Consonant Clarity in Infant-Directed Speech

Syllable Judgements of African American Mothers Talking to their Infants

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Introduction

- How do infants learn to categorize speech sounds?
- Infants are good at categorizing native-language speech sounds in the lab, and this has led to a view that infants can categorize speech sounds in the talking they hear around them
- But speech outside careful laboratory contexts is messy. Should we expect infants to be able to understand most of the words they hear?

- We analyzed mothers talking to their infants, to see if this infant-directed speech is even intelligible, to make sense of when babies can understand syllables
- To set an upper bound on how often we might expect infants to correctly categorize consonants in infant-directed speech, we evaluated how often *adults* could correctly categorize consonants in infant-directed speech

- If adults can't do this well, then it makes sense that infants can't either, meaning that they must get this information from other speech sources, like averaging across different speech utterances

Methodology

- Recorded one African American mother speaking to her infant at 7 and 10 months over two sessions
  - We hand segmented the 1200 utterances into words and sounds
  - Then selected vowel-consonant-vowel syllable boundaries (VCVs), like "a nap" or "an app"
  - These boundaries are either "onsets" where the consonant occurred at the beginning of a syllable, or "codas" where it occurred at the end of a syllable
- Participants then listened to the VCVs and selected which consonant they think they heard

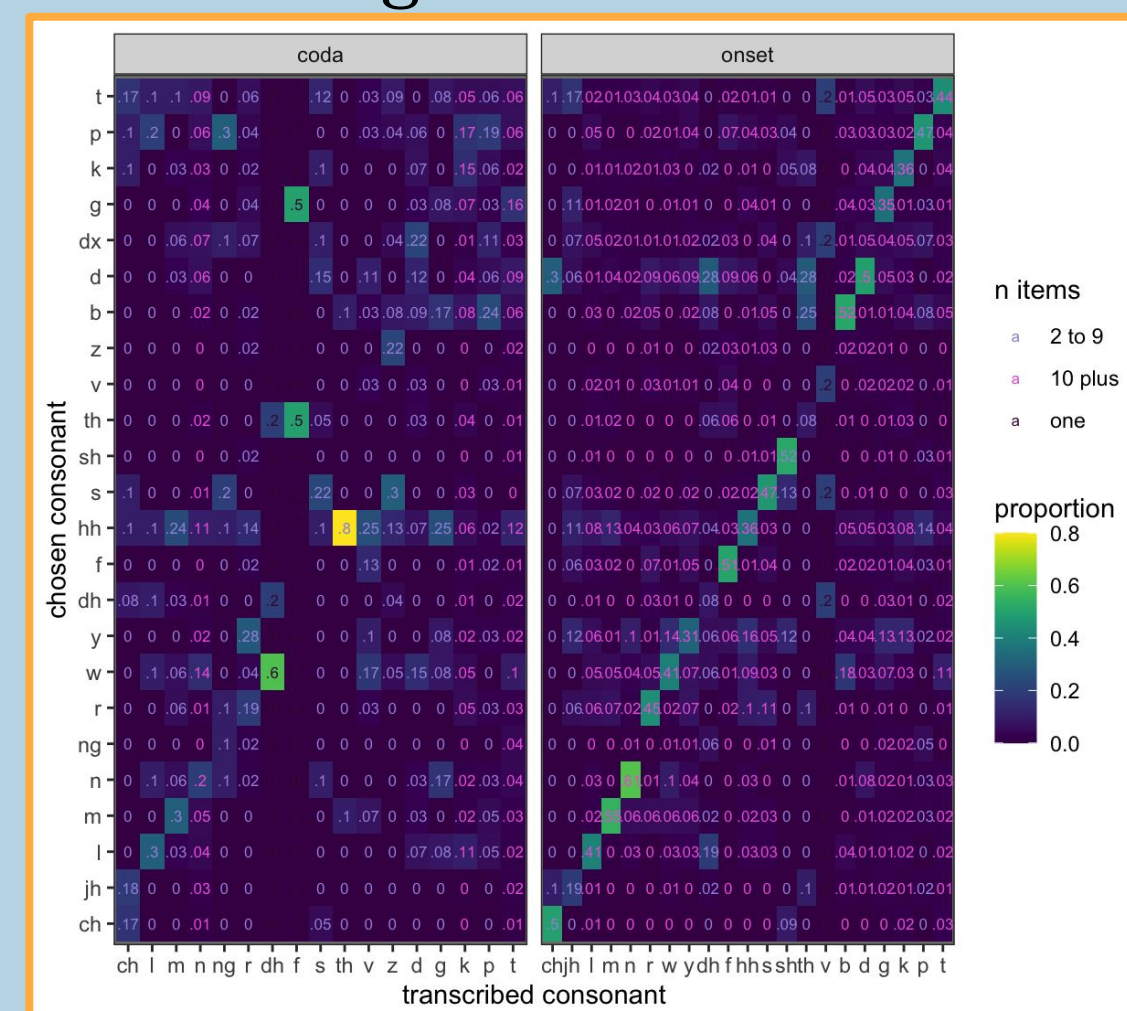### Proportion Correct of Chosen Consonant Matching the Real Consonant

Figure 1. Real consonant matched with the consonant chosen in VCVs. Brightness of the square represents the proportion of subjects that chose that consonant

Results

Proportion Subjects Identified the Syllable Correctly based on Consonant
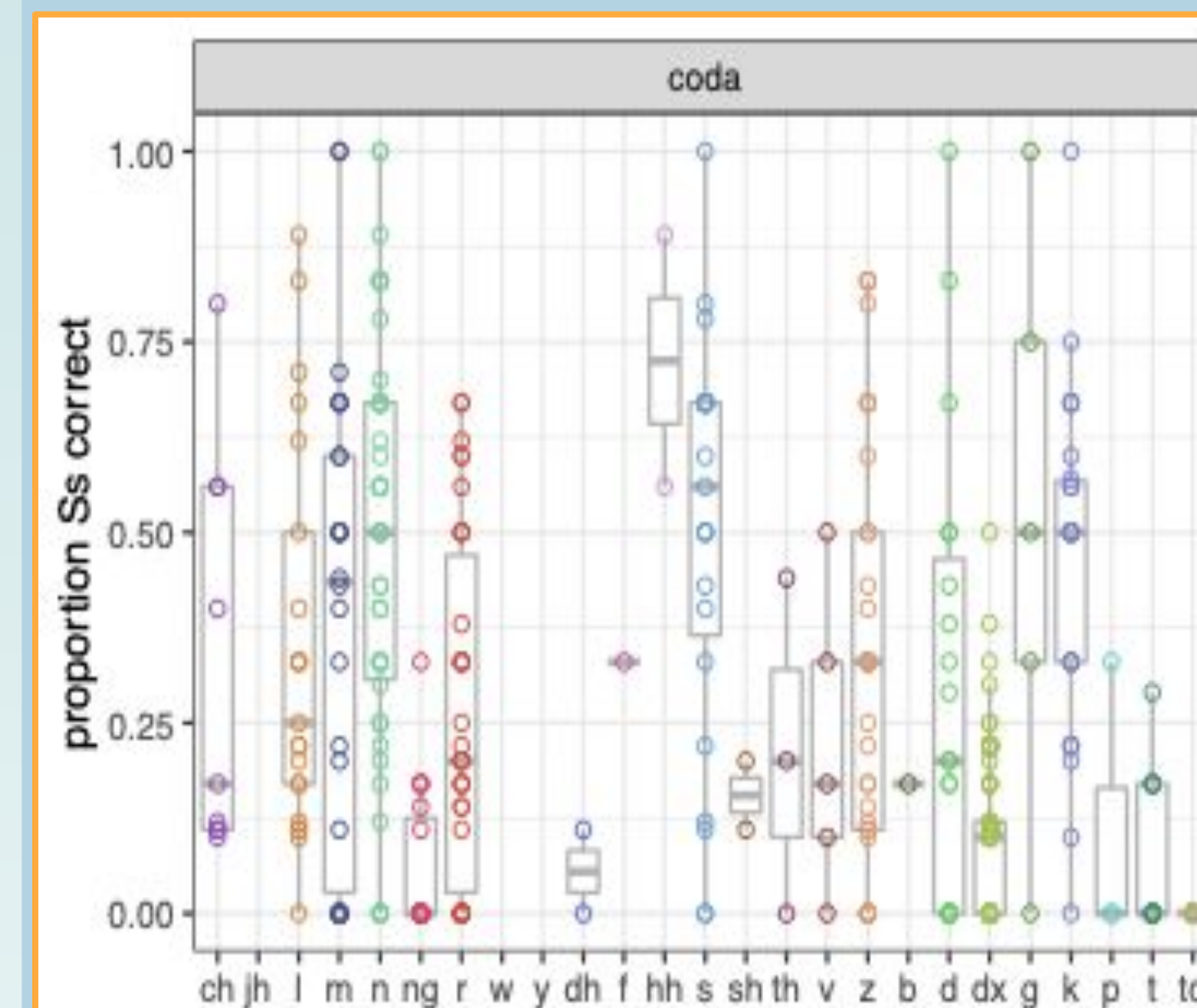

Figure 2. Real consonant of the VCV on the x axis matched with the proportion a subject correctly identified the VCV as a coda for that consonant. Colors represent the different consonants, each dot is a subject
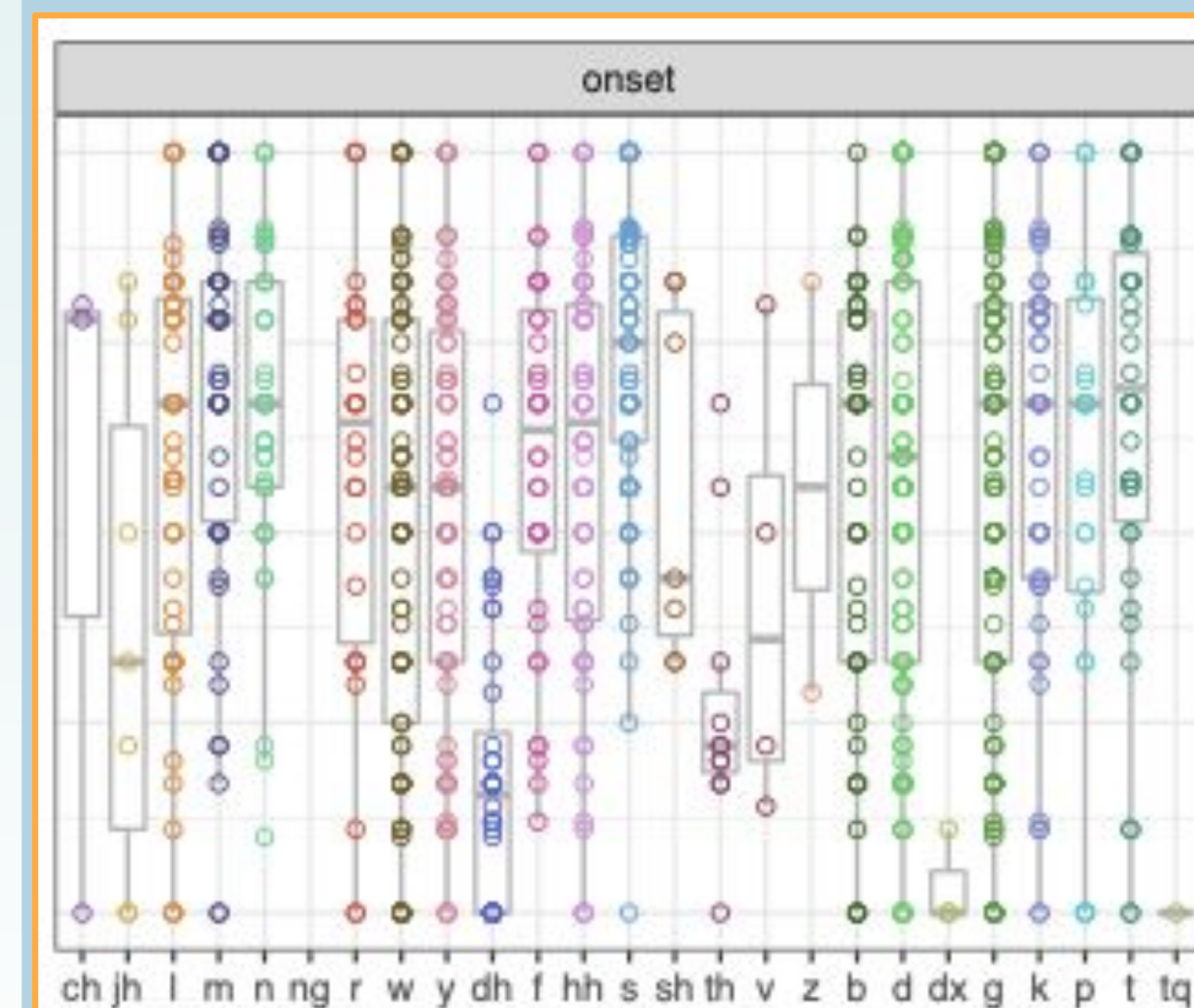

Figure 3. Real consonant of the VCV on the x axis matched with the proportion a subject correctly identified the VCV as an onset for that consonant. Colors represent the different consonants, each dot is a subject

Conclusion and Future Directions?

- Could participants identify the consonants?
  A little less than half of the time Speech is somewhat unintelligible; some instances are better than others, so babies listen in over multiple occurrences to understand sounds. Sounds being hard to understand make the words hard to understand
- This leaves a future question; do babies know when they're hearing clear speech - and do they try to listen better if they are aware?

- *Learning sounds:* either based on less "local" sound information, like individual sounds, or based on a better perceived subset of consonants
- *Segmenting words:* babies may be able to segment words into sounds, but it's probably not being learned and applied exhaustively over every word and sound