RESEARCH ON SPOKEN LANGUAGE PROCESSING
Progress Report No. 29 (2008)
Indiana University

The Relation Between Early Word Stress Discrimination and Later Lexical Development¹

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¹ This work was supported by a National Institute for Deafness and Other Communication Disorders (NIDCD) Research Grant (R01 DC006235) to Derek Houston and a Holcomb Undergraduate Grant for scientific research to Danielle Elder. Thanks are also due to the Infant Language Lab.
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Abstract: A key component of early intervention for children with delayed language acquisition is early assessment. Previous research has shown that English-learning infants’ sensitivity to lexical stress plays a role in their segmentation of words from fluent speech – a critical step to developing a lexicon. This study investigated the possibility that performance on a word stress discrimination task predicts later lexical development for normal-hearing infants. A version of the visual habituation procedure (VHP) was used to test infants’ ability to discriminate two-syllable words with trochaic versus iambic stress patterns (trochaic being most common in English). Infants were first habituated to recorded lists of words with either trochaic or iambic stress patterns and then presented with words of the habituated stress pattern and words of the novel stress pattern. Infants’ attention towards the novel stress pattern was measured by looking duration in seconds and compared to their looking durations during the presentation of the habituated stress pattern. Longer looking times to the novel stress pattern suggests discrimination of the stress patterns. To assess lexical development, the MacArthur Bates Communicative Development Inventory (CDI) was administered at twelve months of age. Overall, infants showed a high degree of variability on both the discrimination task and the CDI measures. As a group, infants habituated to words following trochaic and iambic stress patterns but did not demonstrate the ability to discriminate between the novel and familiar stress patterns. There was no significant relationship between the ability to discriminate and the CDI measures. These results suggest that there is not a relationship between early word stress discrimination and later lexical development. Future work will aim to determine the degree of influence word stress discrimination has on later language acquisition. More specifically, future work will compare word stress discrimination ability in infant directed speech to later language development.

Introduction

There is growing consensus among language development experts that early assessment and intervention is key to reducing the long-term impact of language acquisition challenges. For example, Yoshinaga-Itano et al. (1998) found that when identification of hearing loss occurred before six months of age, hearing-impaired children developed better language skills than when assessment occurred after six months. These findings suggest that, at least for hearing loss, “early intervention” means intervention during prior to six months of age. For infants who are diagnosed with severe-to-profound hearing loss, early intervention may involve cochlear implantation and intensive speech and language therapy. It also involves close evaluation of the effectiveness of the intervention strategy for developing age-appropriate speech perception and language skills. However, while there are reliable methodologies for assessing hearing loss in infants, there are no established methodologies for assessing infants’ speech perception and language skills directly. Currently, clinicians must rely on parental reports for assessment, which are limited by the evaluation skills of the parents. Thus, developing methodologies for direct assessment of speech perception and language during infancy is crucial for equipping clinicians with tools for tailoring early intervention strategies to the specific needs of each child.

Recent research has identified some early speech perception skills that appear to be important for later language development. Tsao, Lie, & Kuhl (2004) examined the relation between phonetic discrimination at six months of age and later vocabulary. Using a conditioned head-turn paradigm, Tsao et al. measured English infants’ ability to discriminate two computer-synthesized Finnish vowels, /u/ and
/y/ similar to the English vowels /u/ and /i/, and then assessed their vocabulary at 13, 16, and 24 months of age. They found that infants who required fewer trials to reach a criterion for phonetic discrimination had larger vocabularies at the later ages. In a follow-up study, Kuhl et al (2005) investigated the relation between 7-month-olds’ discrimination of nonnative (Chinese) contrasts and later vocabulary growth. Previous research has shown that 6- to 10-month-olds begin to show more sensitivity to phonetic contrasts of their native language and less sensitivity to nonnative contrasts. They found that infants who showed a more mature pattern of discrimination – i.e., discriminated native but not nonnative contrasts – had greater vocabulary growth than infants who discriminated both types of contrasts. These findings suggest that milestones of speech perception development during infancy may predict later language outcomes and may be useful for identifying infants who are at risk for language disorders.

There are several potential speech perception skills acquired during infancy that may be useful for predicting later language difficulties. Newman and her colleagues recently compared several speech perception measures assessed during infancy to later language outcomes (Newman et al., 2006). They found that speech segmentation was a particularly important predictor; infants who demonstrated the ability to recognize familiarized words in fluent speech developed better language skills than infants who did not. These findings are consistent with mounting evidence that infants’ ability to segment words from fluent speech is an important milestone in early language development. Thus, speech perception skills that are linked to speech segmentation may serve as important indicators of later language skills.

Speech Segmentation by Infants

Spoken language does not have consistent markers, such as pauses, that inform the listener of individual word boundaries. Therefore, the infant must somehow segment the continuous speech stream in order to comprehend individual words and develop a lexicon. Recently, researchers have attempted to identify the cues used by infants to segment the continuous speech stream including rhythmic, phonotactic, allophonic, and distributional cues (Houston & Jusczyk, 2000; Morgan & Saffran, 1995; Newman et al., 2006). Past research indicates that English-learning infants use rhythmic cues, especially word-level stress, to segment fluent speech. For example, Jusczyk, Cutler, & Redanz (1993) found that infants show a preference to trochaic (stressed-unstressed), bisyllabic words when contrasted with iambic (unstressed-stressed) bisyllabic words. In a follow up study by Jusczyk, Houston, and Newsome (1999) infants demonstrate a marked sensitivity to trochaic, bisyllabic words when segmenting fluent speech.

This sensitivity to lexical stress and preference for trochaic stress plays a role in infants’ segmentation of words from fluent speech – a critical step to developing a lexicon. During participation in a heard-turn preference paradigm, 7.5-month-old infants were able to segment trochaic bisyllabic words from fluent speech following a short familiarization period. Errors were, however, made on iambic words because infants attended to the stressed second syllable. By 10-months-old, infants were correctly segmenting trochaic and iambic words from fluent speech (Jusczyk, Houston, & Newsome, 1999) suggesting that during development infants recognize lexical stress as an indicator of word onset. However, word stress is not the only useful cue to speech segmentation and research suggests that no one cue appears to carry more or less weight with regard to usefulness (Morgan & Saffran, 1995; Thiessen & Saffran, 2003; Turk, Jusczyk, & Gerken, 1995).

In a study by Turk, Jusczyk, & Gerken (1995), infants’ use of syllable weight (tense vs. lax vowels) was compared to their use of word stress in speech segmentation. 9-month-old infants showed a preference for trochaic words over iambic words when syllable weight was not a factor. When syllable weight was included, infants continued to prefer trochaic words over iambic words. Infants also demonstrated a preference for stressed syllables with a tense vowel, but not with a lax vowel. The study suggests that syllable weight and word stress function independently, but infants do recognize trochaic words and heavy syllables as indicators of word onset. Another study explored speech segmentation
while controlling for word stress and statistical cues (Thiessen & Saffran, 2003). At 6.5 months of age, infants attended equally to both trochaic and iambic words. However, by 9 months of age, infants segmented words at the stressed syllable whether it was the onset of a word (trochaic) or of the second syllable (iambic). Statistical familiarity and word stress proved useful to infants at different ages. These studies suggest that no one cue is more or less useful, but infants attend to a variety of cues at different points of language acquisition.

In summary, some researchers have shown that early abilities, such as phonetic discrimination, are predictive of later language development. Others have emphasized the usefulness of word stress in infant speech segmentation, and it has been determined that although various cues are useful at different points in language development no one cue stands out as more or less useful. However, in American English, word stress is a fairly reliable cue because of its frequent occurrence. Research has not explored the relation between word stress as a cue to speech segmentation and later language development.

This study was designed to explore two specific questions. First, do nine-month-old infants possess the perceptual ability to discriminate between two-syllable, American English (AE) words varying in stress? Second, is there a significant relationship between the ability to discriminate stress patterns of two-syllable words at nine months and later language production?

The purpose of this study was to provide new information about language development by focusing on the use of word stress as a cue used by infants to segment speech during the first year of life. Specifically, this study explored the relationship between infants’ ability to discriminate between AE words with trochaic versus iambic stress and lexical growth. This study predicted that infants who were successful in discriminating different stress patterns, an ability related to word segmentation, would be more likely to develop a larger vocabulary more quickly when compared with their peers who did not demonstrate this discriminatory ability.

Methodology

Participants

Participants included 24 normal-hearing typically developing infants, aged 8 to 10 months (M=8.96) at the study onset; 13 were male (M=8.97) and 11 were female (M=8.91). Data collected from six of the participants are not reported, two participants completed a hearing test that revealed fluid in the ear and a mild hearing loss, and four infants did not complete the speech perception task for affective reasons. Thus, data from eighteen participants is reported for the speech perception task.

An adjusted birth date for any child born three or more weeks early or three weeks late was used to encourage developmental similarity among participants. For example, a child who was three weeks old is considered developmentally similar to a child who is three weeks late at birth. This adjusted birth date describes the child at his or her developmental age rather than chronological age.

In addition participants were determined to be normally developing with no physical, cognitive, or developmental delays expressed by the family pediatrician. All participants were found to have normal hearing as evidenced by a newborn hearing screening given at birth and a questionnaire given before testing. Infants with four or more ear infections since birth completed a hearing test performed by an audiologist at the time of study to confirm normal hearing ability and rule out a temporary conductive hearing loss.
Design

This study was completed in two parts. The first part was a speech perception task completed by the infant participants at nine months of age. The speech perception task tested infants’ ability to discriminate between two different word stress patterns. The second part was a language development survey, the MacArthur-Bates Communicative Development Inventory (CDI) (Fenson et al., 1994) completed by the primary caregiver when the infant was twelve months of age. The CDI assessed infant participants’ language acquisition according to the following categories: phrases understood, words understood or words understood and produced, early gesturing, and later gesturing.

Speech Perception Task

Stimuli

The stimuli for the speech perception task consisted of 552 words recorded in a professional studio by a linguistics student with previous experience recording similar stimuli. The talker was in her mid 20s at the time of recording. She was a native speaker of American English with no obvious regional accent. There were two types of stimuli: words with trochaic stress and words with iambic stress. The trochaic stimuli consisted of two-syllable words following a stressed-unstressed pattern. The iambic stimuli consisted of two-syllable words following an unstressed-stressed pattern. Each word within the trochaic condition had a counterbalanced word within the iambic condition. Words counterbalanced each other by having identical vowel sounds in the stressed syllable. For example, the word peanut in the trochaic condition was balanced with the word appease in the iambic condition. Frequency of word use was controlled by these methods; a sample of one-fourth of the stimuli was analyzed for frequency of use in infant-directed speech by using the CHILDES (child language data exchange system) database online at http://childes.psy.cmu.edu. The CHILDES database provides the frequencies of words spoken to children by their parents. The frequency of the trochaic words was compared to the frequency of the iambic words using an unpaired t-test to determine that the relative frequency of occurrence was similar (Seshadri & Houston, 2004).

In the speech perception task, infants were habituated to words with trochaic or iambic stress, and then tested on discrimination between words with trochaic and iambic stress. Stimuli used in the habituation phase included 18 lists of 12 words with the trochaic stress pattern and 18 lists of 12 words with the iambic stress pattern. Stimuli used in the discrimination test phase included 14 lists of 12 words. Of these 14 word lists, 10 lists followed the habituated stress pattern (tokens with the same stress pattern from the pattern presented during the habituation phase). Each word list was 22 seconds in length allowing 1.83 seconds per word. The stimuli order within the lists was randomized using www.random.org, and each word was presented only once in the habituation phase. There were nine participants randomly assigned to each habituation condition, words with trochaic stress (participants SW1 through SW9) or words with iambic stress (participants WS1 through WS9). During the discrimination test, the words in the habituated stress pattern condition alternated between habituated words and novel words. The remaining four lists followed the novel stress pattern (words with a different stress pattern from the pattern presented during habituation) and alternated with words following the habituated stress pattern. Again, similar to the habituation phase, no word was presented twice within the discrimination phase.

Procedure

During the speech perception task, the infant participant and caregiver sat in a sound booth. The caregiver was asked to hold her child on her lap the entire time and asked to remain neutral during testing by not speaking, pointing, or moving themselves or their child around. The caregiver wore earplugs and headphones with music to reduce opportunities for biasing the infant’s responses.
The walls of the sound booth were covered with a curtain façade, designed to ensure that the infant participant would not be distracted by the details of the larger room. Centered below a television screen was an audio speaker used to present acoustic stimuli. Slightly above the television was a small hole fitted with a camera, and the camera was hooded with a black cloth to minimize its appearance and reduce distraction. The infant was recorded with the video camera, which transferred the image to a computer in the control room where the primary experimenter was seated. The image was stored on the computer via Hack TV software, and the participants’ looking time in seconds was recorded by software for Macintosh called Habit. The looking times were recorded as a result of the experimenter pressing the designated computer key when the participant looked in the direction of the acoustic stimuli, but the experimenter was blind to the stimuli of the study.

During the test, a smiling baby appeared on the screen between trials as the attention getter. The caregiver was instructed to use this time to situate herself and her child. This was also intended to help the child orient to the television if he or she became distracted during the study. During this time, the caregiver could point or say, “Look at the baby.”

The habituation phase began with the spacey, a spinning figure played with noise, to attract the infant’s attention. Once the child became bored with the spacey, the habituation trials began (a trial is one word list). During the acoustic stimuli, a blue and white checkerboard pattern appeared on the television screen. Attention towards the stimulus was measured in seconds of eye gaze towards the television. Habituation occurred when the child looked for one half the time as he or she did over the three longest trials. A trial ended during the experiment when the experimenter indicated that the child looked away from the television screen for more than one second.

Once habituated a participant moved on to the discrimination phase. Looking time was also measured in seconds during the discrimination phase. The length of time spent looking was recorded in seconds for each trial. The discrimination phase presented fourteen word lists to the participant, and a trial ended when a participant looked away for more than one second. The order of the word lists was randomized, and no two novel stress pattern lists were presented consecutively.

Language Development Survey

Following the speech perception task, caregivers were contacted again when infants reached 12 months of age and asked to complete the CDI. The CDI may be used to assess Early Words and Actions and Gestures. Early words include Phrases Understood, which reflect an infants’ understanding of daily phrases and routines such as get up. Early words also included Words Understood and Words Produced, such as mommy, doggie, milk. The Actions and Gesture category assessed infants’ early communicative and representational skills not dependent on verbal expression. These included early gestures, such as shaking head yes or no, and later gestures, such as pretending to drink from a toy cup or putting a baby doll to bed. Studies have shown the CDI to have reliability and validity (Fenson et al., 1994). To date, data has been collected for 13 participants who have completed the speech perception task and the survey.

Results

Habituation to words with trochaic or iambic stress

In order to determine whether infants became habituated to the stress patterns they were exposed to, habituation was measured over at least four trials. Each participant attended to at least 4 trials but up to as many as 18. As predicted all participants showed habituation (Figure 1) as demonstrated by reduced looking time across the habituation phase. The mean number of trials needed to become habituated to the stimuli was calculated for both groups. Participants in the trochaic condition needed on average 7.5 trials to become habituated, whereas participants in the iambic condition needed on average 8.8 trials to
become habituated. The difference between groups, however, was not significant, which will be explained below.

In order to compare across groups and determine whether or not the habituation condition affected the rate of habituation, the average looking time over the first four trials was measured in seconds (Figure 2). It was predicted that infants presented with words of trochaic stress would habituate more quickly than infants presented with words of iambic stress, because of the higher frequency of words with trochaic stress in AE. Participants in the trochaic condition looked on average over the first four habituation trials for 7.61 seconds, and participants in the iambic condition looked on average over the first four habituation trials for 10.67 seconds. However, the results of an independent t-test revealed the difference between groups to be non-significant.
A one-way analysis of variance (ANOVA) was completed to determine if the habituation condition (habituation to words with trochaic or iambic stress) was related to the number of trials needed to become habituated to the stimuli, or the average looking time in seconds over the first four trials. Results of the ANOVA showed that there was no significant main effect of group on the number of trials needed to habituate, $F(1,16)= .498, p = .491$, or the average looking time in seconds over the first four habituation trials, $F(1,16)=1.644, p = .218$. Overall, the results showed that there were no significant differences between groups during habituation, and there were also no significant interactions between condition and habituation.

**Discrimination between novel stress patterns and habituated stress patterns**

In order to measure the infants’ ability to discriminate between words with trochaic and iambic stress, the average looking time in seconds for words with the novel stress pattern and words with the habituated stress pattern was calculated. It was predicted that infants who discriminated between the different stress patterns would look longer to words with the novel stress pattern than the habituated stress pattern.

During the discrimination phase, infants habituated to words following the trochaic stress pattern were presented with novel words following the habituated trochaic stress pattern and words following the novel iambic stress pattern. They looked for 4.39 seconds on average to stimuli of the novel stress pattern compared to 3.57 seconds on average to stimuli of the habituated stress pattern (Figure 3). Six of nine participants who were habituated to the trochaic stress pattern looked longer to words with the novel, iambic stress pattern compared to the habituated, trochaic stress pattern. However, the difference in looking time between the habituated conditions was not significant, indicating that discrimination did not occur.

**Figure 3.** Average looking time in seconds for participants habituated to words with trochaic stress, for test stimuli with novel iambic stress (WS) and stimuli with habituated trochaic stress (SW).
Participants habituated to words with the iambic stress pattern were presented with words of the habituated iambic pattern, and words of the novel trochaic pattern. Unexpectedly, the group looked for 5.03 seconds on average to the novel, trochaic stimuli compared to 5.21 seconds on average to the trials containing the habituated, iambic stimuli (Figure 4). Only three of nine participants who were habituated to the iambic stress pattern looked longer to stimuli of the novel, trochaic stress pattern during the discrimination phase compared to the habituated iambic stress pattern. Again the difference in looking times between the conditions was not significant, which showed that infants did not discriminate between the different stress patterns.

![Figure 4](image)

**Figure 4.** Average looking time in seconds for participants habituated to words with iambic stress for stimuli with novel trochaic stress (SW) and stimuli with habituated iambic stress (WS).

Differences between the average looking time for stimuli with novel stress and stimuli with habituated stress over all eighteen participants showed that half of the participants looked longer at the novel stimuli and half looked longer at the habituated stimuli. Two-thirds of the participants who looked longer towards words of the novel stress pattern compared to the habituated stress pattern were habituated to words with the trochaic stress (Figure 5).
It was predicted that participants who discriminated would look longer towards stimuli following the novel stress pattern compared to stimuli following the habituated stress pattern. A paired t-test was performed using the average looking time in seconds to the stimuli with novel stress and the average looking time in seconds to the stimuli with habituated stress in order to determine discrimination. The paired t-test included all eighteen participants regardless of habituated condition. Results showed that as a group, infant participants did not look significantly longer to words with the novel stress pattern ($M=4.67$, $SD=2.06$), compared to the habituated stress pattern ($M=4.39$, $SD=1.99$), $t(17)=.631$, $p>.05$. A within groups paired t-test also showed no significant difference in looking times between the stimuli with novel stress and stimuli with habituated stress. It was concluded that infants did not discriminate between trochaic and iambic words.

**MacArthur-Bates Communicative Development Inventory Data**

These participants, ages 11.81 months to 13.06 months ($M=12.24$) at the time the CDI data were collected, included seven males and seven females. Four infants who completed the speech perception task had not yet reached one year of age, and therefore their caregivers have not been given the CDI.

Parent reports on the CDI indicate that infant participants demonstrated a wide range of ability. Infants’ raw scores for phrases understood ranged from 6 to 27 out of a possible total of 28 phrases. The range for words understood was from 16 to 388 out of a possible total of 396 words. Within the category of words produced there was a possible total of 396 words, and the infants’ raw scores ranged from 1 to 52 words. Early gestures included 18 possibilities, and infants’ scores were from 8 to 14. Later gestures included 45 possibilities, and infants’ scores were from 2 to 25. The range for total gestures was 14 to 39 out of a possible total of 63.
Data from the present study were compared to normative data for twelve-month-olds from a study by Fenson, Thal, & Bates (1990). Comparisons are shown in Table 1 below. While the means were similar between studies the variance was very different between the two samples. For example, the category “phrases understood” has means of 16.63 in the present study and 15.8 in Fenson et al., but the standard deviations were 7.54 and 5.5 respectively. In the categories words understood, early gestures, and later gestures, both the means and the standard deviation were very different between the two samples. It seems that the data/participants tested in this study varied more than the data/participants tested in Fenson et al., perhaps for reasons such as a much smaller sample in the present study (n=13).

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Table 1. Individual percentile ranks for infant participants based on the CDI parent report.

Table 2 below shows the sample’s mean raw score for each category assessed by the CDI. It demonstrates the wide range of inter-participant variability, means, and standard deviation for each measure assessed by the CDI.
Table 2. Raw scores for infants in the present study and the normative data by Fenson et al. (1990).

Correlations between discrimination phase measures and CDI percentile ranks

It was originally predicted that there would be a significant correlation between infant participants’ looking time difference in terms of effect size and the percentile ranks on the CDI. In order to compare the individuals’ looking time differences between novel and habituated stimuli with other infants’, the looking time differences were transformed to a measure of effect size, which accounted for variance and made all of the measures positive. Effect size is a measure of the strength of the relationship between attention to the novel stimuli and habituated stimuli. More specifically, it is an indicator of the amount of influence the novel stress pattern had on the looking time difference during the discrimination phase.

In order to calculate effect size, a resampling program designed by David Howell was downloaded from http://www.uvm.edu/~dhowell/StatPages/Resampling/Resampling.html. The resampling program randomized the obtained data from the sample 10,000 times and drew potential samples. The means from these 10,000 randomized sets of data were used to produce a histogram of the potential sampling distribution that could be drawn from the population. The t-test statistics were calculated for each participant’s sampling distribution and provided the t score, p-value, and effect size for each participant. These statistics were similar to those of the sample. The effect size is shown in Figure 6.
Figure 6. The looking time difference in seconds in terms of effect size for participants who completed the speech perception task and language survey.

Results showed no significant correlations between effect size and the following CDI measures: phrases understood (r = -.352), words understood (r = -.185), words produced (r = -.275), early gestures (r = -.287), later gestures (r = -.353), and total gestures (r = -.335). There was not a significant correlation between this early ability to discriminate and later lexical development, which is likely a result of infants’ inability to discriminate between words of trochaic and iambic stress.

Discussion

This study examined whether nine-month-old infants’ ability to discriminate between two-syllable AE words following trochaic and iambic stress patterns is predictive of later lexical acquisition. The study predicted that infants who demonstrated the ability to discriminate would develop a larger vocabulary more quickly than their peers who did not demonstrate this discrimination ability. The motivation for the prediction came from previous research that supported the relationship between early linguistic abilities and later language development. Specifically, a study by Juszcyk, Cutler, & Redanz (1993) showed that nine-month-old infants showed a preference for words following a trochaic stress pattern. The results of the present study, however, did not support the hypothesis that infants who discriminated between words of trochaic stress and words of iambic stress would develop a larger vocabulary more quickly than their peers who did not discriminate.

While participants in both groups habituated to trochaic or iambic lexical stress, there were no group differences in terms of the rate of habituation. Both groups habituated after a similar number of trials and with similar looking times in seconds. These measures demonstrated a range of variability within both conditions, but the differences between conditions were not significant.
Unexpectedly, the infants in both groups did not discriminate between the novel stimuli and the habituated stimuli, and the correlations between the discrimination ability and the CDI measures were also non-significant. Bivariate correlations were, however, completed to determine if there was a relationship between infant participants’ looking times to iambic and trochaic word stress patterns and their language acquisition as measured by the CDI. Measures included the difference between the average looking time to words with novel stress and the average looking time to words with the habituated stress pattern, and the CDI percentile ranks.

**Post-hoc analyses for discrimination ability and CDI measures**

The inability to discriminate between word stress patterns seen in the present study was inconsistent with Jusczyk et al.’s study (1993) that suggested nine-month-old infants prefer the trochaic stress pattern. In order for infants to prefer one stress pattern they would first need to demonstrate the ability to discriminate between two stress patterns. Boredom may have presented as a possible confound. It was eliminated as a confounding variable by analyzing the first two relevant trials only, but still no significant difference was obtained. Infants did not discriminate between the novel stress pattern (M= 5.49, SD= 5.41) and the habituated stress pattern (M= 5.61, SD= 5.03), t(17)= -0.074, p= .942.

**Conclusions**

Three main conclusions were drawn from this research study. First, nine-month-old infants became habituated to AE words following trochaic and iambic stress patterns relatively quickly and without between group differences. However, when presented with words of a novel stress pattern following habituation, infants could discriminate between words of the trochaic and iambic stress patterns. Finally, early word stress discrimination was not predictive of later lexical development for the entire group. These unexpected results may have been due to boredom, a small sample, or stimuli presentation methods. Future work will aim to determine whether a larger sample will yield different results and whether replicating the study by Jusczyk et al., (1993), which demonstrated preference for the trochaic stress in nine-month-olds, will show a relationship between early word stress discrimination and later lexical development.

**Future Directives**

The sample for this study was small and increasing the sample has the potential to change the results, and make them more reflective of the population and more similar to the normative data with regard to the CDI. Providing a larger sample in a study reduces variability effects on results. Also, as infant participants get older, more CDI measures will be collected providing longitudinal data and allowing the opportunity for developmental patterns to emerge.

This study did not cover a large time span. The age of infant participants at the study onset was nine-months-old, and the first CDI measures were taken at 12-months-old. CDI measures are currently being collected from caregivers when infant participants reach 15 months of age. More distinct developmental patterns may emerge in the CDI measures following this additional data collection.

The results derived from the infants who looked longer in seconds to words of novel stress were inconsistent with the prior results that included all infant participants, which suggested that there was no relationship. Modifying the methodology and re-running the experiment may yield different results. For instance, replicating Jusczyk, Cutler, & Redanz (1993) experiment that showed nine-month-old infants’ preference for trochaic patterned words, completing CDI measures, and running correlations could lead to a different outcome. Replicating the study by Jusczyk et al. (1993) would involve presenting infants with words of both trochaic and iambic stress patterns during habituation and then novel words of both stress patterns during the test phase to determine whether or not infants demonstrate preference. The correlations would include infants who showed a preference for words of trochaic stress, infants who
showed a preference for iambic stress, and infants who did not show a preference for either stress, related to their CDI percentile ranks.

Finally, work is currently underway to partially replicate the present study using infant directed speech as well as adult directed speech. Infant directed speech is when the talker raises the pitch and increases the vowel duration of her speech making it more animated and interesting to the infant listener. It is predicted that infants will respond differently to the infant directed speech compared to the adult directed speech. More specifically, it is predicted that infants will discriminate between trochaic and iambic word stress when spoken in infant directed speech. If infants show the ability to discriminate between trochaic and iambic stress in infant directed speech, then a CDI language survey will be completed to test for any correlation between word stress discrimination and later lexical development.

References


Seshadri, P. & Houston, D. (year). Sensitivity to rhythmic properties of words in normal hearing infants and deaf infants who use cochlear implants. Indiana University School of Medicine, Indianapolis, IN.

