

Online Components of Spelling Test (CoST): Pseudo-word version

An evidence-based spelling error analysis tool for diagnostic, comparative and longitudinal assessment purposes

The **CoST: Pseudo-word version** comprises three **Subscale Tests**, one for each component (PhOrM). Each Subscale Test can be administered separately.

This **online assessment offers automated error analysis**, saving teachers considerable time. Full instructions are provided. These include administration protocols, dictation prompts, tables of norms (Years 3 to 6) and Scoring Templates (for the option to manually analyse errors if preferred).



A detailed **Error Analysis Report** is provided for each **Subscale Test** that is administered/completed online. The **Error Analysis Report** is presented in an Excel file. It includes raw scores, percentiles, standard deviations, and the words that each student in the class attempted.

Select the assessments appropriate for the school year level:

1. CoST: Pseudo-word Subscale Tests for students in Year 3 and Year 4; or
2. CoST: Pseudo-word Subscale Tests for students in Year 5 and 6, or above if needed.

Summary of CoST: Pseudo-word structure

Spelling Components (PhOrM) Subscale Tests	Error analysis: CoST Pseudo-word Subskills
Phonological (Ph) 1. Year 3 and Year 4 Test: 25 words 2. Year 5 and Year 6 Test: 30 words Approximate duration: 20 minutes	Monosyllabic words ^a Epenthesis errors Elision errors Substitution errors Disyllabic words ^a Epenthesis errors Elision errors Substitution errors Polysyllabic words ^a Epenthesis errors Elision errors Substitution errors
Orthographic (Or) 1. Year 3 and Year 4 Test: 30 words 2. Year 5 and Year 6 Test: 35 words Approximate duration: 20 minutes	Part A: Constrained letter patterns ^b Part B: Common long vowel graphemes ^c
Morphological (M) (items dictated in sentence contexts) 1. Year 3 and Year 4 Test: 45 words 2. Year 5 and Year 6 Test: 50 words Approximate duration: 30 minutes PowerPoint slides are included for the online Subscale Test.	Inflected suffixes ^d Derivational suffixes ^d Prefixes ^d [includes non-assimilated & assimilated prefixes] Greek & Latin roots ^e

Notes.

^a All grapheme-phoneme correspondences are analysed using the scoring templates (initial consonants, final consonants, short vowel graphs, consonant blends (clusters) and consonant digraphs;

^b Graphemes included are dependent upon their position in a word. One plausible grapheme for each item;

^c Multiple graphemes are plausible for each item;

^d Sentences are dictated, with all words visible to the student except for the affixed pseudo-word by which the student is required to spell. The pseudo-base is also provided;

^e The target pseudoword is not visible to the student but the remaining words in the sentence are.

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Summary of key psychometric properties of the CoST: Pseudo-word version

The *Components of Spelling Test (CoST): Pseudo-word version* is a valid and reliable norm-referenced dictation spelling assessment based on Triple Word Form Theory. It uses a structured and systematic error analysis technique designed to measure three spelling components underpinning Standard English: The three Subscale Tests measure the Phonological component (Ph), Orthographic component (Or) and Morphological component (M) of spelling.

Research background

Full details are published in:

Daffern, T., & Ramful, A. (2020). Measurement of spelling ability: Construction and validation of a phonological, orthographic and morphological pseudo-word instrument. *Reading and Writing*, 33(3), pp. 571-603.
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Psychometric testing and validation of the CoST: Pseudo-word version occurred over two research phases. In the first phase, the CoST: Pseudo-word version was tested on a calibration sample of 381 students from Years 3 to 6, aged between 8 and 12 years. Two versions of the test were recursively developed for Years 3 and 4 (*Pseudo-word: 3-4*) and Years 5 and 6 (*Pseudo-word: 5-6*). In the second phase of the study, the calibrated instrument was validated on a different sample of students in Years 3 and 4 ($n = 224$) and Years 5 and 6 ($n = 233$).

The norm-referenced sample

Students for sample two were recruited from four Australian Government schools to participate in the second phase of instrument validation. The mean demographic (ICSEA) index for the participating schools was 1028 and the school indices ranged from 985 to 1140. The participants were 457 students (228 boys and 229 girls) from Years 3, 4, 5 and 6, aged between 8 and 12 years. All students whose parents provided consent were included in the sample. Eight participating students were identified as Aboriginal or Torres Strait Islander (Year 3, $n = 2$; Year 4, $n = 2$; Year 5, $n = 3$; Year 6, $n = 1$); and ten students were learning English as an additional language (Year 3, $n = 3$; Year 4, $n = 3$; Year 5, $n = 2$; Year 6, $n = 2$). The sampled population was assessed in the middle of the school year in 2018.

Reliability

The table below presents the reliability values of the final version of the CoST: Pseudo-word version for Years 3 and 4 (*Pseudo-word: 3-4*), and for Years 5 and 6 (*Pseudo-word: 5-6*). Data from the second phase of the study were used for these analyses. Results show strong internal consistency among the items in each of the constructs. The Cronbach alpha values range from .812 to .931 and the separation reliability values vary from .790 to .916, well above the 0.7 recommended benchmark.

Reliability indices (Cronbach alpha and separation reliability) of the reduced instrument

Students	$n = 224$		$n = 224$	
	Pseudo-word: 3-4		Pseudo-word: 5-6	
CoST	Test items	Cronbach alpha (Separation Reliability)	Test items	Cronbach alpha (Separation Reliability)
Phonological	$n = 25$	$\alpha = .865 (.860)$	$n = 30$	$\alpha = .897 (.909)$
Orthographic	$n = 30$	$\alpha = .854 (.845)$	$n = 35$	$\alpha = .812 (.790)$
Morphological	$n = 45$	$\alpha = .910 (.913)$	$n = 50$	$\alpha = .931 (.916)$

Note. Separation reliability indices from Rasch are presented in brackets

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Normed sample (derived from 2nd phase of the study)

Year of schooling (Australia)	Mean age in years
Year 3 (<i>n</i> =110)	8
Year 4 (<i>n</i> =114)	9
Year 5 (<i>n</i> =110)	11
Year 6 (<i>n</i> =123)	12

Predictive validity

The CoST: Pseudo-word version significantly correlates with the real-word version of the CoST. In the table that follows, the numbers below the diagonal are the correlations between the real-word and pseudo-word constructs for the Year 3 and 4 students (taken as one cohort) while those above the diagonal are for Year 5 and 6 students (taken as one cohort). For instance, the correlation between Phonological-rw and Orthographic-rw is .796 for the Year 5 and 6 cohort while it is .809 for the Year 3 and 4 cohort. The correlations are significant and relatively high for both the Year 3 and 4 cohort and the Year 5 and 6 cohort, supporting the argument that the spelling components develop almost concurrently across age level. These findings provide empirical support for Triple Word Form Theory.

Correlations between CoST: Real-word and CoST: Pseudo-word for Years 3 to 6

Spelling Component	1	2	3	4	5	6
1. Phonological-rw	-	.796**	.785**	.681**	.702**	.770**
2. Orthographic-rw	.809**	-	.826**	.572**	.775**	.833**
3. Morphological-rw	.811**	.860**	-	.669**	.761**	.883**
4. Phonological-pw	.806**	.749**	.733**	-	.713**	.614**
5. Orthographic-pw	.781**	.800**	.757**	.804**	-	.717**
6. Morphological-pw	.793**	.820**	.851**	.770**	.777**	-

** $p < .01$; rw: real word; pw: pseudo-word

Summary of descriptive scores for the CoST: Pseudo-word (Years 3 and 4) from 2nd study phase

	Phonological /25		Orthographic /30		Morphological /45		Total (PhOrM) /100	
	Year 3	Year 4	Year 3	Year 4	Year 3	Year 4	Year 3	Year 4
Average	12.86	14.50	15.28	18.54	19.55	24.12	47.70	57.17
SD	5.88	4.69	6.25	5.34	8.79	7.96	19.66	16.36
Mode	13	16	11	19	19	34	48	52
Median	13	15	16	19	19	24	48	59
Min	1	5	2	4	3	9	9	22
Max	24	24	27	29	42	42	87	88

For additional psychometric information about this measure including construct validity, content validity, inter-rater reliability, group differences (MANOVAs) and item-level analyses (using Classical Test Theory (CTT) and Rasch), please refer to the publication by Daffern and Ramful (2020).

Ethics approvals for the research as reported in Daffern and Ramful (2020) were obtained through the University of Canberra and the participating schools.

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Suggested assessment schedule using the CoSTEY and CoST

Grade	Timeframe	Spelling Assessments	Purpose		
			Comparative	Diagnostic	Longitudinal
Foundation	Semester 2: Term 3	CoSTEY: Phonological (Part A only) (online or print)	✓	✓	
Grade 1	Semester 1: Term 1	CoSTEY: (online or print) Phonological (Part A & B)	✓	✓	✓
		CoSTEY: (online or print) Orthographic (Part A & B)	✓	✓	
		CoSTEY: (online or print) Morphological	✓	✓	
Grade 2	Semester 1: Term 1	CoSTEY: (online or print) Phonological (Part A & B)	✓	✓	✓
		CoSTEY: (online or print) Orthographic (Part A & B)	✓	✓	✓
		CoSTEY: (online or print) Morphological	✓	✓	✓
Grades 3 to 6	Semester 1: Term 1	CoST: (online or print) Real-word version (online or print)	✓	✓	✓
Grades 3 to 6	Semester 2: Term 4 (follow-up measure)	CoST: (online or print) Pseudo-word version	✓	✓	✓
Foundation to Grade 2	Twice a term	See CoSTEY manual: Dictation passages; Sentence-level applications.	ART: Progress monitoring of taught concepts Acquisition (A) + Retention (R) + Transfer (T) = ART		
Grades 3 to 6	Twice a term	See CoST Dashboard: Cloze passages; Dictation passages; Sentence-level applications.	ART: Progress monitoring of taught concepts Acquisition (A) + Retention (R) + Transfer (T) = ART		

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CoSTEY Introduction Video: https://youtu.be/6d4Pxsruem?si=Eu_WT9sNp8cTI4hf

CoST Introduction Video: <https://youtu.be/kIN389RMO6M?si=oiXuchFNjBDjPQO> CoST Information Video: <https://youtu.be/6MJqvkcylNc?si=Fd8Ril2THZxfRptj>