

Neuroaudiology Newsletter

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AUDIOLOGY INNOVATION

Amidst the COVID-19 global pandemic, health care professionals, students, and researchers all over the world have been using their knowledge and skills to help patients get the care they need. Neuroaudiology lab member, Bryan Wong, AuD, is one of those amazingly innovative persons. Dr. Wong, who is

currently a PhD student at the University of Arizona, has been 3-D printing face shields for local Tucson hospitals. These face shields not only help prevent the spread of the virus, but they also allow for the use of visual cues to promote better communication.

AUDIOLOGY TRIVIA

ANSWERS ON THE LAST PAGE

1) The human basilar membrane at the basal end is approximately how wide?

a) .08-.16 mm, b) .21-.28 mm, c) .32-.36 mm, d) .40-.46 mm

2) Which of the following researchers is most associated with brief tone audiometry?

a) Scott Reger, b) Ray Carhart, c) Herb Wright, d) Tom Tillman

3) What is the average, unpracticed gap detection threshold for white noise stimuli in normal, adult listeners?

a) 1-2 ms, b) 4-5 ms, c) 8-9 ms, d) 11-12 ms



CENTRAL AUDITORY PROCESSING DISORDERS CORNER



Topic: Spectral and Temporal Processing in CAPD

If one reviews the history of test development for central auditory problems, there are some observable trends. Ettore Bocca and his colleagues in the mid 1950s developed central auditory test procedures that were speech based. The idea was to decrease the redundancy of a speech signal to render it more challenging to perceive; in turn, this would allow detection of a central auditory problem.

In the early history, this was done by filtering the speech signal, increasing the rate of presentation, and binaural presentation of different speech signals at each ear. A decade or two later, Marilyn Pinheiro and Paul Ptacek introduced a non-speech central test that required pattern perception. This procedure ended up being (among other things) an assessment of temporal processing—specifically temporal sequencing. Jumping ahead many years, other non-speech central test procedures evolved into clinical consideration, including gap detection. This procedure also required temporal processing—specifically temporal resolution.

In current audiology, therefore, there are tests of temporal processing, but what about spectral processing? Spectral processing is also critical to our overall hearing.

There are a variety of approaches to testing spectral processing, but here we would like to focus on simple frequency discrimination. Psychoacoustically, this task usually involves comparing two tones that differ in frequency and varying the difference to reach some set criteria. Unfortunately, in present day clinical audiology, there are essentially no identified tests of frequency, intensity, or duration discrimination (but see comment below). This is one of the major shortcomings of not only central auditory assessment but for audiology in general.

Research studies clearly show that neurological compromise of the central auditory system does in fact affect frequency discrimination. Further, at least five independent studies have reported decreased frequency discrimination ability in children with language impairments. Despite these (and other) reports, frequency discrimination tests have not become part of the central auditory or general audiological evaluation. This is especially alarming because auditory discrimination is a critically important process underlying normal hearing.
(continued on next page).

CAPD Corner Continued...

As an aside, there is a test of intensity discrimination on many commercial audiometers, but it is known as the short increment sensitivity index (SISI) by Jim Jerger. This test was designed to identify cochlear pathology and differentiate it from retrocochlear involvement. However, it is a procedure that requires discrimination of intensity changes, which of course was not intended to be a test specifically for auditory discrimination.

Clearly one of the greatest needs in audiology and neuroaudiology is the development of a clinically useable test of auditory discrimination. Many patients with hearing problems are presently being missed or misdiagnosed because we do not have a measure of this most fundamental aspect of hearing.

Related Readings:

Bocca, E. et al. (1955) Testing cortical hearing in temporal lobe tumors. *Acta Otolaryngol.* 45, 289-304.

Kleindeinst, L., Musiek, F.E. (2011). Do frequency discrimination deficits lead to specific language impairments? *The Hearing Journal.* 64 (4), 10-11.

Shinn, J. (2014) Temporal processing tests. In: Musiek, F. and Chermak, G., *Handbook of Central Auditory Processing Disorder*, Plural Publishing, San Diego, Chapter 15.

THE HEARING JOURNAL FEATURE

The June issue of the Hearing Journal featured an interview with Frank Musiek. This interview was in reference to the Gaps in Noise (GIN) test. The GIN test was developed by Musiek and colleagues with the initial publication in *Ear and Hearing* (Musiek et al., 2005).

This interview, however, did not focus on the historical development of the GIN, instead the focus was on the current applications. Specifically, the interview focused on the worldwide use of the test and the recent meta-analysis publication of the GIN's neurodiagnostic value (Filippini, Schochat, & Musiek, 2019).

The article can be found on The Hearing Journal's website:

https://journals.lww.com/thehearingjournal/fulltext/2020/06000/updates_in_gaps_in_noise_test.9.aspx

HAPPY 4th OF JULY!

The Neuroaudiology Lab wishes everyone a safe Fourth of July! It is important to keep in mind that during events like this where background noise is present in the form of multi-talker babble and fireworks, many people with normal hearing will still have a more difficult time with communication.

Multiple studies have shown that despite having normal audiograms, people with insult to the central auditory nervous system or with poor auditory processing or cognitive abilities struggle with understanding speech in background noise (Pienkowski, 2017; Musiek et al., 2018). This is often referred to as “Hidden Hearing Loss.” As the term suggests, individuals are not likely to be properly identified without further specialized auditory testing, rather than an audiogram alone. Keep this in mind the next time your ‘normal hearing’ patient or friend has difficulty understanding you!



Interesting Reads on Neuroaudiology and CAPD

Sidiras C, et al., (2019). Deficits in auditory rhythm perception in children with auditory processing disorder are unrelated to attention. *Frontiers in Neuroscience*, 13, 953.

Tepe V, et al., (2020). Acquired Central Auditory Processing Disorder in Service Members and Veterans. *Journal of Speech, Language, and Hearing Research*, 63(3), 834-857.

AUDIOLOGY TRIVIA ANSWERS

- 1) The width of the human basilar membrane at the basal end is about (A) .08-.16 mm.
- 2) The researcher who is most associated with brief tone audiometry is (C) Herb Wright.
- 3) The average, unpracticed gap detection threshold is (B) 4-5 ms.