A faster way to measure child-directed speech: Development and validation of a new clinical tool

Jayne Newbury, PhD and Dean Sutherland, PhD. School of Psychology, Speech, and Hearing, University of Canterbury, Christchurch, New Zealand

Introduction

There are few psychometrically validated child-directed speech (CDS) measures designed for speech-language clinicians. Currently clinicians rely mainly on informal analyses of parent-child observations and discussion with parents to assess CDS (Newbury & Sutherland, under review). This gap is starting to receive attention in the literature (Levickis et al., 2018). This is a barrier to evidence-based practice, as clinicians cannot be certain they are accurately measuring the behaviours they are coaching parents to change.

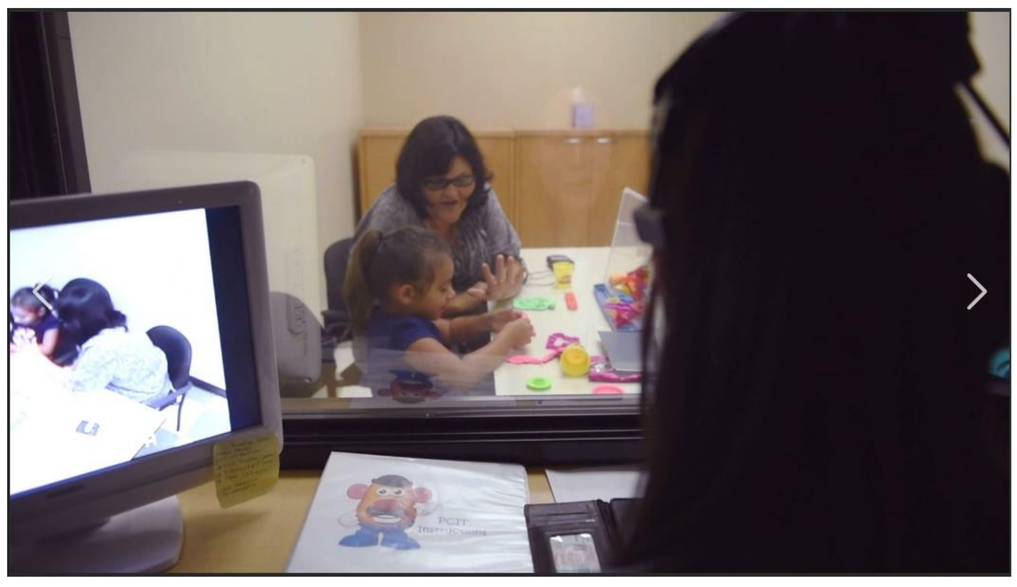

Image retrieved from: https://www.first5la.org/

Child Directed Speech Rating Scale (CDSRS)

This study aimed to develop and evaluate a new clinical tool to measure CDS: The Child Directed Speech Rating Scale (CDSRS). The tool aims to:

- establish the need for CDS intervention
- support collaborative goal setting
- measure change in CDS as a result of intervention

The current version of the CDSRS was developed with reference to the literature regarding adult-child interactions which were predictive of child language outcomes between the ages 2-4 years (see Hoff (2006) for a review).

This study trialled the first version of the tool and evaluated its psychometric properties.

Research Questions

1. What is the interrater reliability of the CDSRS items?
2. What is the construct validity of the CDSRS items?
3. What is the predictive validity (at 42-49 and 60-66 months) of the CDSRS items for total language scores on standardised assessments?

Method

Participants

- 80 children (65% boys)
- A subset of the *Learning to Talk* participants (see Klee, Stokes and Moran, 2015) for details).
- The sample was skewed towards higher parent education and language scores
- English the main language spoken in the home.
- No developmental diagnoses or sensory impairments at Time 1.

Measures

The children's data from 3 time points were used for the current study.

Table 1. Participant and assessment information

Time	Age (mean, standard deviation)	Number of participants	Measures included in the current study
Time 1	24-31 months (26.8, 1.7)	80	• PLS-4 • 20 minute parent-child interaction
Time 2	42-50 months (45.2, 1.9)	79	• PLS-4
Time 3	59-67 months (63.0, 2.1)	56	• CELF-P2

Note. PLS-4 = Preschool Language Scale – 4th Edition; CELF-P2 = Clinical Evaluation of Language Fundamentals – Preschool, 2nd edition.

Child-directed speech analysis from T1 parent-child interaction videos

- The middle 10 minutes of the 20 minute samples were analysed.
- Interrater reliability for transcription was found to be 89% at word level and 97% at utterance segmentation level.

Analyses:

- Adult / child MLU and TNW, adult WPM and adult / child total utterances from SALT.

The samples were then analysed in two ways:

1. CDSRS codes – the student viewed the video once and rated the interaction on 12 Likert scale items.

2. Video coding – the student viewed the video as many times as needed to assign the following codes –

- Responsivity; down on level; repetition of new words; type of adult utterance (questions, prompts, descriptions, expansions, recasts, vocalisation, affirmation, imitation, other); child's length of response (in morphemes) to questions and descriptions.

- Interrater reliability calculations for the video coding are currently underway

Results

- Fourteen percent of the samples were recoded by the first author. Point-to-point agreement for CDSRS items ranged from 9%-100% (mean 52%). However, 98% of the disagreements were within 1 Likert scale point.

- Three items of the CDSRS were excluded from further analysis due to inadequate variation in ratings and or low construct validity (r <.3):
  - Down on level (item 10)
  - Adult level of language relative to child's comprehension (item 3)
  - Adult rate of speech relative to child's ability to process / respond (item 8)

- The remaining 9 items were evaluated for concurrent and predictive validity with language.

Results of the construct, concurrent and predictive validity correlations are displayed in Table 2:

Table 2. Bivariate correlations of 9 CDSRS items with comparable objective measure of CDS at T1 and language scores at T2 and T3.

CDSRS item (item number)	Comparison objective measure	Correlation with comparison objective measure N = 80	Correlation with T2 PLS-4 total language score N = 79	Correlations with T3 CELF-P2 total core language score N = 56
Amount of talk (1)	TNW (adult plus child)	.73***	.23*	.18†
Proportion of talk (adult:child) (2)	Adult TNW divided by (child TNW plus adult TNW)	-.60***	.20*	.30*
Adult expansions and recasts (4)	Total extensions plus recasts	.70***	.37***	.40**
Adult using repetition to reinforce a new word (5)	Total adult repeat vocabulary	.59***	-.24*	-.08
The effectiveness of the adult's questions to extend conversation (6)	Child MLU of responses to adult questions	.42***	.42***	.47***
The effectiveness of the adult's comments to extend conversation (7)	Child MLU of responses to adult comments	.47***	.38†	.32*
Verbal responsivity of the adult (9)	Total responsive utterances	.50***	.29**	.17
Adult following the child's interest / attention (11)	Total responsive and on topic utterances divided by total adult utterances	.64***	.44***	.14
Adult praising the child (12)	Total adult affirmations	.53***	-.12	-.30*

Note. One tailed significance testing. †p<.10; *p<.05; **p< .01; ***p< .001. TNW = Total number of words; MLU = mean length of utterance

Conclusions

- Interrater reliability varied widely on the 12 CDSRS items, but disagreements were within 1 point.
- Three items were excluded from analysis due to inadequate validity / variation.
- Construct validity for the remaining 9 items was moderate – high.
- Predictive validity for language outcomes was moderate for four of these items (4, 6, 7, 11) at Time 2 and for five items (2, 4, 6, 7, 12) at Time 3.
- **These initial positive results demonstrate the feasibility of developing a quick, user-friendly clinical rating scale for CDS which has strong psychometric properties.**

Limitations:

- This method of sampling assumes the parent-child interaction viewed in clinic is representative of how parents and children interact throughout their daily lives.
- Interrater reliability for the video coding is currently underway.

Continuing Research:

- The internal validity of the CDSRS will be analysed and the second version of the tool developed.
- Construct validity and interrater reliability can likely be improved by clarifying the wording, increasing training and reducing the amount of items in the scale (Martin & Bateson, 2007). This may in turn improve the predictive validity for language outcomes.

References

Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review, 26*(1), 55-88.

Klee, T., Stokes, S. & Moran, C. (2015). *Early factors in childhood communication disorders: Final project report.* Marsden Fund of the Royal Society of New Zealand.

Levickis, P., Reilly, S., Girolametto, L., Ukoumunne, O. C., & Wake, M. (2018). A replicable, low-burden mechanism for observing, recording, and analysing mother–child interaction in population research. *Child: Care, Health and Development, 44*(6), 901-907.

Martin, P. & Bateson, P. (2007). *Measuring behaviour an introductory guide* (3rd ed). Cambridge University Press.

Newbury, J. & Sutherland, D. (under review). Measurement of child-directed speech: A survey of clinical practice. *International Journal of Speech-Language Pathology*.

Research supported by the Marsden Fund of the Royal Society of New Zealand UOC-1003 (awarded to T. Klee, S. Stokes & C. Moran) and Summer Scholarship Fund 2018-2019, UC.

Acknowledgement to the families, Michelle Conway, Tom Klee, Stephanie Stokes, Catherine Moran, Hamimah Ahmet, Daniela Buehler, Gina Tillard, Kate Cook and Ruth Ramsey and many the research assistants who helped to collect and code this data.

Speech Pathology Australia Conference, Brisbane, Australia, June 2019

Correspondence to: jayne.newbury@canterbury.ac.nz