

# Neuroaudiology Newsletter

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## Happy New Year!



### Central Auditory Processing Disorders Conference



Gail D. Chermak, PhD, (pictured left) and Frank E. Musiek, PhD, (pictured right) presented at the University of Arizona on CAPD Diagnosis and Intervention: Practical Perspectives for Clinicians. This Audiology Workshop was an all-day event that brought forward over 100 attendees. Dr. Musiek discussed the 10 principles of CAPD, the key anatomy involved, and the etiologies of CAPD in all

populations. The etiologies revealed that CAPD can be due to aging, lesions, surgical effects, brain damage, and even psychiatric problems. Psychiatric problems included auditory hallucinations and schizophrenia. Those with schizophrenia present an interesting population in regard to CAPD. Recent studies have shown that almost 3/4 of individuals with schizophrenia have auditory hallucinations. Over the years it has been shown that this population seems to do poorly on tests of central auditory function. More recently, it has been shown that the auditory cortex is smaller and those with auditory hallucinations in schizophrenia. This has created much interest across several scientific disciplines in the investigation of this population. Another interesting population are those with dyslexia. These individuals seem to perform poorly on central auditory test batteries. Because of this audiological interest has been directed towards those with dyslexia with interesting and very positive results. Dr. Musiek elaborated on the diagnostic procedures involved in determining the presence of CAPD. There are

#### *Did you know?....*

Stacy Guild, Ph.D. back in the 1930's – 40's was an anatomist who tested hearing of patients in the hospital at Johns Hopkins. He may have been one of the first to integrate anatomy and audiology. Dr. Guild's interest was in temporal bone anatomy.

different batteries of tests that are involved when diagnosing a child compared to an adult. Dr. Chermak brought in her perspectives and research on CAPD. She discussed the risk factors for CAPD and how the prevalence of this disorder is about 23-76% in the older adult population. One of the main risk factors that Dr. Chermak discussed was how CAPD is a major component of presbycusis due to age-related decline in the auditory processing portions of the brain that can start from age 40. Together, Dr. Chermak and Dr. Musiek discussed their new application that will soon be released called Sound Auditory Training. This application is a web-based program that uses practical exercises to train a child or adult with CAPD to improve their listening skills, communication, and learning. It is a motivating application that is designed to be intensive, adaptive, and generalizable to real-world situations.

## Historical Vignettes-Raymond Carhart

Raymond Carhart (pictured right), born in 1912, is widely referred to as the “**Father of Audiology**” for his pioneering contributions to the field of audiology. He was an outstanding clinician and researcher. He obtained his B.A. in Speech and Psychology from Dakota Wesleyan University. He went on to complete both M.A. and Ph.D. degrees in Speech Pathology, Experimental Phonetics and Psychology at Northwestern University. Carhart remained at Northwestern University from 1936 to 1943 where he became Associate Professor in Speech Re-education. In 1944, he joined the U.S. Army Medical Administrative Corps, serving 7 years as a captain.



During WWII, Carhart became Director of the **Acoustic Clinic** at the Deshon General Hospital in Butler, Pennsylvania until 1946 where he directed an **aural rehabilitation program**. This aural rehabilitation program served 16,000 + military personnel that were hearing impaired. Due to this contribution, **Audiology** broke away from speech pathology into its own field as the science of hearing. After his time served in the war, he returned to Northwestern as **Professor of Audiology** developing the first audiology program in the country. He served as the Professor of Audiology for nearly 30 years where he contributed to enhancing speech audiometry and how it can help determine the effectiveness of hearing aids. In addition, he discovered a pattern in the audiograms (Carhart Notch) of those with otosclerosis-bones of the ear hardening, which ultimately led to better diagnosis of this disorder. The most important of Dr. Carhart’s contributions is likely the development of the Carhart Threshold Tone Decay test in 1957. This is a test that measures a person’s auditory nerve adaptation. The testing procedure includes playing a

### Pondering....

Intensity patterns (loud-soft- loud)(LSL)) vary in their perceptibility. The patterns of SSL and LLS are the most difficult of six pattern types to correctly identify. The intriguing question is why is this the case? This is indeed an intriguing research question that perhaps someone will answer.

tone that is 5 dB above the patient's thresholds and presented for 60 seconds. If the tone is not heard for the full 60 seconds, the tone is increased in 5 dB steps until the patient hears it for the full duration. The number of dB steps above the threshold that the tone needs to be increased by indicates whether the person has normal functioning, a cochlear hearing loss, or damage to the auditory pathway higher up than the inner ear.

## **Interview with Jennifer Shinn-Pettyjohn Chief of Audiology:**



In this issue of the newsletter, we had the opportunity to interview **Jennifer Shinn-Pettyjohn, PhD.**, (pictured left) and discuss with her some of her upcoming research. Dr. Shinn is the Chief of Audiology at the University of Louisville, Kentucky. She received her PhD. from the University of Connecticut. Dr. Shinn was one of the first of **Dr. Musiek's** doctoral students. Jennifer is a co-author of the book, **Disorders of the Auditory System**. Our interview focused on the auditory training procedure she is currently working on, the Dichotic Interaural Intensity Difference (DIID) in conjunction with fMRI. Improvement to auditory processing has been noted using the DIID but the mechanism for this improvement remains unknown. It is suspected that benefits are due to restructuring the central auditory pathway through training and improving attention skills. Dr. Shinn's current study involves administering the DIID training procedures to stroke patients with confirmed lesions of the central auditory nervous system. Brain imaging through fMRI is being used before training session begin and after the last session to help identify the underlying neural mechanisms for DIID benefit.

## **Upcoming Conferences with our Students**

2016 is a big year for audiology at The University of Arizona! There are three main conferences and coming up in the next few months: **Association for Research in Otolaryngology (ARO)**, February 20-24; **American Auditory Society (AAS)**, March 3-5; **American Academy of Audiology (AAA)**, April 13-16 and as a part of AAA, the **Academy Research Conference (ARC)** will be held on April 13<sup>th</sup>. Members of the Neuroaudiology lab at The University of Arizona have all worked together to get the opportunity to present research to each of these conferences.

- Alyssa Everett, Barrett St. George, Nicole Denny, and Frank Musiek are presenting a poster on **The Angular Gyrus: New Views on its Anatomy and Location** at ARO and AAA
- Barrett St. George, Andrew DeMarco, and Frank Musiek are presenting a poster on **Unusual Morphology of the Posterior Sylvian Fissure: Trifurcations and False Ascending Rami** at ARO. In addition, they will be presenting this research at the ARC conference
- Barrett St. George, Andrew DeMarco, and Frank Musiek are presenting a poster on **Revisiting Anatomical Variability along the Sylvian Fissure: Its Impact on Central Auditory Research** at AAA
- Diane Cheek, Renata Filippini, and Frank Musiek are presenting a poster on **Audiologic Evaluation of the Multiple Sclerosis Patient** at AAS, ARC, and AAA
- Nicole Denny and Frank Musiek are presenting a poster on **Frequency Pattern Perception for Lesions along the Auditory Pathway** at AAA

## Past Neuroaudiology

### Newsletters/Neuroaudiology Sites

- **March 2015 Newsletter:**  
<http://slhs.arizona.edu/wp-content/uploads/2015/03/Neuroaudiology-Newsletter.pdf>
- **May 2015 Newsletter:**  
<http://slhs.arizona.edu/wp-content/uploads/2015/04/MayNewsletter3.pdf>
- **July 2015 Newsletter:**  
<http://slhs.arizona.edu/wp-content/uploads/2015/07/JulyNewsletter.pdf>
- **September 2015 Newsletter:**  
<http://slhs.arizona.edu/wp-content/uploads/2015/08/September-Newsletter.pdf>
- **November 2015 Newsletter:**  
<http://slhs.arizona.edu/wp-content/uploads/2015/11/November-Newsletter-AuD.pdf>
- <http://musiek.faculty.arizona.edu/>

## 2015 Articles of Interest

### **Auditory Training for Central Auditory Processing Disorder** in *Seminars in Hearing*

Weighing, Chermak, & Musiek

### **Interaction of Musicianship and Aging: A Comparison of Cortical Auditory Evoked Potentials**

in *Behavioural Neurology*

O'Brien, Nikjeh, & Lister

### **Language Processing of Auditory Cortex Revealed by Functional Magnetic Resonance Imaging in Presbycusis Patients**

in *Acta Oto-laryngologica*

Chen, Wang, Deng, Liang, Li, & Chen

### **Descriptive Anatomy of Heschl's Gyri in 430 Healthy Volunteers, including 198 Left-Handers**

in *Brain Structure and Function*

Marie, Jobard, Crivello, Perchey, Petit, Mellet, Joliot, Zago, Mazoyer, & Tzourio-Mazoyer