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Verbal Working Memory in School-Age European Portuguese Children with and without Language Impairment.

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Introduction

Abstract

Studies have shown that processing dependent measures can be reliable indicators of working memory skills and language ability in school-age children. The objectives of this study were to develop, as a Portuguese-language version, and compare performance of children with and without LI on the European Portuguese Competing Language Processing Task (EP_{CLPT}). The EP_{CLPT} was developed to mirror the structure of the CLPT (Gaulin & Campbell, 1994). The task was administered to 150 children (75 with LI and 75 randomized age-matched typical peers), aged 7-11, in Northern Portugal.

Results indicate group differences and a relationship between the measure and the LI group. The sensitivity and specificity analysis demonstrate that this measure may have a clinical and educational usefulness in identifying children with LI.

References

Daneman, M., & Carpenter, P. (1980). Individual differences in working memory and reading. *Journal of Verbal Learning and Verbal Behavior*, 19, 450-466.

Ellis Weismer, S., & Thordardottir, E. T. (April, 1999). *Verbal working memory abilities of school-age children with and without language impairment.*

Gaulin, C., & Campbell, T. (1994). Procedure for processing verbal working memory in normal school-age children: Some preliminary data. *Perceptual and Motor Skills*, 79, 55-64.

Haynes, R., Sackett, D., Guyatt, G., & Tugwell, P. (2006). *Clinical Epidemiology: How to do clinical practice research.* (Third ed.). Philadelphia: Lippincott Williams & Wilkins.

- Competing Language Processing Task is a reliable indicator of working memory skills and language ability in school-age children (Ellis Weismer & Thordardottir, 1999; Gaulin & Campbell, 1994).
- Goals of this study are to:
 - Develop a European Portuguese Competing Language Processing Task (EP-CLPT)
 - Compare the performance of European Portuguese speaking school-age children with and without language impairment (LI) on the EP-CLPT
 - Investigate sensitivity & specificity of EP-CLPT in identifying European Portuguese speaking children with LI

Method

Development of EP_{CLPT}:

- The EP_{CLPT} was developed to match the CLPT (Gaulin & Campbell, 1994)
- The same 42 sentences from CLPT translated into European Portuguese
- Recorded by Native European Portuguese speaker
- Stored on Mini-Disc recorder

Participants

- The task was administered to 150 children (ages 7-11; 2nd - 5th grade)
 - 75 children with LI (identified by school administrators)
 - 75 age, gender and SES-matched peers
- All children came from 17 state-funded schools in Northern Portugal
- All children had intelligible articulation
- All children had nonverbal IQ scores > 80 (WISC III).

Administration of the task

- Each child seen individually by the experimenter.
- Same procedure as Gaulin & Campbell (1994)
- Children's responses recorded

Measures

- Number Yes/No
- Last words recalled
- Span Size: the level at which one or both groups of last words are recalled correctly (Daneman & Carpenter, 1980, 1983, 1986).

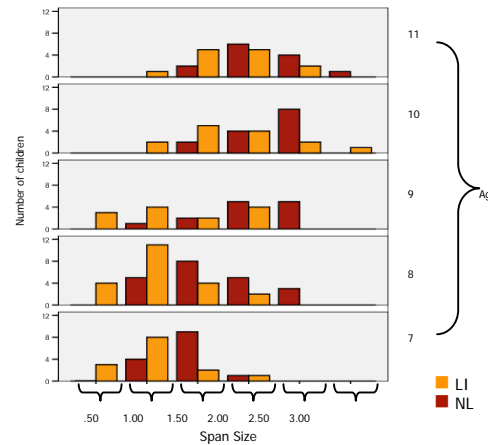
		Si/No	Child Response	Word Recalled	
		Level 1			Span SIZE 1.0
Grupo 1	As árvores têm folhas Trees have leaves.	S	S	folhas	
Grupo 2	Os comboios voam. Trains can fly.	N	N	voam	
		Level 2			
		Level 1			Span SIZE 1.5
Grupo 1	As abóboras são roxas. Pumpkins are purple.	N	N	roxas	
	As camionetas têm rodas. Busses have wheels.	S	S	rodas	
Grupo 2	Os meninos comem. Boys can eat.	S	S	comem	
	As bananas são azuis. Bananas are blue.	N	N	n/a	

Results

OVERALL PERFORMANCE: LI performance significantly worse than NL for:

- Number of correct Yes/No responses ($F(1, 147) = 26.647, p < .001$)
- Number of Last Words Recalled ($F(1, 147) = 125.102, p < .001$)
- Span Level ($F(1, 147) = 41.05, p < .001$)

	LI (N=75)		TD (N=75)	
	Mean	SD	Mean	SD
True/False	39.28**	2.2	40.73	1.2
Word Recall	12.15**	5.4	18.53	3.9
Span Level	1.37**	.58	1.86	.52



LIKELIHOOD RATIO (LH) ANALYSIS

(Haynes, Sackett, Guyatt, & Tugwell, 2006)

EP-CLPT Word Recall

Words Recalled	LI		TD		Lh. ratio
	N	Prop.	N	Prop.	
≤ 10	28	0.373	1	0.013	28.04
11-18	37	0.493	34	0.453	1.09
≥ 19	10	0.133	40	0.533	0.24
Total =	75	1.0	75	1.0	

EP-CLPT Span

Span Level	LI		TD		Lh. ratio
	N	Prop.	N	Prop.	
≤ 1.5	54	0.72	33	0.44	1.63
2-2.5	16	0.21	21	0.28	0.75
≥ 3	5	0.06	21	0.28	0.07
Total =	75	1.0	75	1.0	

SENSITIVITY AND SPECIFICITY OF EP_{CLPT}

Sensitivity and Specificity for the EP_{CLPT}:WORDS RECALLED

Cut points	Sensitivity	Specificity
10	0.40	0.99
19	0.87	0.60

Sensitivity and Specificity for the EP_{CLPT}:SPAN SIZE

Cut points	Sensitivity	Specificity
1.5	0.73	0.60
3.0	0.94	0.30

- EP_{CLPT}:WORDS RECALLED has better LH ratio than EPCNrep
- EP_{CLPT}:SPAN SIZE has better sensitivity values than EPCNrep

Conclusions

- Children with LI performed significantly below the TD group in the EP_{CLPT}.
- These results show evidence of problems in verbal working memory and language abilities in European Portuguese speaking school-age children with and without language impairment (LI)
- The sensitivity and specificity analysis demonstrate that EP-CLPT Word Recall and EP-CLPT Span may have a reliable clinical/educational usefulness in identifying children with language impairment in Portugal.

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