To the Point: Real World Effectiveness of Directional Microphones

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Clinical Situation

1. You tout the benefits of directional microphone technology to patients.

2. The actual real world results of directional mic performance is less than the published laboratory results would suggest.

3. This gap between expectations and reality diminishes the value of the product and perhaps even the credibility of the professional in the eyes of the patient

Agenda

1. Typical Findings from Directional Microphone Research
2. Findings from Recent Articles
3. Clinical Implications

Two ways Directional Microphone findings are reported:

1. Objective benefit (laboratory, using HINT, CSTetc.)
2. Listener Preferences (real world or laboratory)

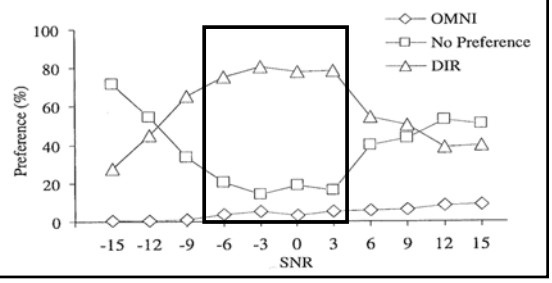
Typical Lab Findings

Listener Preferences:

Walden et al JAAA, 2005
- Evaluated 11 different SNRs
- Speech from front
- Noise from back and side

Typical Lab Findings

Listener Preferences:

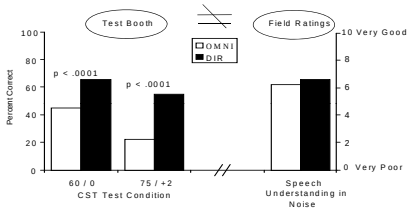


Limitations of Lab-based Preference Studies

Listener often has to make a forced choice, after careful consideration.

Listener can focus all of their attention on the task at hand.

Typical Findings: Lab vs. Real World



Walden & Walden, 2004

Recent study on real world benefits of directionals

Gnewikow et al, JRRD, 2009

3-year double-blinded study

N = 94

Three hearing loss groups: mild, moderate, severe

Wore 1 month in omni mode and 1 month in directional mode

Objective tests: HINT, CST

Subjective tests: PHAB, SADL, Patient preference questionnaires

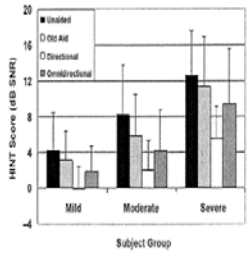


Figure 8.
Hearing in Noise Test (HINT) results. SNR = signal-to-noise ratio.

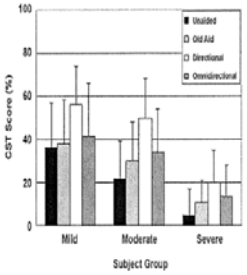


Figure 9.
Connected Speech Test (CST).

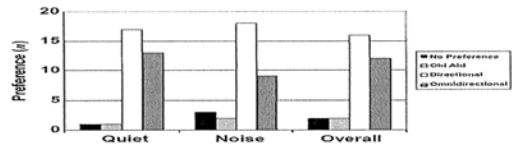


Figure 13.
Hearing aid preference, mild group.

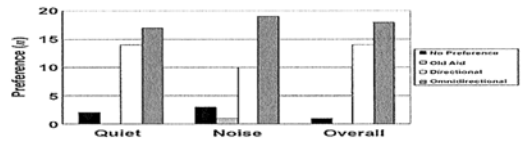


Figure 14.
Hearing aid preference, moderate group.

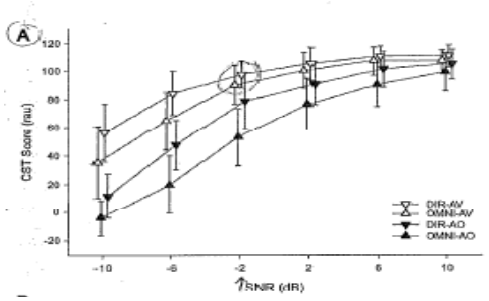
Why the discrepancy?

- Lip-reading Effects?
- Divided Attention Effects?
- Age Effects?

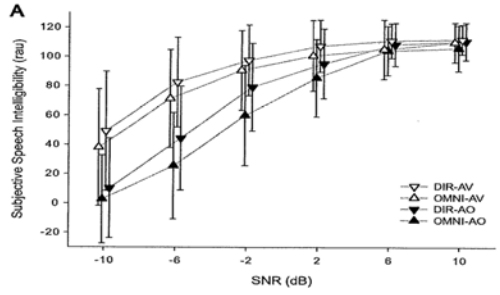
- Wu and Bentler, Ear & Hearing, 2010
- Impact of Visual cues on Directional Benefit and Preference:
  - Part 1: Laboratory Tests
  - Part 2: Field Trials

- N = 25 adults, between 20 & 80 years old
- Mild to moderate-severe, symmetrical hearing loss
- 8 new users, 16 experienced users
- SNR conditions: speech: 65 dBA , babble varied across 6 SNRs
- Field data: paired-comparison technique, after training session
- **Compared OMNI to DIR performance in the AO and AV conditions**

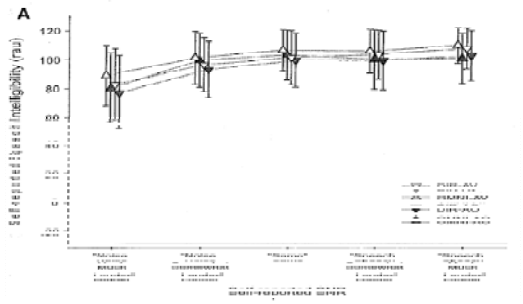
Objective Scores in Lab



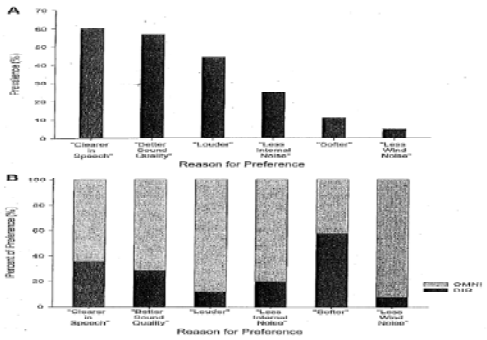
Lab Preferences



Field Ratings



Reason for Preferences



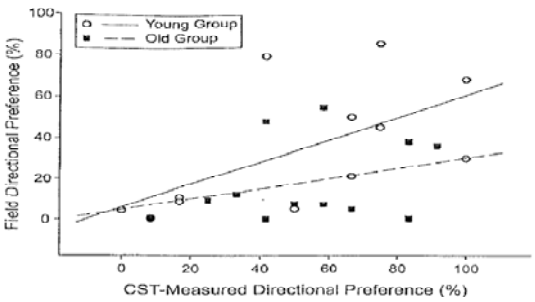
Wu, JAAA, 2010

Effect of Age on Directional Microphone Hearing Aid Benefit and Preference

N = 24, (same as previous studies)

Compared two groups: Old group and Young group

Procedures and tests were the same as those used in the Wu & Bentler studies



Key Findings: Lab Study

Visual cues significantly improved speech recognition in noise to its ceiling level, reducing DIR benefit and DIR preferences

At typical SNR conversation levels (-2dB) omni directional may be just fine in face-to-face conversations

AO DIR benefit cannot predict AV DIR benefit (this may explain why listeners with large DIR benefits in lab conditions fail to obtain similar benefits in the real world)

Key Findings: Field Studies

OMNI processing was preferred more frequently than DIR processing

Visual cues were not found to have a significant effect on preference for DIR processing

Preference score obtained by the lab preference judgment task in the AV condition was the best predictor of microphone preference in the real worls

Clinical Implications

Patients with strong lip-reading abilities may not notice that DIR processing is effective

Use the Utley screener to see who may be a good lip reader and modify accordingly

Older adults are unable to “multi-task “as well as younger adults (divided attention), therefore they are unable to perceive DIR benefit in the real world because the comparison task requires more attention.

Establishing Expectations with Patients

Clear demonstration of how to arrange listening situation to optimize DMT use (video on Internet site)

Establish clear expectations, taking into consideration age and lip-reading ability.

Don’t overstate the benefits of DMT

Thanks

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