EFFECTS OF HEARING LOSS ON LEARNING NEW INFORMATION

PART I

“Isn’t speech perception enough?”

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Arizona State University
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American Speech-Language-Hearing Foundation
Isn’t speech perception enough?
LEARNING NEW INFORMATION

Isn’t speech perception enough?

Isn’t the perception of familiar speech enough?

Is the perception of unfamiliar speech important?
Hearing Handicap Inventory for Adults
Scores for social and emotional

Hearing Handicap Inventory for the Elderly
Scores for emotional and situational

Hearing Handicap Inventory Screening Questionnaire for Adults
Score indicating probability of hearing impairment

#3 Do you have difficulty hearing/understanding co-workers, clients, customers?
WHAT IS UNFAMILIAR?

People (names)
Medical jargon (condition/medications)
Places (addresses)
Terminology/technology
HOW MANY NEW WORDS COULD THERE BE?

Oxford dictionary of American English:
1000+ new entries each year
1. new words
2. new definitions to existing words
How Many Words Are There?

Merriam-Webster Dictionary

Database started in the 1880s
15.7 million words

To be included in the database, the new word must be used in a substantial number of citations that come from a wide range of publications over a considerable period of time.

http://www.merriam-webster.com/help/faq-words-into-dictionary
D’Anna, Zechmeister, & Hall (1991)

The average undergraduate student knows between 15,000 and 200,000 words.

Excluded:
- abbreviations
- affixes
- interjections
- scientific words
- slang
- hyphenated words
- contractions
- foreign words
- technological words

“Slang is the changing vocabulary of conversation; it comes into sudden vogue, has a meaning, usually figurative, which is known by a particular set or class [of people] and which constitutes a sort of shibboleth* during the brief period of its popularity, and then dies in the obscure corners of forgotten words and un-abridged dictionaries, or passes into the legitimate speech.”

*A way of speaking or behaving which shows that a person belongs to a particular group.

WHAT DOES THIS MEAN?

Children have a lot of word-learning to do.

50,000 words
learned over 18 years (3 to 22 years)
= 7 new words everyday

Adults need to update their vocabularies as well.

1,000 word per year
= 3 new words every day
Do adults update their vocabularies?
Is word learning a perishable skill?
Are children better than adults at learning new words?
Is word learning affected by hearing loss?
Older adults outperformed younger adults on standardized vocabulary tests (Verhaeghen, 2003).

Better vocabulary scores with increasing age may be due to a cohort effect that favors the earlier born (Flynn effect).

Stahl and Pittman (in process)
Henriksen’s (1999) lexical knowledge model:
1. Size - how many words are known
2. Depth - how well the words are known
3. Mastery - comprehension and production of the words
### UPDATES TO ADULT VOCABULARY

<table>
<thead>
<tr>
<th>Word Type</th>
<th>#</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longstanding word with established definition</td>
<td>15</td>
<td>Dogleg: Of a course, route, or a person following it: to turn or bend, to make a dogleg</td>
</tr>
<tr>
<td>Longstanding word with new definition</td>
<td>15</td>
<td>Ship: The desire of a fan for two fictional characters to be in a romantic relationship</td>
</tr>
<tr>
<td>New word</td>
<td>15</td>
<td>Senioritis: Affliction of students in their final year of high school or college, characterized by a decline in motivation or performance.</td>
</tr>
<tr>
<td>Nonsense word</td>
<td>5</td>
<td>Pesill</td>
</tr>
</tbody>
</table>
UPDATES TO ADULT VOCABULARY

2. Affirmative
   a) To have an effect on; to make a difference to
   b) Agreeing with a statement or to a request
   c) Making an assertion
   d) To move someone emotionally
   e) I don’t know
1. **Voluntourism**
   a) To freely offer services in support of a cause.
   b) The commercial organization of vacations and visits to places of interest.
   c) To enter into the military service voluntarily.
   d) A form of tourism in which travelers participate in voluntary humanitarian work.
   e) I don’t know.
OVERALL PERFORMANCE

Age Groups  n

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-39 yrs</td>
<td>68</td>
</tr>
<tr>
<td>40-59 yrs</td>
<td>63</td>
</tr>
<tr>
<td>60-74 yrs</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>144</td>
</tr>
</tbody>
</table>

Proportion Correct

Generation

30 50 70

0.46 0.47 0.47

p > 0.05

Stahl and Pittman (in process)
UPDATES TO ADULT VOCABULARY

**NONSENSE**

- 30: 0.88
- 50: 0.87
- 70: 0.83

**ESTABLISHED WORDS**

- 30: 0.37
- 50: 0.42
- 70: 0.46

**NEW WORDS**

- 30: 0.65
- 50: 0.59
- 70: 0.52

Proportion Correct

Stahl and Pittman (in process)

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Conclusions:

1. Vocabulary knowledge is generational
2. Younger adults know fewer (or less about) longstanding words than older adults
3. Older adults know fewer new words compared to younger adults
Implications:

1. To communicate effectively with younger generations, older adults must continue to learn new words.

2. Adults who are at risk for learning new words (e.g., hearing loss) may experience decreasing vocabularies and increasing difficulties with everyday communication.
WHAT ABOUT CHILDREN?
By 10 mos., heard >7 million words

MacArthur Bates Communicative Development Inventories
VOCABULARY GROWTH IN EARLY CHILDHOOD

Children
317 HI Children
117 NH Children

Fig. 2. Average predicted language scores based on mixed model across ages 2 to 6 years for CNH and children who are hard of hearing grouped by severity of unaided hearing loss. CNH, children with normal hearing.

Tomblin et al. (2015) Language Outcomes in Young Children with Mild to Severe Hearing Loss, Ear & Hearing, 36, Sup 1, 76s–91s
VOCABULARY GROWTH IN GRADE-SCHOOL AND ADOLESCENCE

Children
81 HI Children
110 NH Children
WHAT ABOUT HEARING LOSS?
ADULTS VS. CHILDREN WITH HEARING LOSS IN THE U.S.

AGE & DEGREE OF HEARING LOSS

<table>
<thead>
<tr>
<th>AGE (years)</th>
<th>HEARING LOSS (degree)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Profound</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
</tr>
</tbody>
</table>

0 5 10 15 18

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DEGREE OF HEARING LOSS

227 Children (6 years old)

Sensorineural hearing loss

317 children (6 months to 7 years of age)

Better-ear PTA

All types of hearing loss

Tomblin et al. (2015) Outcomes of Children with Hearing Loss: Data Collection and Methods, Ear & Hearing, 36, Sup 1, 14s-23s.
134 children (0 to 6 years)
Better ear PTA
Hearing loss requiring amplification

COMPARISON OF ACOUSTIC CONFIGURATIONS OF LOSS

Compared audiograms of:
- 227 children (6 years old)
- 248 adults (60-61 years old)

Sensorineural hearing loss

CONFIGURATION OF LOSS

CONFIGURATION OF LOSS

Children
317 HI Children
117 NH Children

Fig. 2. Average predicted language scores based on mixed model across ages 2 to 6 years for CNH and children who are hard of hearing grouped by severity of unaided hearing loss. CNH, children with normal hearing.
VOCABULARY DEVELOPMENT IN GRADE-SCHOOLERS AND ADOLESCENTS

Children
81 HI Children
110 NH Children

Delayed lexical development as a function of age

Impaired lexical development as a function of age

Children
40 HA Children
47 CI Children

College students
93 Hearing loss
97 Normal hearing

WHAT HAVE WE LEARNED SO FAR?

Vocabulary knowledge is generational and must be updated to remain current.

Breadth:
- Vocabulary grows rapidly in childhood.
- Hearing loss delays vocabulary growth.
- The extent of the delay is related to the degree of hearing loss.

Depth:
- Vocabulary knowledge is vulnerable to hearing loss.