


# Innovation at NAL: Creative Solutions to Difficult Problems in Hearing Health Care

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Laboratories

Sydney, Australia  
The logo for National Acoustic Laboratories (NAL), featuring the letters 'NAL' in a stylized, bold font with a curved line underneath.





## Connecting with NAL: Soundbites Webinar Series

Over 30 webinars

3 different timezones

15-20 minute presentations

By NAL researchers

Q&A at the end



## Connecting with NAL: Soundbites Webinar Series



# Who Is NAL?

- Government-funded hearing research center
  - Supported by the Department of Health
  - In existence since 1942
- 40+ career scientists
  - Audiologists
  - Engineers
  - Speech pathologists
  - Neuroscientists
  - Psychologists
- Located in the Hearing Hub
- Hearing Australia Services



# Why We Exist: NAL's Mission

Lead the world in hearing research and evidence-based innovation to improve hearing health and transform the lives of people with hearing difficulties.

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Lead the world in **hearing research and evidence-based innovation** to improve hearing health and transform the lives of people with hearing difficulties.

# How We Work

- Focused on impact
- Staffed by career scientists, not students
- Work with hearing industry partners
- Use innovation methodologies:
  - Design Thinking
  - Lean Startup MVPs
  - Agile





## Industry Trends



## Motivations and Decision Making



## Tools & Technology Development



## Outcomes with Devices



## Industry Trends



## Motivations and Decision Making

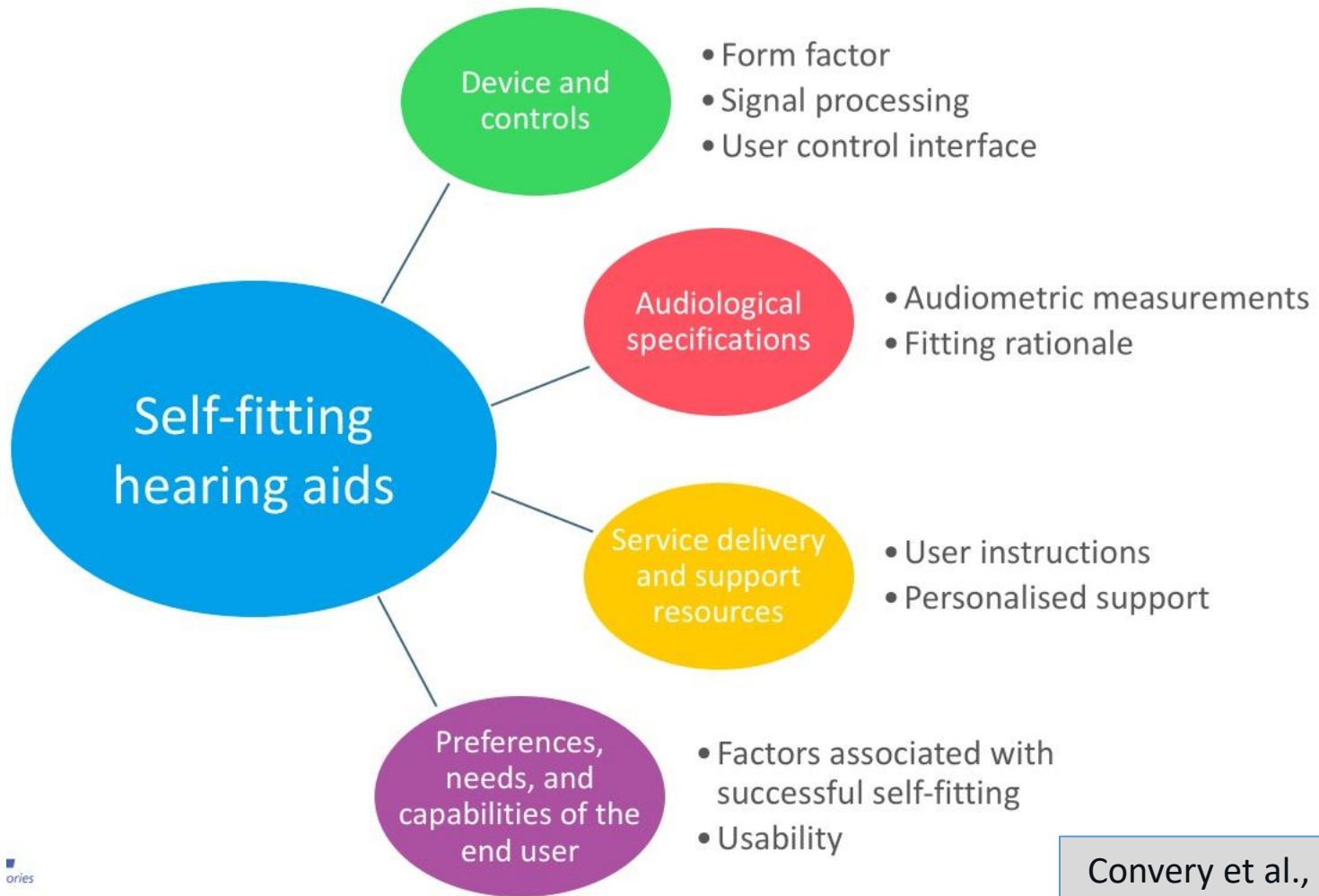


## Tools & Technology Development

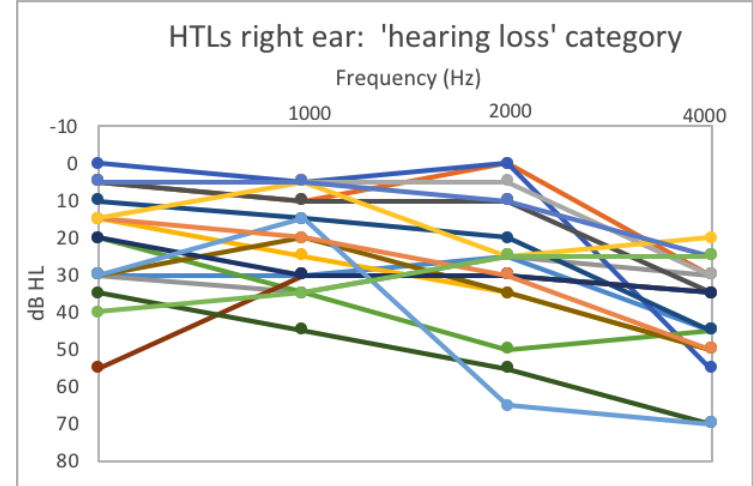
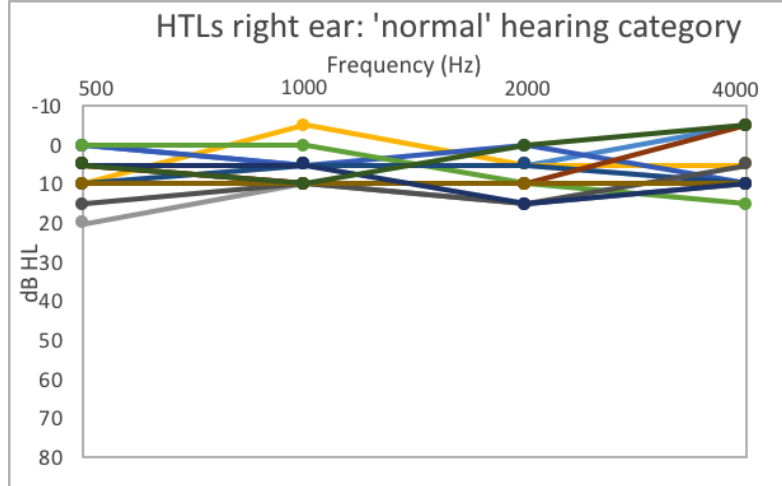


## Outcomes with Devices

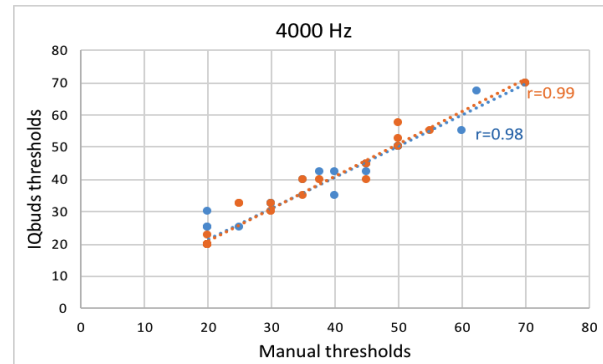
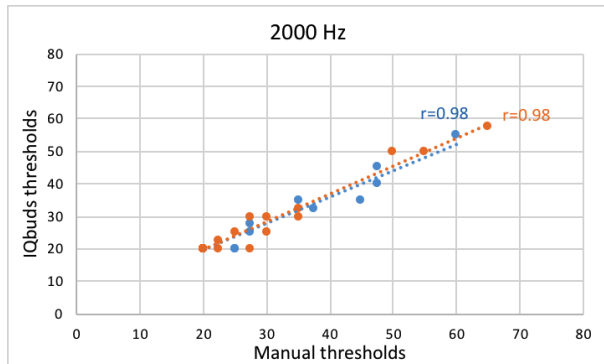
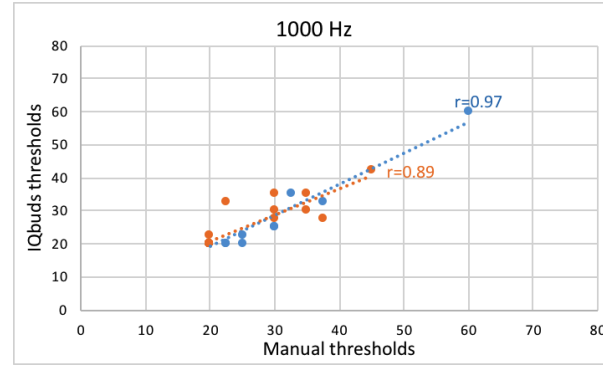
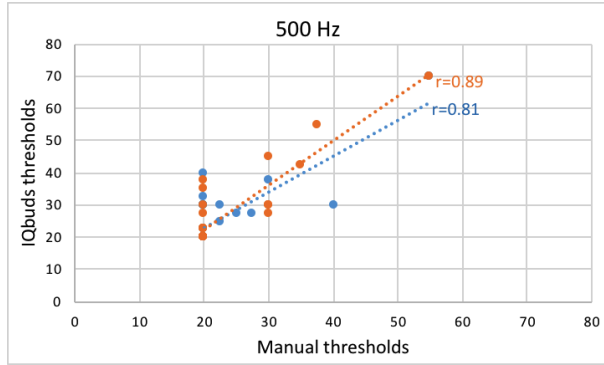
# **Self-fitting Hearing Aids and Hearables**



# Self-test of Hearing Loss using App



# Self-test of Hearing Loss using App

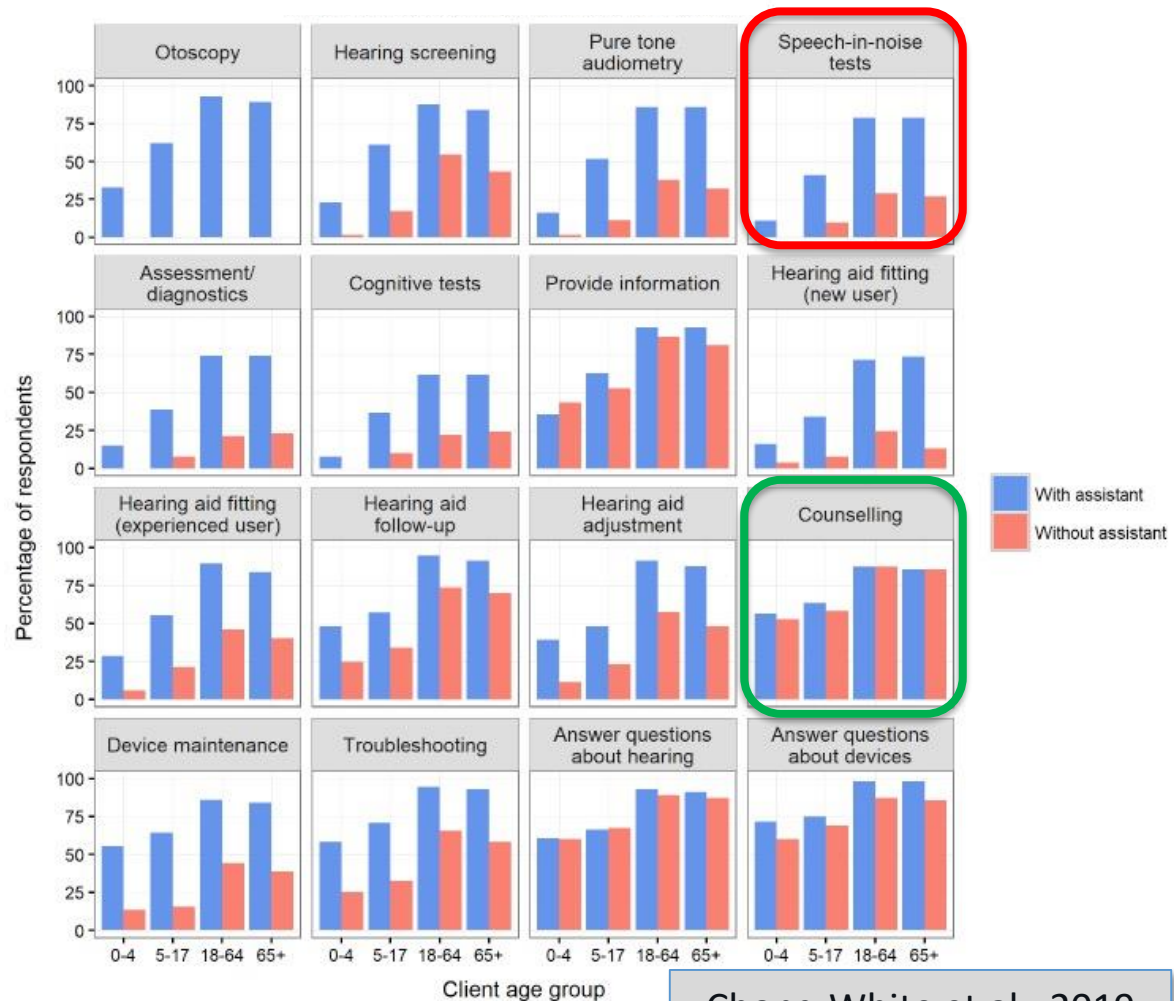


# Teleaudiology

# Willingness of audiologists to use teleaudiology

95 Audiologists surveyed worldwide

- More willing with an assistant than without
- More willing for communication than testing and fitting

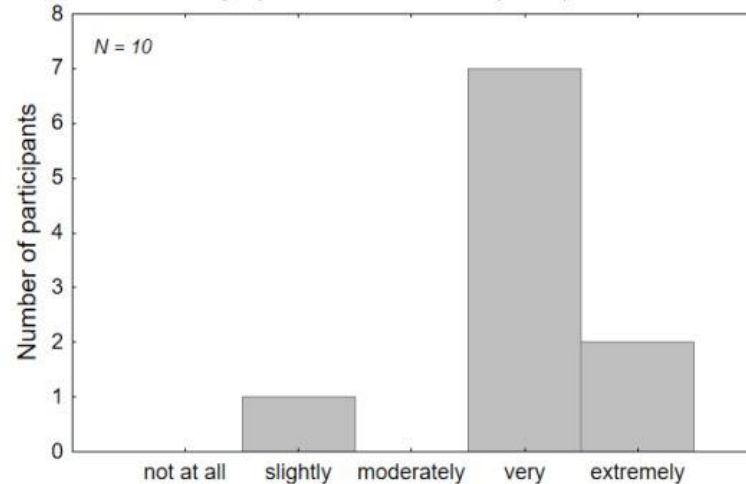




# ReSound Remote Assist Evaluation

Satisfied with settings  
programmed remotely

After using the App, how satisfied were you with the new settings you received from your provider?





Industry Trends



Motivations and  
Decision Making



Tools & Technology  
Development



Outcomes with  
Devices

**Big Data**

# Online Assessment of Hearing Ability and Beliefs

## Online Hearing Assessment

A quick set of questions and audio test to measure your hearing.

Start

The Online Hearing Assessment includes a short questionnaire followed by an audio test to measure how well you hear and your attitudes toward hearing.

Please keep in mind that this assessment service is just one way to check your hearing. Different methods can give different results, and if you're worried about any aspect of your hearing, it's worth booking in for a personal assessment with a professional audiologist.

This assessment takes about 10 minutes to complete.

### Can I take the assessment?

If you want to measure your hearing, you should take the assessment. However, it is not suitable for people who wear hearing aids or are fitted with a cochlear implant.

How old are you?

Do you currently wear hearing aids or a cochlear implant?


## How well do you think you could manage hearing aids if you ever needed them?

Slight difficulty

1 2 3 4 5

< Back Next >

## Part 2: Audio



Listen and click on the 3 numbers you hear

7 8 9  
4 5 6  
1 2 3  
0 Delete

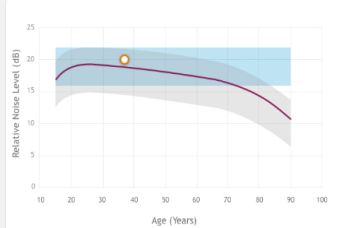
Begin Test

## We haven't found any hearing loss, but you have noticed hearing problems.

Click for your initial report

Prior to doing this test, you considered that you have:  
A severe hearing loss.

Your audio test results are displayed in this graph:



## You indicated that you:

Thought that hearing aids definitely made people look older than they are. It's a concern that comes up quite regularly – but research has shown that:

- The aging effect is less than a year on average (if hearing aids are actually noticed)<sup>4</sup>
- Friends and family of people wearing hearing aids don't view them negatively.<sup>5</sup>
- Only 10% of people who've worn hearing aids reported being mistaken as older.<sup>6</sup>
- Hearing aid wearers have a better image of themselves than people their age who have hearing loss and don't wear hearing aids.<sup>7</sup>

# Predicting Hearing Aid Benefit

## **Benefit is related to:**

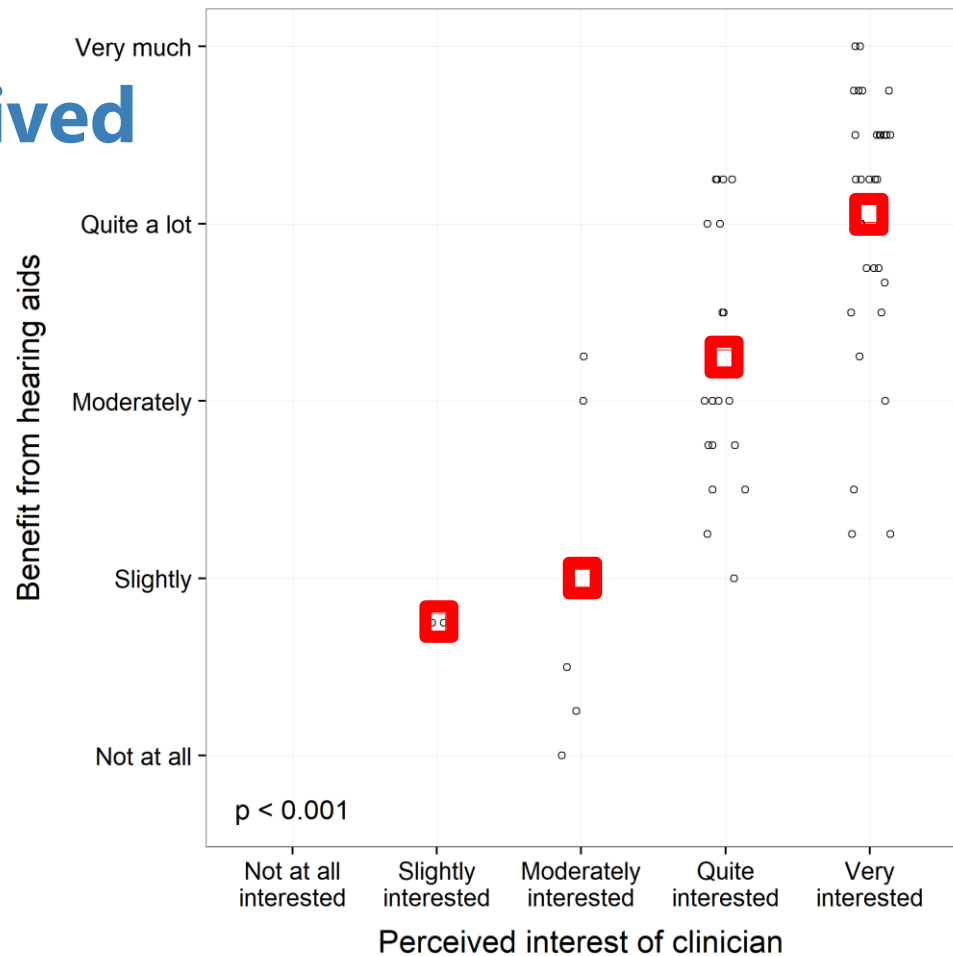
- Uncomfortable loudness ( $p=0.03$ )
- Own voice quality ( $p=0.02$ )
- Physical comfort ( $p=0.01$ )
- Sound quality ( $p=0.002$ )
- Clinician interest ( $p<0.001$ )

# Predicting Benefit

## **Benefit is related to:**

- Uncomfortable loudness ( $p=0.03$ )
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- **Clinician interest** ( $p<0.001$ )

# Benefit versus perceived clinician interest



# Behavioral Economics



# Behavioral Economics

- Definition
  - Understanding the irrational factors that affect human **decision-making**
  - “**Nudging**” influences decision-making behavior by understanding the behavioral economic principles at play and countering or reinforcing them
  - Can apply to hearing healthcare decisions

# Hearing Aid Decision-making

- Problem
  - Why do most people choose the cheapest and least-capable hearing aids?
- Challenge:
  - Can we nudge people to choose better hearing technology to get better hearing outcomes?

# Results

- Numerous insights were obtained that match Behavioral Economics heuristics
- Nudges identified to improve decision-making: choosing better hearing aids
- 5 major changes made to clinic visit

Number choosing  
better hearing aids  
more than doubled





Industry Trends



Motivations and  
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**Tools&Technology  
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Outcomes with  
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# Clinical Use of Cortical Measures

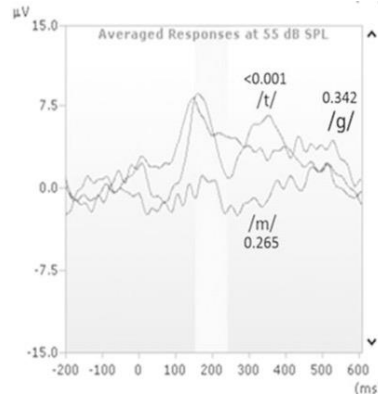
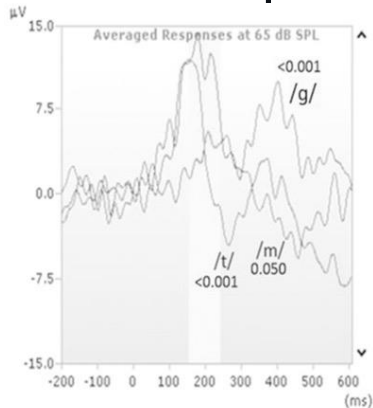
## Problem:

When does an infant using hearing aids benefit more from CIs?

- < 60 dB HL: hearing aid
- > 85 dB HL: cochlear implant
- Between 60 and 85 dB HL: depends on speech discrimination ability

## Solution:

Measure cortical representation of speech





Industry Trends



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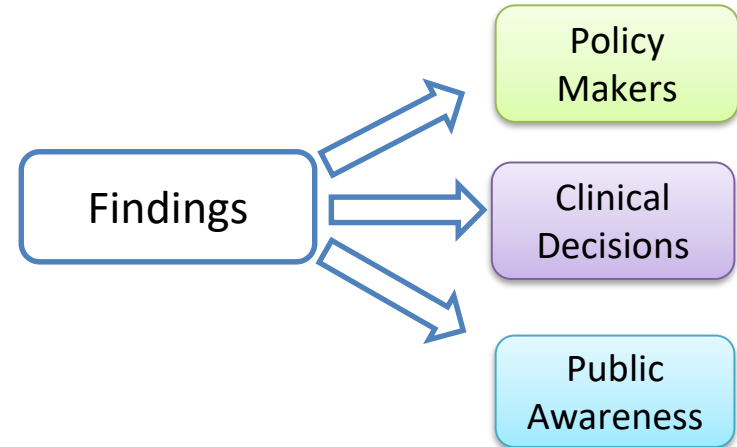
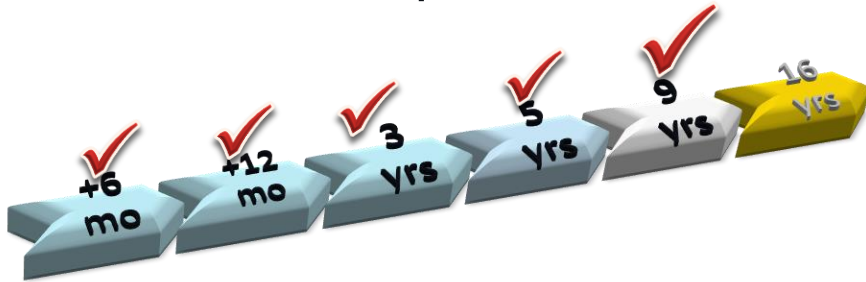


Outcomes with  
Devices

# Longitudinal Outcomes

# Longitudinal Outcomes of Children with Hearing Loss (LOCHI)

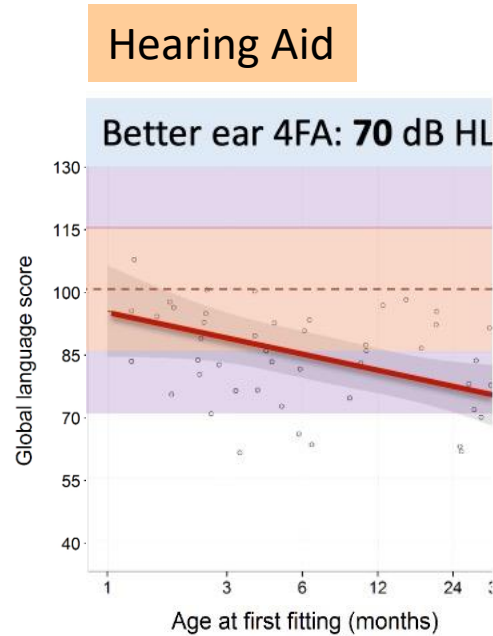
- Follow children born with hearing loss through adulthood to determine the impact of hearing aids and cochlear implants on a full life set of outcomes





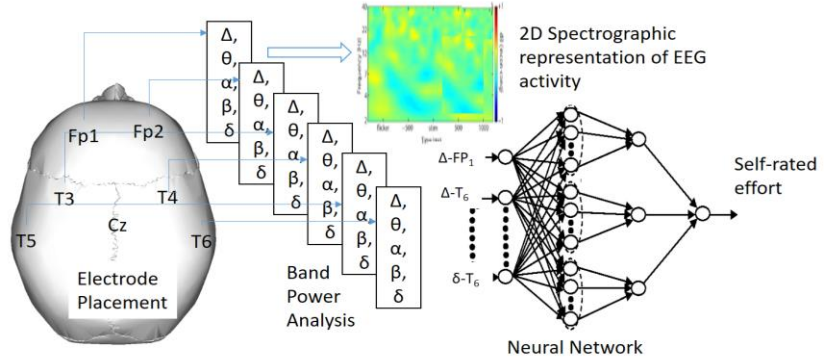
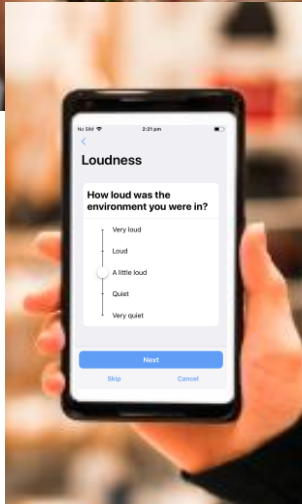
## Findings:

- Early fitting -> early auditory access -> better language



# Realistic Measurements

# Real world vs Realistic listening conditions





## Connecting with NAL: Soundbites Webinar Series



## CONNECTING WITH NAL: SOUNDBITES WEBINARS

### *Week 2 Presenters*



**Teresa Ching**

Tuesday, 2nd June  
3 PM, Los Angeles time

LOCHI  
(TBC)



**Jorge Mejia**

Thursday, 4th June  
9 AM, London time

Realistic listening situations  
(TBC)



**Mel Ferguson**

Friday, 5th June  
12 PM, Sydney time

Smart-phone connected hearing  
aids  
(TBC)

# Q&A

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