# Word Learning in Quiet and in Noise: A Preliminary Study

**Presenter:** Grace M. Wholley  
**Advisor:** Jessica F. Hay  
**Department of Psychology, The University of Tennessee, Knoxville**

**Email:** gewolley@vols.utk.edu  
**Email:** hayj@tennessee.edu

## Introduction

### How do infants find words in continuous speech?

- The majority of speech heard by infants is spoken continuously with few reliable acoustic cues to word boundaries.
- Previous research has demonstrated that infants can track the transitional probability (TP) between syllables (i.e., the likelihood two syllables will co-occur) in continuous artificial (Saffran, Aslin, & Newport, 1996) and natural languages (Pelucchi, Hay & Saffran, 2009) to discover word boundaries.

## Methods

### Purpose:

To develop a sensitive within subjects methodology to test the relationship between statistical learning and subsequent word learning.

### Participants:

- 20- to 24-month-old monolingual English-learning infants (n = 20) were recruited from the greater Knoxville area.

### Materials:

- We used a naturally produced Italian corpus in which the TP between syllables was manipulated in 4 target words: high TP (HTP; TP=1.0) words with component syllables only occurring within those words, and two low TP (LTP; TP=0.3) words with component syllables occurring in other words throughout the corpus.
- A female native Italian speaker produced 2 counterbalanced languages, target novel words (casa, bici, fuga, and melo), familiar words (shoe, book, baby and doggie), and all English carrier phrases (e.g., Look at the)

### Procedures:

- Infants were first familiarized to one of the languages while watching an unrelated silent video (~2mins 15 sec).
- Following familiarization infants were trained to pair 2 HTP and 2 LTP novel Italian words heard in the corpus to novel objects on the screen. Familiar words and objects were presented intermittently as fillers.
- Finally, we used a Looking-While-Learning procedure (Fernald et al., 2008), to test accuracy and eye-gaze patterns to find the labeled object.
- Order of test trials was counterbalanced across participants.

## Results

### Infants were successfully able to learn both the HTP, t(19) = 2.26, p = .038, and LTP words, t(19)=2.89, p = .009. Although accuracy performance appears to be somewhat better in the LTP than HTP condition this difference was not significant.

### In both the HTP and LTP conditions, the infants showed the correct pattern of quick shifting from the distractor to the target word after word onset in distractor onset trials and staying on the target word after word onset in target onset trials. This indicates that the infants were successful in recognizing the object-label pairings.

## General Discussion

- We were successful in developing a within subjects design using the more sensitive Looking-While-Learning procedure.
- Infants were able to learn both HTP and LTP words from a novel natural language. However, our predictions that HTP words would make better object labels than LTP words was not supported.
- Previous work has demonstrated that HTP words make better object labels that LTP word. Why did our infants learn both the HTP and LTP words?
- The infants tested in this study were much older (20-24 months) than those tested in the Hay et al. (2011) study (17 months). Children at this age could be at a developmental level that makes them better word learners. They may be adept at understanding several cues other than just statistical probability.
- Additionally, we provided referential support that was not used in the previous study. Referential support may have overridden the supportive effects of statistical regularities in early word learning. To address this issue, we would need to test infants using an unrelated corpus (i.e. one without statistical probability cues).
- While the HTP words had a higher TP than the LTP, the LTP syllables appeared 3 times more often in the corpus than the syllables of HTP words. Thus, syllable familiarity may have been driving learning in this study.

To address the role of syllable frequency in word learning we have developed test words in which the TPs of the target words are violated, but the syllable frequency is maintained (e.g., pair the first syllable of one LTP word with the last syllable of another HTP word – caci and bisia instead of casa and bici). This experiment would help elucidate the relative roles of syllable frequency and transitional probability during early word learning.

## What next?

After running the appropriate control conditions, we will present background during the familiarization phase to test the resilience of statistical learning. This will help us understand statistical learning and subsequent word learning in a more natural setting.

## References


## Acknowledgements

We would like to extend a warm thank you to all participating families and the members of the Infant Language and Perceptual Learning Lab at the University of Tennessee, Knoxville.

This work was supported by a grant to JFH (1R01HD83312) from NICHD.

**Poster presented at the Exhibition of Undergraduate Research and Creative Achievement (Eureka) at the University of Tennessee in Knoxville, Tennessee.**