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Analyzing Speech Samples in Support of a Psycholinguistic Approach to Speech and Literacy Difficulties

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Background

Stackhouse, Pascoe, and Gardner (2006) state that a child's language development is the product of an intact speech processing system, comprised of three domains: speech input processing, stored word representations, and speech output processing. A psycholinguistic approach to speech-language therapy examines each of the child's domains for potential breakdowns. A profile of strengths and weaknesses is developed for each patient using information about patient speech, medical history, literacy skills, phonological awareness and processing, and speaker-listener interactions. This profile, along with educational, linguistic, medical, and psychosocial perspectives, are taken into consideration when developing therapy targets. Several measures are available that can inform clinicians' understanding of the speech processing system, particularly speech output. Speech-language pathologists may wonder which measures are best and what are the relationships among these measures that can help guide the treatment process.

Thus, the purpose of the current study is to support our understanding of speech processing by evaluating the following measures commonly used for speech therapy: static percentage consonants correct, connected percentage consonants correct (Shriberg & Kwiatkowski, 1982), speech sound (phonetic) inventory (Stoel-Gammon, 1985), and receptive vocabulary with the Peabody Picture Vocabulary Test (Dunn & Dunn, 2007).

Research Question

What are the relationships among percentile rankings from the Peabody Picture Vocabulary Test, percent consonants correct in static speech, percent consonants correct in connected speech, and phonetic inventory? How do these relationships support the domain of speech output outlined by the psycholinguistic approach to language development?

References

See handout for references

Methods

Design:
Cross-sectional study of speech production at one time period to evaluate relationships among speech output measures.

Participants:
15 American-English speaking children age 3 years 0 months to 6 years 2 months, with moderate to severe speech sound disorder.

Measures:

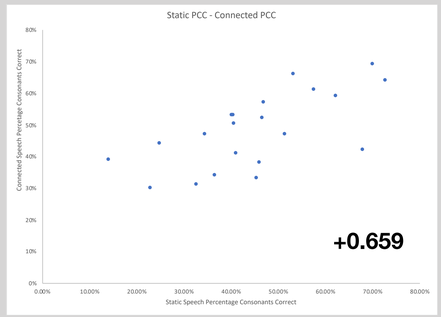
Connected Speech Sample: Percentage Consonants Correct (Connected PCC)
Correct consonant sounds produced by each child when speaking in full sentences, divided by the total target consonants in a 100-word speech sample. Consonants produced are not controlled and are generated by each child. The same connected speech sample was used in measurement of both percentage consonants correct and phonetic inventory.

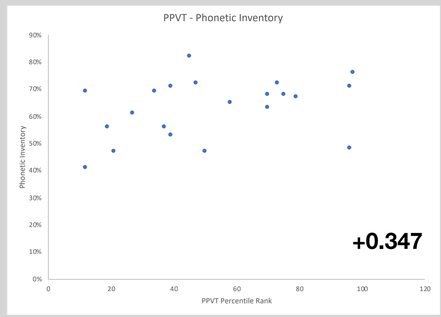
Static Speech Sample: Percent Consonants Correct (Static PCC)
Correct consonant sounds produced by each child when speaking in isolated, single words, divided by the total 205 target consonants in a 50-word speech sample. Consonants are balanced across all sounds in English.

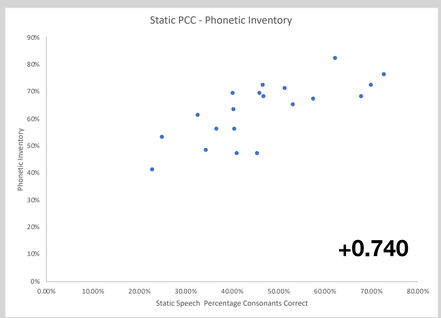
Peabody Picture Vocabulary Test (PPVT)
Percentile Rank achieved by each child when presented with picture identification task. Child points to one of four pictures to indicate understanding of word meaning.

Phonetic Inventory
Tally of consonant sounds spontaneously produced by each child in a connected speech sample, divided by the total consonant sound target production opportunities for English. Opportunities were defined as two or more productions of a sound regardless of accuracy and word position for a maximum of 24 consonants.

Results







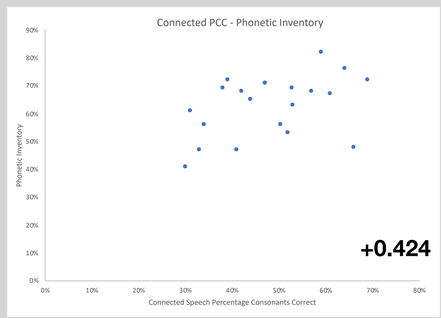


Figure 1. Correlations among measures of speech output. Scatter plots depict individual relationships among static PCC, connected PCC, inventory, and PPVT.

Discussion

- Data analysis revealed a strong, positive correlation between static PCC and phonetic inventory. This relationship suggests that both measures evaluate similar aspects of the speech output processing domain of the psycholinguistic model across participants. The words for the PCC measure include a fully representative sample of consonants that are also evaluated in an inventory.
- A moderate positive relationship was found between static and connected percentage consonants correct. A stronger correlation was expected, as both measures are calculated in the same manner and appear to assess the same skill; however, PCC of connected speech does not control for targets as PCC in the static single word sample.
- Analysis revealed a weak positive correlation between PPVT scores and phonetic inventory. This result suggests that the two measures assess different domains. More specifically, the PPVT assesses the stored word representation domain of the psycholinguistic model, while phonetic inventory assesses speech output processing.
- A weak positive correlation between connected PCC and phonetic inventory may suggest that the measures assess different speech output skills even though the data come from the same sample of 100 words.
- Stackhouse, Pascoe, and Gardner define speech output processing as the programming and production of speech. Measures of static PCC assess speech production across a balanced profile of all consonant sounds. Connected speech measures of inventory and connected PCC tap into speech programming, since the child must plan the production of spontaneous utterances, as opposed to following a static speech model.
- While using multiple measures assesses all aspects of speech output processing, measures assessing more than one skill can be used to reduce testing burden. Given the correlation between static and connected PCC, a single connected speech sample could be used to assess PCC, and static scores could be extrapolated from that data. This strategy would alleviate the burden of testing on both clinician and patient, and with the added advantage of connected speech samples providing a more accurate representation of the patient's speech and language abilities in real-life situations.

Future Directions

Data will be used to compare relationships between the same measures in French-speaking children with speech sound disorders.