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# European Portuguese Children's Test of Nonword Repetition in School-Age Children with and without Language Impairment

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## Abstract

Research suggests nonword repetition ability to be an excellent marker for language and reading impairments and phonological short-term memory deficits. The objectives of this study were to develop the European Portuguese Children's Test of Nonword Repetition (EPC<sub>NR</sub>Rep) as a Portuguese-language version and compare performance of children with and without language impairment (LI).

Subjective estimates of the wordlikeness of a list of 100 nonwords were obtained following Gathercole & Baddeley (1994). Forty nonwords in sets of eight for each number of syllables (from two to six) were chosen to represent the EPC<sub>NR</sub>Rep. The EPC<sub>NR</sub>Rep was administered to 150 children (75 with LI and 75 randomized age-matched typical peers), aged 7 - 11, in Northern Portugal. Results indicate that the children with LI show significantly lower accuracy in nonword repetition as compared to their peers. The sensitivity/specificity analyses demonstrate that this measure may have reliable clinical utility in identifying children with LI.

## References

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- ♦Gathercole, S., Willis, C., Baddeley, A., & Emslie, H. (1994). The children's test of phonological working memory. *Memory*, 2(2), 103-127.
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## Introduction

□ Nonword Repetition ability appears to be a sensitive marker of children at risk for language and reading impairments (Dollaghan & Campbell, 1998; EllisWeismer et al., 2005).

□ Since the CNRep Test was developed in accordance with the phonotactic rules of English language (Gathercole & Baddeley, 1996) and the stress and pattern of the syllables in Portuguese words are different, neither the NRT or the CNRep are not suitable for non-English speakers.

## Purpose

□ To develop a European Portuguese Children's Test of Nonword Repetition (EPC<sub>NR</sub>Rep).

□ To compare European Portuguese children's performance with and without language impairment (LI).

## Development of the EPC<sub>NR</sub>Rep

Subjective estimates of the wordlikeness of a list of 100 nonwords were obtained, according to Gathercole & Baddeley's research (1994).

Twenty adult graduate native Portuguese rated each of the two, three, four, five and six syllable lengths, and the mean ratings of wordlikeness were calculated.

Mean ratings ranged from a least wordlike mean rating of 1.65 ("fataturviricho") to a most wordlike rating of 3.75 ("prota").

After this procedure, **40 nonwords** were divided into sets of eight at each syllable length (from two to six), representing the EPC<sub>NR</sub>Rep.

Each set has four nonwords rated high wordlikeness and four rated low wordlikeness.

At each of the five nonword syllable lengths, four of the nonwords contain single consonants and four contain nonwords with one or more consonant clusters.

## High and Low Wordlikeness Nonwords

### High Wordlikeness Nonwords

2-syllable	3-syllable	4-syllable	5-syllable	6-syllable
Naca	Lofena	Covilado	Melanifito	Turamusalato
Fopa	Banita	Fenerade	Bonifadade	Delagapalico
Trana	Praleta	Trapilado	Craletonina	Prinalvenioso
Prota	Bramato	Cravastado	Versatranista	Volturnacidade

### Low Wordlikeness Nonwords

2-syllable	3-syllable	4-syllable	5-syllable	6-syllable
Cafo	Mafofa	Lemanado	Nocafozono	Rolinicistato
Tuma	Dopeta	Dilomopa	Lodanapito	Fataturviricho
Grapa	Gremata	Dragamato	defermicato	Satopogatico
Trila	Tramafa	Trafeleste	Promoflicada	Cremoforosada

## Participants

• children (75 language impaired children and 75 age, gender and SES-matched peers), aged 7 -11, from 2nd to 5th grade.

• All participants came from 17 state funded schools (rural, suburban and urban environments) in Northern Portugal.

• Participants consisted of 108 boys (72%) and 42 girls (28%).

• All had intelligible articulation and nonverbal IQ scores > 80 (WISC III).

## Administration and scoring of the task

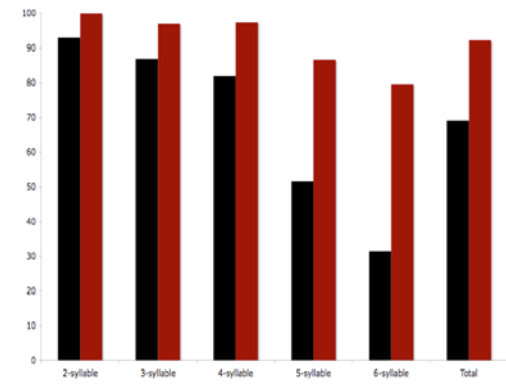
• A randomized sequence of the 40 items was generated, and a Mini-Disc recording was made of a Portuguese female speaker saying aloud the nonwords at the rate of one item every 3 seconds.

• The experimenter used a scoring procedure in which a correct repetition attempt was scored as "1" and an incorrect attempt was scored as "0".

• All children were tested individually with the experimenter at a comfortable listening level in a quiet location at school.

## Results

Results indicate that children with LI show significant lower accuracy in their nonword repetition ability as compared with their age-matched peers



Percent correct on the EPC<sub>NR</sub>Rep for children with LI and TD.

## Likelihood ratio analyses - based on Total Words Correct

• Likelihood ratio (LH) analyses (Haynes, Sackett, Guyatt, & Tugwell, 2006) were conducted.

• Sensitivity and specificity properties of EPC<sub>NR</sub>Rep total words correct were also calculated for the cut points shown below

Cut points	Sensitivity	Specificity
70	0.50	0.97
88	0.97	0.88

LH ratio for the LI and TD on the EPC<sub>NR</sub>Rep

## LH Ratio for EPC<sub>NR</sub>Rep compared to prior research

TOTWords	EPC <sub>NR</sub> Rep				Lh. ratio
	LI = 75		NL = 75		
	N	Prop.	N	Prop.	
≤ 70	38	0.50	2	0.03	<b>19.04</b>
71-74	34	0.45	2	0.03	<b>17.43</b>
75-87	1	0.01	5	0.07	<b>0.2</b>
≥ 88	2	0.02	66	0.88	<b>0.03</b>

TOTPPC	Dollaghan & Campbell (1998) <sup>1</sup>				Lh. ratio
	SLI = 44		NL = 41		
	N	Prop.	N	Prop.	
≤ 70	27	0.61	8	0.02	<b>25.15</b>
71-74	10	0.22	5	0.07	<b>3.11</b>
75-87	6	0.13	6	0.21	<b>0.62</b>
≥ 88	1	0.02	25	0.68	<b>0.03</b>

TOTPPC	Ellis Weismer et al., (2000) <sup>2</sup>				Lh. ratio
	SLI = 80		NL = 359		
	N	Prop.	N	Prop.	
≤ 70	20	0.25	34	0.09	<b>2.78</b>
71-74	12	0.15	22	0.06	<b>2.50</b>
75-87	13	0.16	64	0.18	<b>0.89</b>
≥ 88	35	0.44	239	0.67	<b>0.69</b>

TOTPPC	Thal et al., (2005) <sup>3</sup>				Lh. ratio
	H(LT) = 20		NL = 44		
	N	Prop.	N	Prop.	
≤ 70	12	0.6	8	0.18	<b>3.33</b>
71-74	2	0.1	5	0.11	<b>0.91</b>
75-87	1	0.05	6	0.14	<b>0.36</b>
≥ 88	5	0.25	25	0.57	<b>0.44</b>

<sup>1</sup> Previously classified as LI (school-age children)  
<sup>2</sup> Previously classified as SLI (kindergarten children)  
<sup>3</sup> Previously classified as HLD (late talkers - 16 months)

## Conclusions

♦ EPC<sub>NR</sub>Rep sensitivity and specificity analysis demonstrate that this nonword repetition measure may have reliable clinical/educational usefulness in identifying European Portuguese speaking children with language impairment.

♦ EPC<sub>NR</sub>Rep LH ratio analysis for Total Percent Words (TOTWrds) correct was comparable to the results of English speaking children using Total Percent Phonemes Correct (TOTPPC), (Dollaghan & Campbell, 1998; Ellis Weismer et al., 2000; Gathercole & Baddeley, 1994).

♦ Further research needs to determine if LH ratio's for EPC<sub>NR</sub>Rep TOTWrds and TOTPPC are comparable. If yes, then scoring may need to be done only at the 1/0 Word correct level for identification of children at risk for language learning impairments.

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