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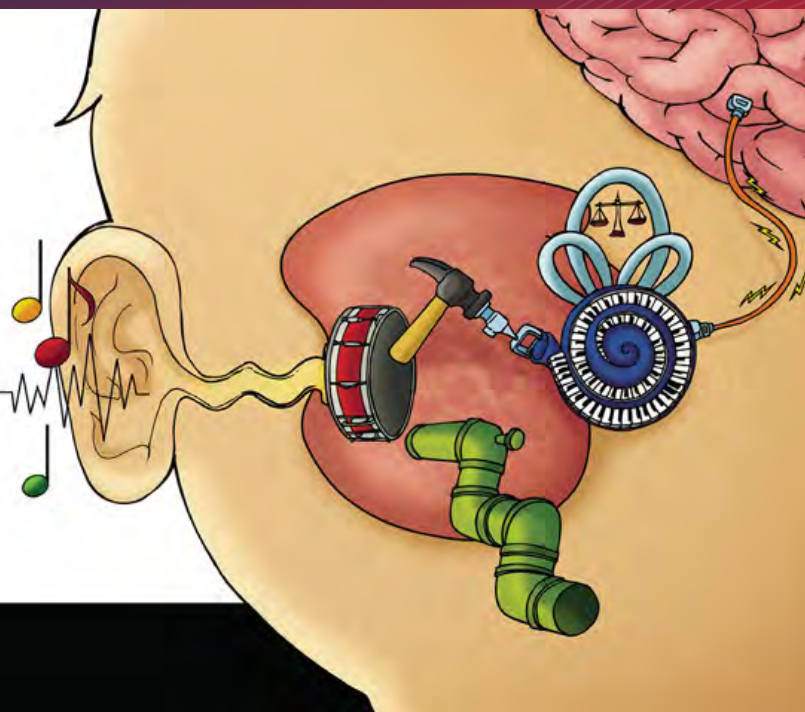
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EAR TO BRAIN: THE PATH TO UNDERSTANDING

Hearing is
complicated.

think-💡-audiology

#thinkaudiology



DISCLOSURES

Kim Cavitt, Au.D.

Financial

- •Audiology Resources, Inc. (ownership)
- •Northwestern University (adjunct faculty)
- •Academy of Doctors of Audiology (consulting)
- •Michigan Audiology Coalition (consulting)
- •Illinois Academy of Audiology (consulting)
- •AudiologyOnline (consulting)
- •Cognivue (consulting)
- •Sonova (collaboration)

Non-Financial

- •Illinois Board of Speech Pathology and Audiology (chair)
- •Audiology Quality Consortium (member)
- •American Speech Language Hearing Association Audiology Group (member)
- •Academy of Doctors of Audiology (committee member)

Heidi Hill, Au.D.

Financial

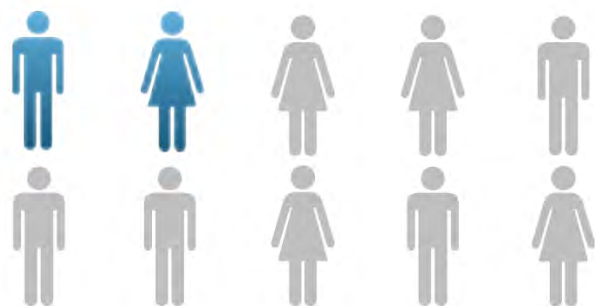
- •Hearing Health Clinic (owner)
- •Cognivue (consulting)

LEARNING OUTCOMES

After this course learners will be able to

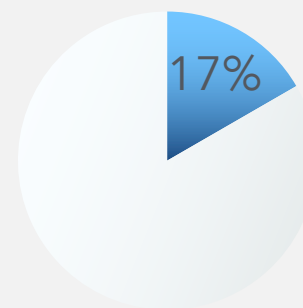
- Discuss available evidence regarding the brain's role in hearing and communication.
- Discuss the role of cognition in real-life communicative environments.
- Describe the value of a functional needs assessment, including cognitive screening, to enhance audiologic patient care.

WHERE WE ARE



20%

Of the US
population
has
hearing
loss



World Health Organization, 2020

■ Get Hearing Aids



30%

Of those 70 and
older who need
hearing aids use
them



16%

Of those 20-60
years who need
hearing aids use
them



76%

With severe
hearing loss treat
their hearing loss



40%

With moderate
hearing loss treat
their hearing loss



3.4%

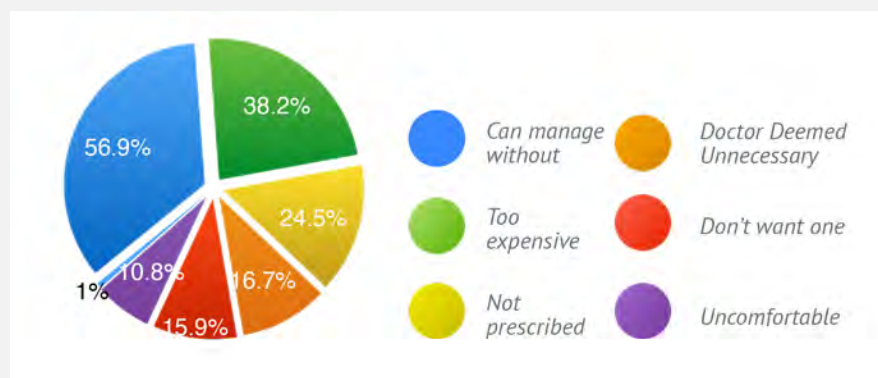
With mild hearing
loss treat their
hearing loss

WHERE WE ARE

“More Than Six Million Older Adults Avoid Hearing Aids Because of Cost”

Wider availability and awareness of over-the-counter hearing aids may help millions of seniors

More than 9.9 million older adults avoid hearing aids because they do not understand what “managing without out hearing aids” is costing them



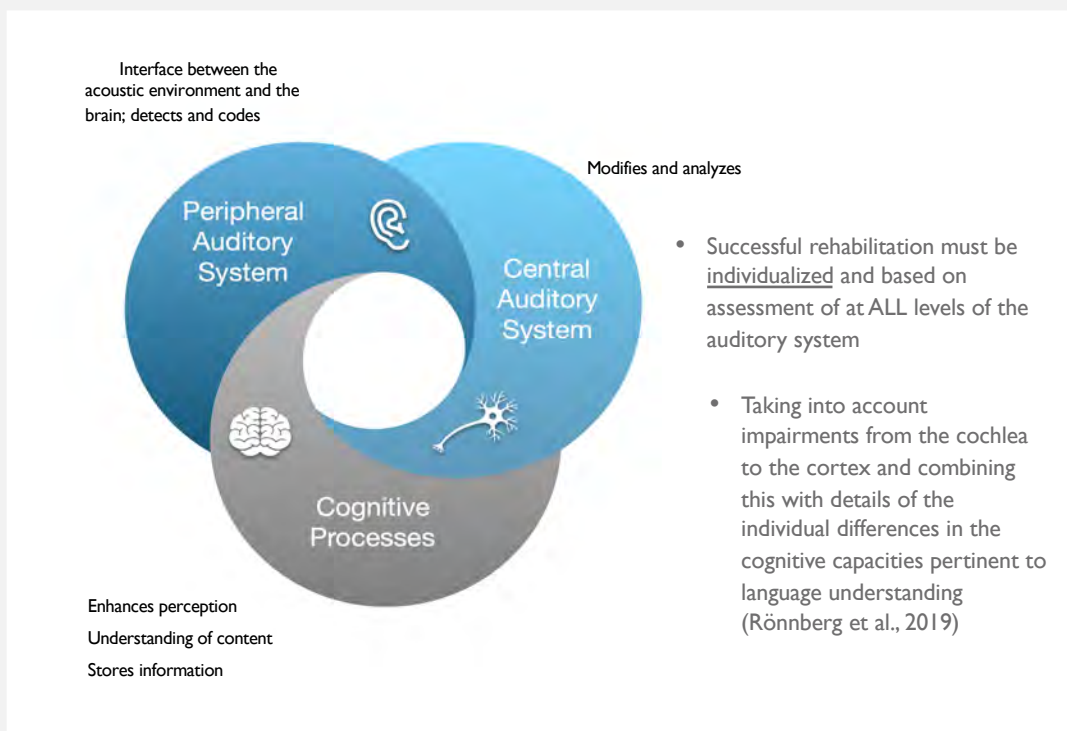
[SeniorLiving.org](https://seniorliving.org), 2020 Survey

WHERE WE ARE



A strategy aimed at compensating for peripheral loss does not yield adequate benefit in many older patients

3 FUNDAMENTAL PROCESSES NEEDED TO HEAR WELL AND UNDERSTAND SPEECH



Speech recognition is an ear to brain phenomenon

It's important to assess and manage the whole auditory system: ear to brain

Ears=Peripheral Auditory System

We are missing a huge part of the auditory picture if we are only looking at peripheral hearing abilities.

Assessment=
traditional hearing test

Assessment=functional communication abilities; cognitive processing, sound detection, sound recognition, sound localization and speech communication in noise



Management=
Hearing Aids

Management=Hearing aids fit to functional communication abilities, assistive devices, communication strategies, auditory training

A strategy aimed at compensating for peripheral loss only does yield adequate benefit for many older patients.

Cognitive Processes/Central Auditory System

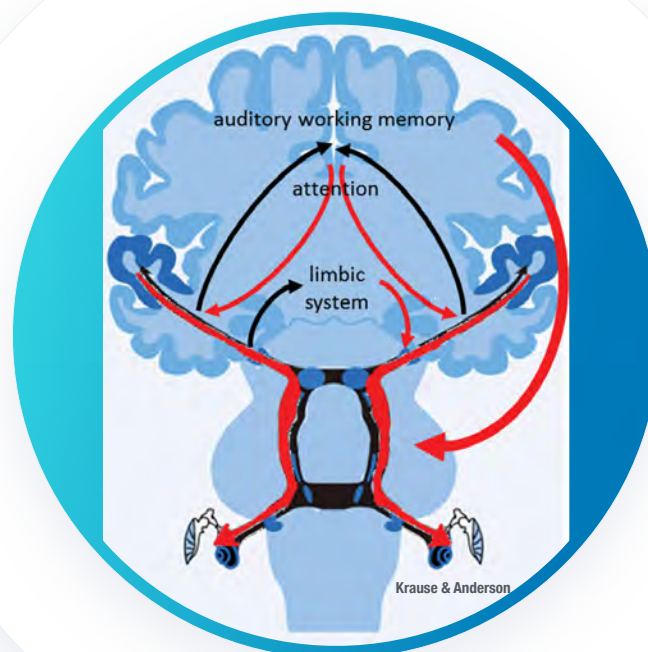
Listening in complex, real-world listening environments is heavily influenced by cognitive factors and auditory processing abilities. These functional hearing loss abilities are vitally important in daily life.



Successful rehabilitation must be individualized and based on assessment of all levels of the auditory system. This approach will lead to better functional outcomes for patients.



It's a 2 way street



Depending on the listening task and how adverse the listening conditions are, bottom-up and top-down processes start interact at different levels in the auditory system. Ease of Language Understanding (ELU) model (Ronnberg 2016)

ASPECTS OF COGNITIVE PROCESSES THAT AFFECT AUDITION

- Executive Functioning
 - Control and coordinate your other **cognitive** abilities and behaviors
 - Impact on audition: impairs ability to focus on a single speaker in noise/multi-talkers
- Working memory
 - The ability to retain information in memory while simultaneously processing the same or new information
 - Impact on audition: problems parsing out complex sentences or recognizing speech in degraded conditions, increased cognitive load
- Processing speed
 - The speed of responding to a perceptual stimulus with simple content, such as a short segment of sound or a digit that presented visually
 - Impact on audition: hinders speech recognition
- General sequential reasoning
 - The ability to take multiple steps to reach a solution to a problem based on stated rules, premises, or conditions
- Inhibitory control
 - The capability to voluntarily inhibit or regulate automatic responses
- Lexical knowledge (vocabulary)
 - Extent of vocabulary that can be understood in terms of correct word meanings

RESULTS OF CHANGING APPROACH

- Contributes to increases in hearing aid adoption
- Increases motivation to seek intervention, which reduces stigma
- Understanding cognition gives
 - Insight into best treatment to achieve patient goals
 - More precision in how we counsel patients
 - Realistic Expectations
 - Better compliance
 - Better patient outcomes

BASICS OF COGNITIVE SCREENING IN AUDIOLOGY

- It is important that audiologists ask individuals about their cognitive status, assess individual's speech in noise, measure an individual's communicative abilities using standardized inventories, screen for cognitive decline, as allowed by state law, refer those who perform poorly in the cognitive screening, and offer auditory rehabilitation programs which focus on improving and enhancing listening and cognitive skills.
 - Do audiologists have, in their state scope of practice, the ability to screen for depression?
 - YOU or a national association does not get to interpret this; the state does.
 - Want this interpretation in writing.

HEARING LOSS INTERVENTION

- Can intervention delay cognitive decline or dementia? = Unknown
 - There has never been a full-scale randomized controlled trial of treating hearing loss to determine efficacy for reducing risk of cognitive decline and dementia
- Reduces cognitive load of processing degraded sound
- Provides increase brain stimulation
- Improves social engagement

WHAT IS A COMMUNICATION AND FUNCTIONAL NEEDS ASSESSMENT?

- Assess chief complaint and history of chief complaint.
- Review of diagnostic audiologic test results.
- Performance of most comfortable loudness and uncomfortable loudness.
- Perform acceptable noise level testing.
- Perform speech in noise testing.
- Unaided real ear.
- Assess with patient, via case history and hearing handicap inventories, and communication partner(s) the patient's lifestyle, their cosmetic desires, and the psychological, medical, educational, emotional, social, and/or vocational impact of chief complaint and any financial limitations.

WHAT IS A COMMUNICATION AND FUNCTIONAL NEEDS ASSESSMENT?

- Screen patient's dexterity.
- Screen patient's cognitive status.
- Screen patient's auditory processing capacities.
- Screen patient's for falls risk.

WHAT IS A COMMUNICATION AND FUNCTIONAL NEEDS ASSESSMENT?

- Counseling patient and their communication partner(s) on their plan of care, including but not limited to:
 - A review of all diagnostic, rehabilitative and screening measures.
 - Presentation of treatment options, as it pertains to the patient's lifestyle, their cosmetic desires, their dexterity, their cognitive status and the psychological, medical, educational, emotional, social, and/or vocational impact of chief complaint and any financial limitations.
 - Discuss potential otologic, medical, or medication management needs and provide the appropriate referrals for further evaluation and treatment.
 - Hearing aids, provider driven and over the counter.
 - Personal sound amplification products.
 - Assistive listening devices, including FM systems.
 - Ear protection.
 - Auditory rehabilitation.
 - Tinnitus management.
 - Auditory prosthetic devices.
 - Basic instruction or information dissemination and counseling regarding plan of care.
 - Earmold impression, as needed.

COGNITIVE SCREENINGS

- Cognivue
 - <https://www.cognivue.com/>
- Montreal Cognitive Assessment (MoCA)
 - http://www.mocatest.org/pdf_files/test/MoCA-Test-English_7_1.pdf
- General Practitioner Assessment of Cognition (GPCOG)
 - <http://gpcog.com.au>
- Mini-Cog
 - <https://mini-cog.com/>
- St. Louis University Mental State (SLUMS)
 - <https://www.slu.edu/medicine/internal-medicine/geriatric-medicine/aging-successfully/assessment-tools/mental-status-exam.php>
- Mini-Mental State Examination (MMSE)
 - <https://cgatoolkit.ca/Uploads/ContentDocuments/MMSE.pdf>

HEARING HANDICAP INVENTORIES

- Hearing Handicap Inventory Options
 - Abbreviated Profile of Hearing Aid Benefit (APHAB)
 - <https://harlmemphis.org/abbreviated-profile-of-hearing-aid-benefit-aphab/>
 - Client Oriented Scale of Improvement (COSI)
 - <https://www.nal.gov.au/products/downloadable-software/cosi-and-hauq/>
 - Hearing Handicap Inventory - Adult (HHI-A)
 - <https://www.sfotomed.com/webdocuments/questionnaire-hearing-handicap.pdf>
 - Hearing Handicap Inventory - Elderly (HHI-E)
 - https://www.audiology.org/sites/default/files/PracticeManagement/Medicare_HHI.pdf
 - Hearing Handicap Inventory for Elderly – Screening (HHIE-S)
 - https://www.audiology.org/sites/default/files/PracticeManagement/Medicare_HHI.pdf
 - Self-Assessment for Communication (SAC)
 - https://lwhl.arizona.edu/sites/lwhl/files/self_assessment_of_communication_-_participant.pdf
 - International Outcome Inventory for Hearing Aids (IOI-HA)
 - <https://harlmemphis.org/international-outcome-inventory-for-hearing-aids-ioi-ha/>

AUDITORY PROCESSING SCREENING

- SCAN – A
- Dichotic Digits
- Dichotic Sentences
- Pitch Pattern Sequence
 - <https://www.oaktreeproducts.com/auditory-processing>
 - <https://auditec.com/price/#S-Z>

LOUDNESS MEASUREMENTS

- Acceptable Noise Level
 - <http://www.audiologyonline.com/articles/20q-acceptable-noise-level-test-basics-14403>
 - <http://www.frye.com/wp/wp-content/uploads/2013/08/ANLgeneralinstru.pdf>
- Speech In Noise
 - QuickSIN
 - Words in Noise (WIN)
 - AZ Bio
 - Hearing In Noise Test (HINT)

OPERATIONALIZING COGNITION

- The cognitive screening could be included in and captured within your:
 - Communication needs and functional needs assessment (which is diagnostic in nature) (92700) or
 - Evaluation and management services.
 - As allowed by state scope of practice, evaluation and management coding can be valuable in capturing the extensive case history, examination and evaluation (screenings) and medical decision making required in the evaluation and management of complex clinical conditions. Evaluation and management services are best presented by 99202-99203 or 99211-99213.

OPERATIONALIZING COGNITION

- Cognitive screening and rehabilitation should never be inclusive to a third-party hearing aid dispensing program.
 - These charges are separately billed and reimbursed, by the patient or their insurer. As they are not related to the sale of a hearing aid.
- Medicare does not cover cognitive screening, communication and functional needs assessments, or evaluation and management services provided by audiologists.

READING LIST

- Lin FR, Albert M. Hearing loss and dementia - who is listening?. *Aging Ment Health*. 2014;18(6):671-673.
• <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4075051/>
- Shen J, Anderson MC, Arehart KH, Souza PE. Using Cognitive Screening Tests in Audiology. *Am J Audiol*. 2016 Dec 1;25(4):319-331.
• <https://halab.soc.northwestern.edu/wp-content/uploads/2016/11/Shen-Souza-2016-Cog-tests-for-auds-AJA.pdf>
- Humes, L Associations Between Measures of Auditory Function and Brief Assessments of Cognition, *Am J Audiol*. 2020 Dec
• https://pubs.asha.org/doi/10.1044/2020_AJA-20-00077
- Gottshalk, K, Olson, A Cognition and Cognitive Screeners in Audiological Management, 2020, Perspectives of the ASHA Special Interest Groups
• https://pubs.asha.org/doi/full/10.1044/2020_PERSP-20-00015

READING LIST – AUDIOLOGY ONLINE 20Q

- <https://www.audiologyonline.com/audiology-ceus/course/hearing-loss-aging- public- health-32607>
- <https://www.audiologyonline.com/audiology-ceus/course/20q-hearing-loss-and- dementia-28840>
- <https://www.audiologyonline.com/audiology-ceus/course/20q-hearing-loss- dementia- highlights-33354>
- <https://www.audiologyonline.com/audiology-ceus/course/20q-importance- cognitive- assessment-in-32631>
- <https://www.audiologyonline.com/articles/20q-hearing-science-hide-and-24038>

READING LIST – WEBINARS

- <https://www.audiologyonline.com/audiology-ceus/course/cognition-and-hearing-should-this-31367>
- <https://www.audiologyonline.com/audiology-ceus/course/cognition-and-aging-auditory-system-27438>
- <https://www.audiologyonline.com/audiology-ceus/course/aging-human-vestibular-system-27197>
- <https://www.audiologyonline.com/audiology-ceus/course/hearing-cognition-and-healthy-aging-27181>

