Looking Beyond Speech Perception: SSD

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Every year, about 60,000 people in the United States acquire single-sided deafness.

Acoustic neuroma, a benign tumor developing on the nerve that connects the ear to the brain; sudden idiopathic hearing loss, which is commonly due to viral infection; blunt trauma to the head; vascular insults that damage the auditory pathway; congenital loss of hearing; and Ménière's disease, a disorder that affects balance and hearing, resulting from the buildup of fluid in part of the inner ear.
• Many SSD sufferers report significant handicaps that interfere with their quality of life*. They seek out treatment options to remediate the hearing they lost in their deafened ear.

• Yet, some individuals with SSD seem only minimally bothered by the loss and do not pursue further treatment.

SSD listeners

- Cannot localize sounds
- Difficulty understanding speech in noise

Depression  Social isolation  Anxiety
Subjects

- 50 patients have undergone CI for SSD
  - Mean age at implantation = 53.06 years (1.59 SE)
  - Duration of hearing loss = 3.7 years (0.6 SE)
  - Females (51%)

- Devices
  - Cochlear = 29
  - Advanced Bionics = 16
  - Med-EL = 5

University of Iowa IRB approved the study
• A lot of variability in performance with this group – Typical of cochlear implant data

• Why do some do well and others not so well?

• Current outcome tools do not fully measure the efficacy of CI as a treatment for SSD*.

Questions

Does this influence outcomes?

- Are their individual personal factors that can effect outcomes?
- What is the impact that a CI has on those outcomes?

Human Ecology
In hearing health care, success with intervention is as much related to the anatomy/physiology of the individual as it is to the environmental and personal (i.e., ecological) factors that make each individual unique from the next.

*Wu YH, Bentler RA. Do older adults have social lifestyles that place fewer demands on hearing? J Am Acad Audiol. Oct 2012;23(9):697-711.
International Classification of Functioning, Disability and Health

- International Classification of Functioning, Disability and Health, known more commonly as ICF
- Model of health suggests that psychological and lifestyle factors are intertwined with physical health and well-being of the individual
Single-Sided Deafness

Body Functions & Structure
- Loss of hearing in one ear
- Increase in tinnitus
- Dizziness
- Spatial awareness
- Cortical reorganization

Activity Restriction
- Hearing in noise
- Localizing sounds
- Resituating during conversation
- Listening effort increased
- Reduction in quality of life

Participation Restriction
- Withdrawal from social situations
- Withdrawal from social interactions
- Change of job duties
- Community, social, and civic life
- Depression

Contextual Factors

Environmental
- Work place environment
- Attitudes
- Family support during interactions
- Insurance limitations

Personal
- Socio-economic Status
- Personality
- Education Level
- Age
- Other health issues
Goal

- Characterize the relative contributions and change in functioning and disability associated with CI as an intervention for SSD
  - Investigate this longitudinally
- Characterize the influence that contextual (e.g. personality, cognition) factors have on outcomes.
Functioning and Disability

Speech Perception and Anxiety

Speech Perception and Depression

The University of Iowa
Contextual Factors

Speech Perception and Lifelong Cognitive Functioning

- CNC Words
- AzBio Sentences

Speech Perception and Personality

- CNC Words
- AzBio in Noise
Conclusion

- Many of the outcomes currently collected to show benefit for SSD individuals with a CI show great variability.
  - Cannot be explained by standard factors such as duration of deafness, etiology, age etc.
  - Need to determine the source of this variability.
Conclusion

• By examining the effects of contextual factors, perhaps we can account for some of this variability.

• Using the ICF model, we will also have a better understanding of the effect that SSD has on lifestyle and health and well-being of the individual.
  – perhaps this will also help us understand why some chose intervention and others do not.
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