausti, Ph.D., is a nationally recognized rehabilitation researcher, a mentor, an audiologist, and a research center administrator. He was the Chief of the Audiology Division at the Portland VA Medical Center from 1971 to 1998, and is currently ACOS and Director for the NCRAR.

Steve considers his most important contribution, and most enjoyable professional role, to be the founder and director of the NCRAR. When asked about the best part of his job he quoted "I love it when a plan comes together", which is his favorite line from the *A-Team*, an old TV series. It took eight years to develop the NCRAR, from design and building of the facility to the employment of research and administrative staff. Through his work as director of the NCRAR he influences the course of clinical science in audition, by guiding the rehabilitative research at the center towards the goal of benefiting the millions of hearing-impaired veterans. He envisions the

NCRAR will lead the nation in the translation of auditory research into clinical care and in the improvement of hearing health care for veterans. The Department of Veterans Affairs has recognized Steve's outstanding leadership and research achievements by awarding him the prestigious Magnuson award in 2004.

What has shaped Steve Fausti as a internationally respected researcher, mentor, audiologist, and administrator? He was raised on the family farm near Walla Walla, Washington. He worked on the farm for the first 18 years of his life, until he left to attend Washington State University. It is perhaps his experiences on the farm that made Steve into the visionary perfectionist he is today and that have given him the ability to build extraordinary things from hard work and perseverance. He says the success of the NCRAR is mediated by the concept that bringing together a multidisciplinary group of investigators into a single physical environment



enables increased ability to solve problems and to develop new ideas.

Steve's co-workers at the NCRAR value him for his many kindnesses to them individually, for his dedication to the Center and for his wisdom, experience, and guidance about the culture of research within the VA system. He shares his grant-writing expertise willingly with other investigators in the Center and takes pride in the successes of NCRAR staff, particularly the career growth of young researchers.

Steve lives with Gwen, his wife since 1963. They have three children who all live in the Pacific Northwest. He is active in his church, loves gardening, animals and the outdoors.

NCRAR patient education materials

The NCRAR is dedicated to providing education to the community, in particular to the veteran population both locally and nationally. To this end the NCRAR in collaboration with the Portland VA Audiology & Speech Pathology Service has developed a number of patient education tools. First we have available three brochures available to clinicians for dissemination to veterans and others. The brochures currently available are: *"Tips for Improving your Listening Experience"* by M. Samantha Lewis Ph.D. & Gabrielle Saunders Ph.D., *"Why Can't I Understand Speech"* by Nancy Vaughan Ph.D., *"Ototoxicity"* by Dawn Konrad-Martin Ph.D. and Stephen

Fausti Ph.D., *"Anatomy and Physiology of the Ear/How We Hear"* by Sara Ruth Oliver M.S., Margaret Peak Ph.D., Christine Kaelin MBA and *"Tinnitus"* by James Henry Ph.D., Martin Schechter Ph.D., Tara Zaugg Au.D., Christine Kaelin MBA, Sara Ruth Oliver M.S. and *"Frequently Asked Questions about Hearing Aids and Hearing Tests at the Portland VA Medical Center"* by Tara Zaugg Au.D. & Anna Forsline M.A. Additional brochures are being developed and will be posted on the NCRAR website when complete.

In conjunction with the VA National Audiology Patient Education Workgroup, members of the NCRAR participated in the development of a tinnitus education video for veterans.

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The video and all brochures are available from the NCRAR website: www.ncrar.research.gov/education or by requesting copies from Carolyn Landsverk. Contact her at (503) 220-8262 ext. 57991, or by email: carolyn.landsverk@va.gov.

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