What Does a Cochlear Implant Sound Like?

Peter Stelmacovich
FM and SF Product Manager
A Bit of History

- Born with normal hearing
- Series of ear infections
- No family history of hearing loss
- No meningitis
- No other risk factors
- Hearing loss suspected by Grade 1 teacher
- Identified that year, amplification begins
That’s not quite what I had in mind…

- School was not easy at first
- Ontario Schools “open policy, break down the walls”
- Interpreted literally, no walls built in school.
- Acoustics were horrendous, noise levels were atrocious.
- Only used 1 hearing aid and no FM system
- Later walls added, noise decreased and marks improved somewhat
She was an angel…

- Academic breakthrough Grade 5
- Achieved peace and quiet in a portable (better than the alternative)
- Teacher wrote down EVERYTHING
- Baked cakes too!
- Went from requiring remedial help to one of top students in class
High School

- Excelled in mathematics, science
- Reasonable results in English
- Terrible results in French
- Always sat in front row...no FM system
- Hearing continues to diminish
University of !%$#

- First year U of T = Disaster
  - Physics (Later dropped for Psychology)
  - Chemistry
  - Biology
  - Calculus
  - Anthropology

- Class Sizes = Huge (ranged from 200 to 2000 students per class)

- Lectures!!
- No FM!!
- Marks plummet from 85 average to 65 average
Second Year UWO

- Transferred to UWO.
- Confidence building year
  - Greek and Roman History
  - Theology of Marriage
  - Social Psychology
  - Behavioral Psychology
  - Calculus/Finite Math
- Class sizes @ 50
- Finally using FM system
- Marks jump to over 80 average
Communication Disorders

- Accepted into CD Undergrad Program
- First Canadian trained audiologist with hearing loss
- Started “HEAR”
  - Hearing-Impaired for Educational Advancement and Recognition – Self-Help Group on Campus.
- London CHS Board of Directors
Grad School - Audiology

- Very small classes (@15 people)
- Consistently used FM in all classes
- Got caught in a "fire"…later got my first Hearing Ear Dog Radar…
- Next came Amie…miss her terribly
- Now I have a huge goofball named Flora
Working Years

- Worked in variety of clinical environments.
- Robarts School for the Deaf for 5 years
- Phonak Canada past 12+ years
- Although hearing has been in severe profound range, FM technology allowed function in a variety of environments
Cochlear Implant…latest leg of journey

- @2002, word identification starting to drop. (0% R  10% L)
- Phone use become impossible
- Needed to lip-read even in quiet environments (exhausting)
- Decided on the Freedom from Cochlear + MicroLink Freedom from Phonak
- Replacement on its way soon, but not at liberty to discuss right now
Importance of FM

- In Restaurants, bars, cafes
- Talking to wife or son in car
- Meetings
- Lectures
- Kayak lessons
- Skiing lessons
- Tour guide in Switzerland

- iPod
- TV
- Computer
- GPS System in car
- Place of Worship
- Mobile Phone (Bluetooth)
- Bass Guitar
- And more
Solutions for Cochlear Implants

- ML Freedom for Cochlear Freedom
- ML14i for Nucleus N5
- AS14 with MLxi for N5
- MLxi + iConnect ABC
- MLxi + Med-El
- MyLink+
Not a Happy Boy…

- After mapping, listened to speech via implant for first time
- Sounded like…
  - GARBAGE
- Specifically, sounded like R2D2
Changes in Map over Time

- C’s lower slightly
- T’s lower dramatically
- Slowly add in lower pitch electrodes, 2-3 per mapping session
- Higher pitch electrodes becoming very clear “sound”
- Lower pitch electrodes went from thumping sensation to more auditory like
Changes in Speech Perception

- R2D2
- Sammy the Snake
- Alvin Chipmunk inhaled a helium balloon
- Alvin has ditched the helium
- Young Jerry Lewis
- More natural...just a little bit on the high pitch side
- Monosyllabic word identification 94% (open set, auditory only)
Improvements from CI and FM

- Can use the phone again (via FM)
- Can understand everyday speech in quiet without requiring lip-reading
- Speech in car via FM
- Less reliance on CC
- Speech on radio (News)
- Mobile Phone via Bluetooth and FM
What Does a Cochlear Implant Sound Like?

1. Normal Hearing
2. “Hard of Hearing” or Mild-Moderate Hearing Loss
3. Deafened
4. Cochlear Implants from 15+ Years ago
5. Modern Cochlear Implants
Gear:

- **Bimodal user:**
  - Electrical stimulation on right via Cochlear Freedom
  - Hearing aid on left Naida IX UP

- **FM System**
  - ML10i on Naida
  - ML Freedom on CI
  - SmartLink+
  - Inspiro + 3 DynaMic
  - TX300V Large Area Transmitter
Bilateral CI’s vs Bimodal

- **Bilateral CI’s:** a cochlear implant in each ear
  - Some improved ability to perceive where sounds are coming from (localization).
  - Improved speech understanding and communication in noisy settings.
  - A more balanced perception of sound.
  - Improved overall quality of sound including volume and tone.
- **Bimodal:** hearing aid in one ear and a CI in the other ear
  - Some localization
  - Access to fine structure cues
  - *Improved music perception*
114 CI Users
- Long Electrode (traditional CI’s)
- Short Electrode + Hybrid CI + HI
- “Low frequency acoustic hearing improves pitch perception as compared with traditional electric only cochlear implants”
- Note: not everyone can get the Hybrid implants…sufficient LF hearing is needed
- BUT: Use of a hearing aid on non-implanted ear
Music, CI’s, and kids

- Mitani 2007 (Music recognition, music listening, and word recognition by deaf children with cochlear implants)
- “Child implant users enjoy music more than adult implant users. Moreover younger age at implantation increases children’s engagement with music which may enhance other auditory domains”
- Anecdotal reports suggest early implanted children enjoy music more than late implanted children or adults.
Blog...

- For further information, be sure to visit my blog: http://deafenedbutnotsilent.wordpress.com/