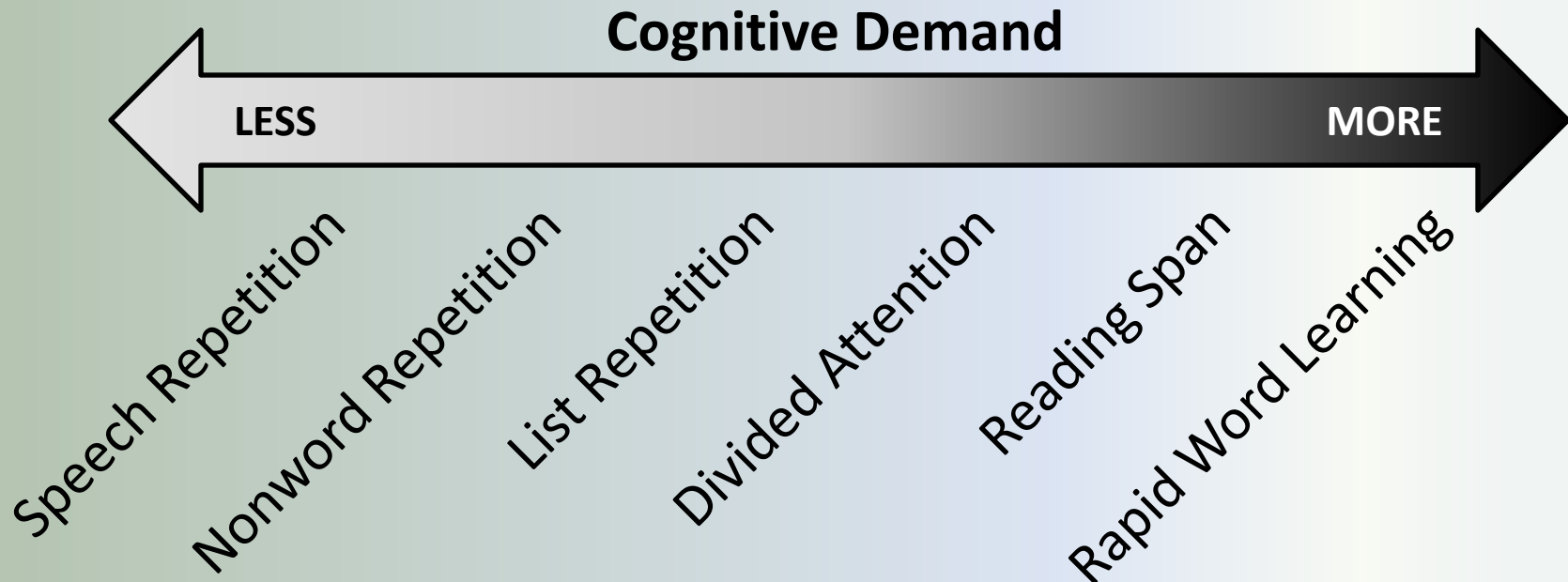


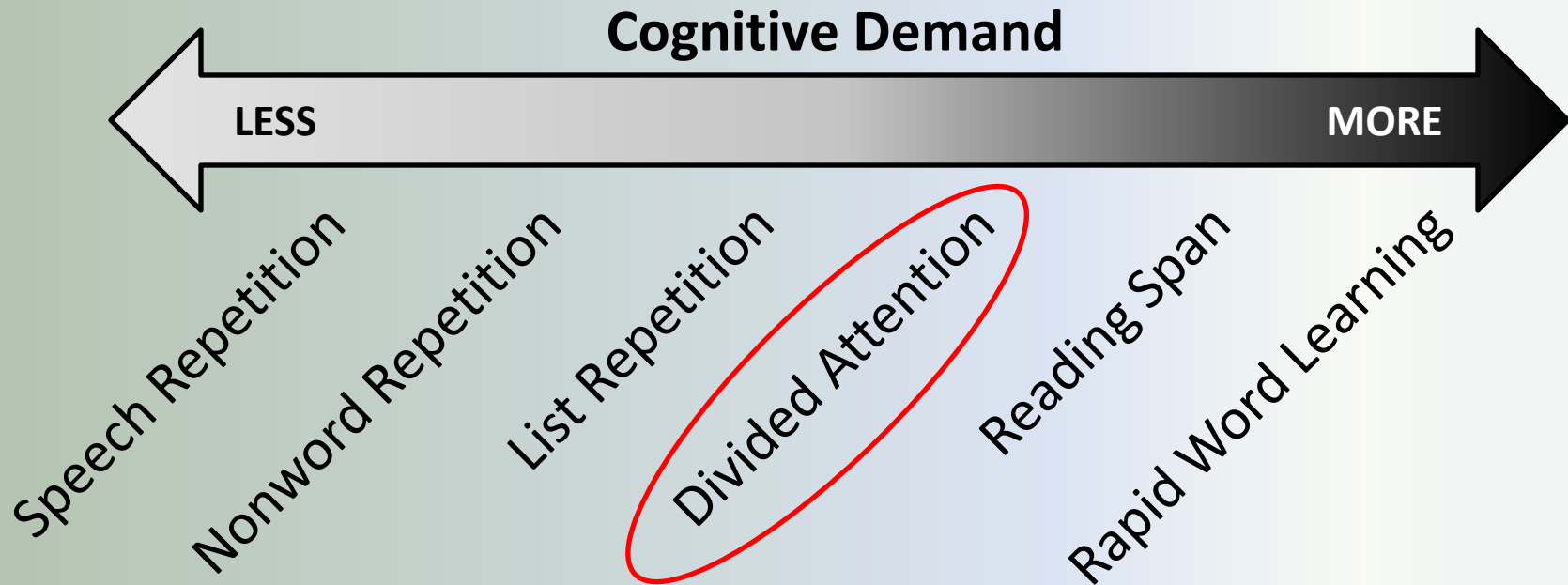
# **Cognitive Resource Allocation in Children with Hearing Loss**

Andrea Pittman  
Kristi Petersen  
Chelsea Choat  
Arizona State University

# Cognitive Resource Allocation



# Cognitive Resource Allocation



# Divided Attention

- Hicks & Tharpe (2002)

Auditory

Word repetition

Percent words correct

Varied signal-to-noise



Visual

Button pushing

Reaction time



# Divided Attention

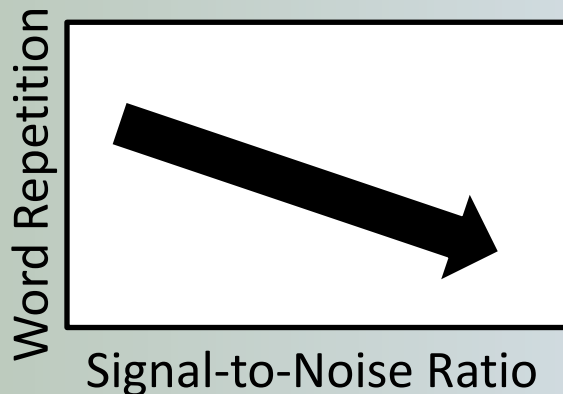
- Hicks & Tharpe (2002)

Auditory

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Percent words correct

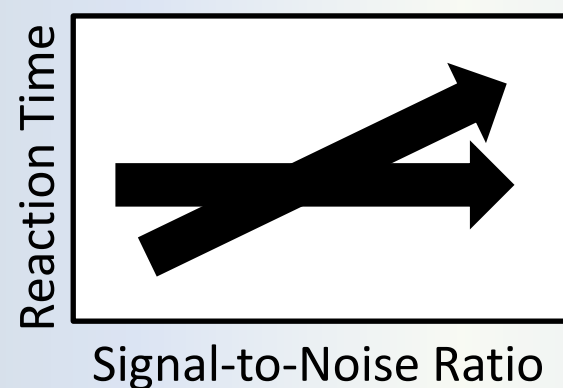
Varied signal-to-noise



Visual

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# Divided Attention

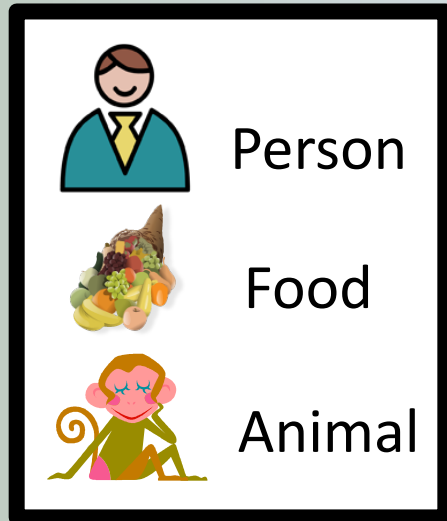
- McFadden & Pittman (2008)

## Auditory

Word categorization

Percent words correct

Signal-to-noise



## Visual

Dot-to-dot games

Dots/minute



# Divided Attention

- McFadden & Pittman (2008)

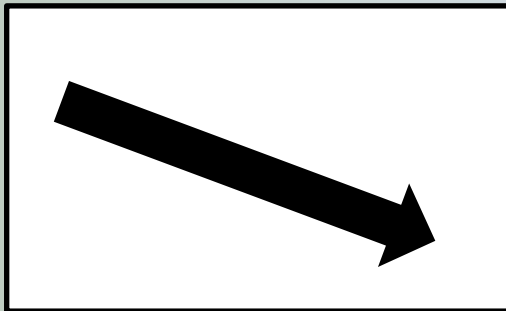
Auditory

Word categorization

Percent words correct

Signal-to-noise

Word Categorization



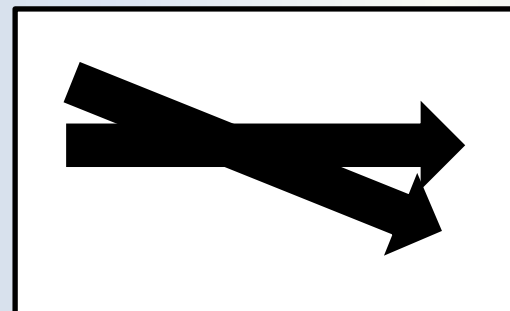
Signal-to-Noise Ratio

Visual

Dot-to-dot games

Dots/minute

Dot Rate



Signal-to-Noise Ratio



# Back to the drawing board...

Rather than asking:

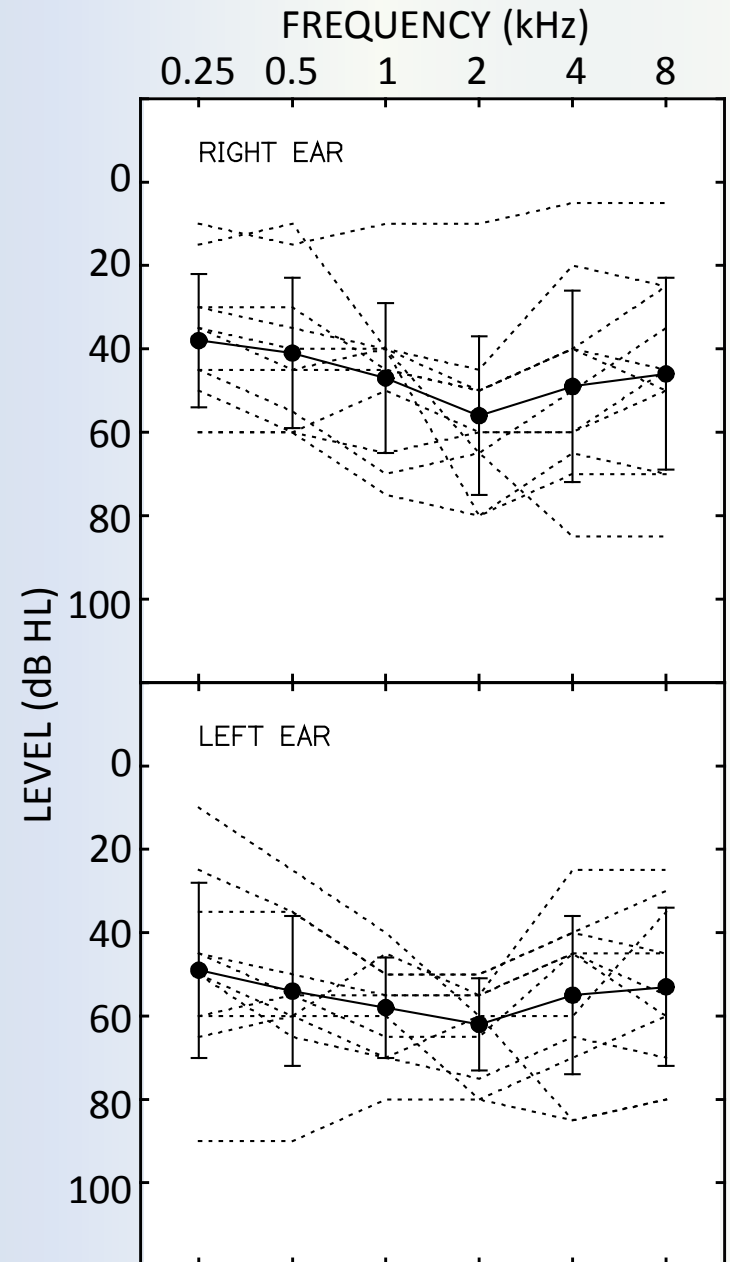
“Does poor speech perception affect performance for other tasks?”

We asked:

“Do other tasks affect speech perception?”

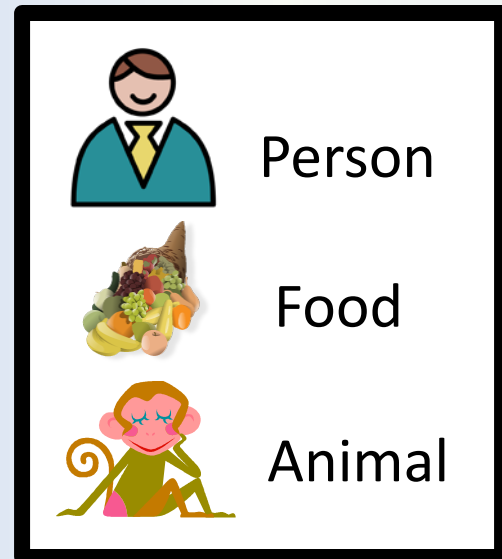
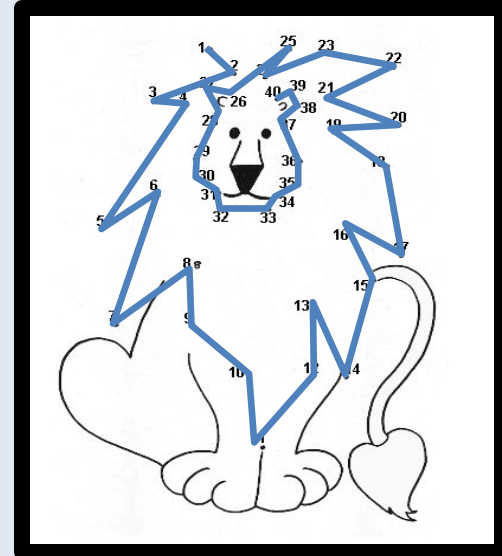
# Method

- Subjects
  - 7-12 years of age
  - 24 normal hearing
  - 11 moderate hearing impairment
- Dual task
  - Visual: dot-to-dot games
    - Dots/minute
  - Auditory: word categorization
    - Percent correct



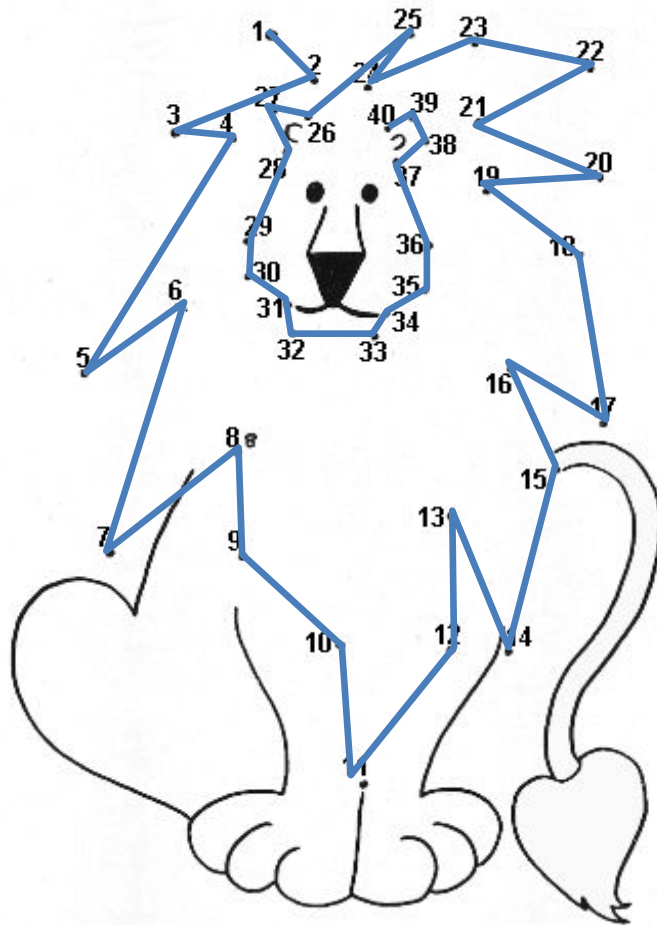
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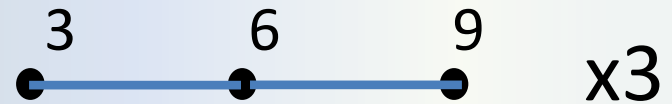
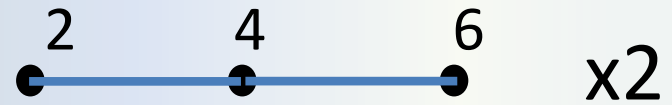
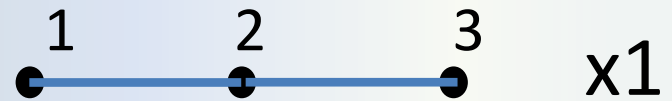


# Method

## Dot-to-Dot Games



- Conditions



# Method

## Word Categorization



Person



Food

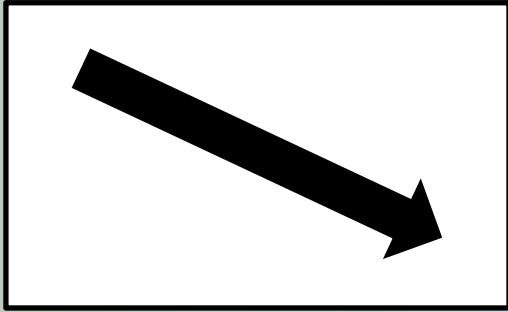


Animal

- Presentation
  - Multitalker babble
    - 6 dB SNR
  - Via earphones
  - Frequency-shaped the stimuli for the children with hearing loss

# Expected Results

Dot Rate



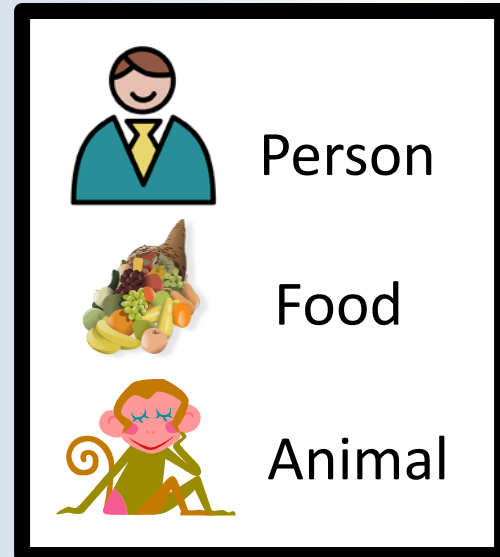
Dot-to-Dot Increment



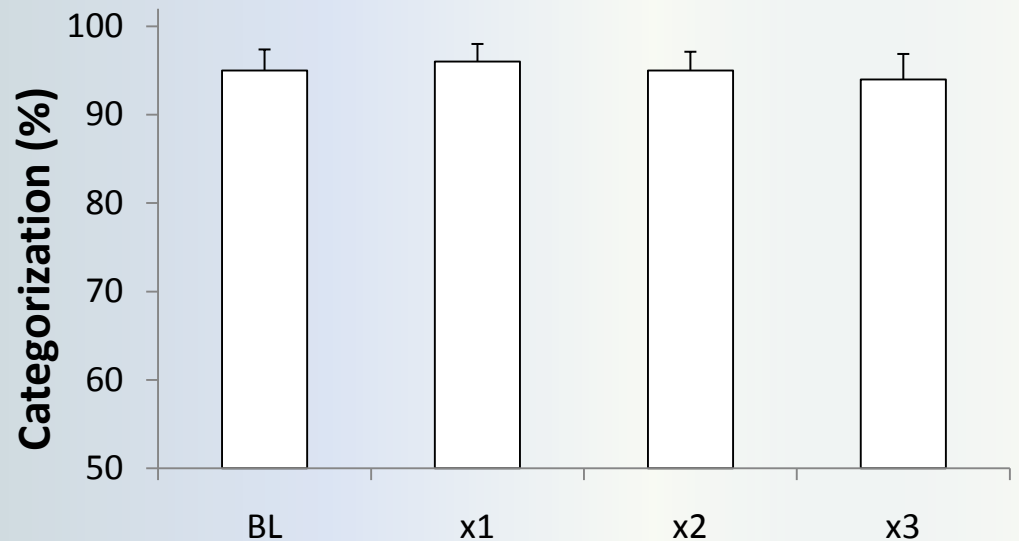
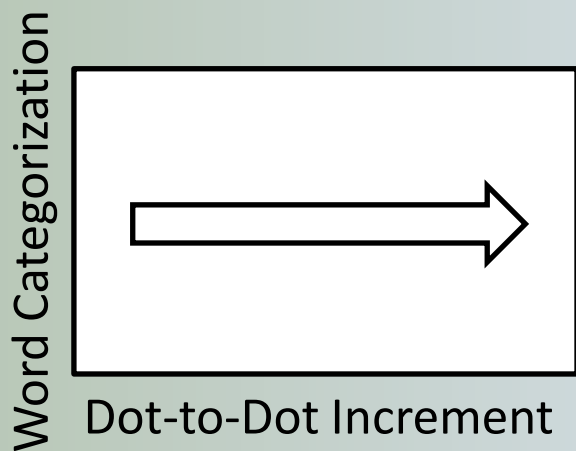
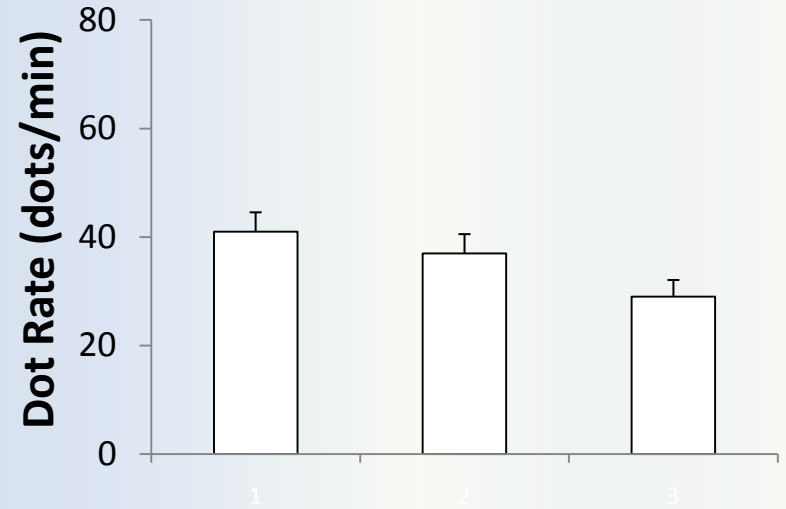
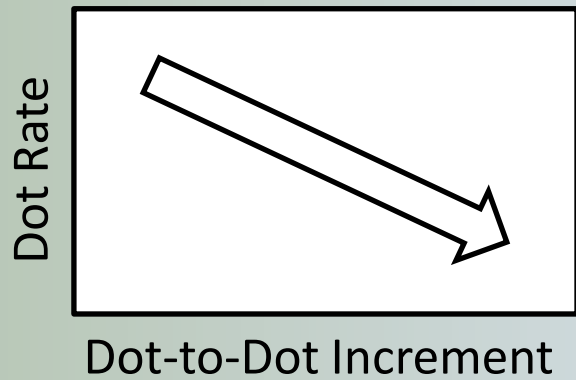
Word Categorization



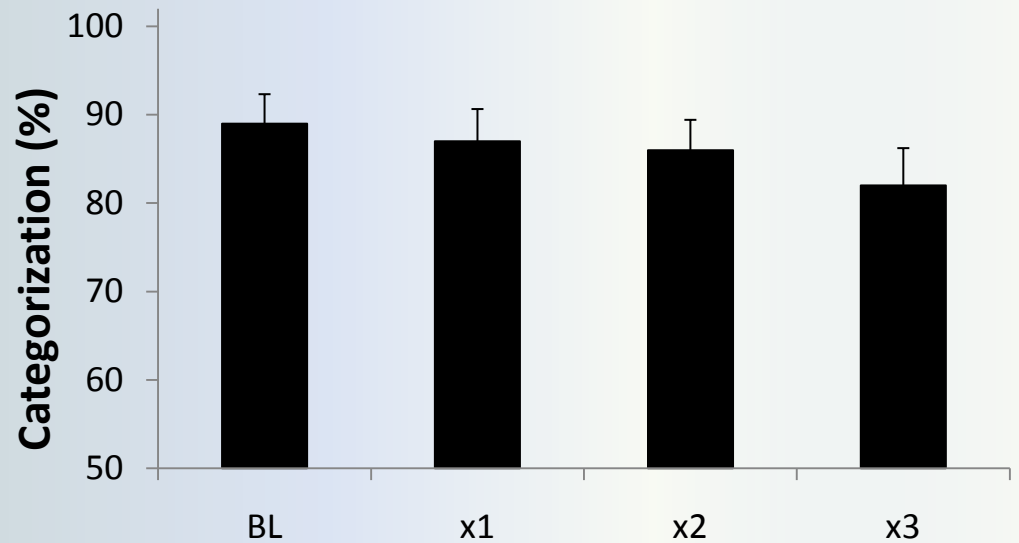
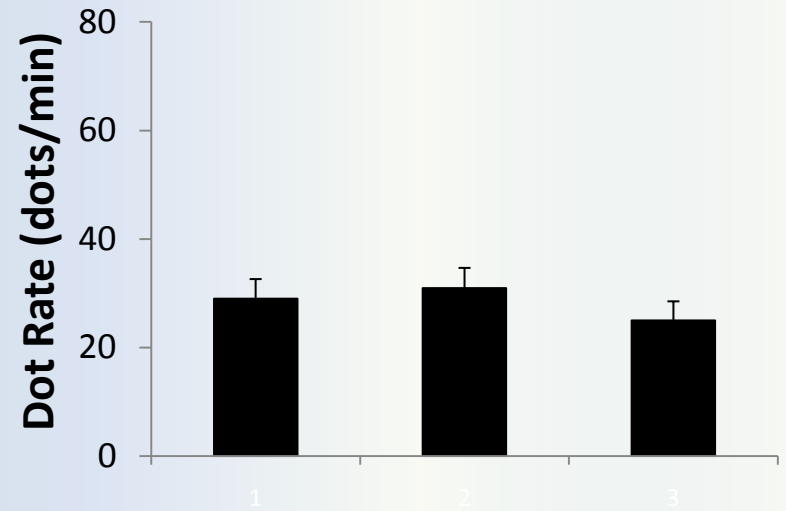
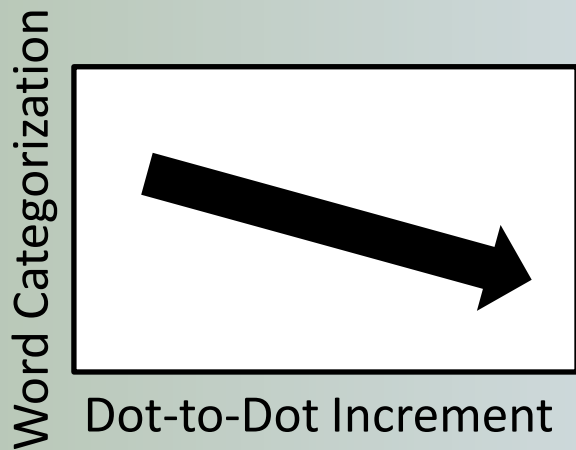
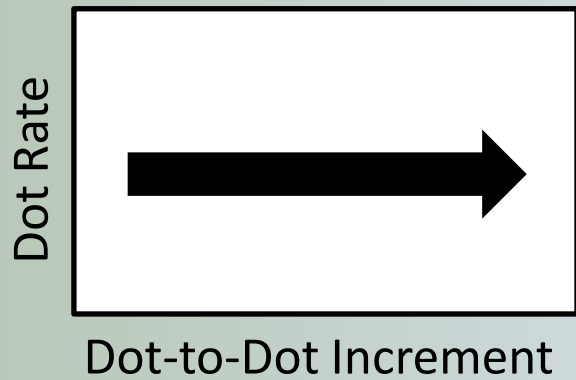
Dot-to-Dot Increment



# Results - NHC

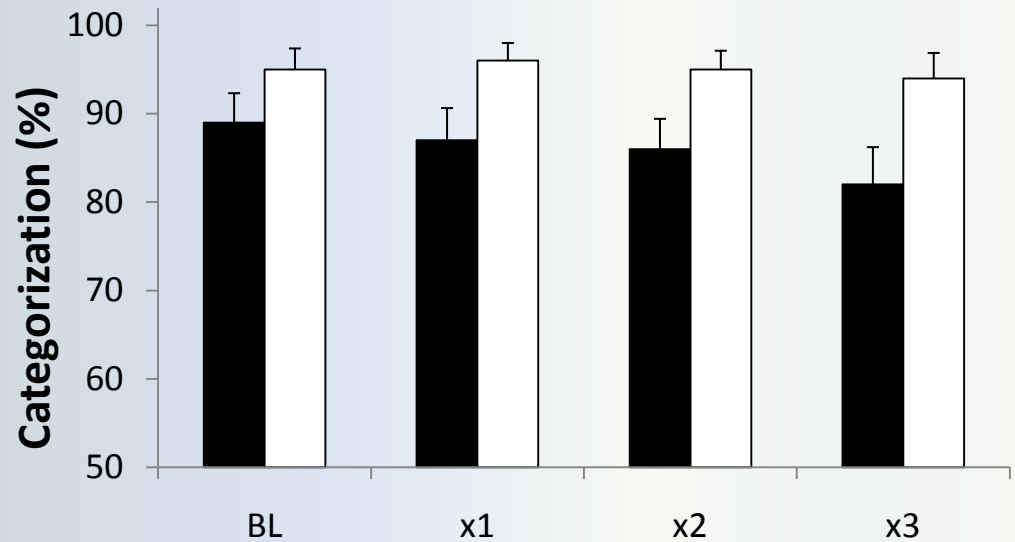
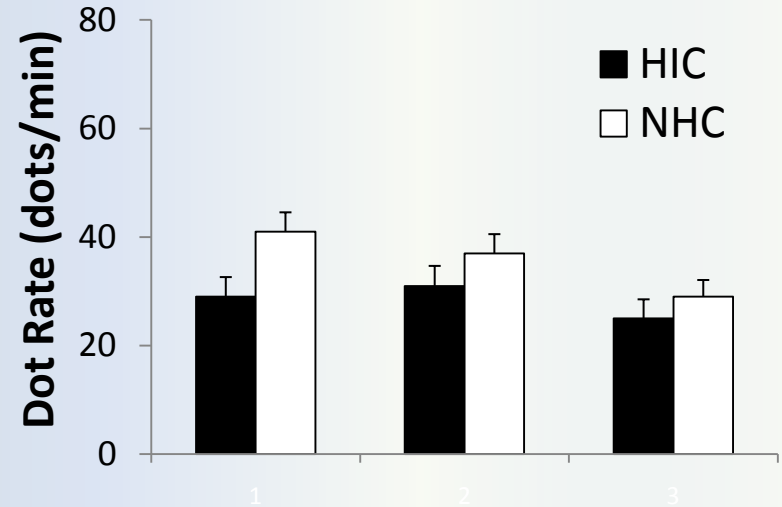
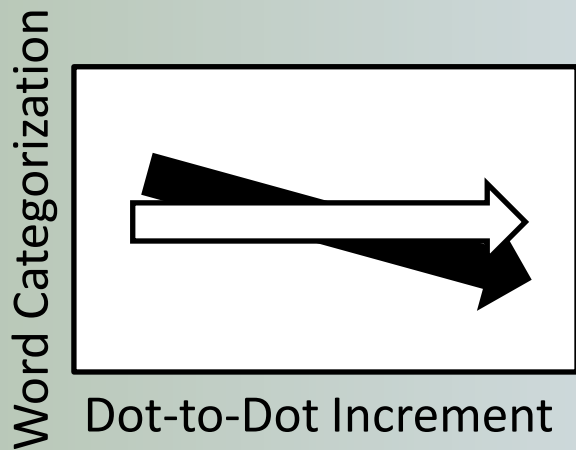
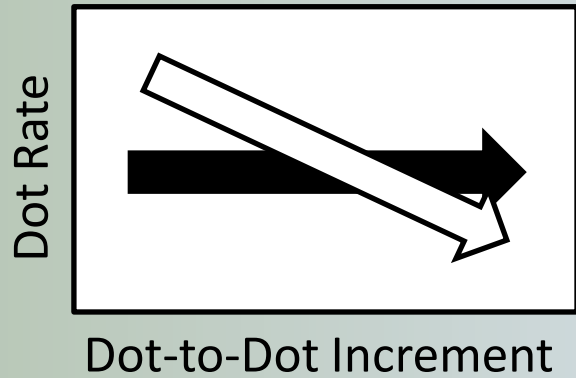


# Results - HIC

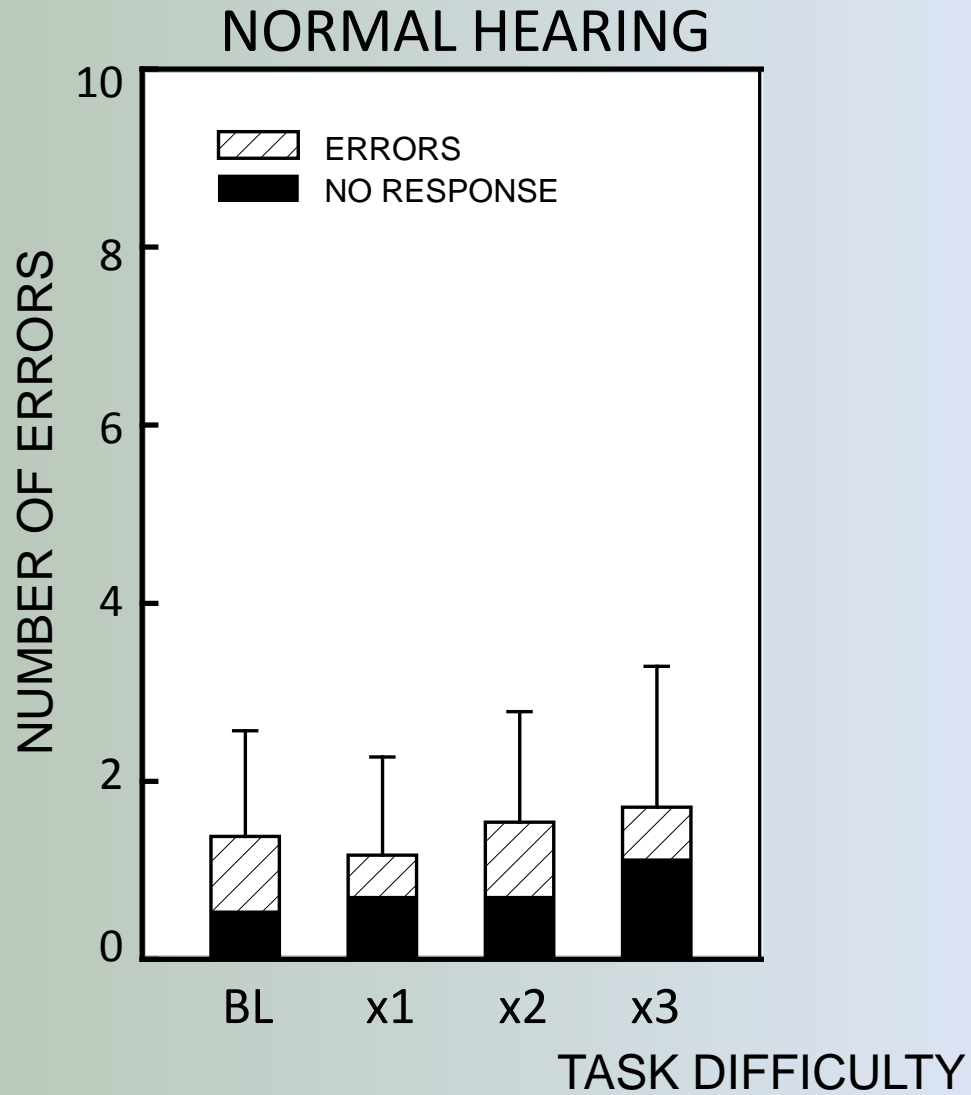




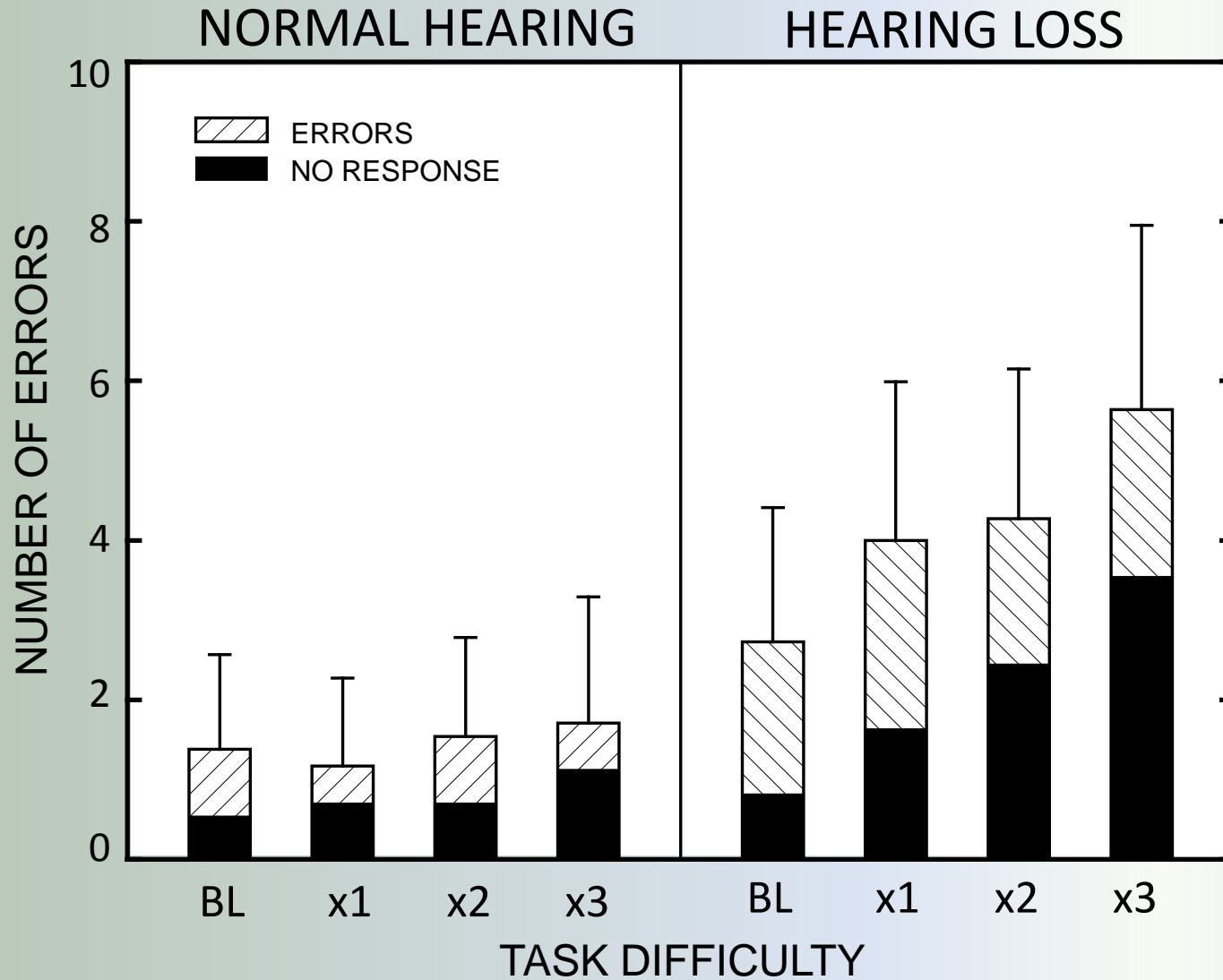
# Results



# Results



# Results





# Conclusions

- Overall, children with hearing loss perform more poorly on cognitively demanding auditory tasks than children with normal hearing.
- Performance for auditory tasks is a composite of perception and attention.
- The cognitive resources of children with hearing loss may not be sufficient to process as much phonological information as children with normal hearing.

