

# NOVEL FEATURE PROCESSING BY CHILDREN AND ADULTS

Jennifer Leparmentier  
*University of Utah Student  
Conference in Linguistics*  
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## Outline

- Introduction
  - Age and Phonological Processing
  - Perceptual v. Lexical Processing
- Present Study
  - Procedures
  - Results
  - Implications

### Introduction: Age and phonological processing

- Common notion that “younger is better” for learning L2 phonology
- Supported by empirical evidence (Flege, Yeni-Komshian & Liu, 1999; DeKeyser & Larson-Hall, 2005; Baker & Trofimovich, 2005)

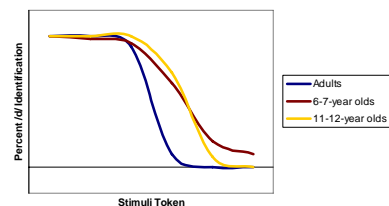
### Introduction: Age and phonological processing

- No clear explanation for “younger is better”
- Few direct comparisons of the **development** of children’s and adults’ **L2** phonological acquisition

### Introduction: Age and phonological processing

- Research comparing children and adults focuses primarily on **native language** phonology
- Some evidence indicates certain aspects of children’s ability to identify L1 phoneme categories differ from adults’
  - Children show greater sensitivity to within-category (sub-phonemic) differences than adults

### Introduction: Age and phonological processing



Native English-speaking children’s and adults’ identification of tokens on acoustic continuum varying from /d/ to /g/ (Hazan and Barrett, 2000)

Introduction:  
Age and phonological processing

- ***Question:*** Does greater sensitivity to L1 within-category differences benefit L2 perception for children?

***Hypothesis 1:*** Children will be more sensitive to a novel L2 contrast than adults

Introduction:  
Perceptual vs. Lexical Processing

- In addition to age, the current study examines the effect of task type on ability to distinguish a novel L2 phonemic contrast

Introduction:  
Perceptual vs. Lexical Processing

- Both children's and adults' sensitivity to phonemic contrasts affected by the involvement of the lexicon in identifying stimuli (retrieval of meaning-based information)
- Greater sensitivity on some tasks when no meaning associated with stimuli
  - In L1: Stager & Werker, 1997
  - In L2: Curtin, Goad & Pater, 1998; Flege & Walley, 1999

Introduction:  
Perceptual vs. Lexical Processing

***Question:*** Does involvement of the lexicon affect both children's and adults' ability to identify a non-native contrast?

***Hypothesis 2:*** Both adults and children will be less sensitive to a non-native contrast in a task involving lexical processing than in a purely perceptual task

## The Present Study

- Tested subjects' sensitivity to the Japanese feature [length] as reflected in ability to distinguish words containing [length] contrasts
  - Contrastive in Japanese, e.g., *otto* "husband" v. *oto* "sound"
  - Not contrastive in English
- English speakers are sensitive to the Japanese length contrast (Hayes-Harb 2005; Hayes-Harb and Masuda to appear)

## Two-Part Experiment

1. **Task 1:** Identification of auditory test words as **same** or **different** than **auditory target (purely perceptual task)**
2. **Task 2:** Identification of auditory test words as **same** or **different** than **target picture** following word learning (**lexical task**)

## Subjects

- 4-5 year old English speaking children (n=4)
- English speaking adults (n=16)
- Japanese speaking adults (n=2)

## Stimuli

- Same auditory stimuli for Tasks 1 and 2
- Three test word conditions:

Target word:	okka
Target-unmatched [length]	oka
Target-unmatched [place]	otta
Target-unmatched [length + place]	ota

Filler word:	ine
Filler-unmatched [manner]	ide
Filler-unmatched [place]	ime
Filler-unmatched [manner + place]	ibe

## Stimuli

Number of targets/ presentations:

- Adults: 6 targets/3 fillers; 27 blocks of 12 test words
- Children: 2 targets/1 filler; 3 blocks of 12 test words

## Hypotheses

**Hypothesis 1:** Children are more likely than adults to show sensitivity to a novel [length] contrast through:

- a. discrimination of minimal pairs differing only by [length]
- b. Less accurate discrimination of a pair differing only by [place] than by [place + length]

## Hypotheses

**Hypothesis 2:** Both groups will show greater sensitivity to [length] in Task 1 (a purely perceptual task) than in Task 2 (a task involving lexical retrieval)

## Task 1: Procedure

- Perceptual discrimination task
- Subjects hear a target word, identify subsequent test words as **same** or **different**
- Response methods:
  - Adults: labeled keyboard
  - Children: cookie in container



## Task 1 Results: Adults

(Table 1 in Handout)

Japanese Subjects more accurate overall than English subjects ( $p < .05$ )

### English Subjects

- Performance on filler stimuli not more accurate than on target stimuli
  - *Problematic filler stimuli*
- Performance on [place] mismatch with target more accurate than on [length] mismatch with target ( $p < .001$ )
  - *Ability to identify familiar [place] contrast more accurate than novel [length] contrast*

## Task 1 Results: Adults

(Table 1 in Handout)

### English Subjects

- Near-chance performance (44%) in correctly identifying [length] mismatch
- Higher proportion “same” responses to target-matched than to [length] mismatched items ( $p < .001$ )
  - *Sensitivity to [length] despite inability to consistently categorize*
- Performance on items containing the [place] contrast was at ceiling

## Task 1 Results: Children

(Table 2)

- Inferential statistical analysis not appropriate
- Performance on filler lower than expected
  - Performance on [place] mismatch with target more accurate than on [length] mismatch with target
    - *Ability to identify familiar [place] contrast more accurate than novel [length] contrast*
- Consistently failed to show sensitivity to [length] contrast

## Task 2 Procedure

- Lexical task
  1. Word Learning Phase: Subjects exposed to picture-auditory word pairings (4 times each for adults; 8 times each for children)
  2. Testing Phase: Subjects see a previously learned target picture, identify subsequent auditory test words as *matching* or *not-matching* the picture
- Response methods
  - Adults: labeled keyboard
  - Children: cookie in container

## Task 2 Procedure

- Sample picture stimuli:



## Task 2 Results: Adults

(Table 3)

Japanese Subjects more accurate overall than English subjects ( $p < .05$ )

### English Subjects

- Performance on filler stimuli not more accurate than on target stimuli
- Performance on [place] mismatch with target more accurate than on [length] mismatch with target ( $p < .001$ ) as in Experiment 1

## Task 2 Results: Adults

(Table 3)

- Near chance performance (46%) in correctly identifying [length] mismatch
- Higher proportion “same” responses to target-matched than to [length] mismatched items ( $p < .005$ )
  - Sensitivity to [length] despite inability to consistently categorize
- Performance on items containing the [place] contrast was at ceiling

## Task 2 Results: Children

(Table 4)

- Inferential statistical analysis not appropriate
- S6 performance suggests a bias for “different” responses or failure to learn the picture-word pairs
- S3 shows greater sensitivity to [length] mismatch in lexical Task 2 (66.7% correct on target-unmatched [length]) than in perceptual Task 1 (0% correct)

## Discussion

**Hypothesis 1a:** Children are more likely than adults to show sensitivity to novel [length] contrast through discrimination of minimal pairs differing only by [length]

### **Results do not provide support for this hypothesis**

- **Small number of children makes comparison non-meaningful**
- **Possible explanations:**
  - 1) **task inappropriate for measuring children's sensitivity to contrast**
  - 2) **children not sensitive to contrast**

## Discussion

**Hypothesis 1b:** Children are more likely than adults to show sensitivity to novel [length] contrast through less ability to distinguish a pair differing only by [place] than by [place + length]

**Absence of error on [place] and [place + length] mismatch conditions does not reveal any distinction between these two conditions**

## Discussion

**Hypothesis 2:** Both groups will show greater sensitivity to [length] in a purely perceptual task than in a task involving lexical retrieval

**Results do not provide support for this hypothesis**

- *Small number of children completing lexical task does not allow for analysis of children's performance*
- *No effect of task (perceptual v. lexical) on adult proportion "same" responses on matched and unmatched items ( $p = .066$ )*
- *However, individual variation in adult scores*

## Implications

- Research has shown children's greater sensitivity to L1 within-category differences compared to adults
- Present study does not provide support for extension of this sensitivity to novel L2 contrasts
- More conclusive results may be found using older child subjects or testing situation that does not favor adults

## Implications

- Past studies support less sensitivity to L2 contrasts on some lexical tasks than perceptual tasks
- Present study does not support consistently greater difficulty on a lexical task
- Individual learner differences as a topic for future investigation