Effect of Sample Length on Children’s Speech Intelligibility Scores

Megan M. Hodge & Carrie L. Gotzke
University of Alberta, Edmonton, AB CANADA
CANADIAN LANGUAGE & LITERACY RESEARCH NETWORK

Introduction

Background

- Measures of intelligibility estimate the cumulative impact of error patterns and mechanism impairment on children’s functional speech ability.
- Measures of intelligibility based on children’s conversational speech (self-generated, with adult communication partner typically):
  - have high ecological validity.
  - are the “gold standard” for evaluating the validity of alternative intelligibility measures.
- Length and characteristics of conversational samples used to estimate measures of children’s intelligibility vary by investigator:
  - 100 contiguous words
  - 200 contiguous words
  - 90-70-225 rule

Question and Rationale

- Do intelligibility scores:
  - obtained from word identification of audio recordings of conversational samples by unfamiliar listeners
  - differ by sample length (100 vs. 225 words) for children with and without phonological delay/disorder age 3 - 6 yrs?
- If findings are comparable, use of shorter (100-word) sample appears warranted for children with typical speech.

Preparation of Conversational Samples

Child Subjects

N = 64 English-speaking children (16 at each of 4 ages: 3, 4, 5 & 6 yrs)
- All children had receptive language, hearing abilities, and speech mechanism structure within normal limits.
- In each age group:
  - 8 children had typically developing speech
  - Obtained scores ≥ 16th %ile on articulation subtest of the Fliuharty Preschool Speech Language and Language Screening Test (Fluharty-2)
  - No history of parent concern or speech-language therapy
  - 8 had speech sound disorders
  - Identified by referring SLP’s and scores < 16th %ile on the Fluharty-2 articulation subtest

Recording Samples

- 15 minute spontaneous speech sample elicited using interactive play and audio recorded digitally using TOCS+ Recorder/Player software and standard microphone and pre-amplifier
- Starting at the 2nd minute of each sample, a 100-word contiguous sample was segmented into utterance following procedures of Shriberg et al.
- Each utterance saved as a .wav file (repeats of identical utterances that occurred were excluded from the sample)
- Same procedures used to obtain an additional 125 word sample to yield a 225 word sample (100 words + 125 additional words)

Judging Samples

- Adults with normal hearing, English as a first language, some level of post-secondary education, 18 - 35 years of age
- 3 different listeners judged each child’s recordings for each sample length of 64 children x 2 lengths x 3 listeners = 383 listening sessions
- Some listeners participated in more than one session but these were at least a month apart and never for the same child
- TOCS+ RPTM used to present the utterance word identification tasks to listeners
- Listeners instructed to type in the words they heard the child say

Results

Intelligibility scores did not differ significantly between sample lengths regardless of group or age:
- Use of shorter (100-word) sample appears warranted as a “standard” when evaluating validity of alternative measures of children’s speech intelligibility for the populations studied

Intelligibility scores differed significantly between groups:
- Group mean of 85% (SD=7.5) for children with typical speech vs. 65% (SD=17.9) for children with phonological disorder
- Note: 6-yr-old children with typical speech did not get 100%

Intelligibility scores differed by age only for children with typical speech:
- 3 yr-olds significantly < 4 & 6 yr-olds

Conclusions*

*Preliminary, pending outcome of analysis of at least 10 children per group.
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References


