INDIVIDUAL DIFFERENCES IN THE ACQUISITION OF THE /s/ - /ʃ/ CONTRAST: A STUDY OF ADULTS' PERCEPTION OF CHILD SPEECH

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INTRODUCTION

- Phonology is a crucial area of study when examining child language acquisition.
- Children's speech production provides useful information about the phonological development of children.
- High individual sound variability amongst children makes studying the phonology of children difficult.
- Traditional clinical and research methods measure sound accuracy as being either correct or incorrect using phonetic transcription.
- The issue with phonetic transcription is that it categorizes the sound produced as one or the other.
- Recent studies shows that there are intermediate stages between sound production for children and are not as binary as previous research has claimed.

OBJECTIVES

1. To develop and validate a clinical tool for assessing children's /s/-/ʃ/ (where /ʃ/ is the phonetic symbol for the 'sh' sound) production that reflects the gradual nature of contrast acquisition
2. To identify child-level predicting factors for the differentiation of /s/ and /ʃ/ through the collection of the following:
   - Output variables: vocabulary, executive function, speech production and speech perception
   - Input variables: home language environment, maternal education, late talker status, and dialect

METHODOLOGY

The methodology of this study has been divided into two sections:

Child Talkers

- Children between the ages of 28-39 months
- Monolingual English Speakers
  - Spoke either Mainstream English or African American English
- Recordings took place at the University of Minnesota-Twin Cities and University of Wisconsin-Madison.
  - Typical visits lasted about 1-2 hours and each child had 2-3 visits.
- Children were assigned to one of three experiments (A, B, C) depending on age, sex, dialect, and late talker status.

Adult Listeners

- Undergraduate students at the University of Minnesota
- Experiment conducted in LearningToTalk Lab
- Untrained in rating children's speech

EXPERIMENTAL DESIGN

Speech production data collection: Children

- Stimuli were recorded during a picture-based auditory word repetition activity by trained university students.
- Children were provided with a visual reinforcer of an animal climbing a ladder to increase motivation as well as praise, encouragement, and stickers.
- Children were asked to produce word initial /s/ and /ʃ/
  /s/: scissors, sad, sock, soap, soup, sun, sick, sandwich
  /ʃ/: shower, sheep, share, shovel, shoe

Stimuli preparation

- Annotated target words were isolated in a process known as segmentation using PRAAT software.
- A text grid was created for each child's recorded production noting the target word, boundaries, and production number.

Perception experiment procedure: Listeners

- Experiment was administered using E-Prime software.
- Stimuli were presented through Sennheiser HD 280 Pro circumaural headphones at a comfortable listening level.
- Presented with a total of 450 unique consonant, vowel sequences for target /s/ and /ʃ/ words.
- Experiment was divided into three components to avoid listener fatigue.
- Provided written and verbal instructions to rate speech sounds along a visual analog scaling (VAS): one end labeled "s" sound and the other end labeled "sh" sound.
- Test stimulus presentation order was shuffled randomly for each listener.

VISUAL ACOUSTICS OF /s/-/ʃ/

Figure A

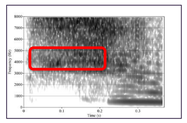


Figure B

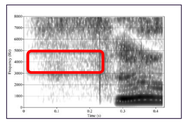
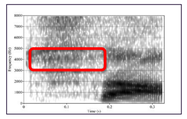


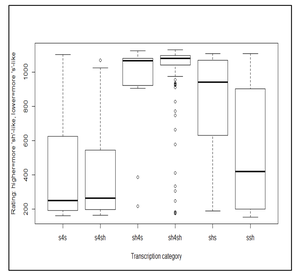
Figure C



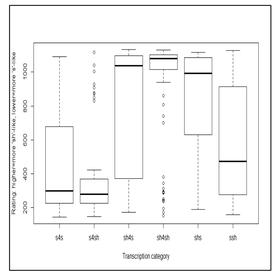
These spectrograms show the distribution of energy in different frequency regions.

- **Figure A** is an /ʃ/ sound and has more energy in the 3000-5000 Hz.
- **Figure B** is an /s/ sound and has less energy in the 3000-5000 Hz range.
- **Figure C** is a production of a sound between /s/ and /ʃ/ and has an intermediate amount of energy in this region.

PILOT FINDINGS



Plot A



Plot B

The above plots show the ratings done by pilot participants.

- Demonstrated how adult perception differs when rating the same productions
- Validated procedure can be used for experimentation
- Confirmed experiment is a useful measure for the intermediary stages of children's production of /s/ and /ʃ/

The "s" sound — The "S" sound

PROJECT

- My project started in the summer of 2015 and continued into the 2015-2016 academic school year as a Independent Study and UROP project
- Results will be presented at the Symposium On Research In Child Language Disorders (SRCLD) in Madison, Wisconsin in June 2016.
- The next set of contrasts that will be studied is /r/ and /w/.

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