Evaluation of a Modern Remote Microphone Designed to Improve Performance in Small Group Settings with Multiple Talkers

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Disclosures

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The Problem

• Cochlear implant recipients experience difficulty with:
  – Understanding speech in noise
  – Understanding speech in reverberant environments
  – Understanding speech from a distance
Potential Solutions

• Directional microphone systems
  – Likely to improve SNR by 2-4 dB in realistic situations (Ricketts & Hornsby, 2003)
  – Must be within critical distance of source (Ricketts & Hornsby, 2003)

• Conventional remote microphone
  – Can improve SNR by 10-15 dB in real world situations (Wolfe et al., 2013)
  – Requires talker-of-interest to wear remote microphone
What about small group situations?
Question

How can I optimize hearing performance in small groups with more than one talker?
• Potential Solutions for Small Group Settings with Multiple Talkers
Remote Microphone with Adaptive Multiple-Beamforming

Roger Select
- Multiple microphones cast 6 beams spaced 60° apart
- Adaptively switches toward “beam” containing most favorable SNR
- Range extends to 3 meters
Multitalker Network with Multiple Remote Microphones
Study

• 20 Advanced Bionics cochlear implant recipients
  – Ages 12-84 years old

• Evaluated with the Naida CI Q90 sound processor
  – Roger 17 receivers
  – Roger transmitters
    • Roger Select
    • Roger Pens set up in a Multi-talker network (MTN)
Study

• AzBio sentence recognition (1 list of 20 sentences per condition) was evaluated at 5 SNRs
  – +10 dB (65/55 dBA)
  – +8 dB (68/60 dBA)
  – +6 dB (71/65 dBA)
  – +4 dB (74/70 dBA)
  – +2 dB (77/75 dBA)

• 3 Test Conditions
  – Naida CI Q90 Only (T-Mic)
  – Naida CI Q90 with Roger Select Adaptive Beamformer
  – Naida CI Q90 with Roger Multi-talker Network
Test Setup
Multitalker Network

Multi-talker babble

4 m

Multi-talker babble

6 inches from each loudspeaker

Multi-talker babble

4 m

Multi-talker babble

4 m
Roger Select and Multitalker Network

Roger Select *improves* performance with multiple talkers

Roger MTN *optimizes* performance with multiple talkers

![Graph showing performance comparison between T-Mic Only, Roger Select, and Roger MTN at different SNR levels. The graph indicates that Roger MTN optimizes performance across all SNR levels compared to T-Mic Only, while Roger Select shows improvements over T-Mic Only. The sample size is n=20.](image-url)
Summary

- Remote microphone with adaptive beamforming and multitalker remote microphone system both provide improvement in speech recognition in noise for small group settings.

- Multitalker network optimizes speech recognition in noise for small group settings with multiple talkers.

- Single remote microphone with adaptive beamforming (Roger Select) offers a less expensive option to improve speech recognition in small group settings with multiple talkers.
Thank you for your attention!

- Great outcomes are probable when we do what it takes.

- Shoot for the moon!