Evaluating the Modified-Shortened Token Test as a working memory and language assessment tool

Theresa Pham, Taylor Bardell, Meghan Vollebregt, Alyssa Kuiack, & Lisa M.D. Archibald, The University of Western Ontario
tpham62@uwo.ca
@tpham62

Introduction

- Language performance depends on:
  - **Working memory**: the ability to hold and process information
  - **Language abilities** or knowledge of the language, word order
- Separable role of working memory in language processing[1]
- The Shortened Token Test[2] may have advantageous properties for separating working memory and language skills
  - The child carries out a command of increasing length and complexity
  - Parts 1-5: commands increase in length
  - Part 6: commands vary in linguistic complexity

Research Questions:

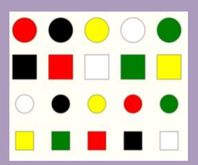
1) Can our Modified Shortened Token Test provide separable estimates of working memory and language knowledge skills?
2) What is the extent to which these separate constructs are related to other tests commonly used by SLPs?

Methods

Study 1

Participants: 257 children; 4 to 7yrs
Procedure: Modified Shortened Token Test

- *"Touch a green circle"* (Part 1, short and easy)
- *"Touch the small green circle and the large blue square"* (Part 5, long and easy)
- *"Put the green square next to the red circle"* (Part 6, long and complex)



Study 2

Participants: 23 4-to-5-y.o children and 24 8-to-17-y.o struggling readers
Procedure:

- Modified (younger) or original (older) Shortened Token Test
- Other oral language measures: Core CELF-4[3], TNL[4], TOWRE-2[5]
- Working memory: finger window subtest from WRAML-2[6]

Analysis: Correlational analyses between identified factors (Study 1) and related measures

Results

Study 1: Factor analysis

	Factor		
	1	2	3
Part 1			.43
Part 2			.32
Part 3	.57		
Part 4	.68		
Part 5	.84		
Part 6	.35	.89	
% variance explained	39	19	15
Eigenvalue	2.37	1.16	.90

Basic attention factor (Part 1, Part 2)
Working memory factor (Part 3, Part 4, Part 5)
Linguistic factor (Part 6)

Linguistic parameters

	Basic attention	Working memory	Linguistic
Word length	3.82	8.47	9.31
Grade level[A]	0	0.87	**2**
Phrase structure[A]	2	3.73	**5.23**
Yngve max depth[B]	1.82	**4.30**	3.23

A = Linguistic > Working memory factor
B = Working memory > linguistic factor

Study 2: Correlations between identified factors and cognitive measures

	Basic attention	Working memory	Linguistic
Younger group			
Recalling sentences	0.29	0.56 **	0.31
Formulated sentences	0.22	0.54 **	0.26
Concepts & FD	0.16	0.42 *	0.44 *
Word structure	0.21	0.49 *	0.51 *
TNL	0.06	0.23	0.13
Finger windows	-0.19	-0.0061	0.13
Older group			
Recalling sentences	0.32	0.50 *	0.52 *
Word reading (TOWRE-2)	-0.16	-0.10	0.14
Nonword reading (TOWRE-2)	-0.27	-0.17	0.11

Note. * p < .05; ** p < .01

Unique correlations emerged:

- For younger children, core CELF-4 had a constant verbal working memory load, with an additional linguistic load on selective subtests
- For struggling readers, recalling sentences required both working memory and language skills
- TNL, finger windows, and TOWRE-2 were not correlated with any composites

Conclusion

Study 1

- Performance on the Modified Shortened Token Test explained by:
  - Basic attention: Parts 1 & 2
  - Working memory: Parts 3-6 (long sentences)
  - Linguistic skills: Part 6 (long & complex sentences)
- Linguistic (vs working memory) composite has unique linguistic demands

Study 2

- Receptive verbal working memory composite related to all language tasks
- Receptive linguistic composite related to following directions and morphological production

Clinical Implications

- The Modified Shortened Token Test could be a potential tool used to examine working memory and language skills in children and more research is needed

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