Children’s Intelligibility Scores: Comparison of TOCS+ and Conversational Speech Samples
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Test of Children’s Speech Plus (TOCS+): Software tool to expedite speech intelligibility measurement in children ages 3–6 years using word identification:

- Word format: 78 items based on English minimal pair phonetic contrasts (consonant, vowel, syllable)
- 3 forms; unique randomization generated for each administration

Sentence format:
- Phrases/sentences ranging from 2-7 words: 80 words in total
- Longest utterance (number of words) based on child’s expressive language level
- Unique test generated for each administration via random selection from master pool of each utterance length (2-7 words)

Purpose:
- Evaluate validity of TOCS+ word and sentence intelligibility measures using audio-recorded 100-word spontaneous speech sample as “gold standard”

64 English speaking children
16 at each of 4 ages: 3, 4, 5 & 6 years
- 8 children had typically developing speech
- 8 had speech sound disorders
- Children with typical speech obtained scores ≥ 16th %ile on articulation subtest of the Fluharty Preschool Speech and Language Screening Test (Fluharty-2) (2001).
- Children with speech sound disorders identified by referring SLPs and scores < 16th %ile on the Fluharty-2 articulation subtest.
- All children had receptive language, hearing abilities and speech mechanism structure WNL.

Recording Samples
- TOCS+ Word and Sentence intelligibility measure administered to each child and recorded digitally using TOCS+ software and standard mic and pre-amp
- Items elicited imitatively with semantic support provided by a relevant photograph
- 12 minute spontaneous speech sample elicited using interactive play procedure of Shriberg (1986) and audio recorded digitally using TOCS+ Record/Playback software (TOCS+ RP) and standard mic and pre-amp
- 100-word contiguous sample selected from spontaneous speech recording and segmented into utterances, with each utterance saved as a .wav file

Judging Samples
- Adults with normal hearing, English as a first language, some level of post-secondary education, between 18 and 35 years of age, served as listeners
- Each listener judged a word test, a sentence test and a spontaneous speech sample; no listener judged the same child on more than one task
- 3 listeners judged each child’s recordings for each task
- TOCS+ software used to present the word identification tasks to listeners
- Listeners instructed to type in the words they heard the child say
- Dependent variable: Percentage of words identified correctly (based on mean of 3 listeners’ scores) = intelligibility score on each task

Methods

Results

Group x Sample x Age Comparisons

Speech Sound Disorder

Relationships between TOCS+ and Conversational Sample Scores (Age Typical/ Speech Sound Disorder)

Table:  
<table>
<thead>
<tr>
<th></th>
<th>TOCS+ Word</th>
<th>TOCS+ Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversation</td>
<td>.57</td>
<td>.46</td>
</tr>
<tr>
<td>TOCS+ Words</td>
<td>.90</td>
<td>.89</td>
</tr>
</tbody>
</table>

Conclusions

Validity of TOCS+ children’s intelligibility measure supported by these findings:
- Regardless of age or test format children with speech sound disorders scored significantly below children with age-appropriate articulation; no ceiling effect
- Regardless of group or age, all children scored significantly lower on TOCS+ word vs. sentence measure
- TOCS+ sentence scores did not differ significantly from and were correlated positively (r=.93, p =.000) with conversation sample scores for children with speech sound disorders.