Effect of Sample Length on Children's Speech Intelligibility Scores

ASHA Convention
November 16, 2007
Boston, MA

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Introduction

Background

❖Measures of intelligibility estimate the cumulative impact of error patterns and mechanism impairment on children's functional speech ability[1]

❖Measures of intelligibility based on children's conversational speech (self-generated, with adult communication partner typically):
- ➢ have high ecological validity[2,3]
- ➢ used as the "gold standard" for evaluating the validity of alternative intelligibility measures[4]

❖Length and characteristics of conversational samples used to estimate measures of children's intelligibility vary by investigator:
- ➢ 100 contiguous words[4,5,6]
- ➢ 200 contiguous words[7]
- ➢ 90-70-225 rule[8]

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 as a "standard" for evaluating validity of alternative measures of children's speech intelligibility[1] appears warranted.

Methods

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[9], hearing abilities[10], and speech mechanism structure[11] within normal limits.

In each age group:

➢8 children had typically developing speech
Obtained scores ≥ 16th %ile on articulation subtest of the *Fluharty Preschool Speech and Language Screening Test (Fluharty-2)*[9] and no history of parent concern or speech-language therapy

➢8 had speech sound disorders
Identified by referring SLPs and scores < 16th %ile on the *Fluharty-2 articulation subtest*[9]

Recording Samples

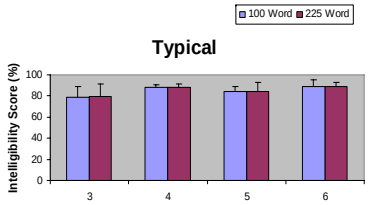
❖15 minute spontaneous speech sample elicited using interactive play[8] and audio recorded digitally using *TOCS+ Recorder/Player software (TOCS+ RP™*[12]) and standard microphone and pre-amplifier
❖Starting at the 2nd minute of each sample, a 100-word contiguous sample was segmented into utterances following procedures of Shriberg et al.[13]
❖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 total 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+* RP™ used to present the utterance 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**

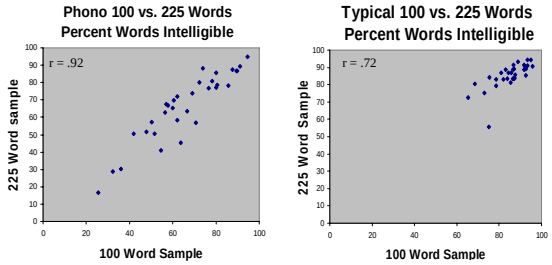
Results



Group (2) x Age (4) x Length (2) ANOVA

Effect of Length: F=.077; p=.78
Length x Group: F=.048; p=.83
Length x Age: F=1.212; p=.31
Length x Group x Age: F=2.034; p=.12

Effect of Group: F= 39.4; p=.00
Group x Age: F= 2.80; p=.05
Post hoc testing:
Typical: 3 < 4 yrs; p =.02
3 < 6 yrs; p =.01
Phono: No significant differences



Conclusions*

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 delay/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

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

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