



Children's Intelligibility Scores: Comparison of *TOCS+* and Conversational Speech Samples

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Background

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"

Participants

- ❖ 64 English speaking children
16 at each of 4 ages: 3, 4, 5 & 6 years
In each age group:
 - 8 children had typically developing speech
 - 8 had speech sound disorders
- ❖ Children with typical speech obtained scores \geq 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



Methods

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



TOCS+ Recording Set-Up



Audio Buddy Mic Pre-amp

Shure WH20 XLP microphone

Judging Samples

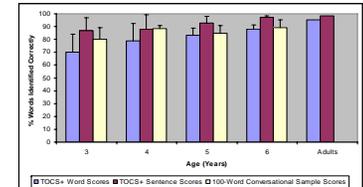
- ❖ Adults with normal hearing, English as a first language, some level of post-secondary education, between 18 and 35 years of age, served as listeners
- ❖ Each listener judged a word test, a sentence test and a spontaneous speech sample; no listener judged the same child on more than one task
- ❖ 3 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



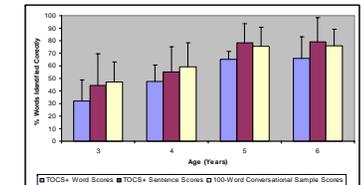
Results

Group x Sample x Age Comparisons

Age-Typical Speech



Speech Sound Disorder



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

| | <i>TOCS+</i> Word | <i>TOCS+</i> Sentence |
|--------------------|-------------------|-----------------------|
| Conversation | .57 | .46 |
| <i>TOCS+</i> Words | .85 | .93 |
| | .90 | .89 |

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.