Language Sample Analysis for Language or Working Memory Impairment: Using the Right Measuring Stick

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Introduction

Specific Language Impairment (SLI)

- Poor language relative to working memory over 1 year
- Lower scores on language sample analysis measures, depending on demands of task and nature of measure (e.g., Fey et al., 2004; Guo et al., 2008; Scott & Windsor, 2000)

Specific Working Memory Impairment (SWMI)

- Consistently poor working memory over 1 year, and average language on standardized measures

Language Sample Analysis

- Can provide an ecologically valid measure of expressive language ability
- Sensitive to subtle differences in ability
- **Productivity** – tends to be indicative of general language development (Loban, 1976; Leadholm & Miller, 1992)
- **Efficiency** – mazing and pausing thought to reflect cognitive processing required for planning and monitoring speech (Guo et al., 2008; MacWhinney & Osser, 1977; Rispoli & Hadly, 2001)
- **Grammaticality** – shown to be sensitive to language impairment (Fey et al., 2004; Scott & Windsor, 2000)

Study Questions

- How do narrative and expository language skills of children with SLI or SWMI compare?
- Might domain-general processing deficits lead to inefficient language production?
- What characteristics of expressive language are specific to SLI?

Methods

Narrative Language Sample

- Lost in Space (Warr-Leeper, 1990)
- Participants recalled the story after hearing it told to them

Expository Language Sample

- Participants explained a familiar sport or game of their choosing using a visual aid (Nippold et al., 2005)

- Samples were recorded, transcribed, and segmented into C-units (Loban, 1976)
- Pauses longer than 250ms were measured using Praat (Goldman-Eisler, 1968; Guo et al. 2008)

Participants

	SLI	SWMI
n	7 (6 male)	5 (3 male)
age	9;3 – 11;6	8;1 – 10;6
Language (CELF-4)	78 (75–81)	100 (94–106)
WM (AWMA)	100.5 (86.3–109.3)	84.18 (84.6–87.3)
IQ (WASI)	102.8 (86–126)	103.5 (98–110)

One child (age 8;3) judged by teachers and parents to be typically developing served as a control.

Analysis

Coding

Productivity

- TC – Total number of C-units
- TNUW – Total number of unmazed words
- NDW – Number of different words

Efficiency

- Pausing
  - CPT – Average pause time preceding each C-unit
  - PT/100W – Pause time per 100 unmazed words
  - %CPT – Percent of C-units preceded by a pause
- Mazing
  - M/100W – Number of mazes per 100 unmazed words
  - %CM – Percent of C-units with mazes

Grammaticality

- MLU-W – Mean length of utterance in words
- V/C – Number of embedded verbs per C-unit
- E/C – Number of errors per C-unit
- %CX – Percent of C-units with complex sentence structure
- %CG – Percent grammatical C-units

Coding Mazes

Filled pauses	*uh, um, er*
Fillers	*Like, you know, something like that*
Repetition	*After lunch, she ate (she ate) cake*
Revisions	*They got in the ship and (flied) they flew off*
Connectors	Repetitive use of conjunctions *(and then) you get your racket* *(and then) you hit the ball*

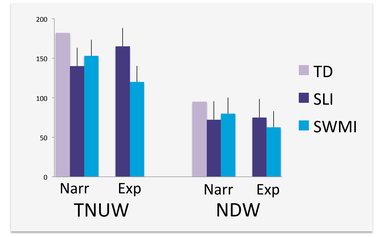
Dollaghan & Cambell, 1992; Fiestas et al., 2005; Finneran et al., 2009; Guo et al., 2008; Thordardottir & Weismer, 2002

Results

Groups were compared using Mann-Whitney U. Error bars represent standard error of the mean.

Productivity

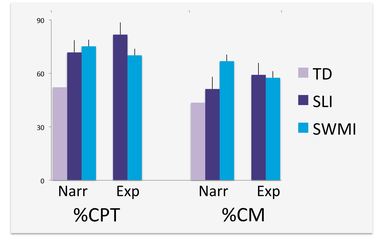
- No differences found between SLI and SWMI on any measure of productivity.



		TD	SLI	SWMI
TC	Narr	23	15.9	15
	Exp		16.7	12.2
TNUW	Narr	182	140	153
	Exp		165	120
NDW	Narr	95	72.3	80
	Exp		75	62.6

Efficiency

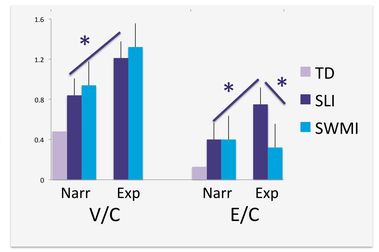
- No differences found between SLI and SWMI on any measure of efficiency.



		TD	SLI	SWMI
CPT	Narr	0.37s	1.26s	1.04s
	Exp		1.65s	1.02s
PT/100W	Narr	13.2s	26.8s	25.4s
	Exp		21.4s	22.9s
%CPT	Narr	52.2	71.8	75.2
	Exp		81.8	70.1
M/100W	Narr	5.49	7.75	8.52
	Exp		7.84	10.5
%CM	Narr	43.5	51.29	66.79
	Exp		59.1	57.48

Grammaticality

- Children with SLI used more embedded verbs but made more errors in expository relative to narrative speech.
- Children with SLI produced more errors in expository speech compared to children with SWMI.



* Significant difference between groups (.05 level)
† Significant difference within group (.05 level)

		TD	SLI	SWMI
MLU-W	Narr	7.91	9.04	9.98
	Exp		9.52	9.78
V/C	Narr	0.48	0.84†	0.94
	Exp		1.21†	1.31
E/C	Narr	0.13	0.4†	0.4
	Exp		0.75†*	0.32*
%CX	Narr	26.1	46†	58.2
	Exp		75.7†	67.3
%CG	Narr	87	68	68.19
	Exp		50.39*	77.53*

References

Alloway (2007) Automated Working Memory Assessment. **Dollaghan & Campbell** (1992) *Top Lang Disord, 12*(2), 56–68. **Fey, Catts, Proctor-Williams, Toblin, & Zhang** (2004) *JSLHR, 47,* 1301–1318. **Fiestas, Bedore, Peña, & Nagy** (2005) *ISB4,* 730–740. **Finneran, Leonard, & Miller** (2009) *Int J Lang Comm Dis, 44*(3), 271–286. **Goldman-Eisler** (1968) Psycholinguistics: Experiments in spontaneous speech. **Guo, Tomblin, & Samelson** (2008) *JSLHR, 51,* 722–738. **Leadholm & Miller** (1992) *Language sample analysis: The Wisconsin guide.* **Loban** (1976) *Language development: Kindergarten through grade twelve.* **MacWhinney & Osser** (1977) *Child Development, 48,* 978–985. **Nippold, Hesketh, Duthie & Mansfield** (2005) *JSLHR, 48,* 1048–1064. **Rispoli & Hadly** (2001) *JSLHR, 44,* 1131–1143. **Scott & Windsor** (2000) *JSLHR, 43,* 324–339. **Semel, Wiig, & Secord** (2003) Clinical Evaluation of Language Fundamentals-4. **Thordardottir & Weismer** (2002) *Brain and Cognition, 48*(2–3), 587–592. **Warr-Leeper** (1990) Lost in space story reformulation. Unpublished norms. **Wechsler** (1999) Wechsler Abbreviated Scale of Intelligence.

Conclusions

Children with SLI

- Grammatical errors can distinguish children with SLI from peers with domain-general deficits
- Errors increase with increases in linguistic complexity

Children with SWMI

- Expressive language similar to children with SLI in terms of productivity and efficiency

Language Sample Analysis

- Poor performance on measures of efficiency (pausing, mazing) may not be specific to children with linguistic impairment

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