Triggering the Word-Learning Process in Children with Hearing Loss

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Word learning is fragile

- Children with hearing loss have smaller receptive vocabularies
- Vocabulary size is related to the degree of hearing loss
- Children with hearing loss learn words at a slower rate
- Degrading the acoustic signal is more detrimental to children with hearing loss
Word Learning Processes (Storkel & Lee, 2011)

1. Triggering
   The acoustic-phonetic properties of an utterance are evaluated against known words in the lexicon

2. Configuration
   Lexical and semantic information about the new word are stored in long-term memory

3. Engagement
   The new word is integrated with existing words
Under-Triggering

An unknown word is repaired to fit the context of the sentence.

“Did you see that black gat?”
“Did you see that black cat?”
Over-Triggering

A known word is misperceived as an unknown word.

“Did you smell that?”
“Did you smell that?”
Effect on Lexical Development

Under-Triggering
- Failure to form new representations
- Impoverished lexicon

Over-Triggering
- Create erroneous representations
- Cluttered lexicon
Purpose

To examine the effects of hearing loss on children’s triggering for unknown words.
Non-word Detection Task

Stimuli

Three lists of meaningful sentences (n=18)
“Leave that trash out.”

Three lists of nonsense sentences (n=18)
“Strange nails taste dark.”
Non-word Detection Task

Six sentences contained no non-words

Six sentences contained one non-word
“Dump srucks fill holes.”

Six sentences contained two non-words
“Dark cloums bring tain.”
Procedure
Method

Children
29 with normal hearing
19 with hearing loss

Age groups
Younger (7-9 years)
Older (10-12 years)
Listening Conditions

Presented binaurally under earphones

- Quiet (65 dB SPL)*
- Broadband noise (SNR +6 dB)
- Multitalker babble (SNR +6 dB)

Stimuli were frequency-shaped for the children with hearing loss.

DSL fitting procedure
Results

![Bar chart showing proportion correct for meaningful and nonsense sentences in different contexts and groups.](chart.png)

- **Meaningful Sentence Contexts**
  - Older: 0.8
  - Younger: 0.6

- **Nonsense Sentence Contexts**
  - Older: 0.7
  - Younger: 0.5

- **Normal Hearing**
  - Meaningful: 0.9
  - Nonsense: 0.6

- **Hearing Loss**
  - Meaningful: 0.8
  - Nonsense: 0.5
Repair

PROPORTION CORRECT

0.2
0.4
0.6
0.8
1.0

MEANINGFUL
SENTENCE CONTEXT

NONSENSE

Over triggering
Under triggering
Under triggering

Over triggering

Poor perception

PROPORTION CORRECT

0.4

0.6

0.8

1

MEANINGFUL SENTENCE CONTEXT

NONSENSE
Error Analyses – Normal Hearing

- **MEANINGFUL**
  - Repair
  - Guessing

- **NONSENSE**
  - Repair
  - Guessing

**Graph Details**
- **Y-axis**: Proportion Incorrect
- **X-axis**: Direction of Error (UNDER, OVER)
- **Bars**:
  - MEANINGFUL: Repair (UNDER: 0.15, OVER: 0.05)
  - MEANINGFUL: Guessing (UNDER: 0.30)
  - NONSENSE: Repair (UNDER: 0.15, OVER: 0.05)
  - NONSENSE: Guessing (OVER: 0.30)
Error Analyses – Hearing Loss

![Bar chart showing proportions of incorrect responses for meaningful and nonsense words, with directions of error (under and over) compared.](chart.png)
Error Analyses – Hearing Loss

![Graph showing error analyses for meaningful and nonsense content]

- **Meaningful**
  - Under: Normal > Loss
  - Over: Normal < Loss

- **Nonsense**
  - Under: Normal < Loss
  - Over: Normal = Loss
Conclusions

Children with normal hearing
Non-word detection was influenced by the context of the sentence.

Children with hearing loss
Non-word detection was independent of context and suggested strong repair strategies.
Consistent with the need for more exposures to learn new words.
Failing to detect unknown words reduces the opportunities to learn new words.
Future Directions

Determine the strength of repair strategies in children with hearing loss

Examine non-word detection in adults with hearing loss
The end.