



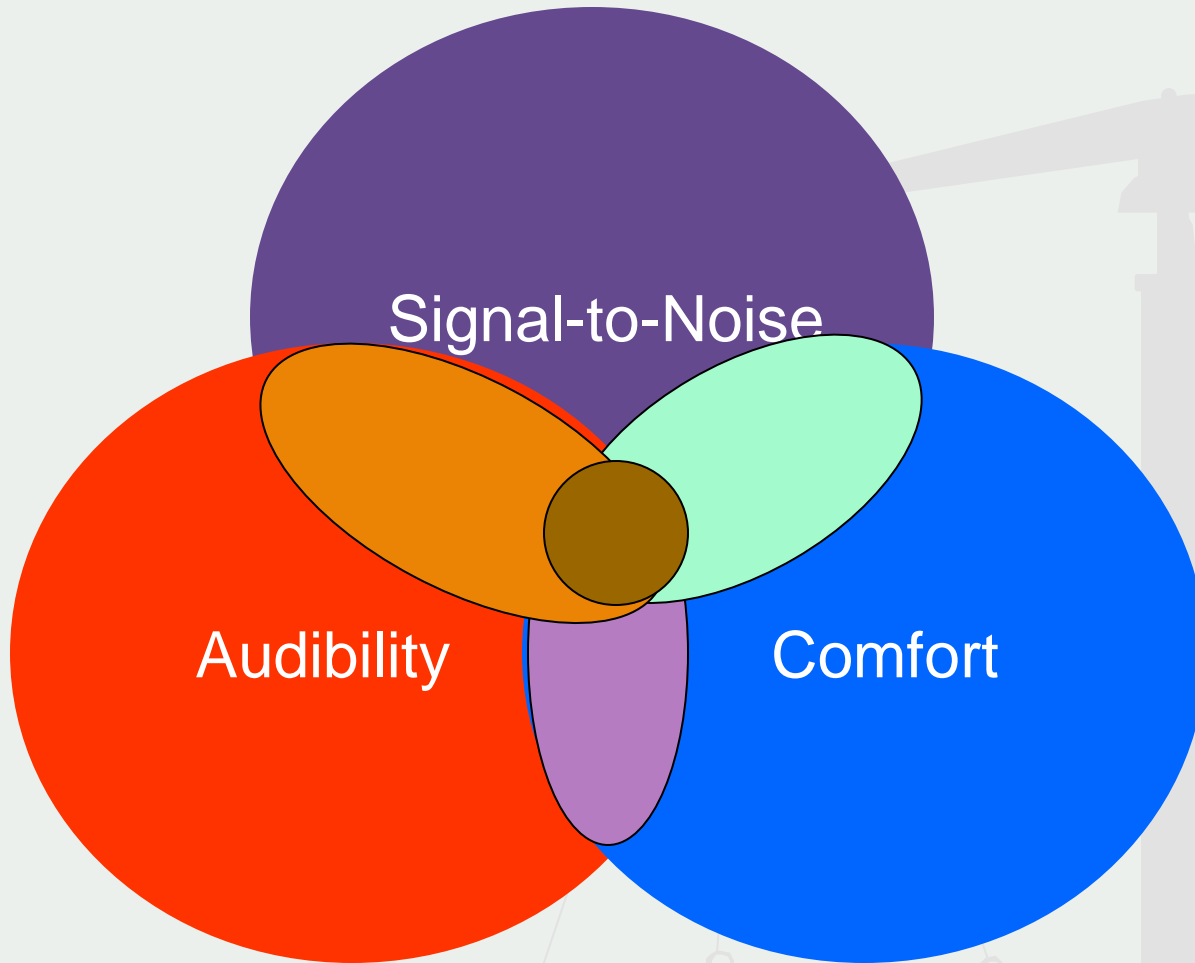
# IROS Vent or Open Fit: You Make the Call

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# Factors Affecting HA Satisfaction




What do we do with  
occlusion problems in  
clients with a high  
frequency hearing loss ?

Open fit BTE is a good solution for  
occlusion

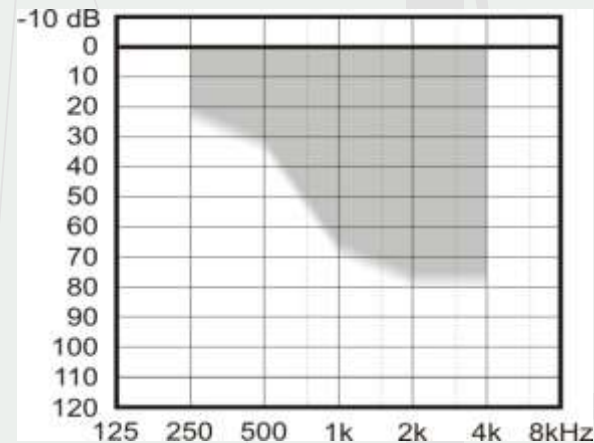


# Study 1

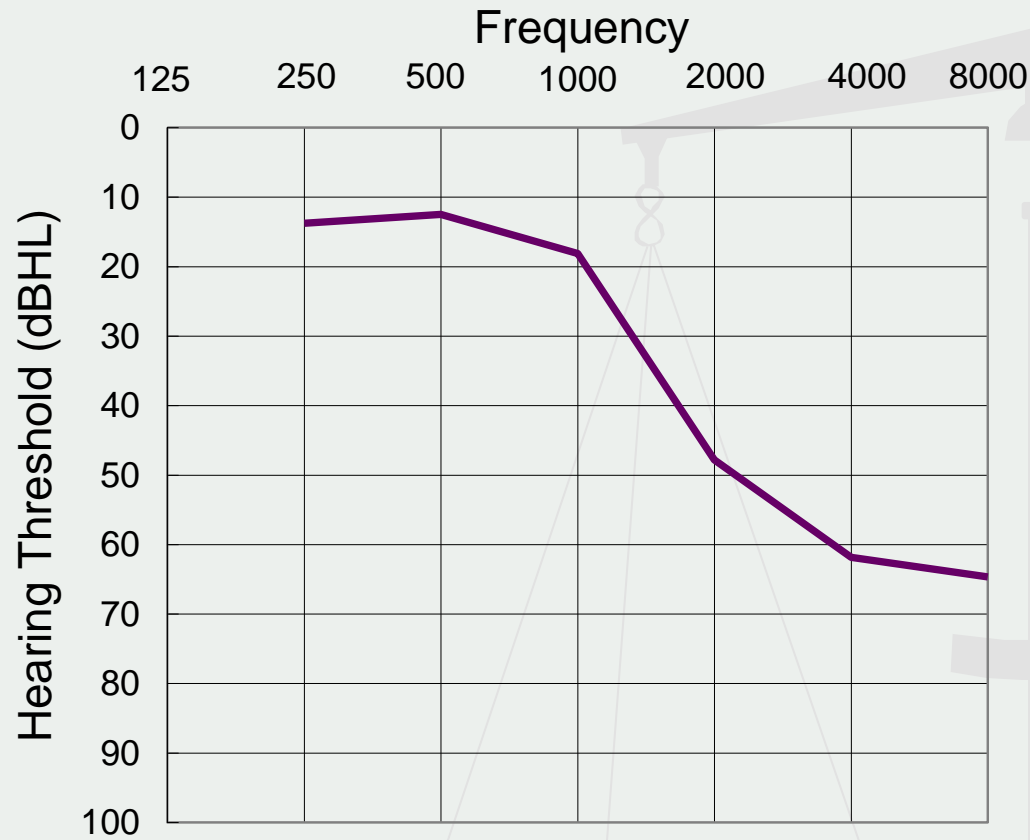
- Study conducted on an open fit BTE
  - Performance evaluation
    - Occlusion effect
    - Speech understanding
  - Eight Males
  - Age 48 to 80 years
  - Five were experienced hearing aid users
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# Senso Diva élan Features

- **Senso Diva élan**
  - Active Feedback Phase Cancelling
  - Diva Compression
  - Diva Locator: fully adaptive directional mic
  - Diva Noise Reduction w. Speech Intensification
  - Sound Harmony™
  - The élan ear-set
  - Senso Diva élan™ fitting
  - Program selection
  - Optional volume control

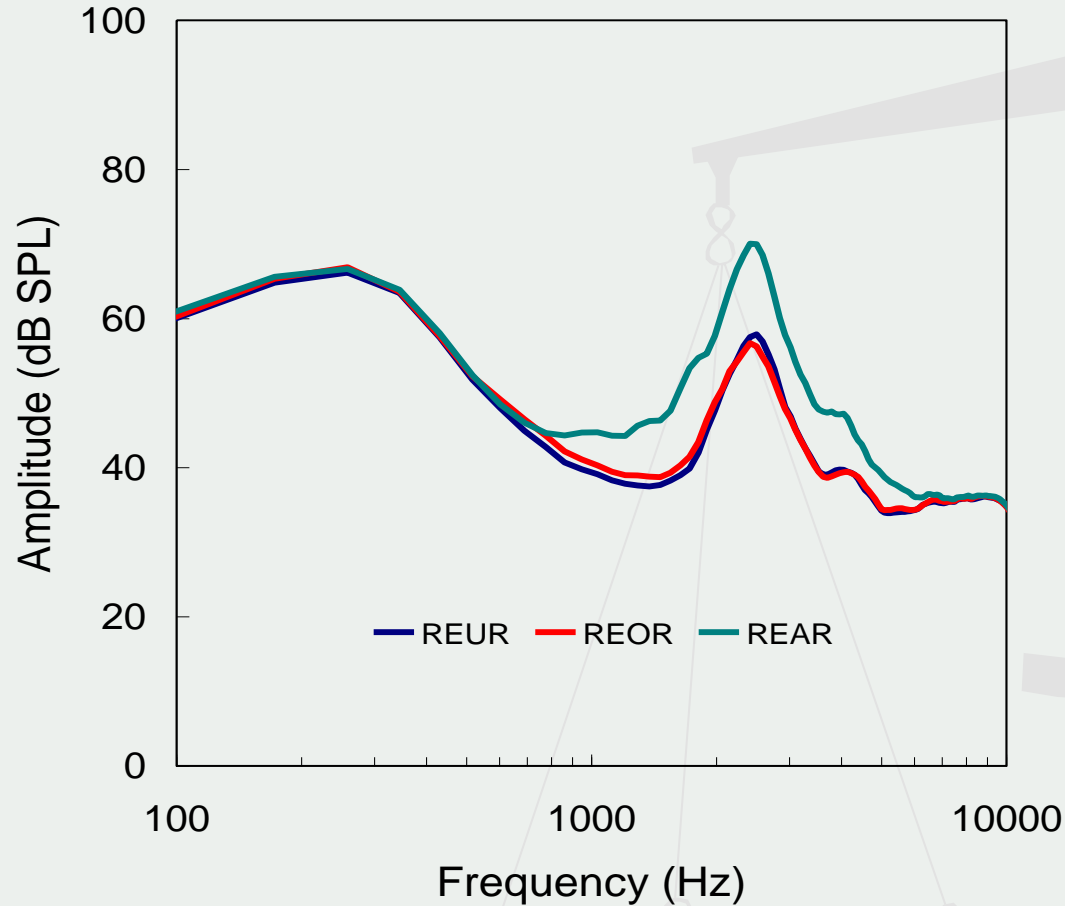


# Average Audiogram (right and left averaged together) for Study 1 Participants



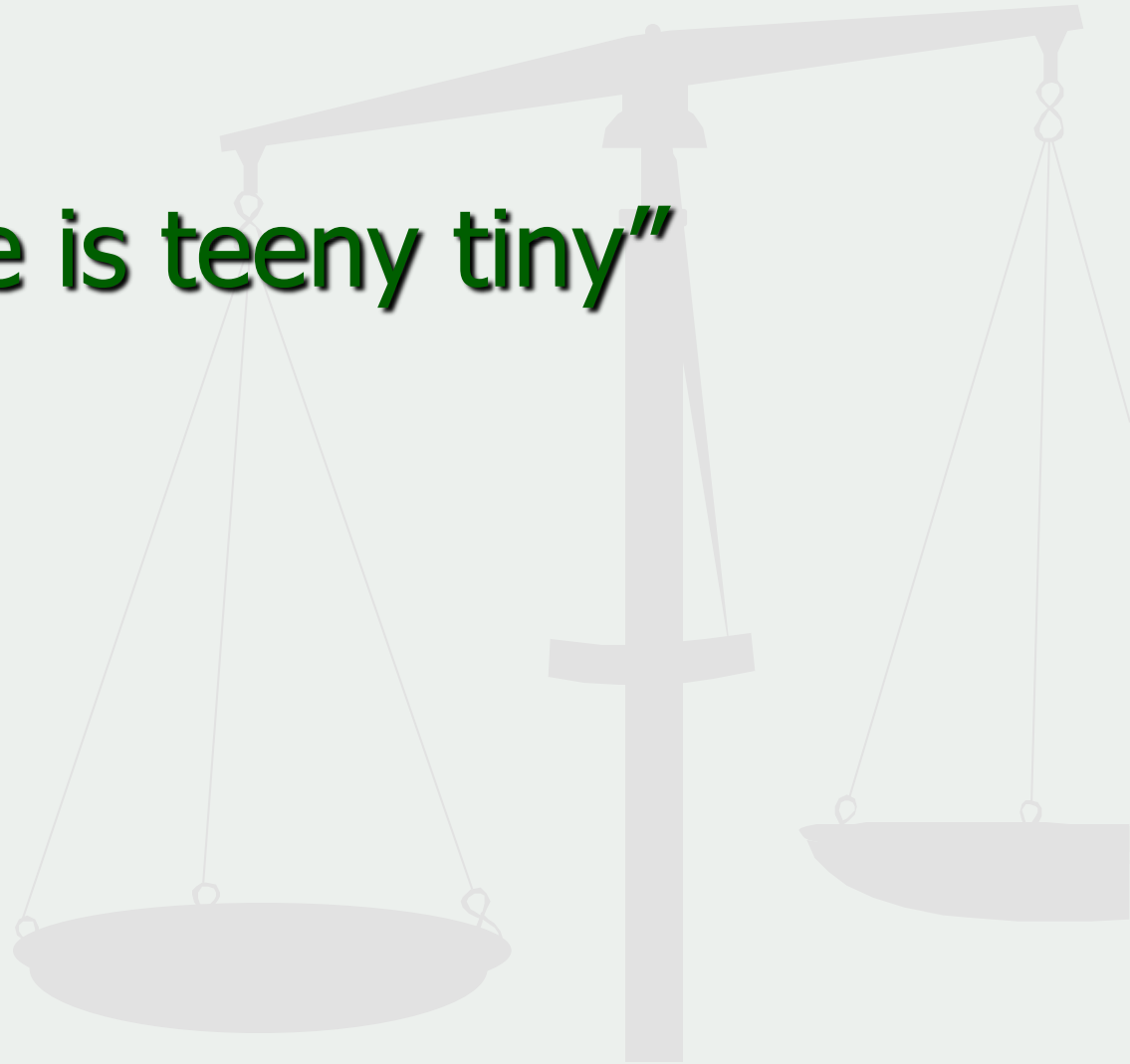
# Objective Measures of Occlusion

With an Open Fit



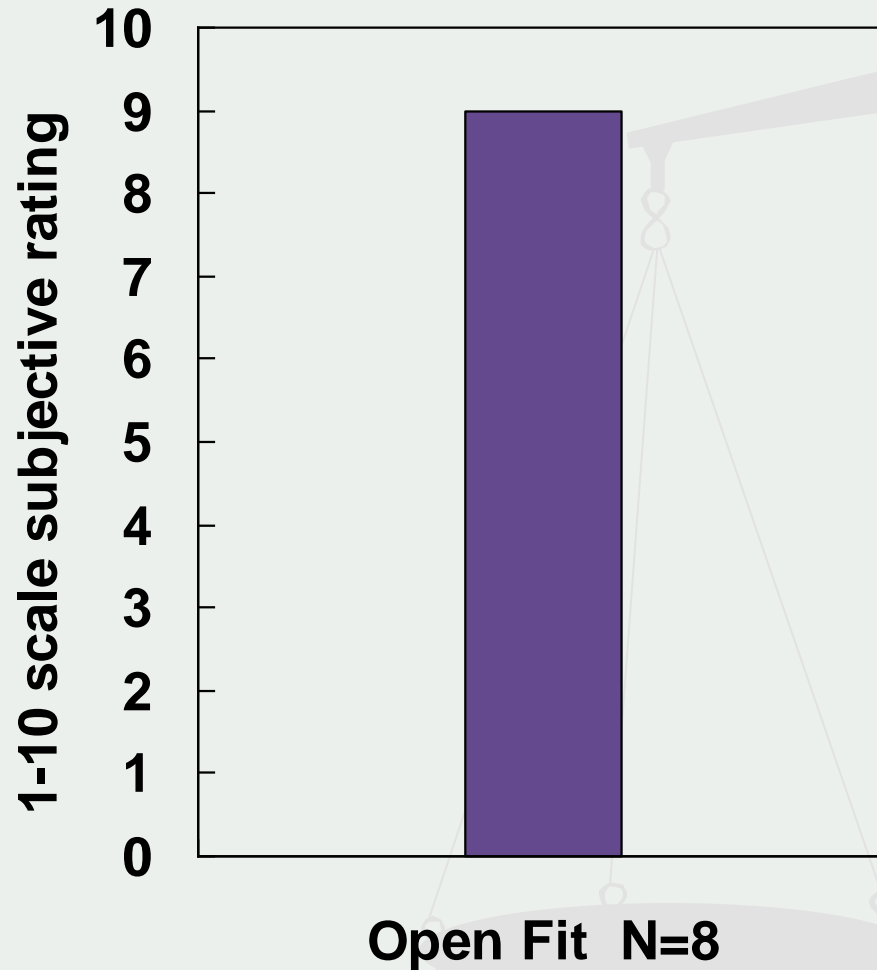
# Subjective Measure

**“Baby Jeannie is teeny tiny”**

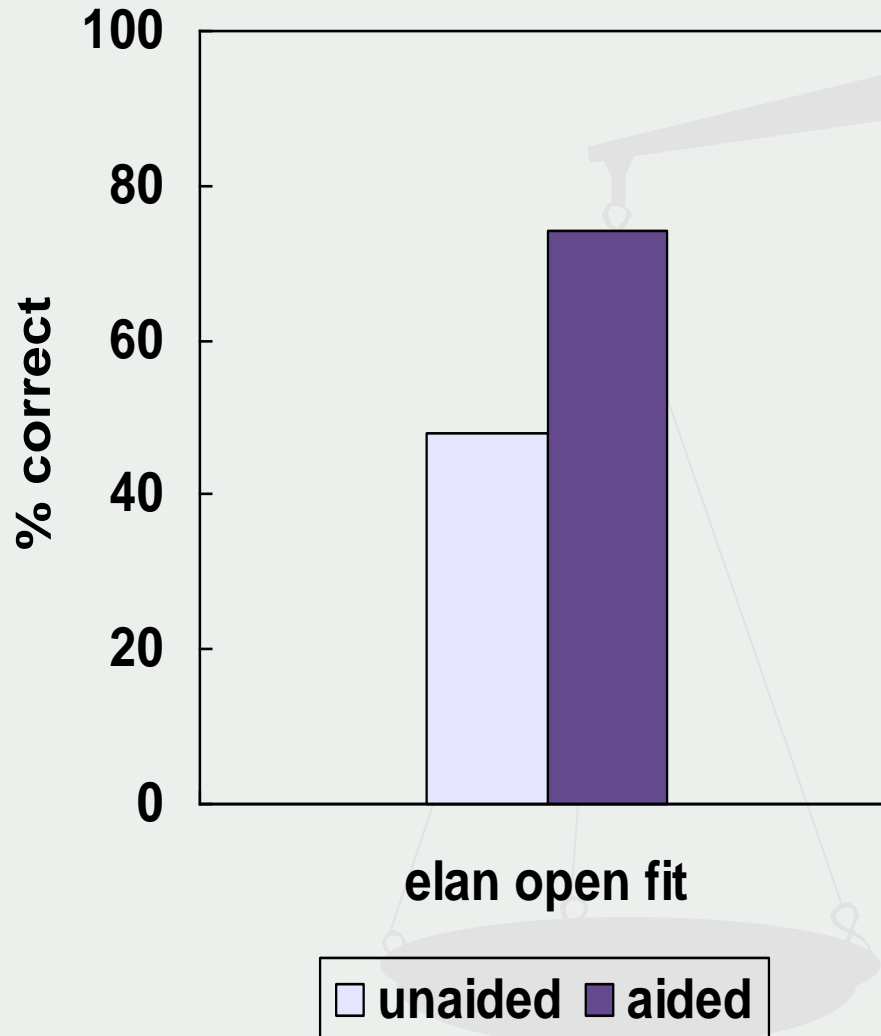




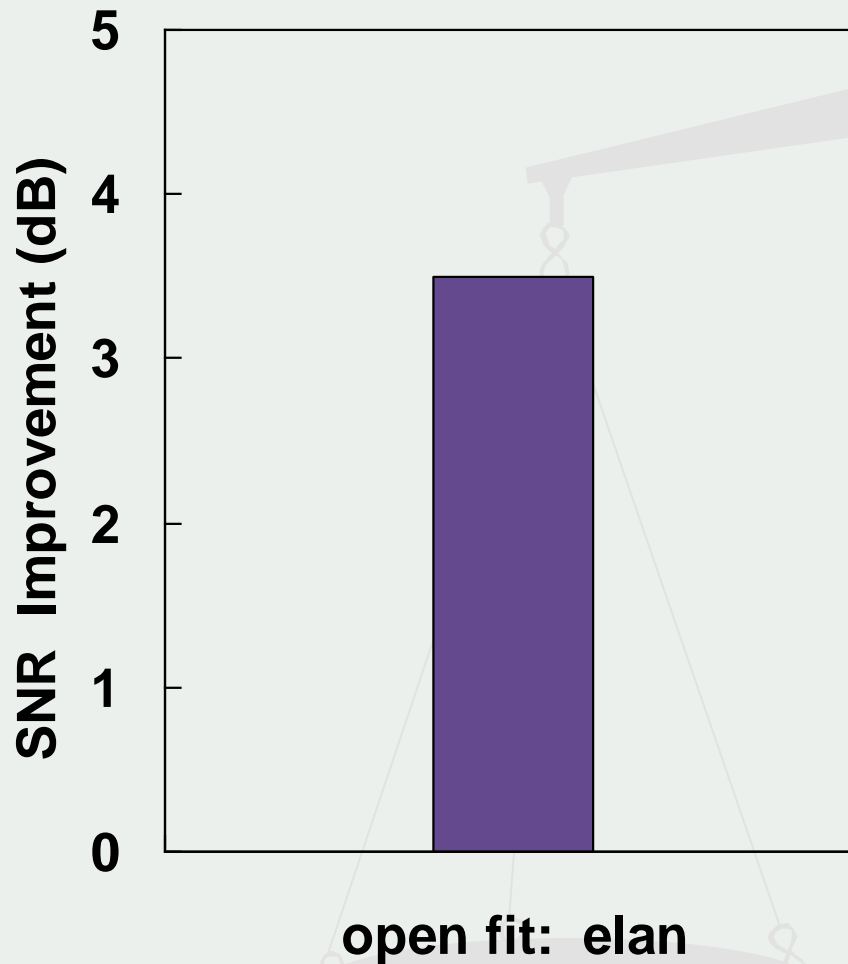
# Median Subjective Rating



# Results of CASPA: % Phonemes Correct



# HINT Score Improvement Over Unaided



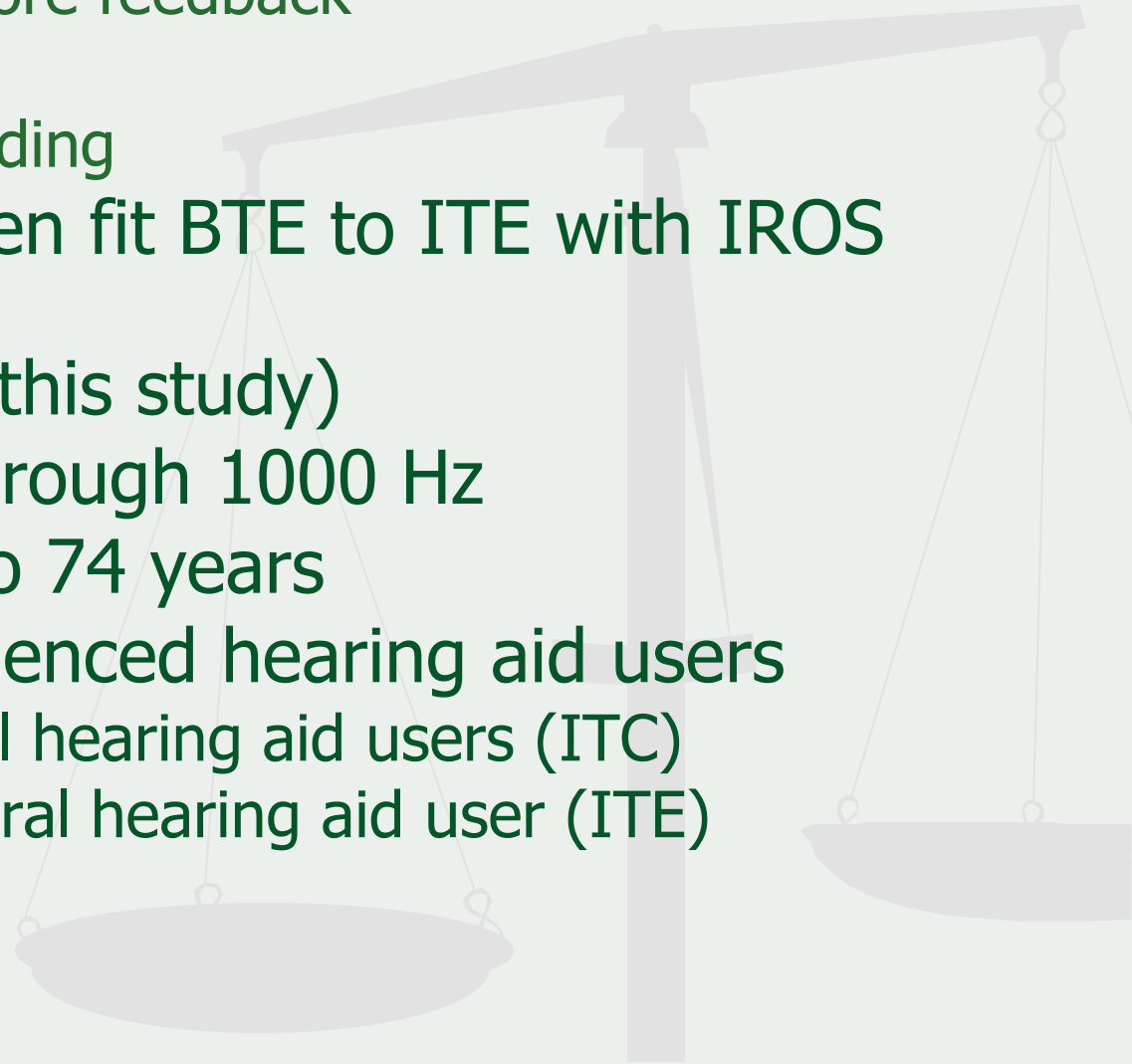


**What if your client refuses  
the open fit BTE?**

**What next?**

# Study 2

- Effect of IROS vent on an ITE
  - Available gain before feedback
  - Occlusion effect
  - Speech understanding
- Comparison of open fit BTE to ITE with IROS vent
- Four males (from this study)
- Normal hearing through 1000 Hz
- Age range of 42 to 74 years
- Three were experienced hearing aid users
  - Two were binaural hearing aid users (ITC)
  - One was a monaural hearing aid user (ITE)

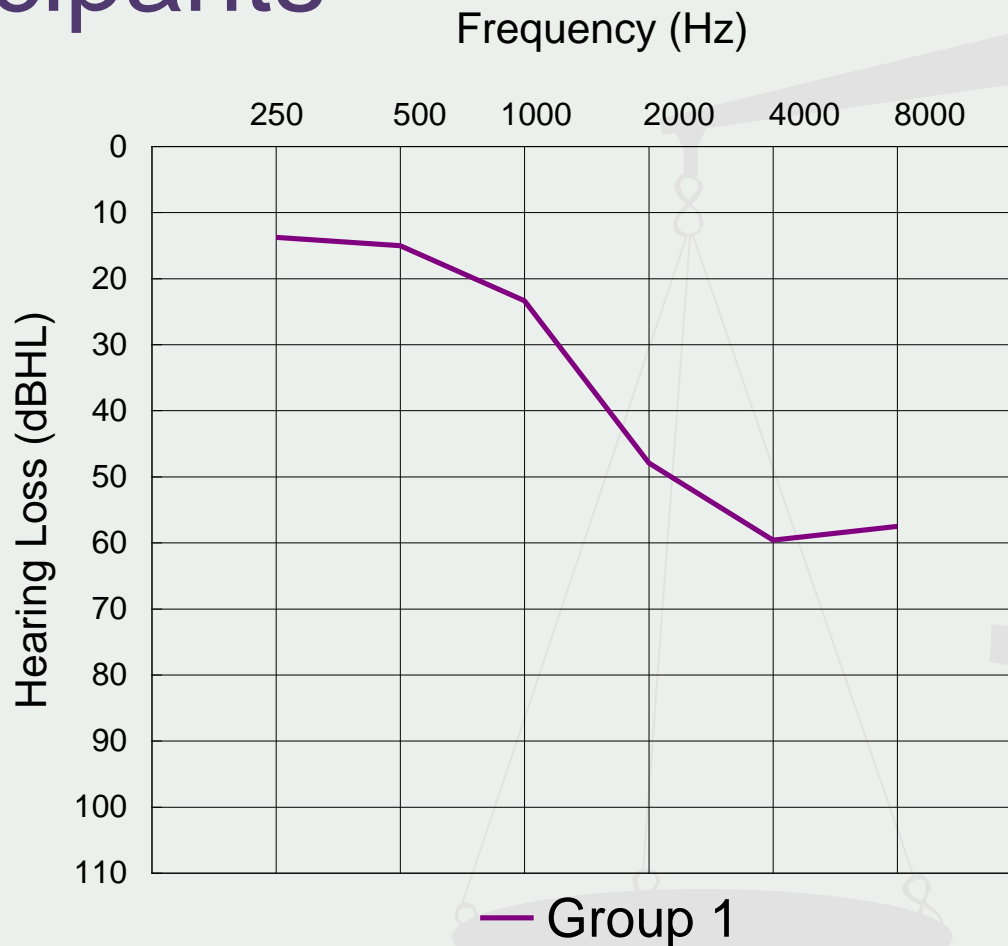


# Custom ITE with IROS Vent

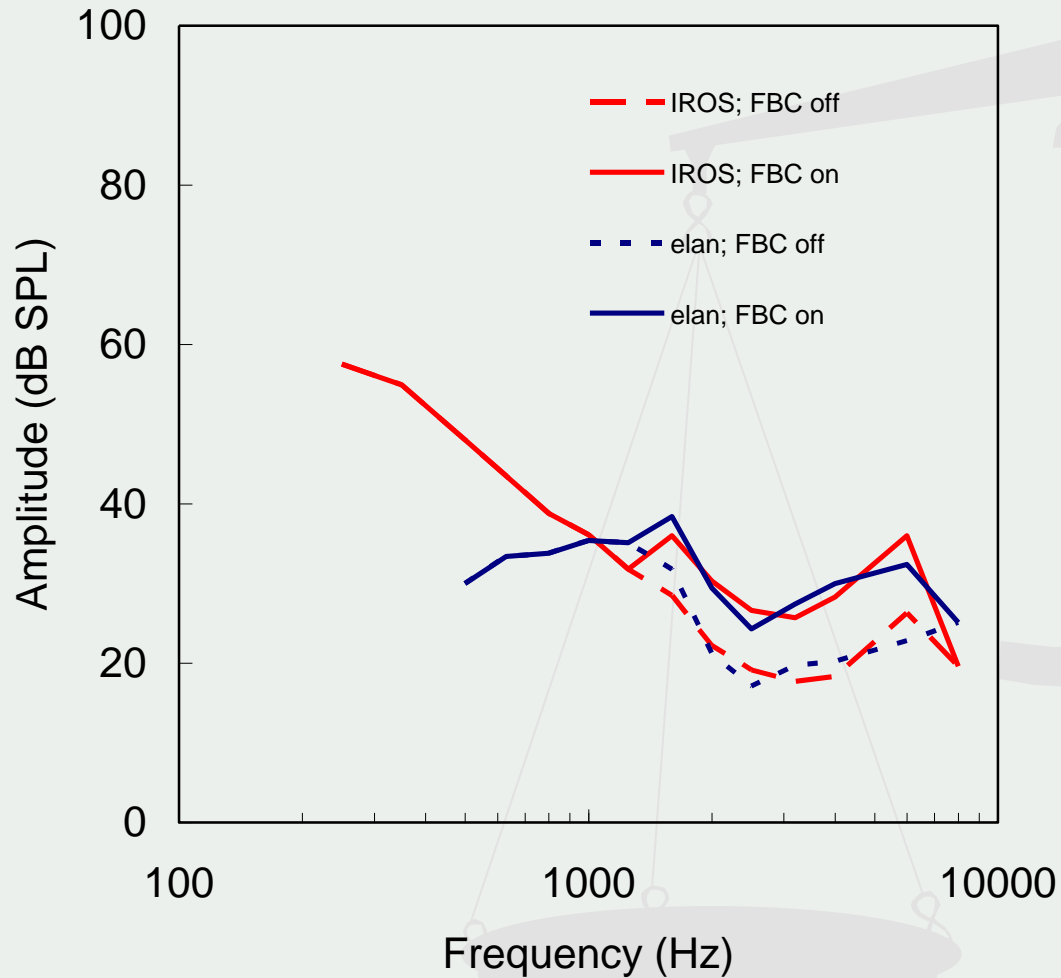


- Average canal length = 22.4 mm
- Average vent length = 10.6 mm
- Average lateral opening = 3.7 mm
- Average medial opening = 4 mm
- Active feedback phase cancellation
- Fully adaptive directional mic
- 15 channel with 0 dB HL CT
- Noise Reduction w. Speech Intensification
- In-Situ Sensogram

# Average Audiogram (right and left averaged together) for Study 2 Participants



# Available Gain with FBC on/off:



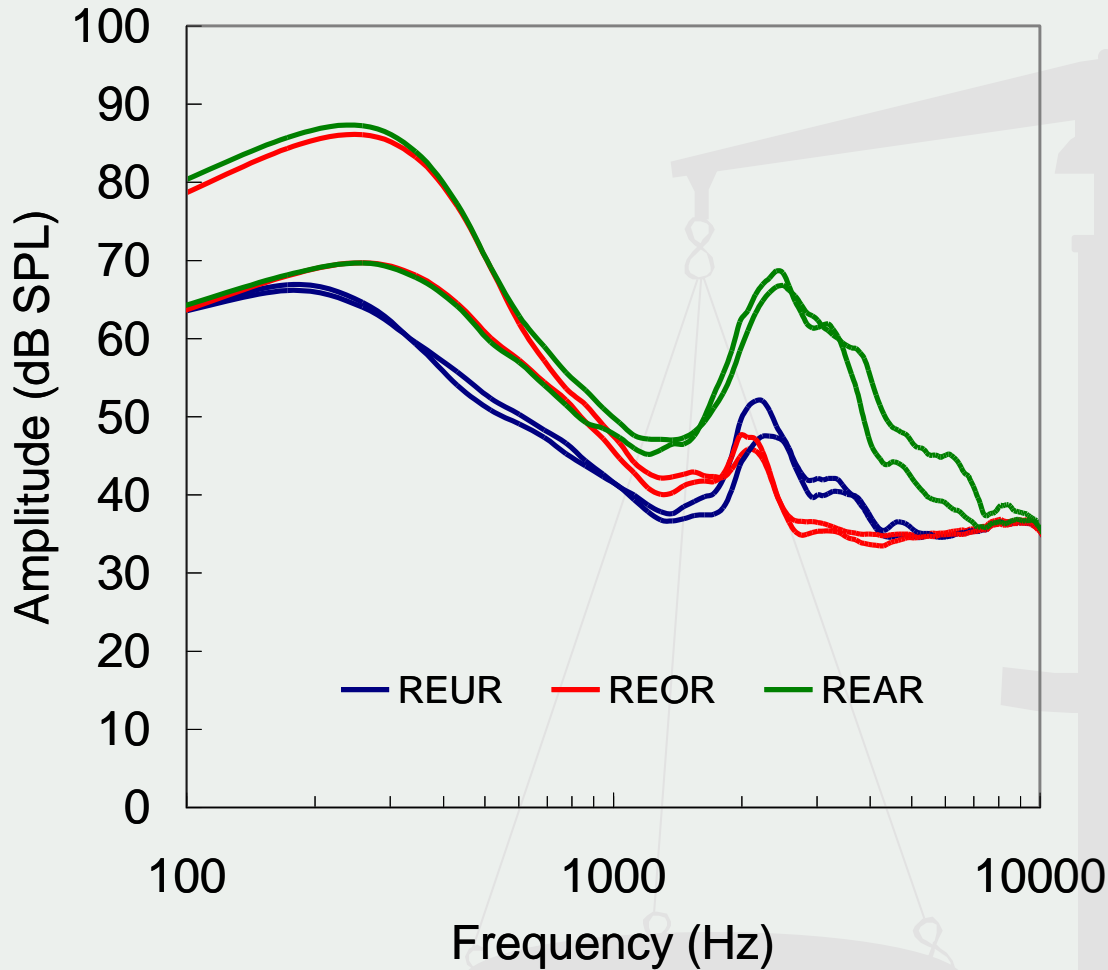


# Observations on Available Gain

- Despite the Open fit BTE being more “open” than the ITE with IROS vent, available gain before feedback was similar between open fit BTE and ITE with IROS vent for frequencies above 1000 Hz
  - Microphone and receiver are closer in ITE which can limit available gain despite the smaller “vent” diameter compared to an open fit
- Both instruments have active feedback phase cancellation that provided about 10 dB additional gain

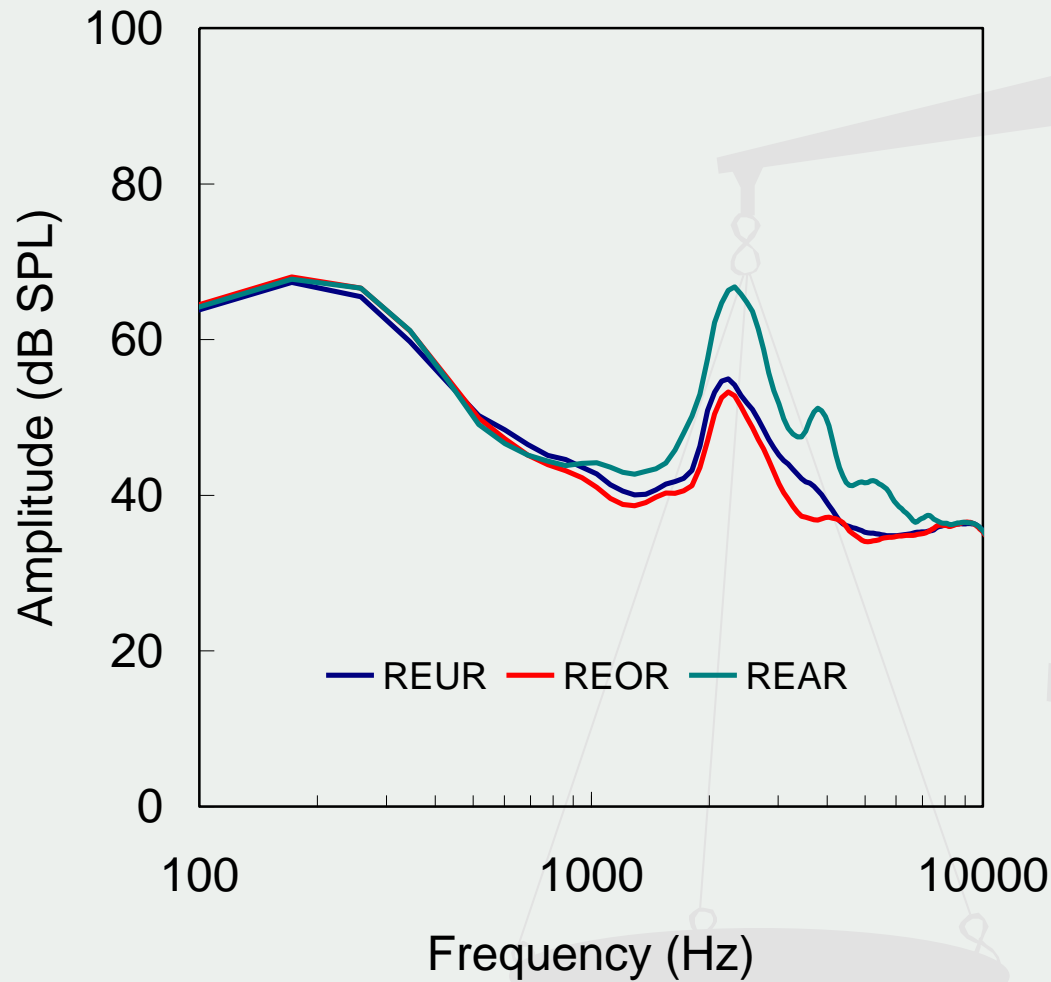
# Objective Measures of Occlusion

With an OROS Vent



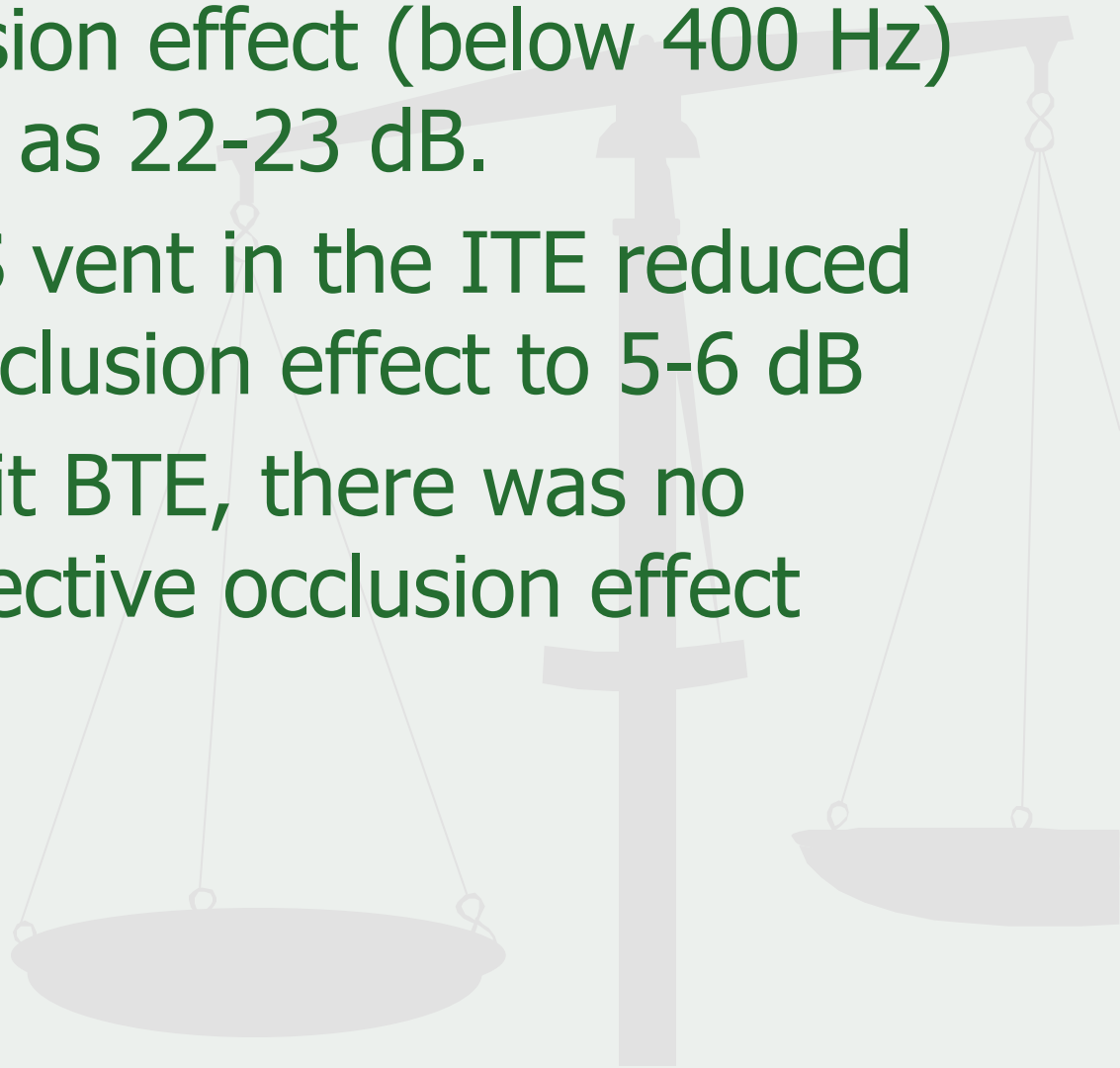
# Objective Measures of Occlusion

With an Open Fit

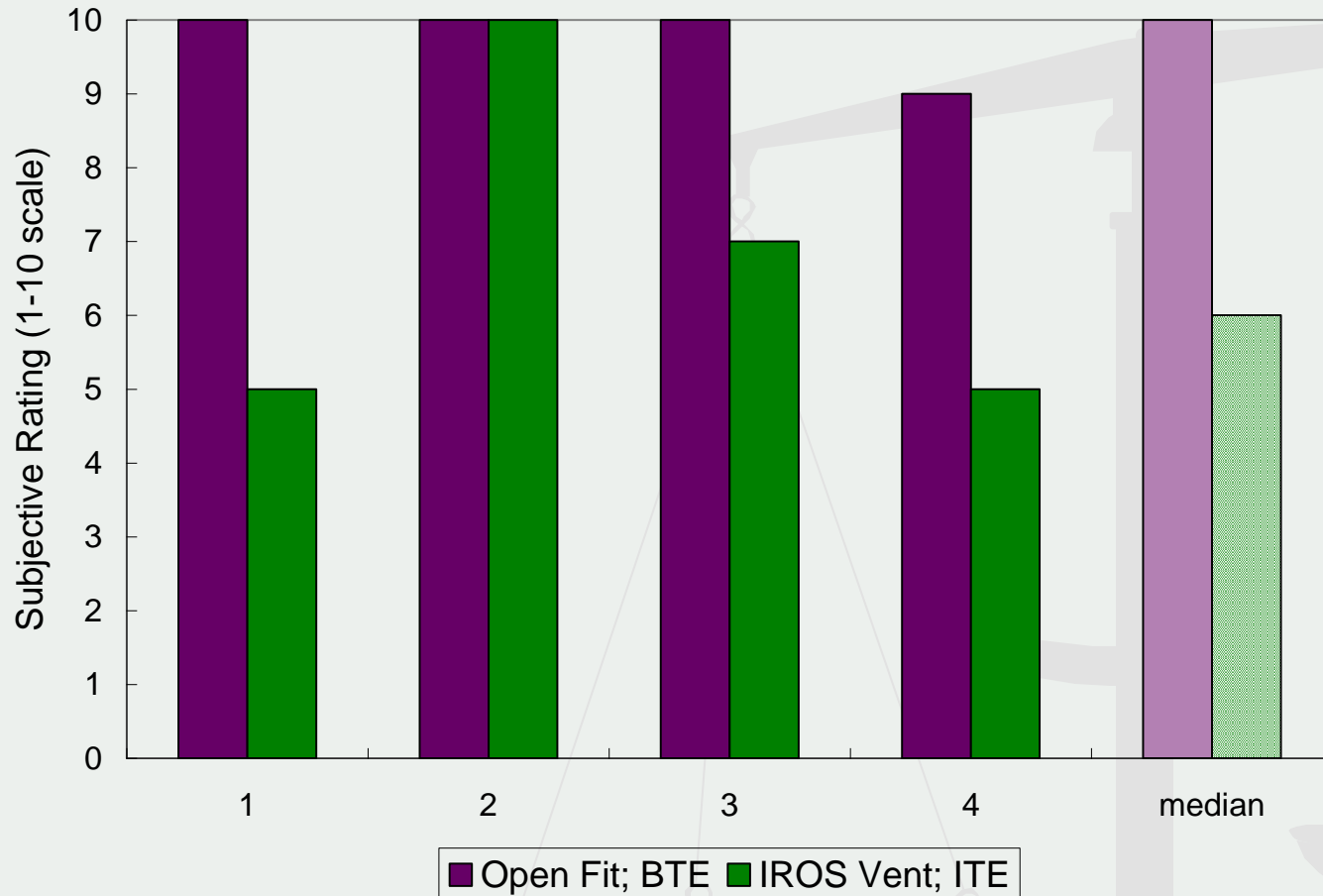


# Observations of Objective Occlusion Effect

- Objective occlusion effect (below 400 Hz) can be as much as 22-23 dB.
- The 4 mm IROS vent in the ITE reduced the objective occlusion effect to 5-6 dB
- With the open fit BTE, there was no measurable objective occlusion effect

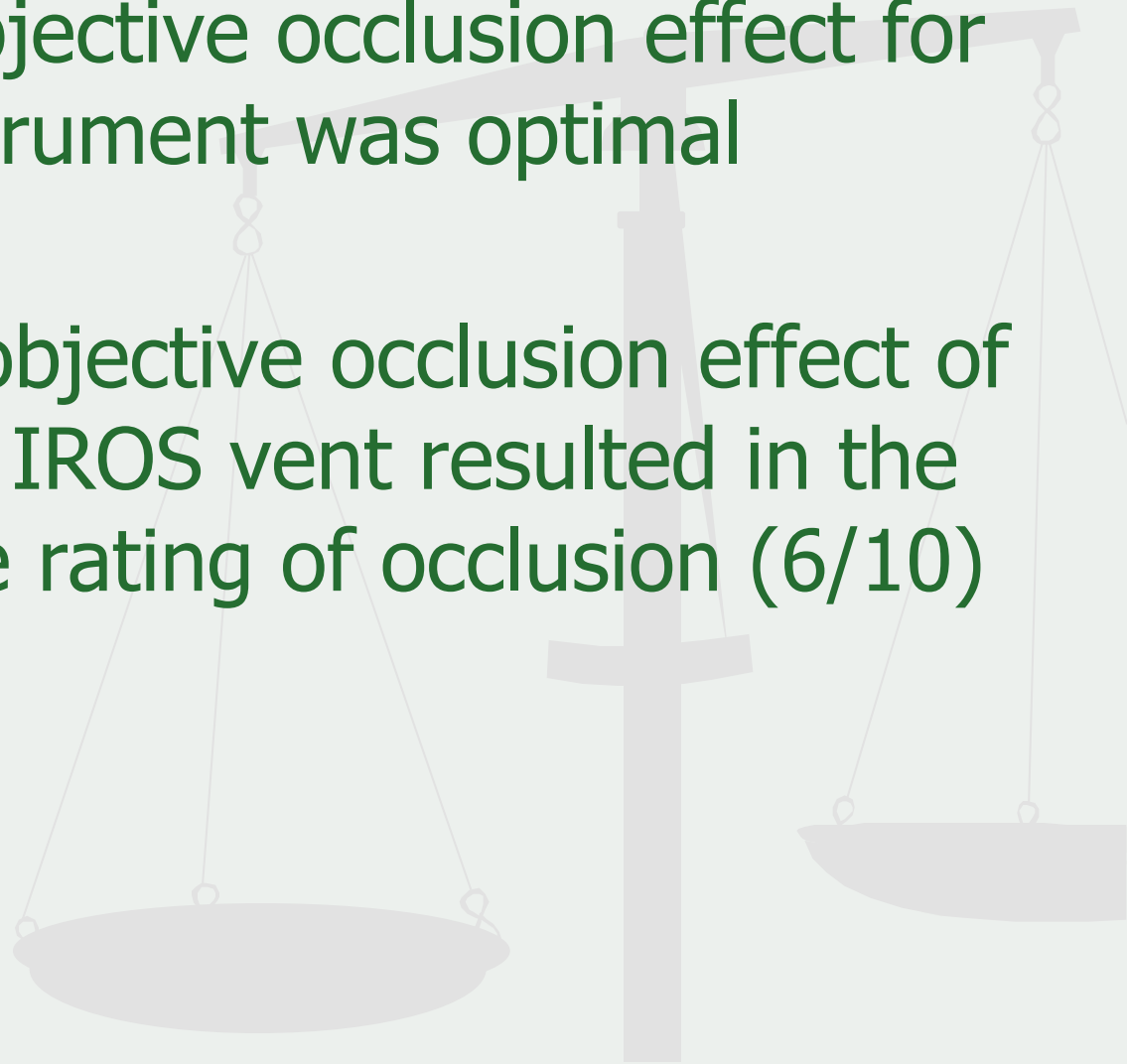


# Subjective Ratings: Study 2

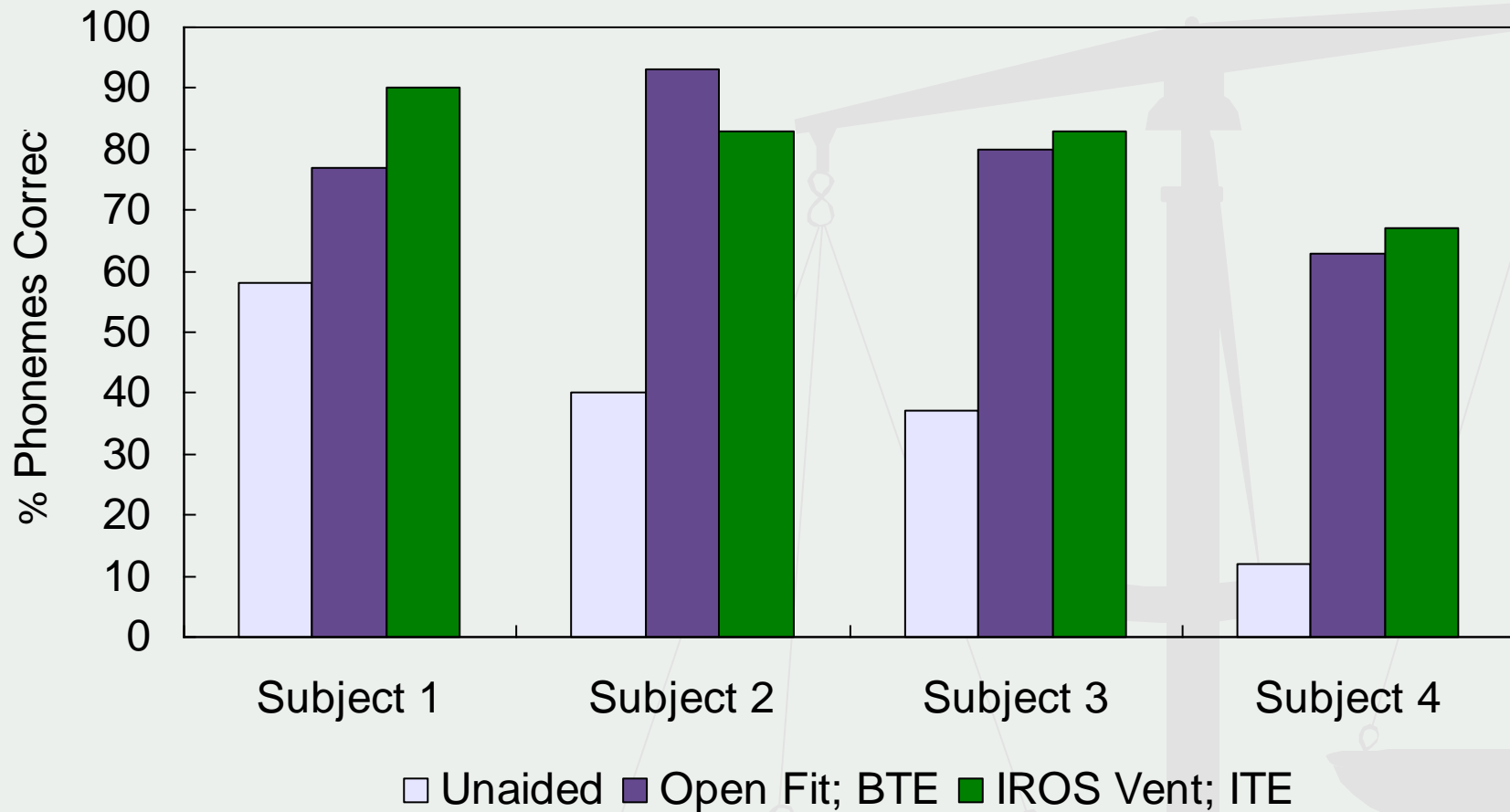


# Observations on Subjective Occlusion Effect

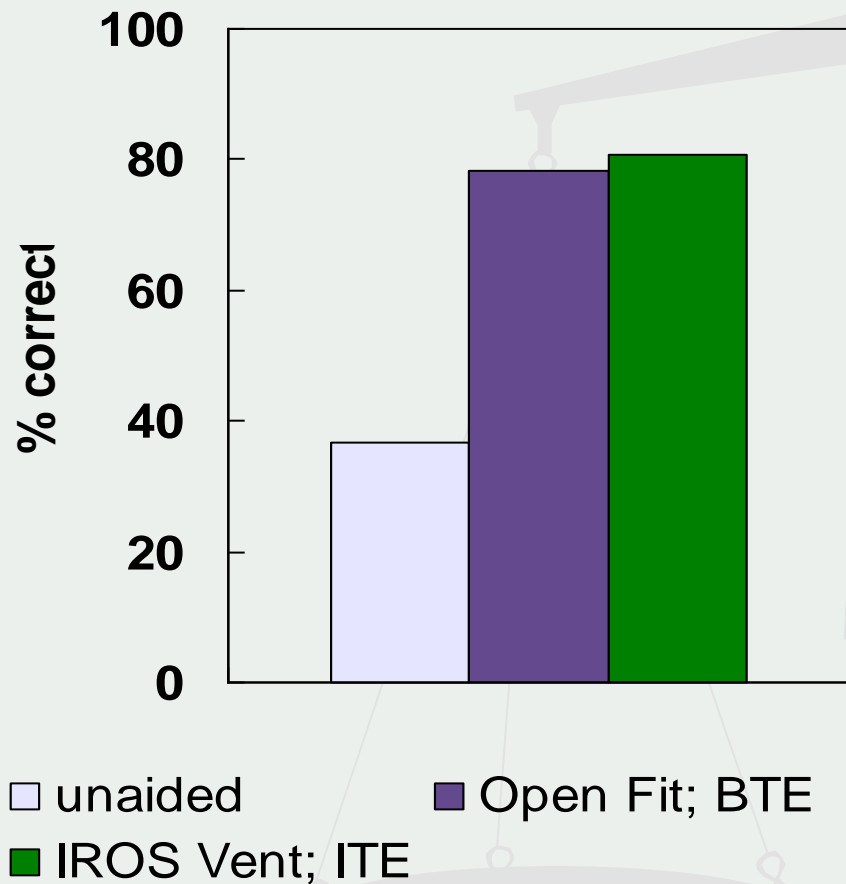
- The median subjective occlusion effect for the open fit instrument was optimal (10/10).
- The measured objective occlusion effect of 5-6 dB with the IROS vent resulted in the lower subjective rating of occlusion (6/10)



# Results of Caspa: % Phonemes Correct; Study 2



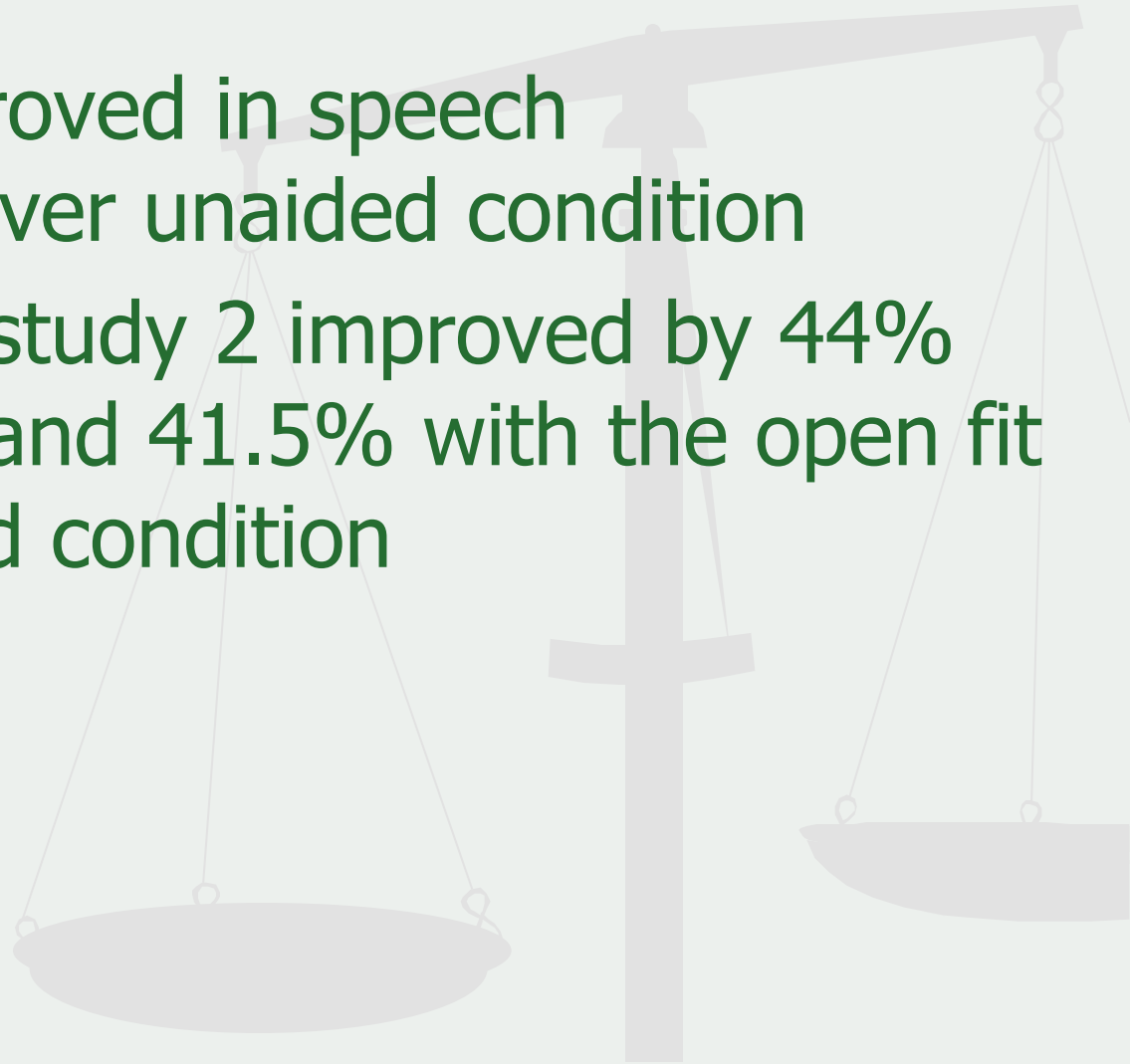
# Average Results of CASPA: % Phonemes Correct



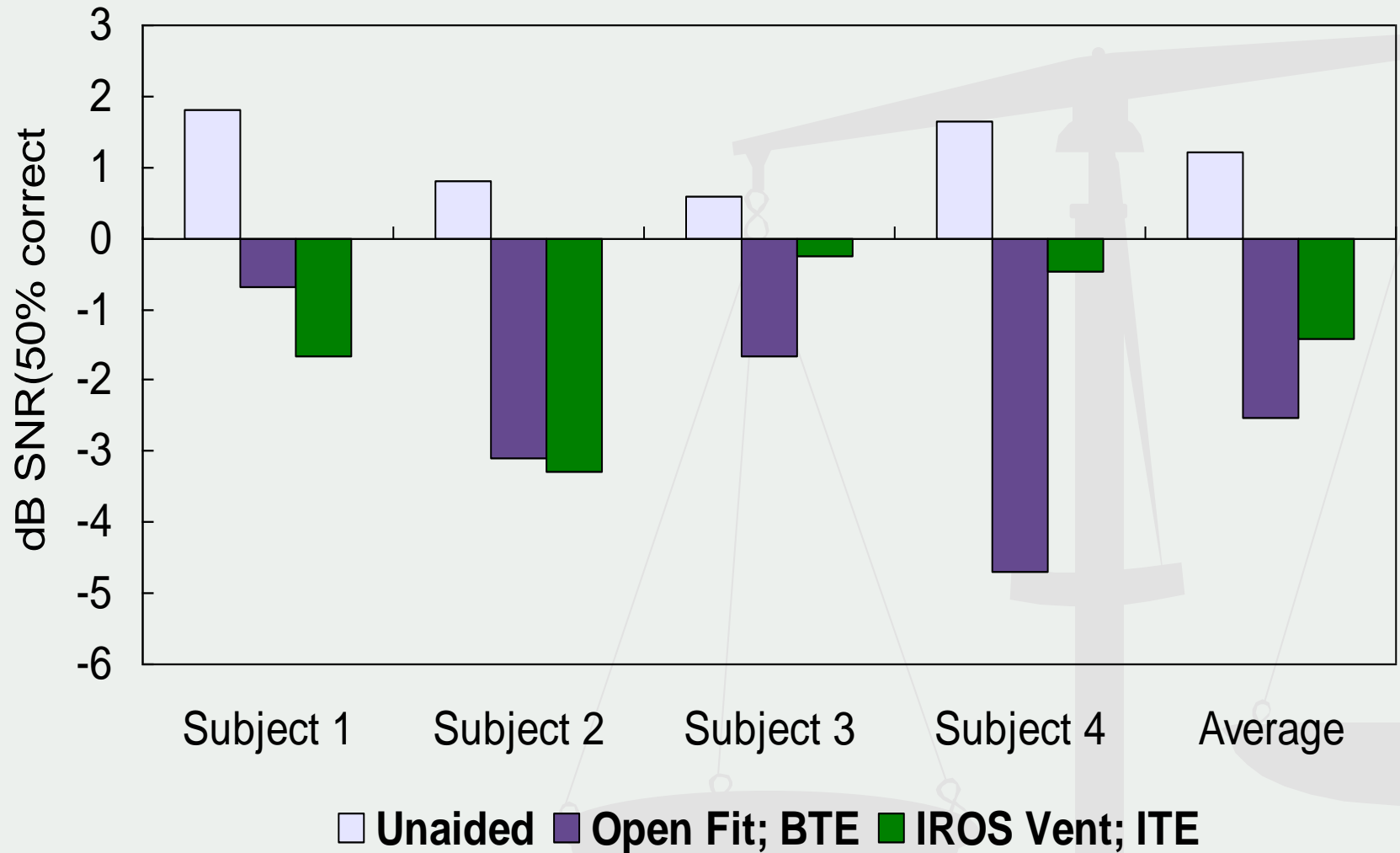


# Observations of Understanding Soft Speech

- All subjects improved in speech understanding over unaided condition
- The subjects in study 2 improved by 44% with IROS vent and 41.5% with the open fit over the unaided condition



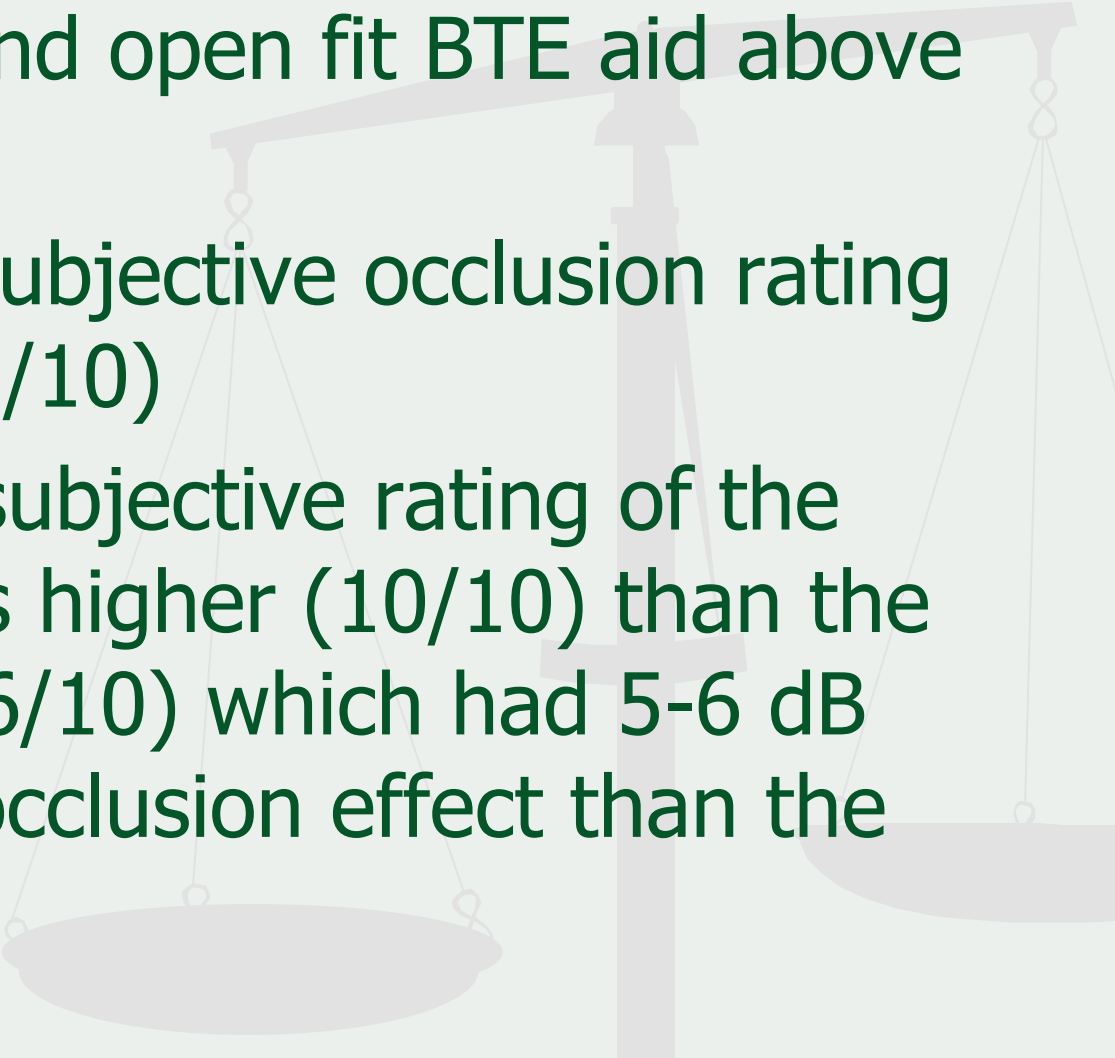
# dB SNR for HINT (50% correct)



# Observations of HINT Results

- The open fit BTE provided approximately 3.7 dB of improvement over unaided condition (effect of noise reduction included – if removed, what is the benefit???)
- The IROS Vent ITE provided approximately 2.6 dB of improvement over unaided condition

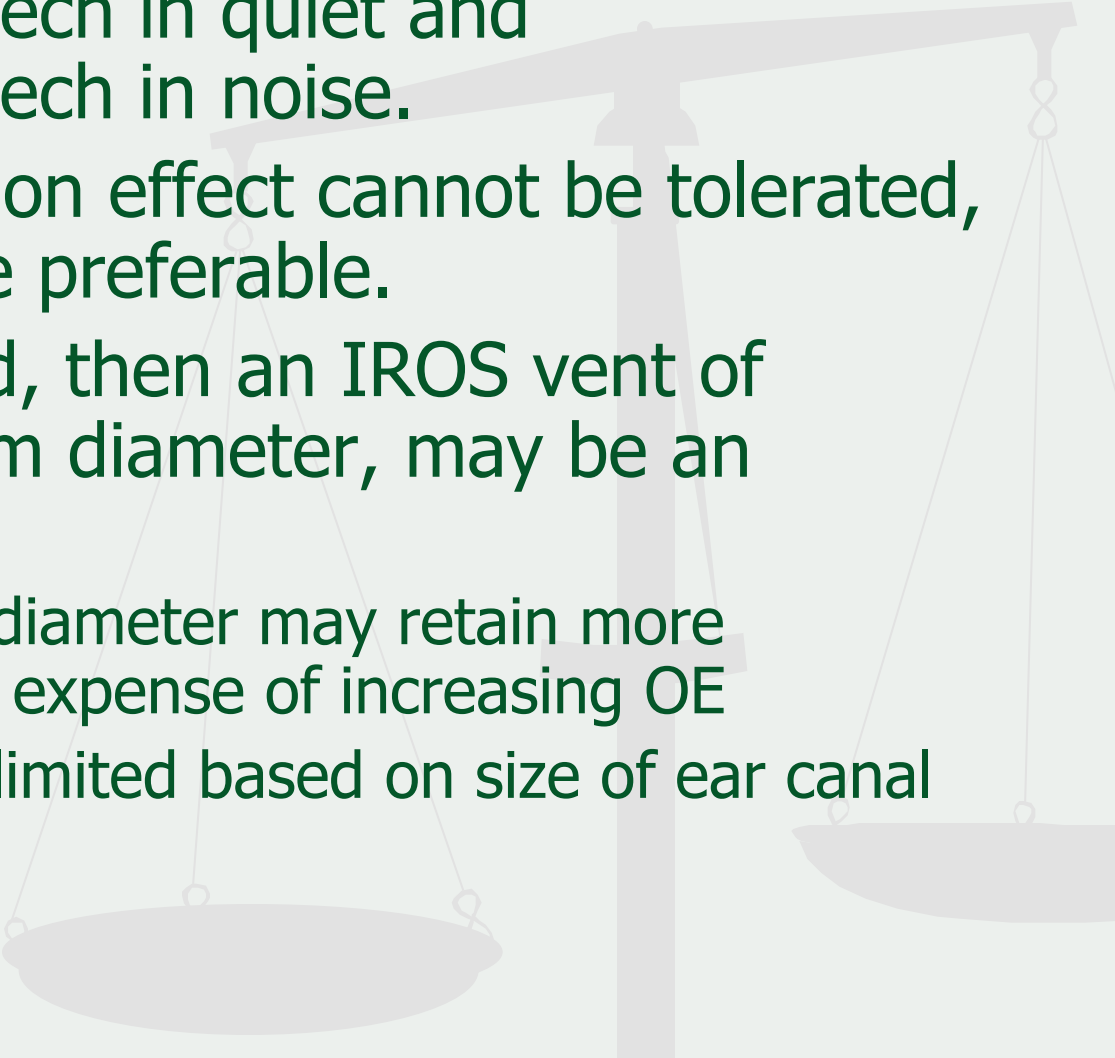
# Summary of Observations

- Available gain was similar between the IROS vent ITE and open fit BTE aid above 1000 Hz
  - In study 1, the subjective occlusion rating was very high (9/10)
  - In Study 2, the subjective rating of the open fit BTE was higher (10/10) than the IROS vent ITE (6/10) which had 5-6 dB more objective occlusion effect than the open fit aid.
- 

## Summary (cont.)

- Understanding soft speech was slightly better with the ITE with an IROS vent (80%) over the open fit (74%=study 1; 78%=study 2)
- HINT improvement over unaided condition was similar (3.5 dB) for the open fit BTE in study 1 and study 2– directional and noise reduction benefit partially retained. The IROS Vent ITE had 1 dB less improvement than the open fit BTE.

# Implications

- Both instruments performed well for understanding speech in quiet and understanding speech in noise.
  - If objective occlusion effect cannot be tolerated, an open fit may be preferable.
  - If an ITE is desired, then an IROS vent of approximately 4mm diameter, may be an alternative.
    - IROS of narrower diameter may retain more intelligibility at the expense of increasing OE
    - IROS vent can be limited based on size of ear canal
- 



**IROS Vent or Open Fit?**

**You Make the Call!**