



Predicting Word Learning:

The Role of Lexical and Phonological Characteristics

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Standardized Vocabulary Tests

- Reportedly insensitive to word learning differences
(e.g., Gray, Plante, Vance, & Henrichsen, 1999)
- Examine the *products*, not the *process* of learning
(e.g., Dollaghan & Campbell, 1998)
- Improve if items selected to reflect process?



Phonotactic Probability

- Likelihood of occurrence of a sound sequence
 - Common (e.g., “coat”)
 - Rare (e.g., “watch”)

- Influences word learning
(e.g., Storkel & Rogers, 2000; Storkel, 2001; Storkel, in press)
 - Common > rare



Overview

- Phonotactic probability tutorial
- Examine words on vocabulary tests
- Create common and rare subscales
- Compare subscale performance to word learning performance



Measuring Phonotactic Probability

- **Positional segment frequency**

Σ Log frequency of words with target sound in target position

Σ Log frequency of words with any sound in target position

- **Biphone frequency**

Σ Log frequency of words target biphone in target position

Σ Log frequency of words any biphone in target position

- **Summed across the entire word**



Positional Segment Frequency Example

| | Position | Numerator | Denominator | Frequency |
|---|----------|-----------|-------------|-----------|
| h | 1 | 1132 | 28649 | 0.0395 |
| I | 2 | 2740 | 28631 | 0.0957 |
| s | 3 | 2219 | 28119 | 0.0789 |

Sum of the Positional Segment Frequencies = 0.2141



Biphone Frequency Example

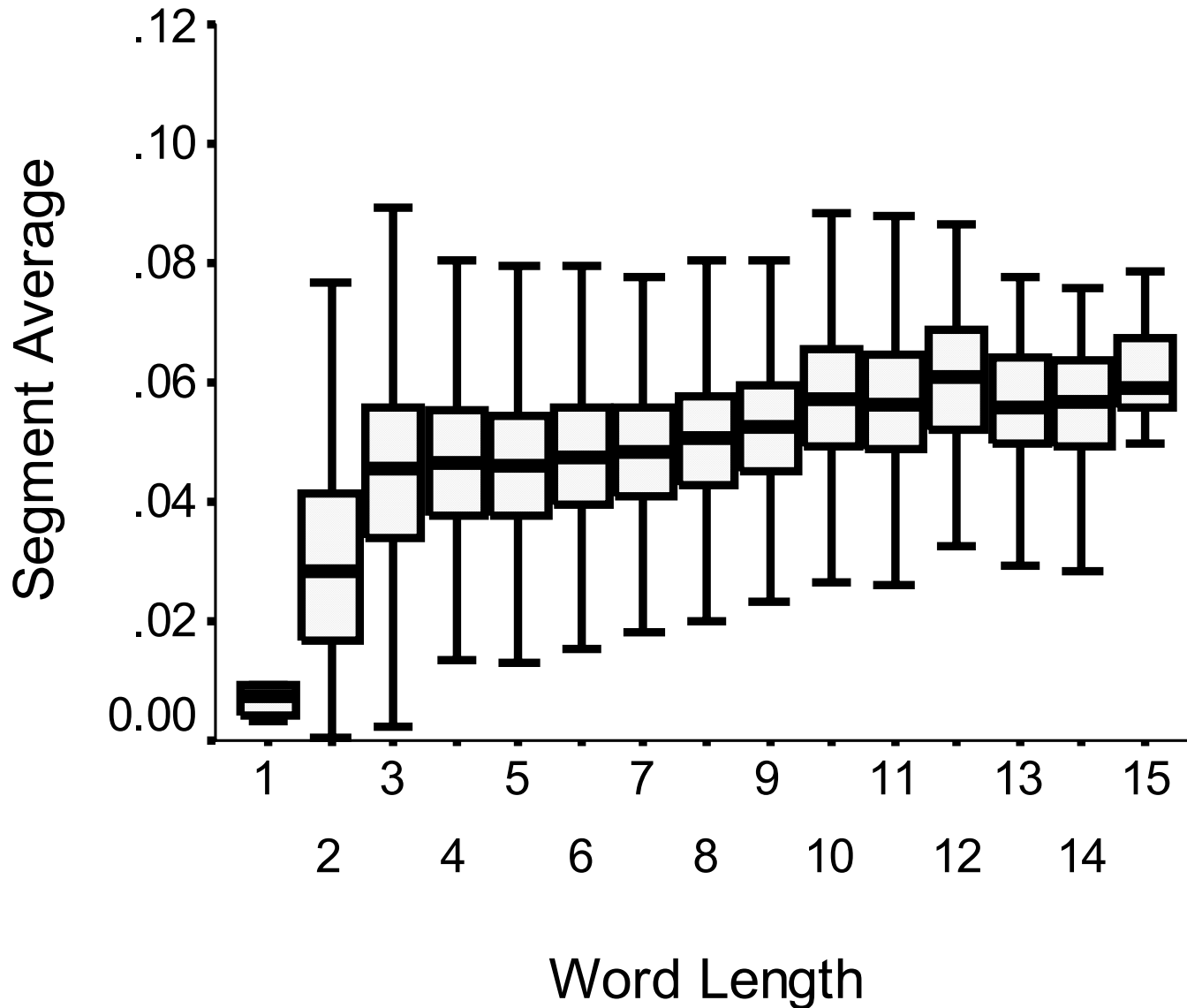
| | Position | Numerator | Denominator | Frequency |
|---|----------|-----------|-------------|-----------|
| hI | 1 | 115 | 28649 | 0.0040 |
| IS | 2 | 477 | 28631 | 0.0167 |
| Sum of the Biphone Frequencies = 0.0207 | | | | |



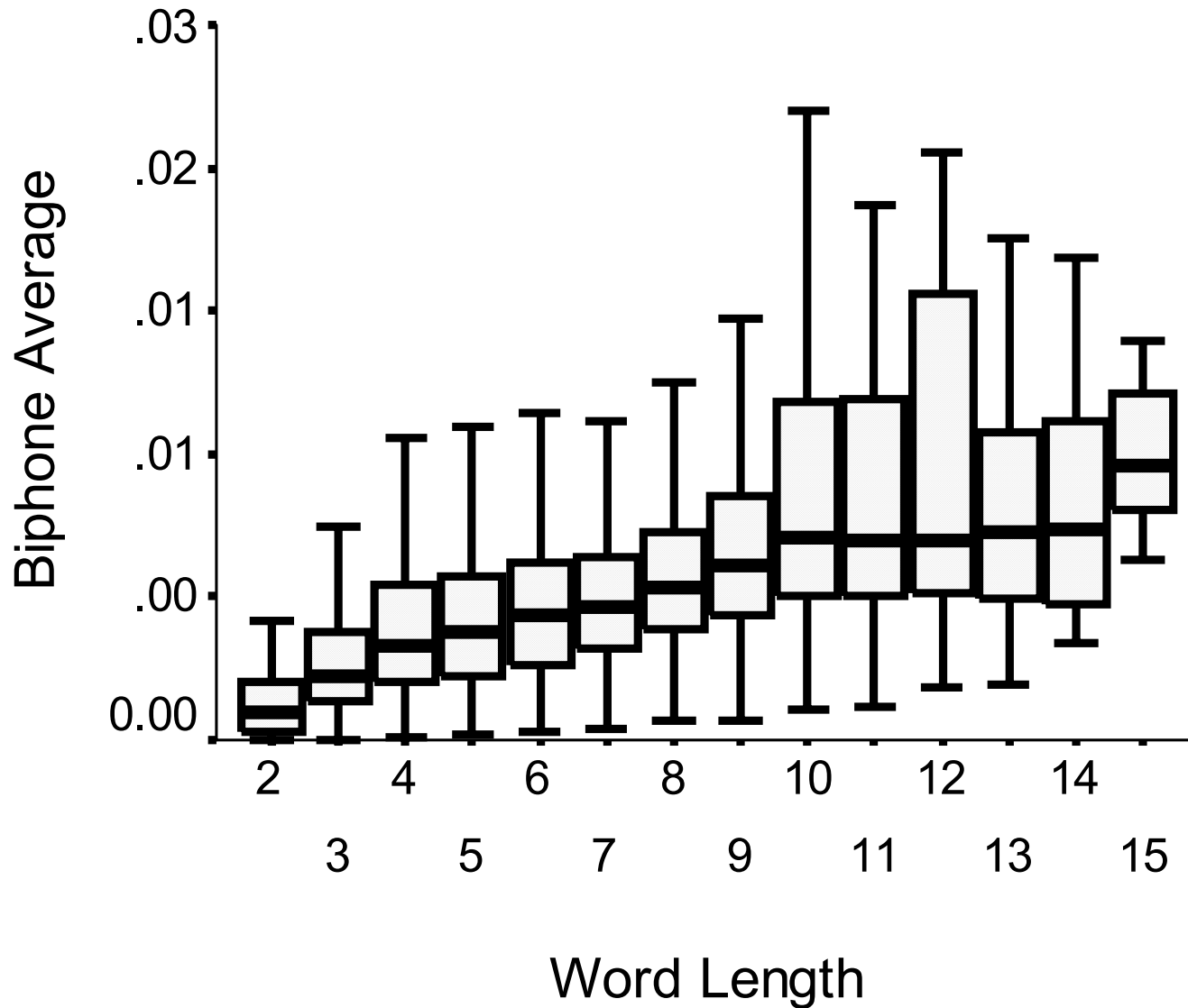
Problem with Calculation

- Sum of frequencies
- Values increase as word length increases
- Unable to compare values for words differing in length

Solution = Average?



Solution = Average?

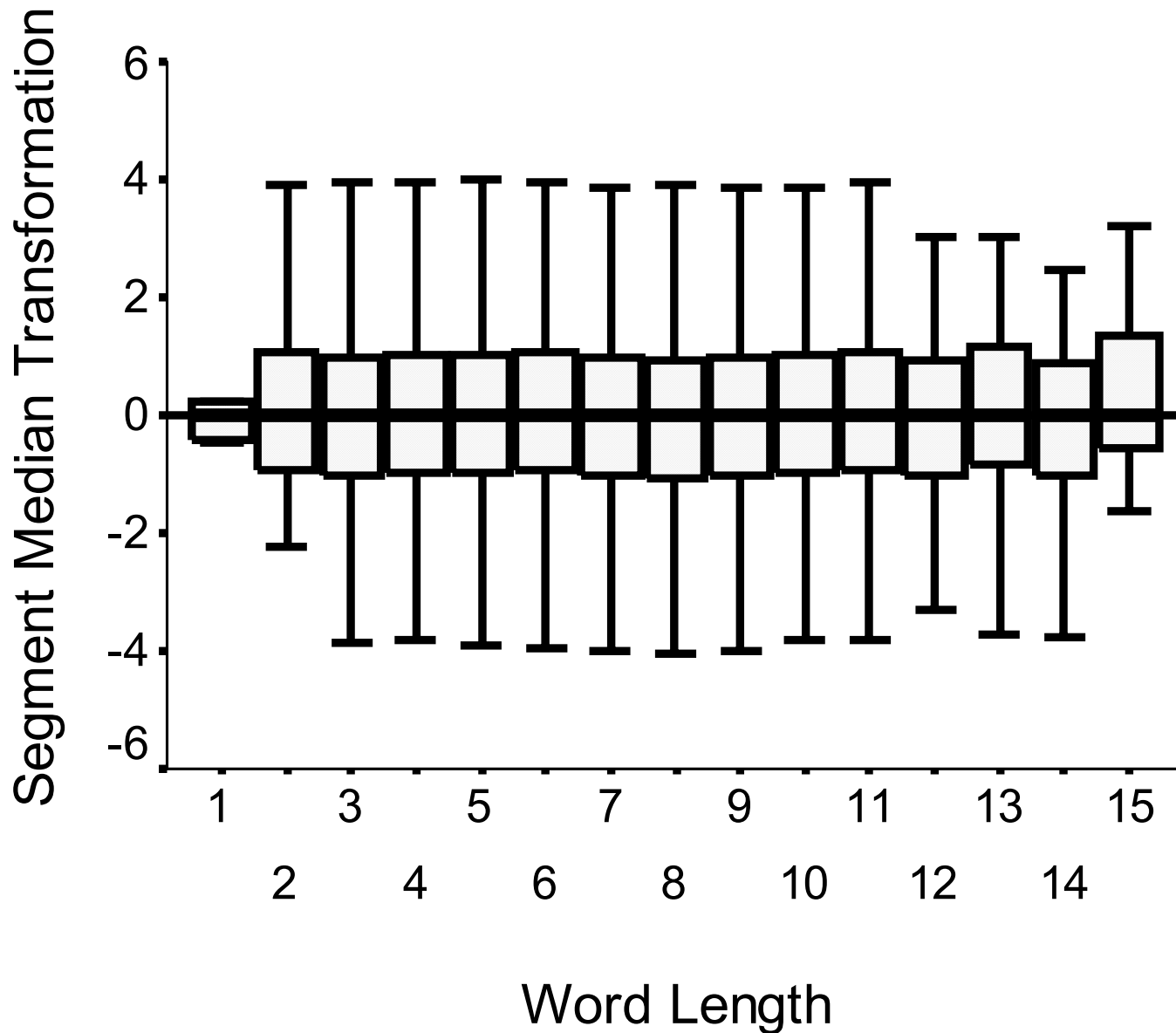




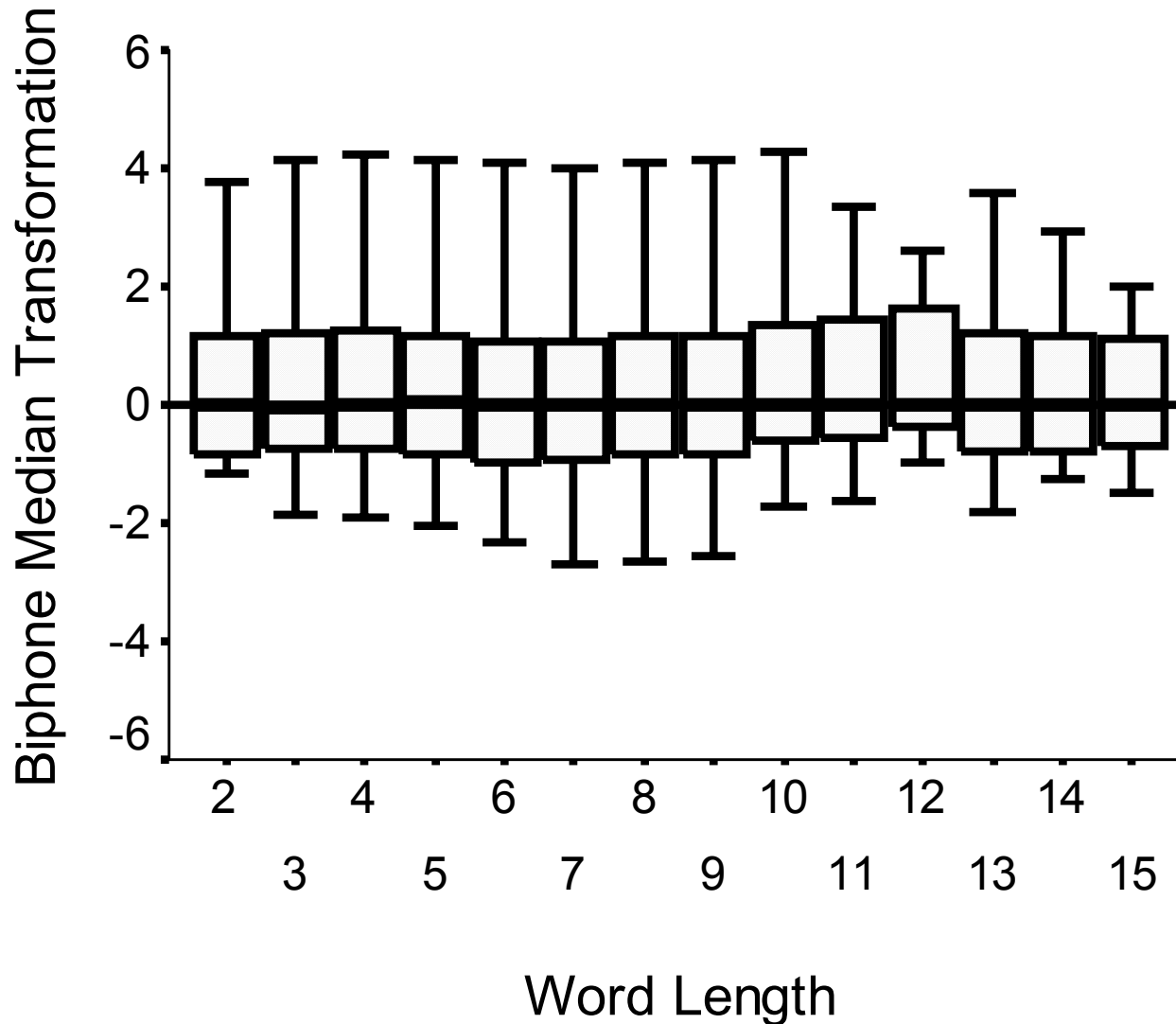
Solution = Average?

- Average increases with word length
- Greater predictability at end of word?
- Denominator decreasing X position
- Derivational morphology

Solution = Transformation



Solution = Transformation





Examine Vocabulary Test

- Peabody Picture Vocabulary Test – 3
- Compute phonotactic probability
- Code as common (+) or rare (-)



PPVT-3A Item Analysis

- Positional segment frequency:
Common (88) < rare (116)
Not correlated with: item number, word frequency
Correlated with: length
- Biphone frequency:
Common (99) = rare (105)
Not correlated with: item number
Correlated with: length, word frequency¹⁵



PPVT-3B Item Analysis

- Positional segment frequency:
Common (93) = rare (111)
Not correlated with: item number,
length, word frequency

- Biphone frequency:
Common (99) = rare (105)
Correlated with: item number, length,
word frequency



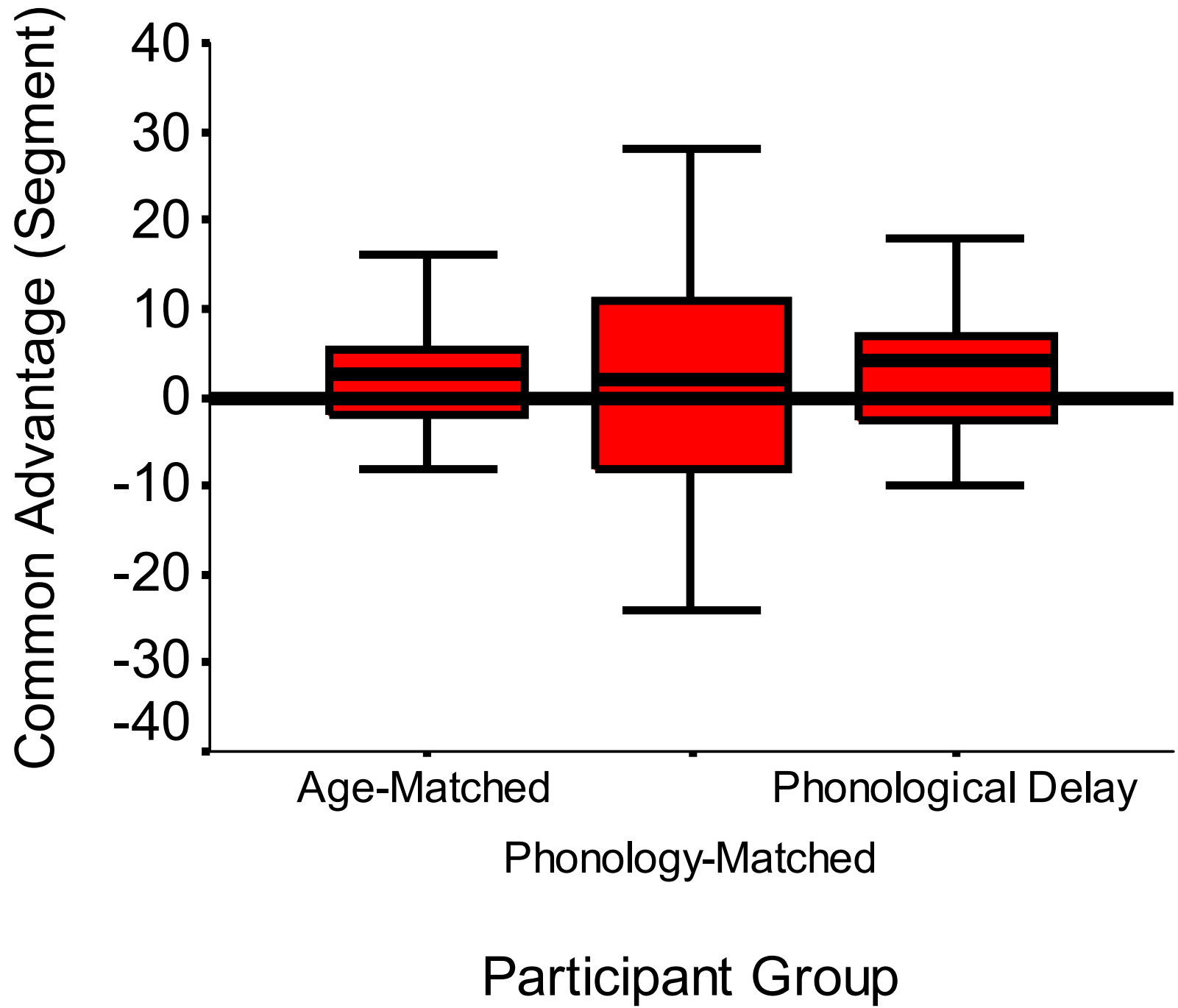
PPVT Subscale Analysis

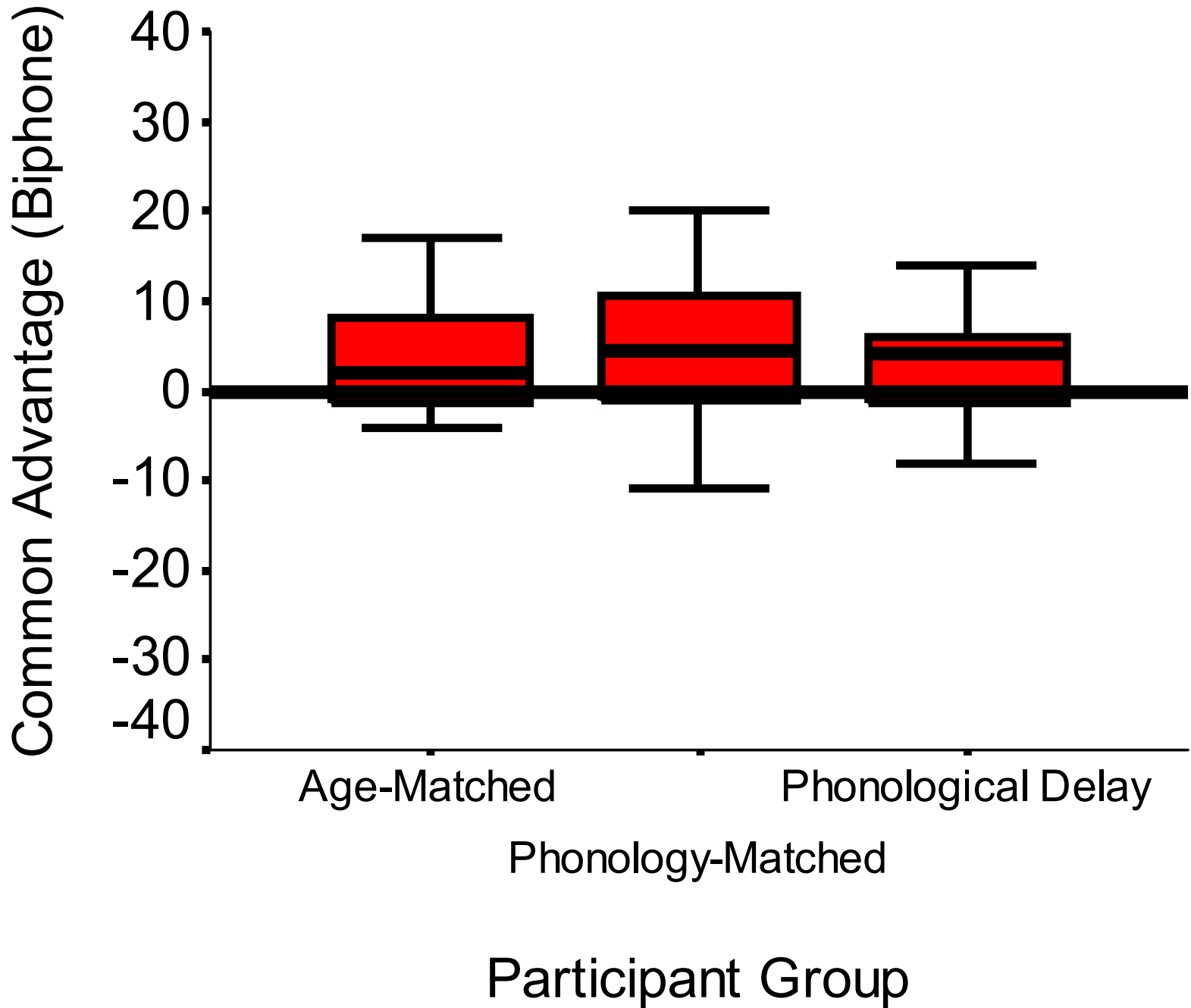
- Data from Storkel (submitted)
 - 68 preschool children, 3 groups
 - Participated in word learning study
 - Phonotactic probability manipulated
- PPVT-3A Subscale Scores
 - % Common correct
 - % Rare correct

PPVT-3A Subscale Results

(Storkel & Perdue, in progress)

- Overall PPVT score:
All children scored within normal limits
- Subscale PPVT scores:
No difference between groups
Common > Rare







Word Learning Results (Storkel, submitted)

- Age-matched children
 - Common \geq rare
- Phonology-matched children
 - Common $>$ rare
- Phonologically delayed children
 - Common $<$ rare



Summary

- Typically developing children:
Test and word learning performance *converge*
- Phonologically delayed children:
Test and word learning performance *diverge*
- Why discrepancy?
 - Long term vs. short term learning
 - Products of learning vs. process of learning

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