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Identifying markers of individual differences in literacy across languages:

Common approaches to early screening and diagnosis

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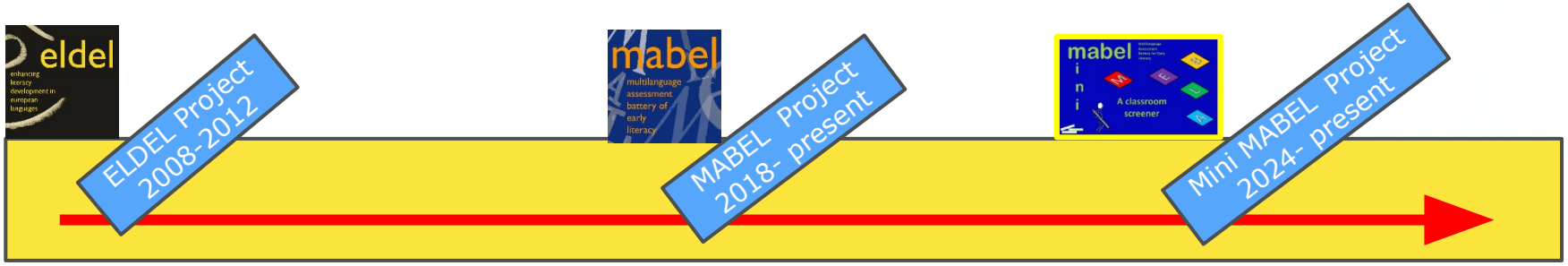
Foundations for the Future

Evidence-based practices and policies to promote early literacy

May 4-5 | Fundação de Serralves - Porto

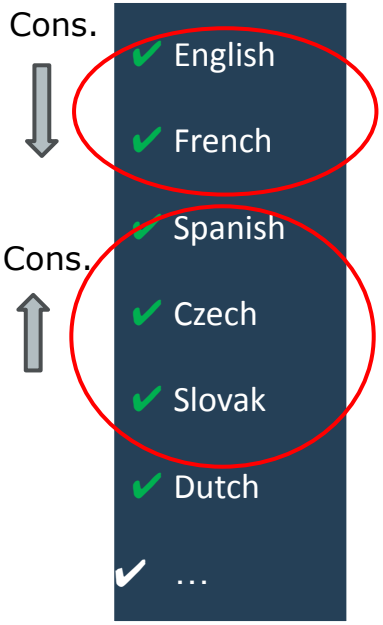
- **Framework**:
  - Cross-linguistic perspective on foundational literacy development
  - Triple Foundation Model (TFM) as theoretical framework
- **Aims**:
  - Consider possible generalizations about cognitive foundations of literacy across languages, over time – empirical studies
    - Key cross-linguistic studies from the ELDEL project
- Following a chronological sequence of events, I will then focus on an evidence-based **application** arising from the ELDEL research
  - **MABEL** – Multilanguage Assessment Battery of Early Literacy - extensions to additional languages, notably Portuguese
    - **New results from Portuguese LER Project**
  - **Mini MABEL** – proof of concept and pilot data assessing a multilanguage screening tool

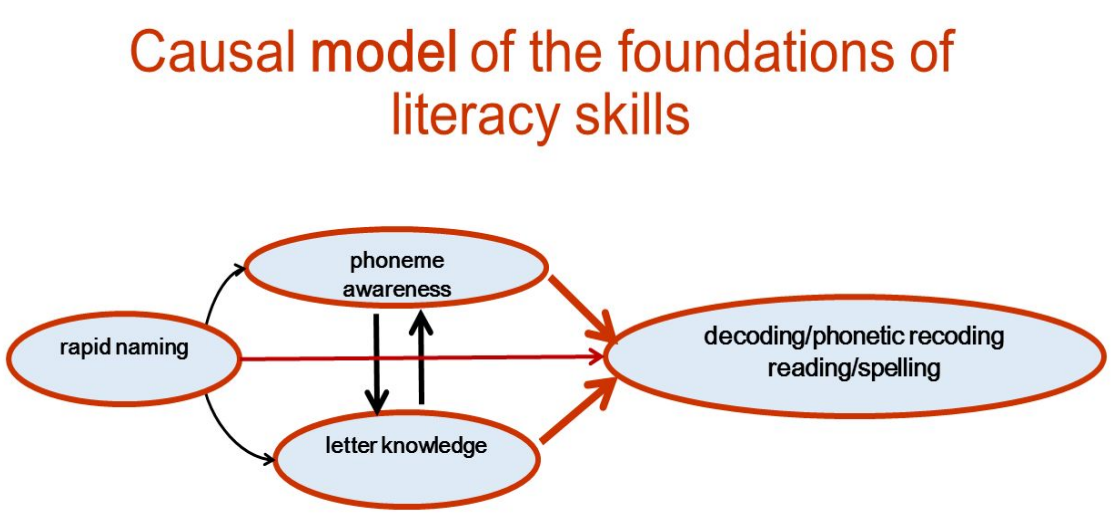


Acknowledgement of contributing colleagues

The MABEL Group @ 2026

Theoretical Framework: Triple Foundation Model
Core foundational predictors of underpin word-level skills in languages across the alphabetic consistency spectrum in the earliest phase of reading development are PA, LK, RAN





Core precursors of word-level alphabetic literacy skills are awareness of phonemes, knowledge of letters, and the ability to name visual objects quickly. These are reciprocally related abilities that promote alphabetic literacy (e.g. Hulme et al., 2005).

- Do inconsistent orthographies require greater emphasis on language-based, phonological skills?
- Do consistent orthographies require greater emphasis on speed of naming (proxy for reading speed) to read?

e.g., Melby-Lervåg et al. (2012); National Institute for Literacy (2008); Snowling and Melby-Lervåg (2016)

+Cons.

~.99

.96

.92

.86

.72

- Cons.

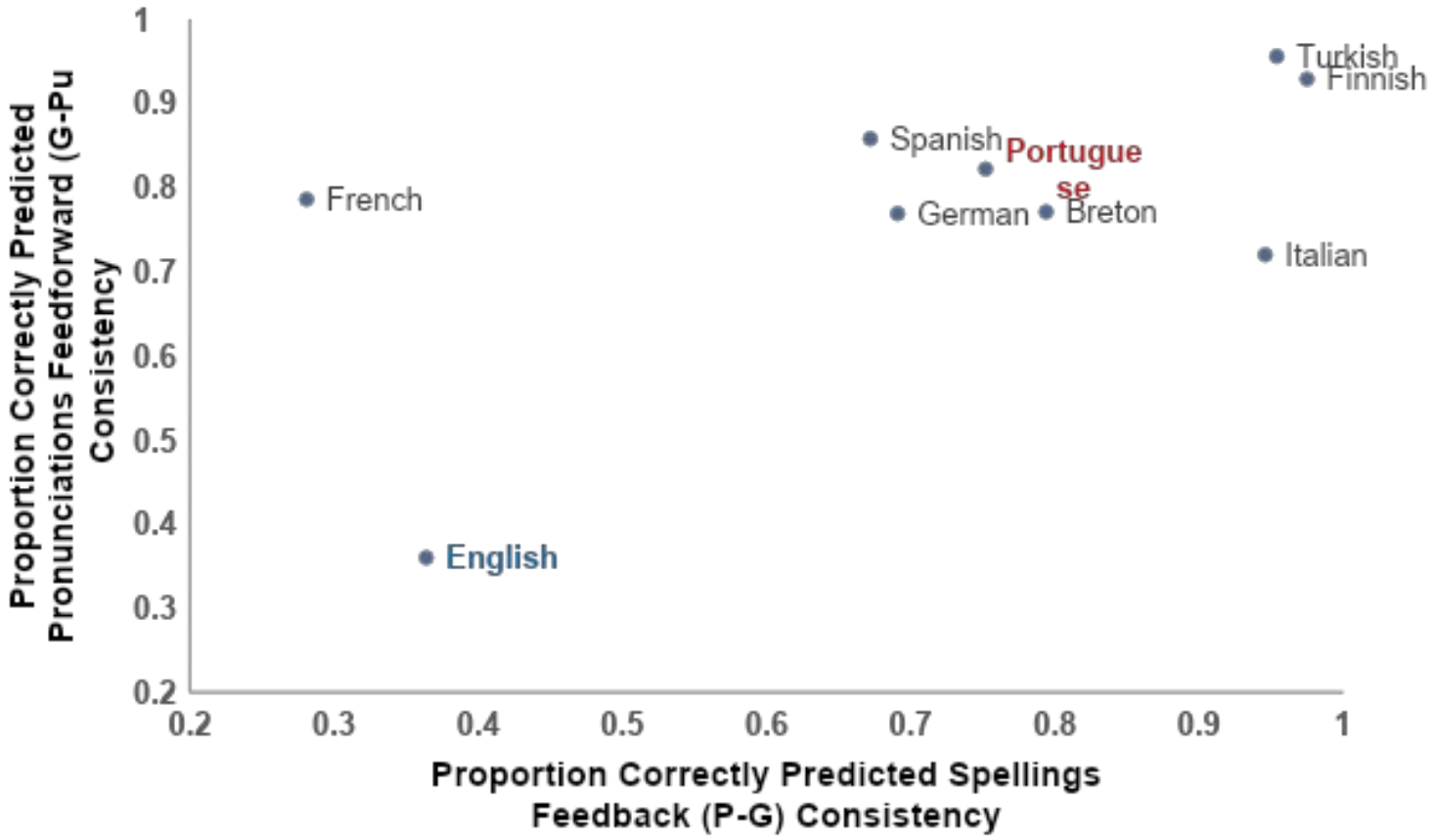


Figure: Marjou (2021)-- Mean G-P and P-G Consistency Estimates by Language

B. Kessler (2011)

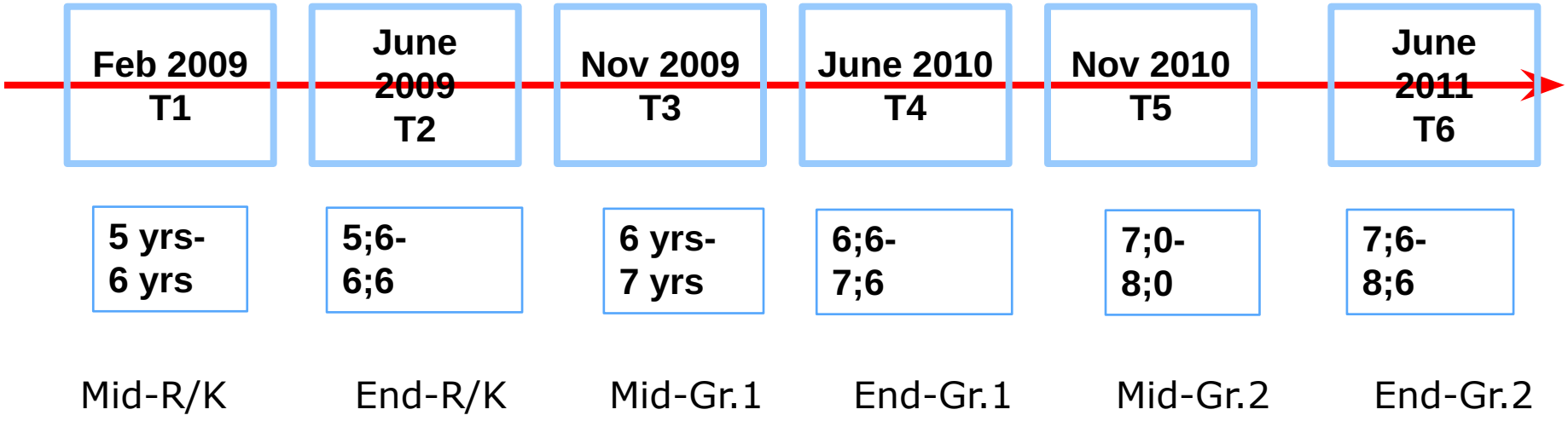
Early Literacy Development in European Languages

eldel
enhancing literacy development in european languages

INVESTIGATED DEVELOPMENT OF READING AND SPELLING SKILS

Tracked > 970 children (*n* = 150-200) in five countries in transition from **kindergarten to second grade**

I. Compared ***foundational underpinnings*** of **emergent reading** abilities
II. Compared children's ***rate*** and ***pattern*** of **growth** of **silent** and **aloud word reading**



Psychological Science
XX(X) 1–9

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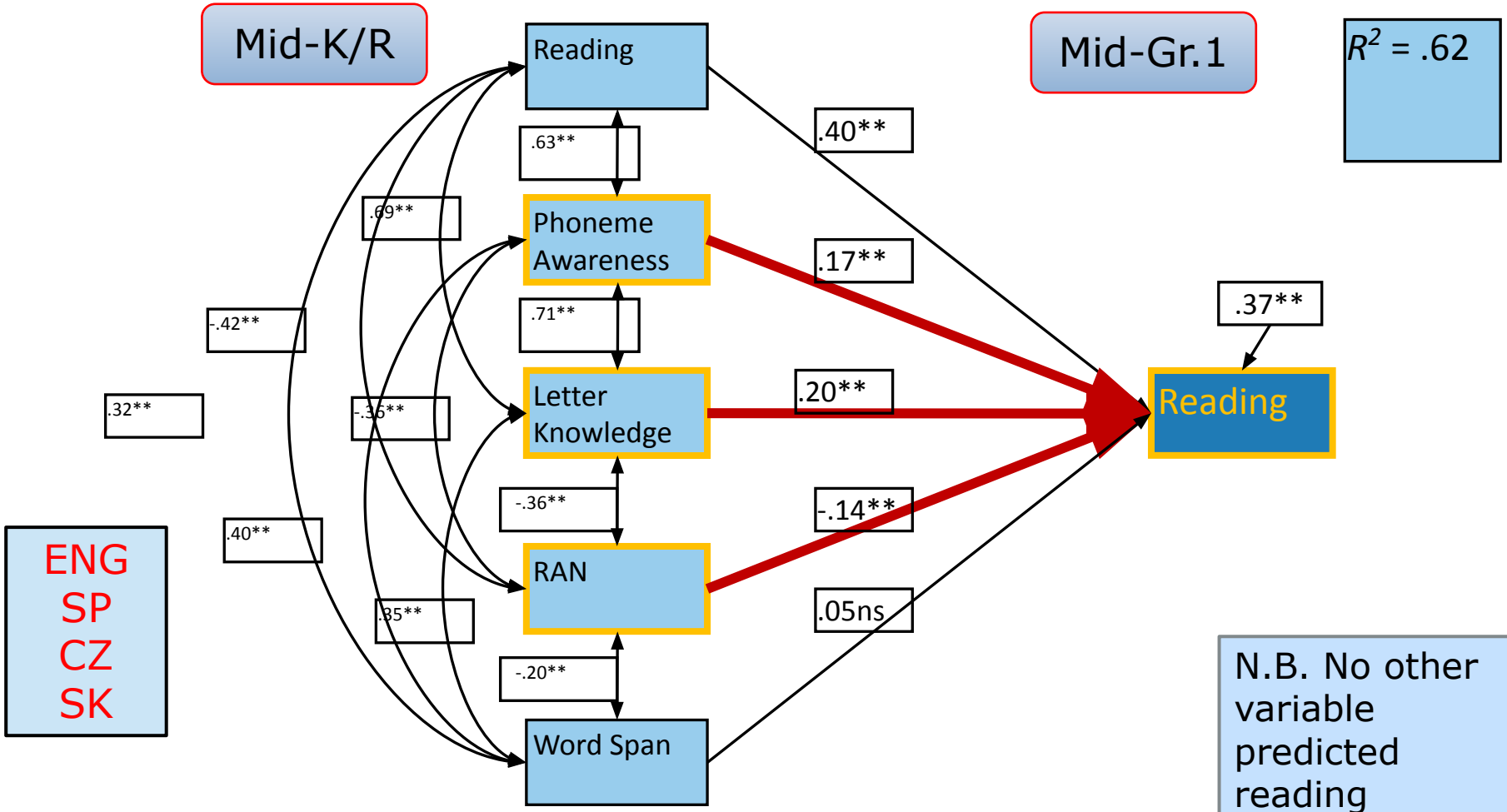
Testing the TFM: Foundations of Reading Development

Multi-group path model predicting growth in early word reading



Model fit: χ^2 (63, N = 675) = 39.70, p < .991, CFI =1.00, TLI =1.02, RMSEA = .000 [.000-.000], SRMR =.041

N.B. No other variable predicted reading development in this phase!

Summary of Cross-linguistic Foundations

- Universal Foundations: PA, LK, & RAN (but not VSTM) are universal predictors of alphabetic literacy.
- Weighting: As the reading/spelling system is being established, these core predictors are equally important across languages.
- Timing & Persistence: All 3 play a role from the beginning of the literacy development process, and their effects persist at least into the middle of grade 1.
- Moderating effects of orthography: Possibly, orthographic consistency will begin having a moderating effect on the relative weighting of the predictors as reading/spelling skills begin to exert a reciprocal impact on component cognitive abilities

In later stages of reading and spelling development...

- Letter Knowledge and Phoneme Awareness tend to correlate very strongly, and their influences become statistically difficult to tease apart.
- As children begin to read and spell autonomously, variance in PA and LK becomes subsumed in concurrent Reading and Spelling variances (e.g., Caravolas, Hulme, & Snowling, 2001; Caravolas et al., 2013)
  - Therefore in studies with older readers, **PA and LK** may not emerge as independent predictors of reading/spelling over and above the autoregressive effects of reading and spelling themselves.
  - **RAN** is typically found to be a moderate but stable predictor of reading accuracy and a robust predictor of reading speed (Araújo et al., 2015; Lervag & Hulme, 2009)

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DOI: 10.1177/0956797612473122
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SAGE

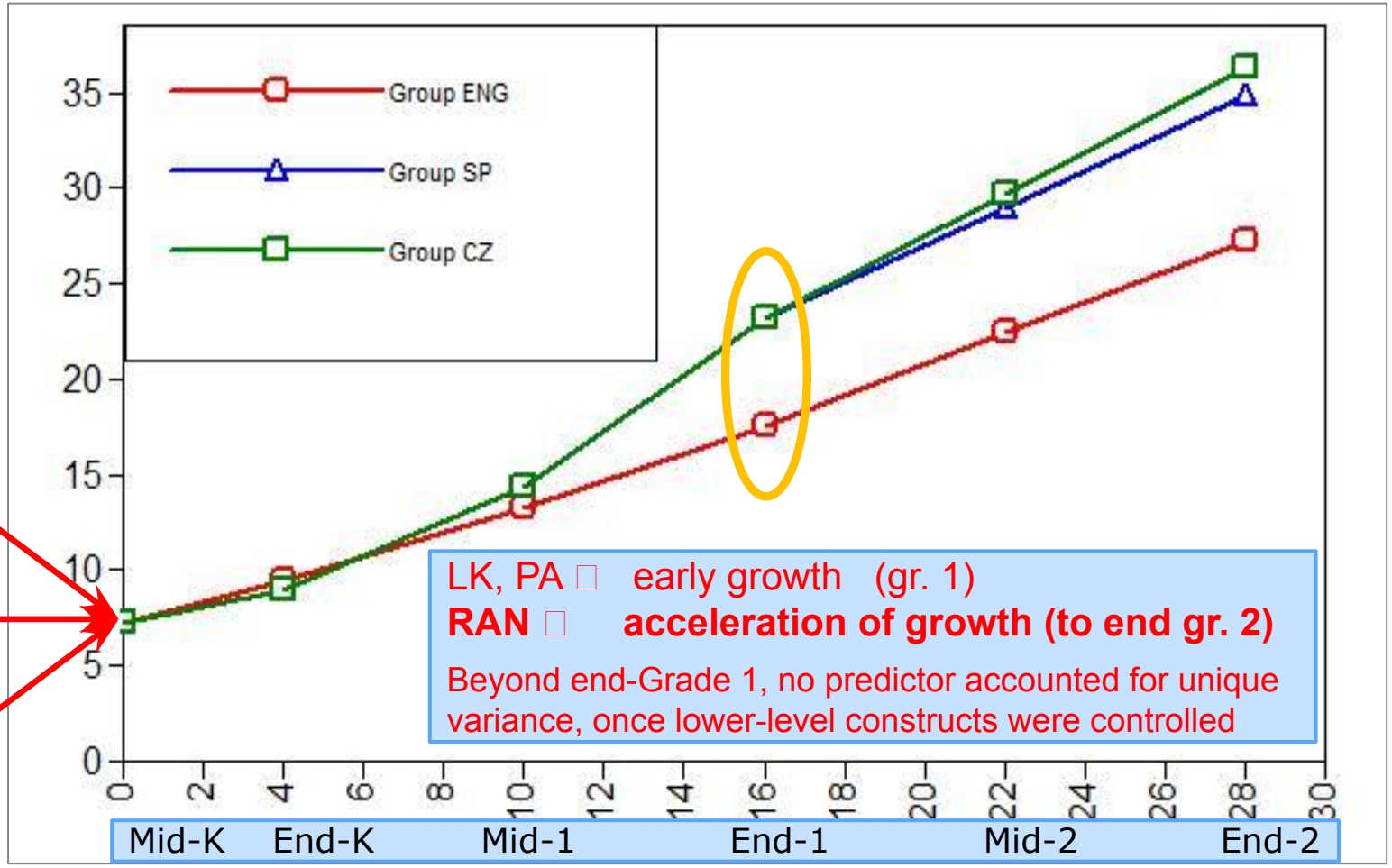
Caravolas et al., 2013

Predictors of Growth – Silent Reading

PA

LK

RAN



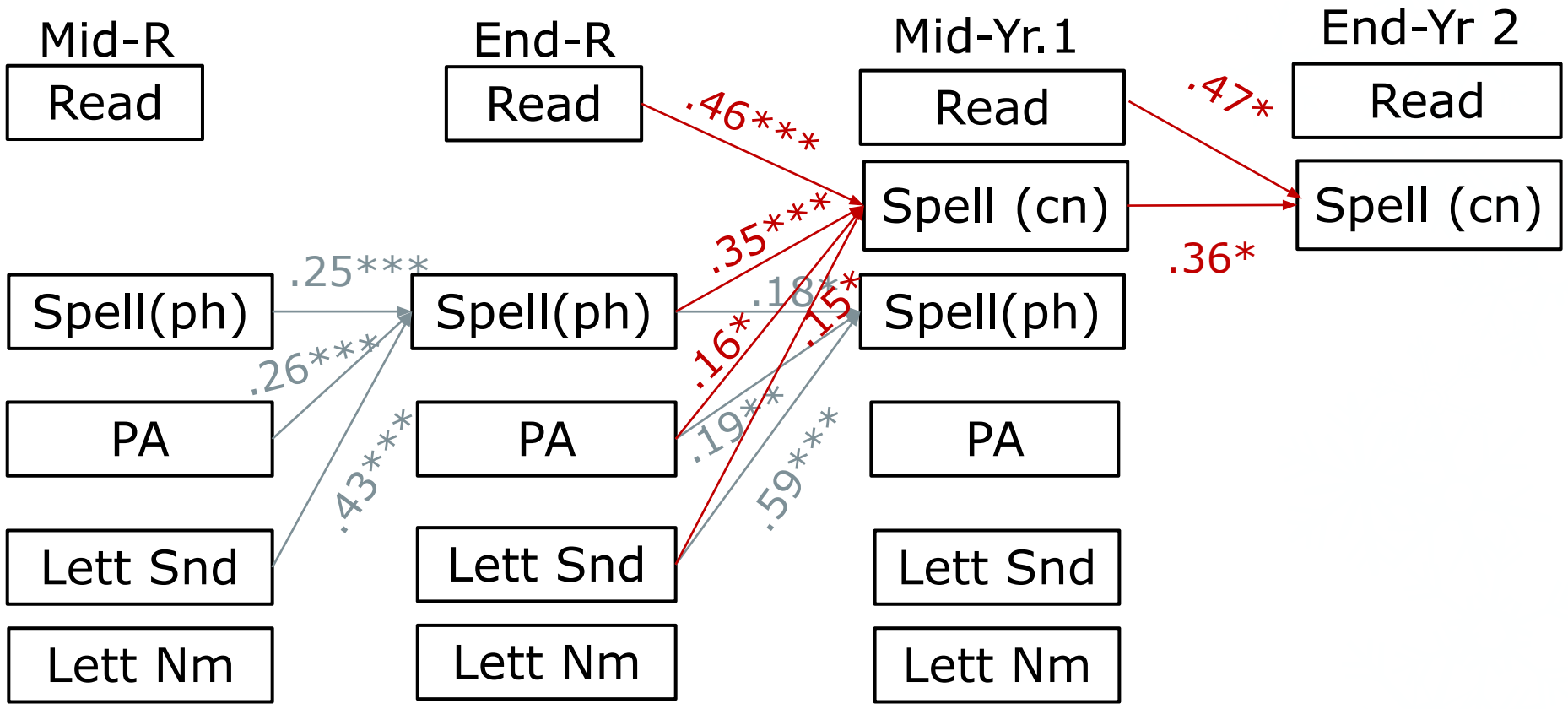
Pattern of prediction was the same across languages.

Foundations of Spelling Development

Journal of Memory and Language **45,** 751–774 (2001)
doi:10.1006/jmla.2000.2785, available online at http://www.academicpress.com on IDEAL®

(Caravolas, Hulme, & Snowling, 2001)

Predictors of Phonological (ph) and Conventional (cn) spelling



The Foundations of Spelling Ability: Evidence from a 3-Year Longitudinal Study

Markéta Caravolas
University of Liverpool, Liverpool, United Kingdom
and
Charles Hulme and Margaret J. Snowling
University of York, York, United Kingdom

Summary of the roles of PA, LK, and RAN in later reading and spelling

- Results confirm that the influences of PA, LK eventually become subsumed in reading and spelling measures.
- RAN continues to contribute independently to individual differences in reading and spelling, and its effects are stable
- Moreover, PA, LK, and RAN are discriminators of typical and dyslexic populations across the orthographic spectrum (e.g.,Araújo et al., 2015; Lervåg & Hulme, 2009; Peterson et al., 2018; Snowling & Melby-Lervåg, 2016, NRP, and others).

From Research to Practice: The MABEL tool

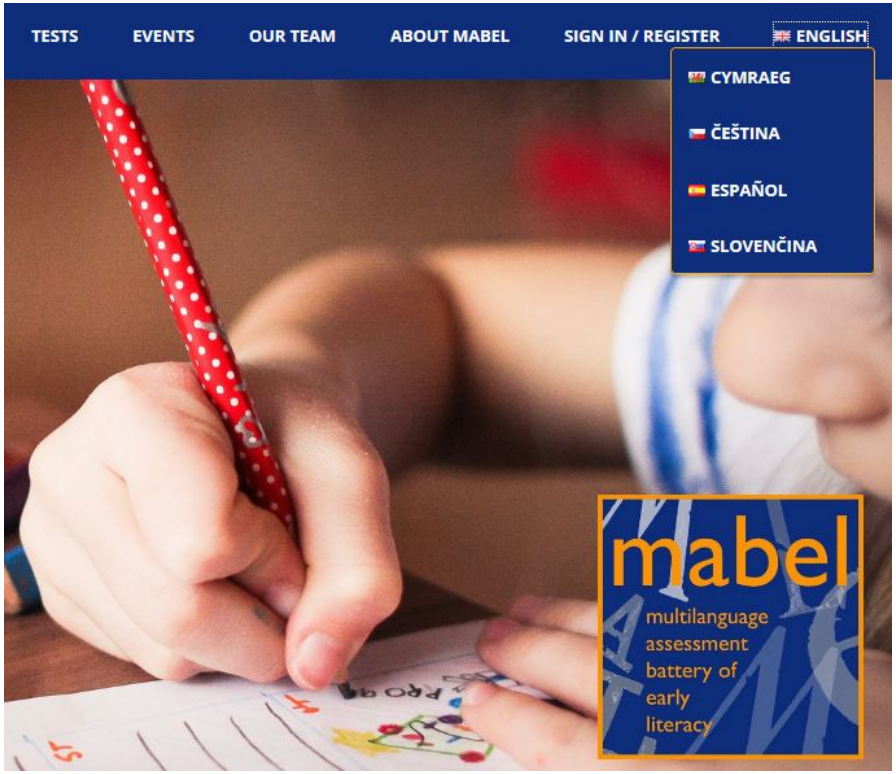
From ELDEL to MABEL

A multilingual, web-based resource for tests and information about the assessment of early literacy in a variety of languages (www.eldel-mabel.net).

- Current holdings include test batteries in 8 languages: English, Welsh, Spanish, Czech, Slovak, Polish, Portuguese, and Ukrainian
- In development are versions in European and Canadian French
- It is **evidence-based**
- MABEL arises from a large-scale **international** Marie Curie ITN (ELDEL), on **research** on early literacy development in European languages
- Test materials **validated** in six major, international, **research publications**, and numerous publications (papers, books) across participating languages

- It is **freely available** to qualified, registered users

- It is **unique in its form and scope**
  - No comparable multi-language tool available



TESTS · EVENTS · GROUP MEMBERS · ABOUT MABEL · PUB

Tests

- Phoneme Deletion — Pen & Paper, Computer Assisted
- Phoneme Isolation — Pen & Paper, Computer Assisted
- Phoneme Blending — Pen & Paper, Computer Assisted
- Basic Word Spelling — Pen & Paper
- Graded Word Spelling — Pen & Paper
- Pseudoword Spelling — Pen & Paper
- One Minute Word Reading — Pen & Paper
- One Minute Pseudoword Reading — Pen & Paper
- Picture-Word Matching — Pen & Paper
- RAN – Colours — Pen & Paper
- RAN – Objects — Pen & Paper
- RAN – Digits — Pen & Paper
- RAN – Letters — Pen & Paper
- Letter Knowledge – Naming — Pen & Paper
- Letter Knowledge – Writing — Pen & Paper

PRUEBAS · EVENTOS · NUESTRO EQUIPO · ACEI

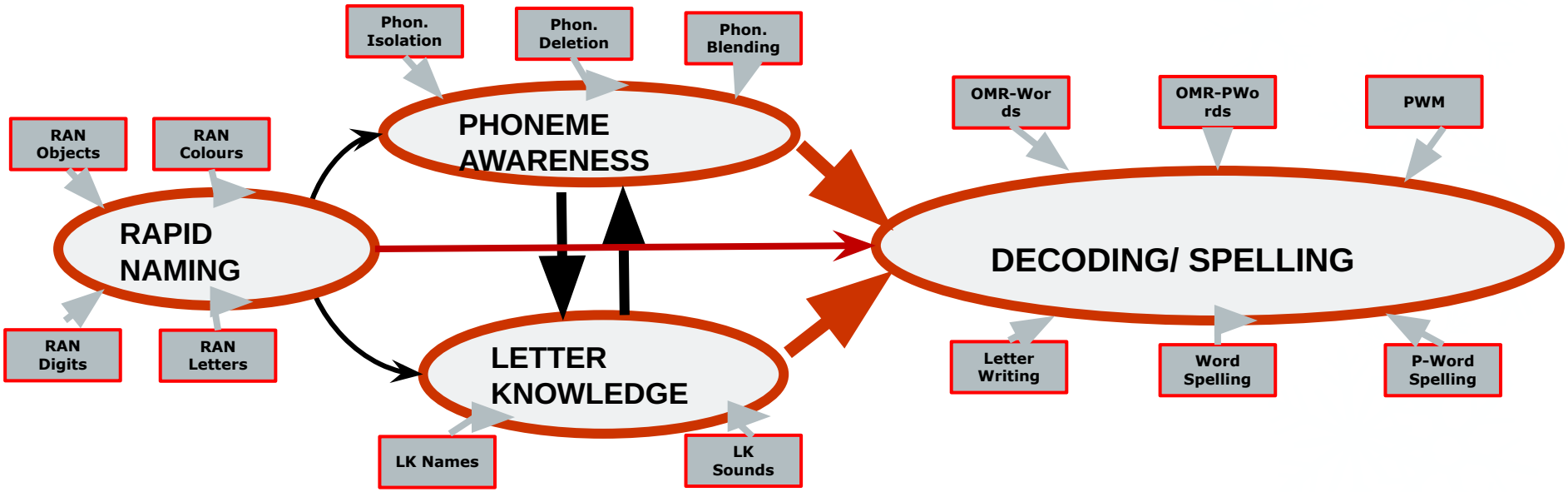
Pruebas

- Omisión del fonema — Pen & Paper
- Aislamiento de fonemas — Pen & Paper
- Síntesis de fonemas — Pen & Paper
- Escritura de palabras básicas — Pen & Paper
- Un minuto de lectura de palabras — Pen & Paper
- Un minuto de lectura de pseudopalabras — Pen & Paper
- Escritura de pseudopalabras — Coming soon.
- Emparejamiento palabra-dibujo — Pen & Paper
- Denominación rápida automatizada (RAN) – Objetos — Pen & Paper
- Denominación rápida automatizada (RAN) – Dígitos — Pen & Paper
- Denominación rápida automatizada (RAN) – Letras — Pen & Paper
- Conocimiento de letras – Sonido y Nombre — Pen & Paper

ENGLISH

- CYMRAEG
- ČEŠTINA
- ESPAÑOL
- SLOVENČINA
- FRANÇAIS
- POLSKI
- PORTUGUÊS
- УКРАЇНСЬКА

Measures of the components of the Triple Foundation Model



Core precursors of word-level alphabetic literacy skills are awareness of phonemes, knowledge of letters, and the ability to name visual objects quickly. These are reciprocally related abilities that promote alphabetic literacy (e.g. Byrne, 1998; Caravolas & Samara, 2015; Hulme et al., 2005).

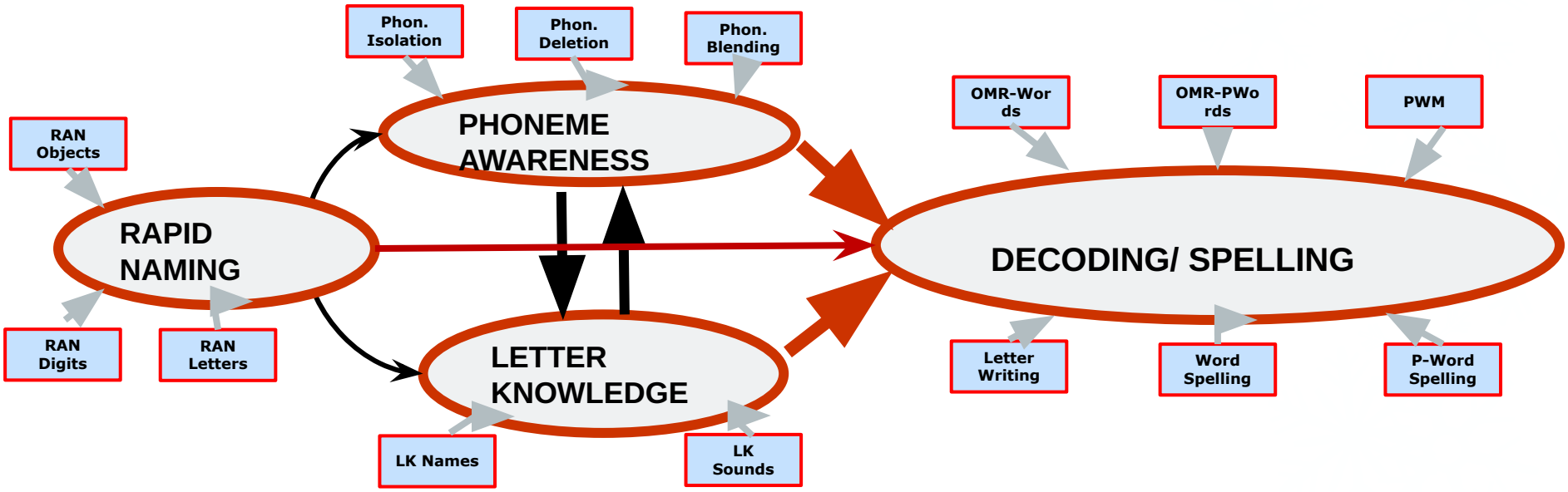
A first look at the longitudinal predictions of Reading in Portuguese

- The large standardisation and validation study of literacy development in Portuguese is under way.
- The study is conducted in multiple longitudinal waves with nationally representative samples of children in Kindergarten, Grade 1 and Grade 2.
- In order to compare the results of the present study with the older ELDEL studies of early reading and spelling, we need to await another year, when Kindergarteners will have reached Grade 1.

- Nevertheless, we were able to examine models predicting reading outcomes in slightly older children in Grades 1 and 2.

- Using similar cognitive reading-related measures as in our previous work, we estimated how the Triple Foundation Model predictors of Phoneme Awareness, Letter Knowledge and RAN predicted later reading.

Measures in the Portuguese Reading Foundations Study the foundations of alphabetic literacy



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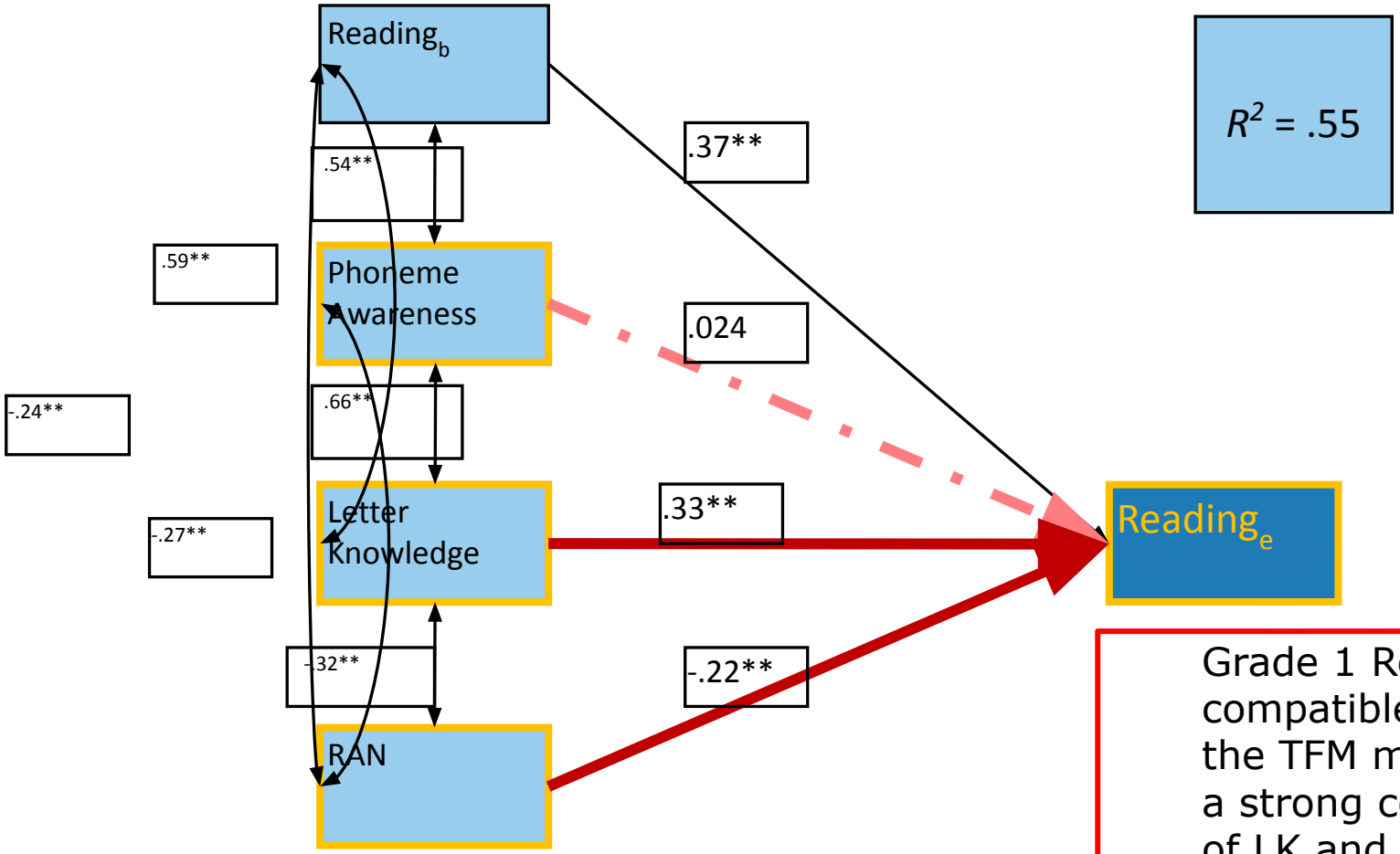
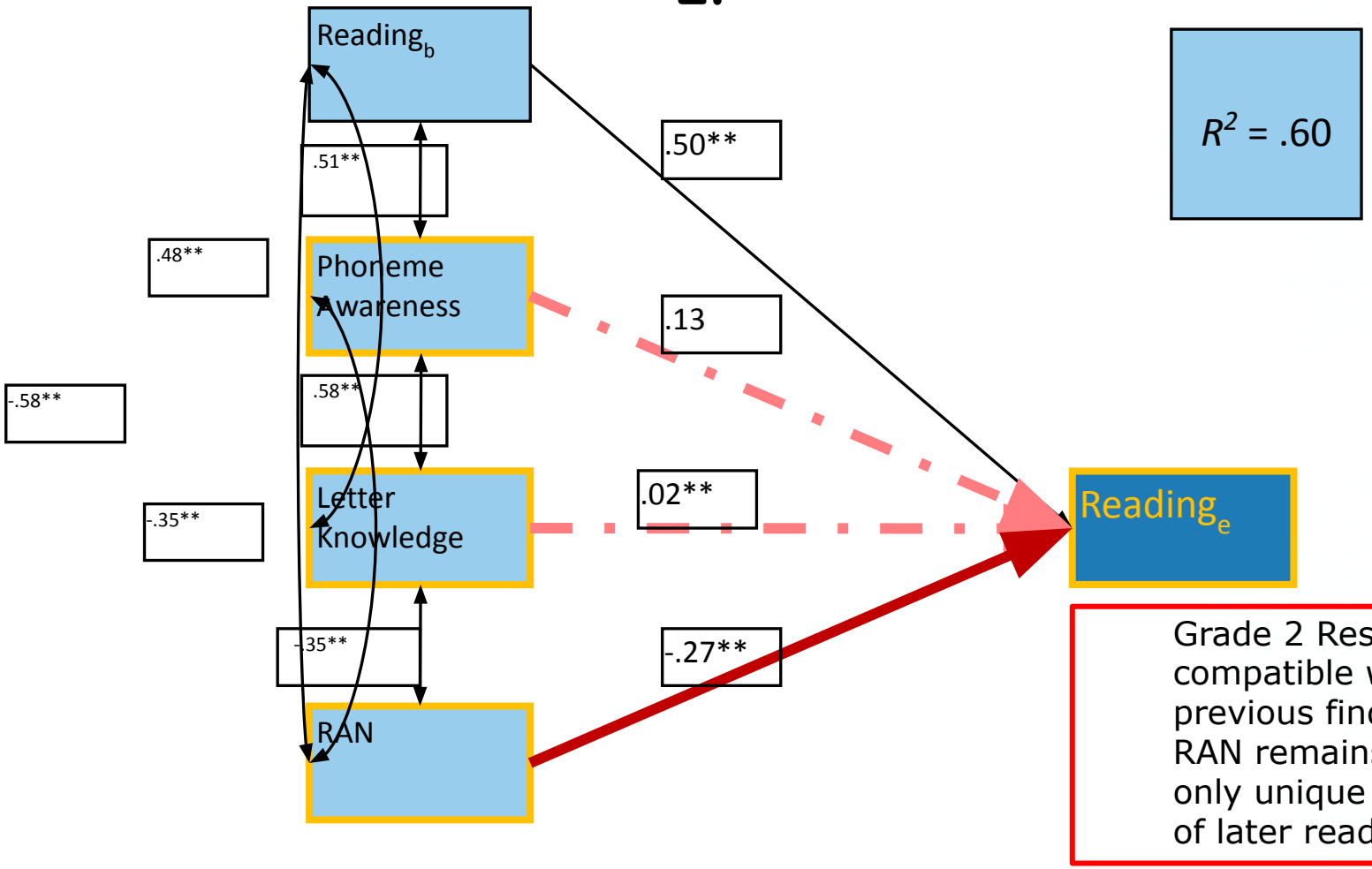
Path model predicting growth at the end of Grade 1 from measures at the start of Grade 1.



Model fit: χ^2 (63, N = 290) = 65.39, p < .000, CFI =1.00, TLI =1.00, RMSEA = .000 [.000-.000], SRMR =.000

Grade 1 Results compatible with the TFM model. PA a strong correlate of LK and Reading, but not a unique predictor.

Path model predicting growth at the end of Grade 2 from measures at the start of Grade 2.



Model fit: χ^2 (63, N = 245) = 39.54, p < .000, CFI =1.00, TLI =1.00, RMSEA = .000 [.000-.000], SRMR =.000

Summary of the Portuguese Results to Date

- Grade 1 Results are compatible with the TFM model, such that:
  - All proximal core skills were strongly associated with end-of grade reading outcomes (***r***s = -.42 (RAN) up to ***r***s = .65).
  - By Grade 1, individual variation in start-of-year Phoneme Awareness was already subsumed by concurrent reading, and Letter Knowledge
    - Thus did not emerge as a unique predictor in this model (cf. Caravolas et al. 2001; Caravolas et al., 2019, and others)
  - Letter Knowledge and RAN emerged as unique longitudinal predictors, over and above the autoregressive effect of start-of-year variations in reading.
- Grade 2 Results are compatible with the TFM and other research on more advanced foundational stage, such that:
  - All proximal core skills were moderately-strongly associated with end-of grade reading outcomes (***r***s = .43 up to ***r***s = -.61 (RAN)).
  - The autoregressive correlation was very high (***r*** = .73).
  - By Grade 2, individual variations in start-of-year Phoneme Awareness and Letter Knowledge were already subsumed by concurrent reading skills
  - RAN emerged as a unique longitudinal predictors, over and above the autoregressive effect of start-of-year variations in reading (cf. Araujo, 2011; Caravolas et al., 2013).

- **The LER results for Portuguese, to date, are largely compatible with findings from other languages**
  - We await the Kindergarten data for a more complete account of foundational literacy development. ☺️

Further Application Developments

Mini MABEL
A classroom Screener
(in development)

Background: Mini MABEL's Key features

Motivation

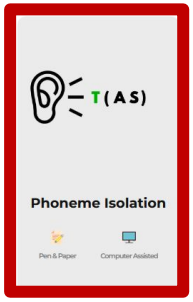
Created **in response to existing Users' and potential Users' expressed need** for:

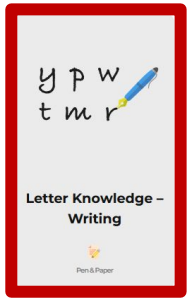
- Something classroom teachers can **easily learn** to administer
- **Quick** to administer (20 min)
- Test **easy to score and interpret** as part of Response to Intervention (does child need early support?)
- A tool with potentially very **important implications for child**

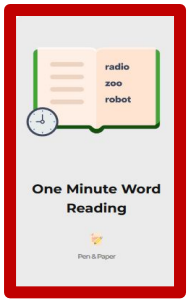
Multilanguage Testing

5 Tests

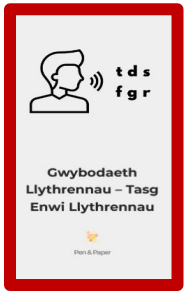
English

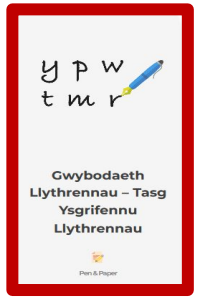






Welsh





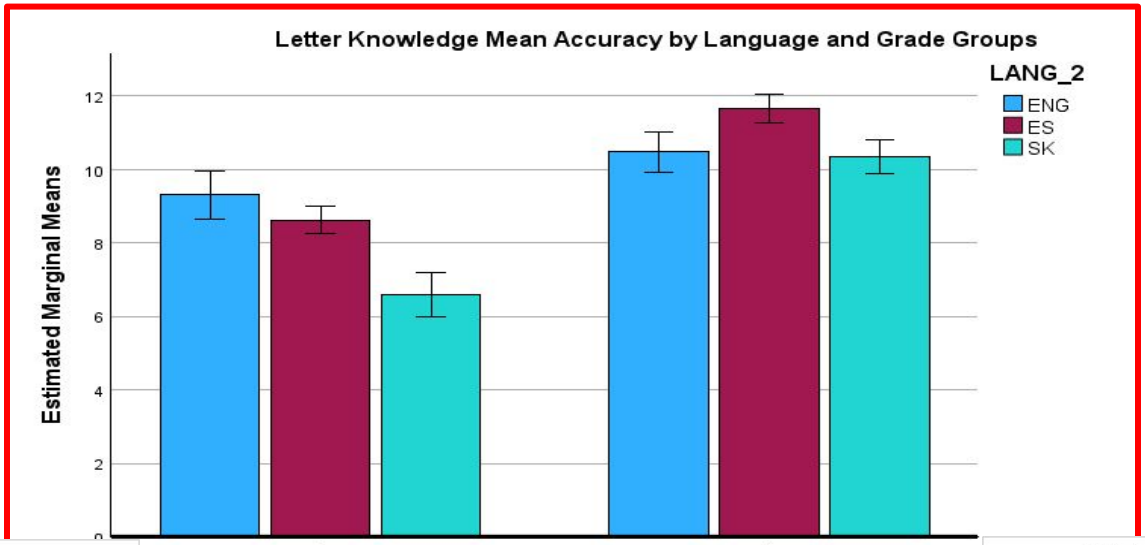
Proof of Concept

- Can a much reduced multilanguage battery of core precursor skills be useful in identifying very young learners for relatively low or high risk of dyslexia?
- Can measures be sensitively scaled to avoid floor and ceiling effects.
- We address this in our Pilot Validation study.

Indicative evidence from three languages: Pilot Study Participants

	Kindergarten/Reception			Grade 1/ Year 1		
Language	Mean (SD)	n	% Girls	Mean (SD)	n	% Girls
English	59 (4.5)	54	54	70 (4.3)	76	49
Spanish	67 (3.9)	162	48	79 (3.8)	149	49
Slovak	75 (4.9)	58	52	81.35 (5.3)	105	58

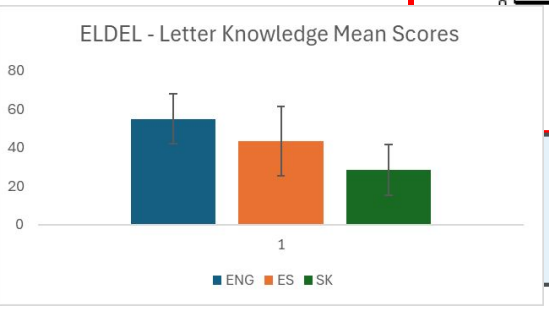
Letter Naming Accuracy in Kindergarten and Grade 1 Across English, Spanish and Slovak



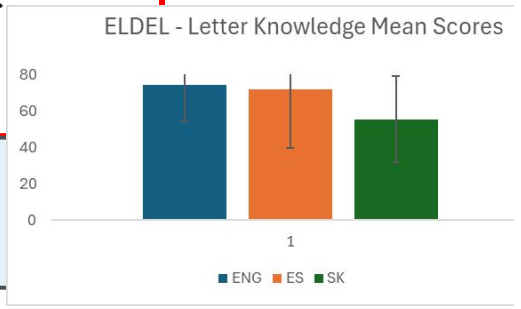
ENG=ES
SK< ENG, ES

ENG=SK
ES > ENG, SK

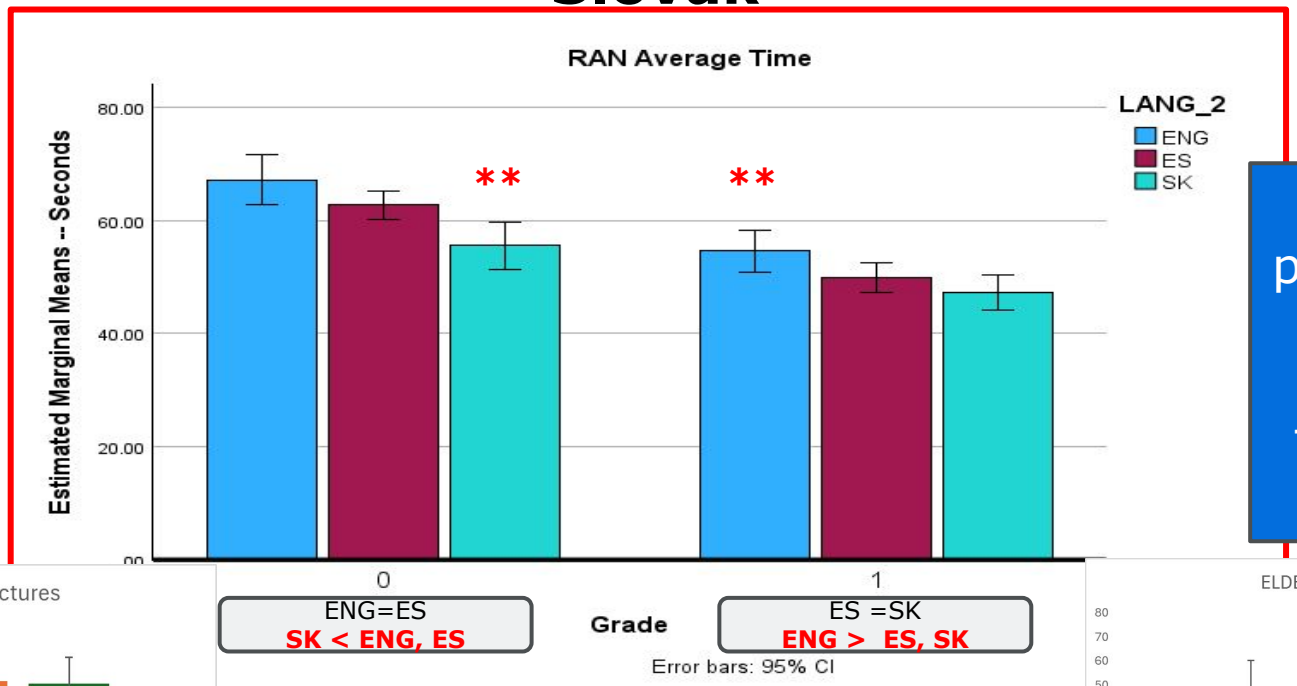
No floor effects in K, mastery in Gr.1



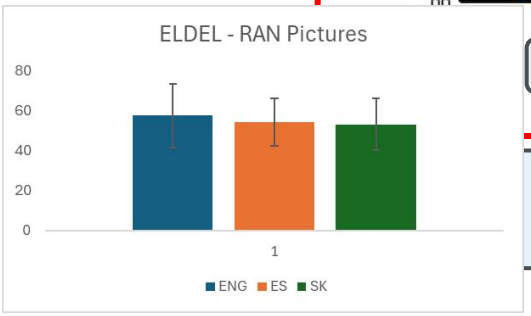
Large effect of grade: η^2 = .21
Small interaction effect Grade x Language: η^2 = .02



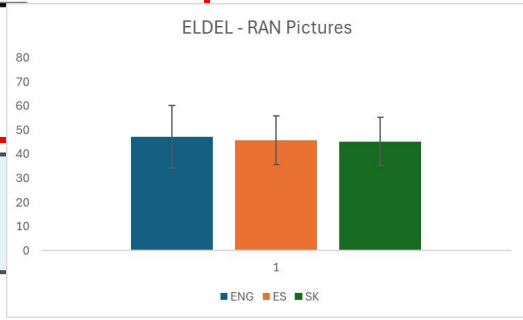
Rapid Automatised Naming Speed – Pictures - in Kindergarten and Grade 1 Across English, Spanish and Slovak



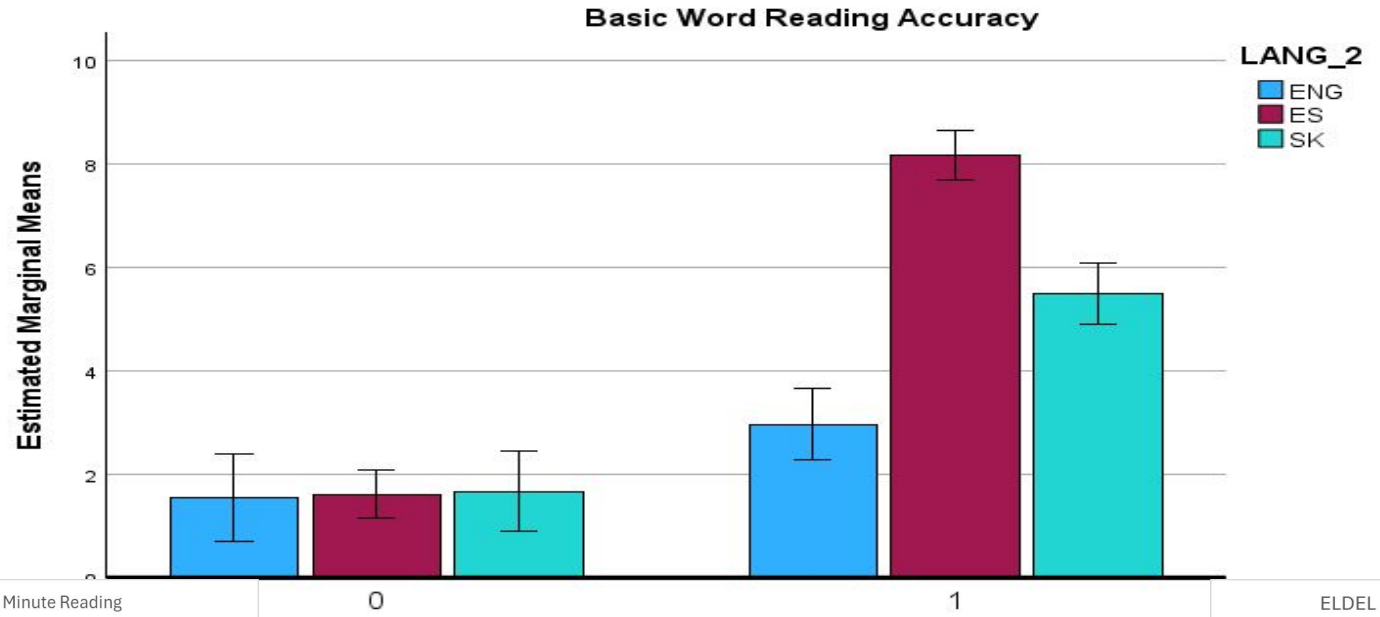
Consistent pattern in K, and Gr.1. All getting faster over time.



Small effect of Language: η^2 = .037
Moderate effect of Grade: η^2 = .092



Word Reading Accuracy in Kindergarten and Grade 1 Across English, Spanish and Slovak

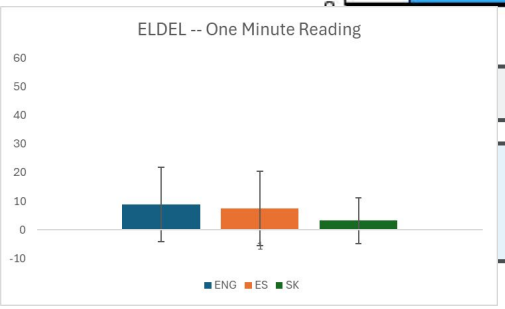


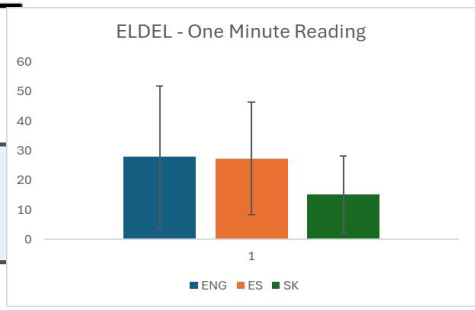
ENG= ES =SK

ENG < SK < ES

Large effect of grade: η^2 = .26

Moderate interaction Grade x Language: η^2 = .10





Our intended screening approach – percentile thresholds of readiness and of risk

Concept

Criterion-referenced – each test to have set threshold scores

- Kindergarten/Reception Year exceeding thresholds (appx. 70-75% accuracy) will signal child's READINESS for literacy
- Year 1 pupils not exceeding thresholds (appx. 25-30% accuracy) signal child's RISK of failure ir literacy attainment (? cca. 10-15% of pupils)

Sets the stage for full MABEL assessment as/when need arises (e.g., if classroom intervention fails and child continues to struggle).

Example Percentile Ranks and Example Cut-offs for Rapid Automatised Naming

RAN Pictures - Percentile Ranks							
RAN Time	**95**	**90**	**75**	**50**	**25**	**10**	**5**
ENG Reception	36	43	**53**	67	75	100	116
ENG Year 1	34	36	42	50	65	**78**	91
ES Kindergarten	41	44	**49**	60	71	89	101
ES Grade 1	34	37	41	47	57	**69**	77
SK Kindergarten	35	38	**46**	55	62	71	90
SK Grade 1	34	36	39	45	52	**61**	72

Summary of patterns by language

- Results of the pilot are encouraging to date.
- All groups made significant gains in all skill between Kindergarten and Grade 1.
- No floor effects, except as expected on reading in K.
- Reliabilities to date from English, Welsh and Slovak are good to excellent (α .80 to .96)
- On reading measure, a reassuring pattern of results, consistent with previous data (ELDEL) using more extensive test materials.

Continuities between MABEL and Mini MABEL

- Currently:
  - MABEL battery now available in nine languages
  - Has near 3,000 users from 35 countries, with positive feedback of functional experiences
  - Users seek also shorter assessments for quick/early screening – hence, Mini MABEL.
- For the near future:
  - Mini MABEL materials complete, data collected in six languages
  - Complete validation studies and then normative data sets
  - Eventually discriminant function analyses to test the validity of our classification approach.
- To date, these two batteries seem to be well streamlined, and early indications are that the screener will be most beneficial as an aggregated across all languages tool.

mabel
multilanguage assessment battery of early literacy

mabel mini
Multilanguage Assessment Battery for Early Literacy
A classroom screener

Obrigada pela vossa atenção

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Univerzita Karlova

PANEURÓPSKA VYSOKÁ ŠKOLA
Fakulta psychológie

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University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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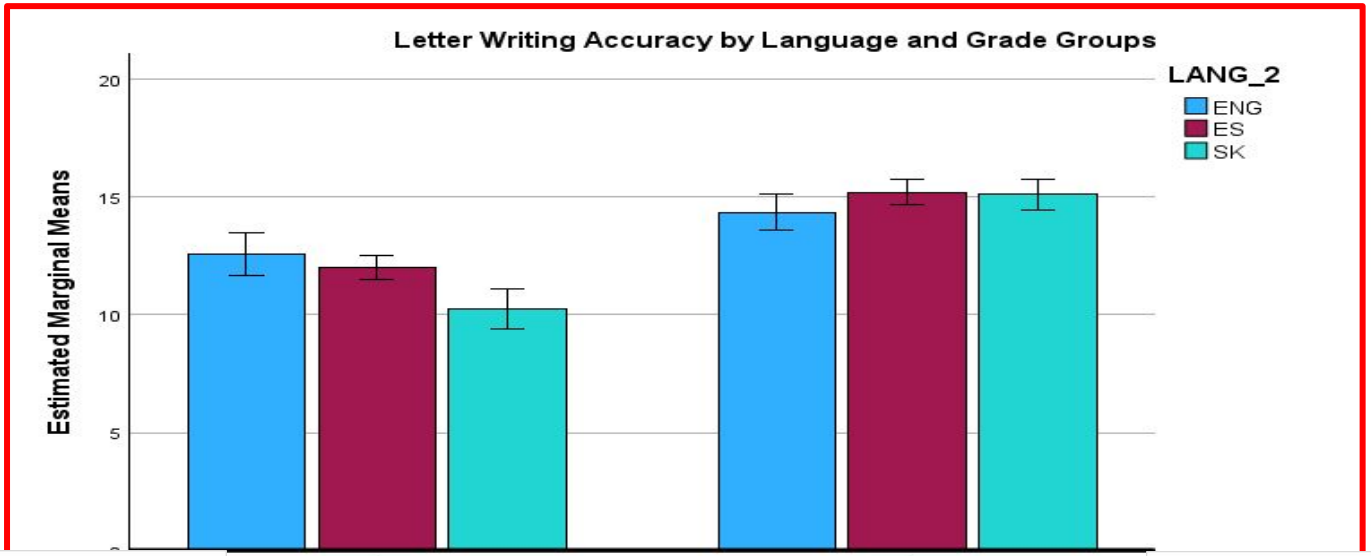
UAM

Example Percentile Ranks and Example Cut-offs for Letter Naming

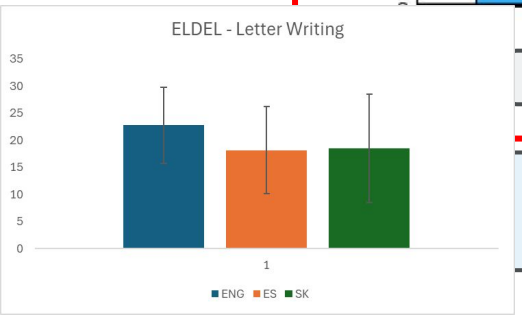
	Percentile Ranks						
Letter Knowledge Acc.	5	10	25	50	75	90	95
ENG Reception	1.20	4.20	7.00	11.00	**12.00**	12.00	12.00
ENG Year 1	5.40	**6.60**	10.00	11.00	12.00	12.00	12.00
ES Kindergarten	4.00	5.00	7.00	9.00	**11.00**	12.00	12.00
ES Grade 1	10.00	**11.00**	12.00	12.00	12.00	12.00	12.00
SK Kindergarten	0.00	1.00	3.00	8.00	**9.00**	11.10	12.00
SK Grade 1	6.00	**7.00**	9.00	11.00	12.00	12.00	12.00

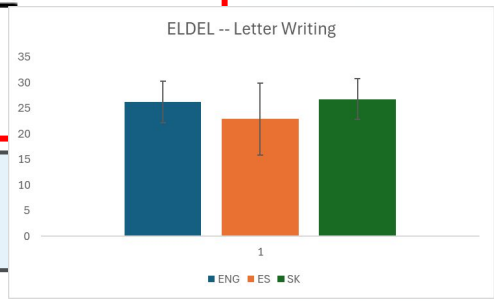
Letter Writing Accuracy in Kindergarten and Grade 1 Across English, Spanish and Slovak



ENG=ES
SK < ENG, ES

ES =SK
ENG < ES, SK

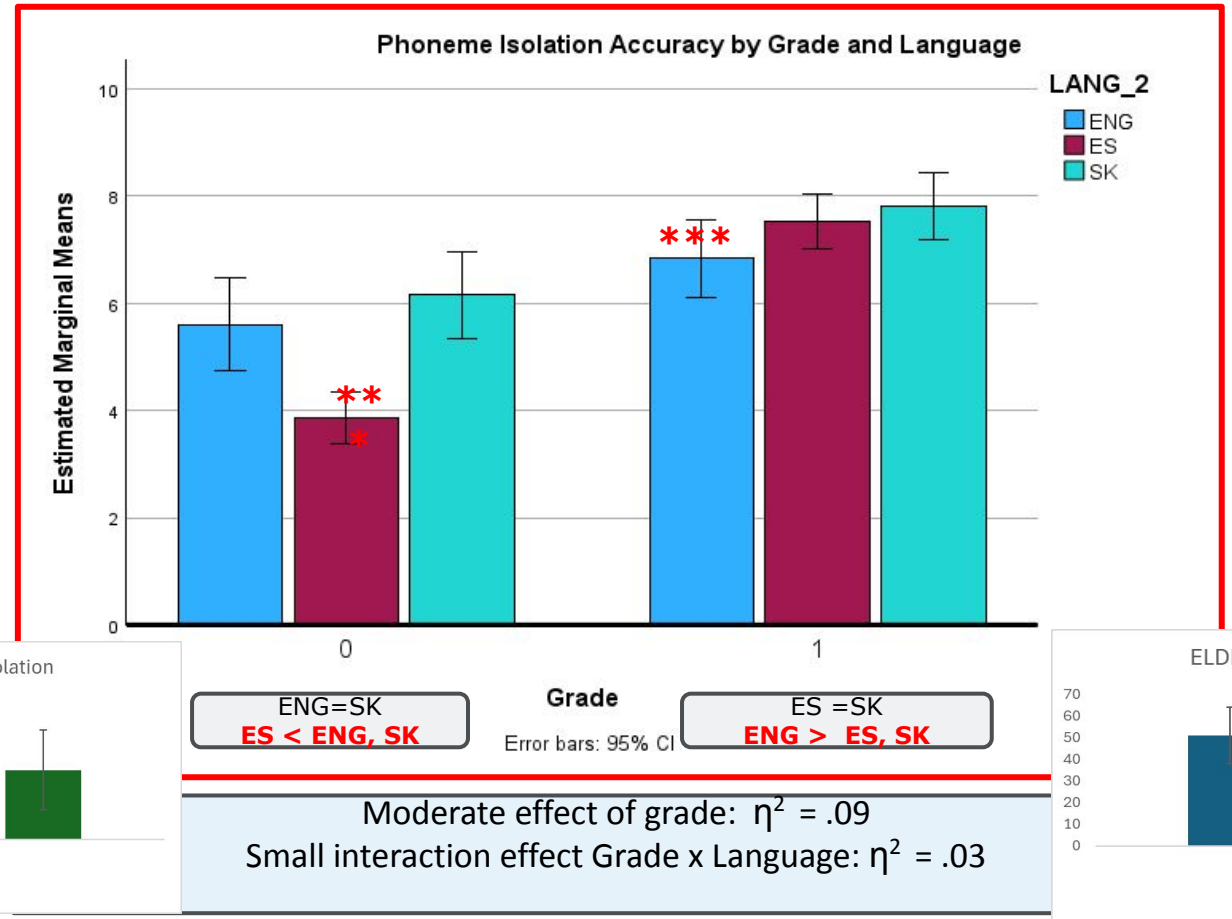


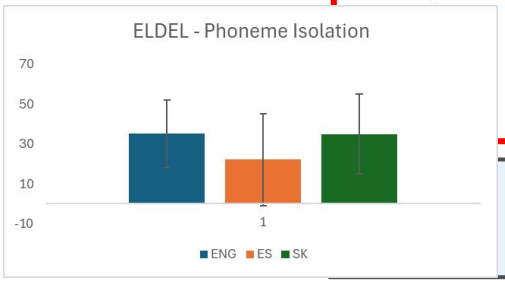


Large effect of grade: $\eta^2 = .17$

Small interaction effect Grade x Language: $\eta^2 = .02$

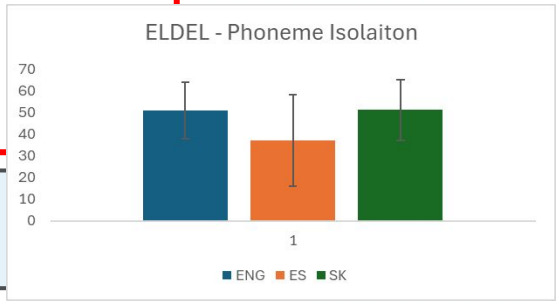
Phoneme Isolation Accuracy in Kindergarten and Grade 1 Across English, Spanish and Slovak





Moderate effect of grade: η^2 = .09

Small interaction effect Grade x Language: η^2 = .03



Concurrent validity – Correlations from **Spanish** and **Slovak** Samples

English Mononlingual sample yet too small.

	Slovak (upper) and Spanish (lower) Kindergarten				
	Letter Naming	Letter Writing	Phoneme Isolation	RAN	Word Reading
Letter Naming	--	.90***	.61***	-.45***	.60***
Letter Writing	.74***	--	.64***	-.41**	.49***
Phoneme Isolation	.57***	.59**	--	-36**	.48***
RAN	-.42***	-.33***	-.33***	--	-.35**
Word Reading	.59***	.46***	.46***	-.34***	--
	Slovak (upper) and Spanish (lower) Grade 1				
	Letter Naming	Letter Writing	Phoneme Isolation	RAN	Word Reading
Letter Naming	--	.76***	.67***	-.62***	.77***
Letter Writing	.41***	--	.48***	-.49***	.53***
Phoneme Isolation	.45***	.18*	--	-.50***	.65***
RAN	-.49***	.22**	-.36***	--	-.61***
Word Reading	.52***	.28***	.51***	-.51***	--

Simultaneous Regressions on End-Year Reading / Spelling Accuracy from mid-year (T1) Reading and Mini MABEL Composite scores

Predicting End-Year Reading Accuracy from Mid-Year MM and Reading skill.

Variable	β	t	p
Kindergarten			
Reading T1	.421	2.88	.01
MM_Composite	**.534**	**3.65**	**.001**
Grade 1			
Reading T1	.398	.424	.01
MM_Composite	**.452**	**4.36**	**.01**

Kindergarten: $R^2 = .58$, $p < .001$
Grade 1: $R^2 = .43$, $p < .001$

Predicting End-Year Spelling Accuracy from Mid-Year MM and Reading skill.

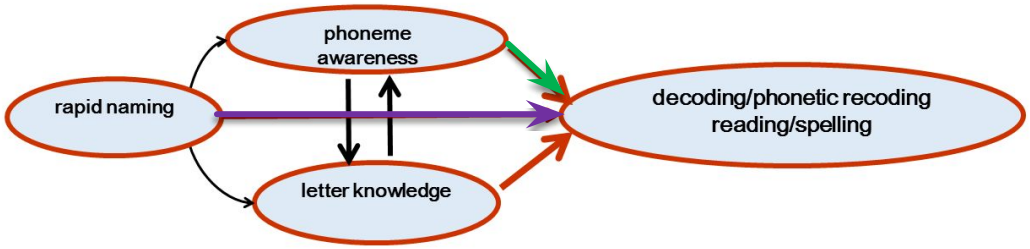
Variable	β	t	p
Kindergarten			
Reading T1	.208	1.12	ns
MM_Composite	**.436**	**2.34**	**.03**
Grade 1			
Reading T1	.063	.424	ns
MM_Composite	**.650**	**4.36**	**< .001**

Kindergarten: $R^2 = .27$, $p = .03$
Grade 1: $R^2 = .44$, $p < .001$

Testing the TFM: Foundations of Reading Development

Are inconsistent and consistent orthographies differentially underpinned by core cognitive skills?

Causal model of the foundations of literacy skills



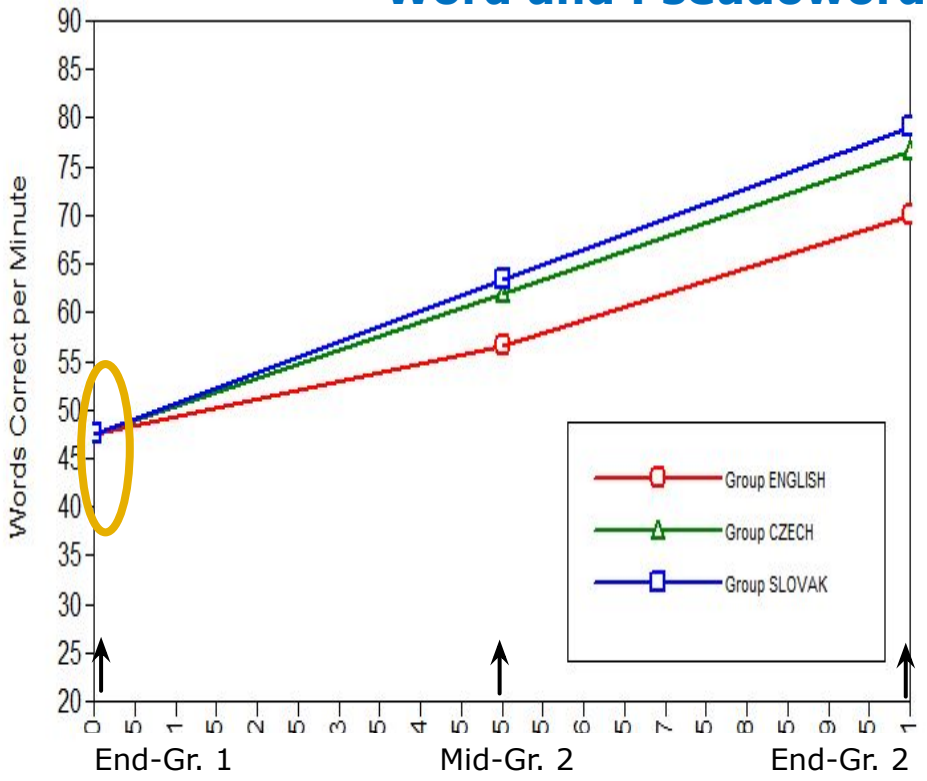
Core precursors of word-level alphabetic literacy skills are awareness of phonemes, knowledge of letters, and the ability to name visual objects quickly. These are reciprocally related abilities that promote alphabetic literacy (e.g. Hulme et al., 2005).

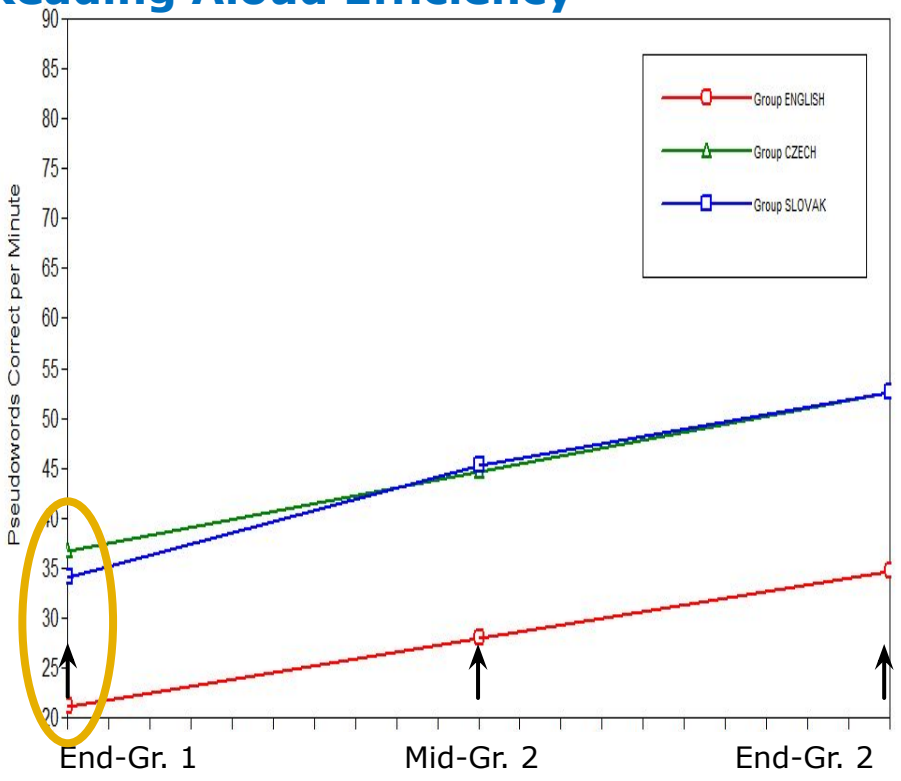
- Do inconsistent orthographies require greater emphasis on language-based, phonological skills?
- Do consistent orthographies require greater emphasis on speed of naming (proxy for reading speed) to read?

Study 2b: The Case of Word Reading Aloud

Compared children's *rate* and *pattern* of growth between End-Grade 1 and End-Grade 2 on reading Words and Pseudowords

Estimated Means for Unconditional 2-Factor Growth Models for Word and Pseudoword Reading Aloud Efficiency





Word Reading χ^2 (10, N = 462) = 18.47, p = .05, CFI =.994, TLI =.994, RMSEA = .074 (90% CI = .008-.126), SRMR = .08.
Pseudoword Reading χ^2 (9, N = 462) = 15.89, p = .07, CFI =.994, TLI =.994, RMSEA = .070 (90% CI = .000-.126), SRMR =.044

Caravolas (2018). JLD.

Study III Summary

- Confirmed, in all languages, the predictive role of **decoding** (WR) skill and its **code-related precursors** on **reading comprehension** over first 2.5 years of reading development
  - Moreover, in consistent orthographies, but not English: better readers relied less on WR skill for RC than weaker readers (cf. moderating effect of ability)
- Confirmed, in consistent languages, that variations in **oral language** also account for variations in **reading comprehension**, but not yet in English
- Revealed that at this stage, children learning consistent orthographies rely to **about the same extent** on **oral language** and **decoding** skills to comprehend text.
- Orthographic consistency **moderates** reading comprehension mainly via its effects on **decoding**.

Participants

Group	N	Age (T1) Months	NVIQ Scaled	VIQ scaled
English	185	60.20	10.13	9.56
Czech	132	72.00	10.39	10.30
Slovak	174	71.98	10.25	10.06
Spanish	184	66.76	11.78	9.16

Background: Mini MABEL's Key features

Motivation

Created in response to existing Users' and potential Users' expressed need for:

- Something classroom teachers can easily learn to administer
- Quick to administer (20 min)
- Test easy to score and interpret as part of Response to Intervention (does child need early support?)
- A tool with potentially very important implications for child

Concept

Criterion-referenced – each test to have set threshold scores

- Kindergarten/Reception Year exceeding thresholds (appx. 70-75% accuracy) will signal child's READINESS for literacy
- Year 1 pupils not exceeding thresholds (appx. 25-30% accuracy) signal child's RISK of failure in literacy attainment (? cca. 10-15% of pupils)

Sets the stage for full MABEL assessment as/when need arises (e.g., if classroom intervention fails and child continues to struggle).

Standing on the shoulders of giants

Profs. Maggie Snowling and Charles Hulme, in Oxford, UK

Acknowledgements 2017- …

Scientists Original Project

- M Caravolas- UK
- Marina Mikulajová - SK
- Gabriela Seidlová Málková - CZ
- Sylvia Defior - ES

Scientists New Languages

- Sao Luis Castro, Ana Paula Vale -- PT
- Marcin Szczerbinski, Anna Ewert – PL
- Victoriia Kishchak - UA

Delphi Definition of Dyslexia new in 2024

(Carroll, J., Holden, C., Kirby, P., Snowling, M. J., & Thompson, P.A. (2024)).

https://en.wikipedia.org/wiki/Delphi_method

The Oracle of Delphi, also known as the Pythia, was a priestess who delivered prophecies and guidance on crucial matters to leaders and individuals from across the ancient classical world. Image: An artwork

- The Rose definition of dyslexia is now 15 years old. The advantages of the **Delphi definition** are that it:
  - Addresses the nature and complex causal basis of dyslexia.
  - Focuses on a range of underlying processing difficulties and the impact on reading and spelling fluency.
  - Is applicable across all age ranges.
  - Directs greater attention to co-occurrence and secondary consequences

Delphi Definition: Nature and Manifestation of Dyslexia

https://osf.io/preprints/osf/tb8mp_v1

The **nature** and **developmental trajectory** of dyslexia depends on multiple genetic and environmental influences.

Manifestation

- Dyslexia is a set of processing difficulties that affect the acquisition of reading and spelling.
  - The most commonly observed cognitive impairment in dyslexia is a difficulty in phonological processing (i.e. in phonological awareness, phonological processing speed or phonological memory).
  - However, phonological difficulties do not fully explain the variability that is observed. Working memory, processing speed and orthographic skills can contribute to the impact of dyslexia.

Delphi Definition: Impact and Variance of Dyslexia

Variance and co-occurrence

- Dyslexic **difficulties exist on a continuum** and can be experienced to various degrees of severity.
- Dyslexia **can affect the acquisition of other skills**, such as mathematics, reading comprehension or learning another language.
- Dyslexia frequently **co-occurs with** one or more other developmental difficulties, including developmental language disorder, dyscalculia, ADHD, and developmental coordination disorder.

Impact

- **Some or all aspects of literacy** attainment are weak in relation to age, standard teaching and instruction, and level of other attainments.
- **Across languages** and age groups, difficulties in reading and spelling fluency are a key marker of dyslexia.

Study II: Growth of word-level reading skills
Different Growth Rates, Same Foundations?

Assumption 2: Learners of **consistent** (Spanish, Czech) orthographies undergo faster skill growth in word reading than learners of **inconsistent** (English) orthographies

Study 2a: The Case of Silent Word Reading

A. Compared children's ***rate*** and ***pattern*** of growth between Kindergarten/Reception and Grade 2

B. Compared ***predictors*** of growth

- **PA, LK, RAN**

Silent Picture-Word Reading Measure

	roads ☐	daisy ☐	rose ☐	cage ☐
	robe ☐	lis ☐	rose ☐	bain ☐
	roca ☐	árbol ☐	rosa ☐	silla ☐
	ruce ☐	váza ☐	růže ☐	bota ☐
	ruky ☐	listy ☐	ruža ☐	mäso ☐

Implications for reading development in Portuguese

Portuguese has a moderately consistent orthography

- Based on studies with languages that span the orthographic consistency spectrum:

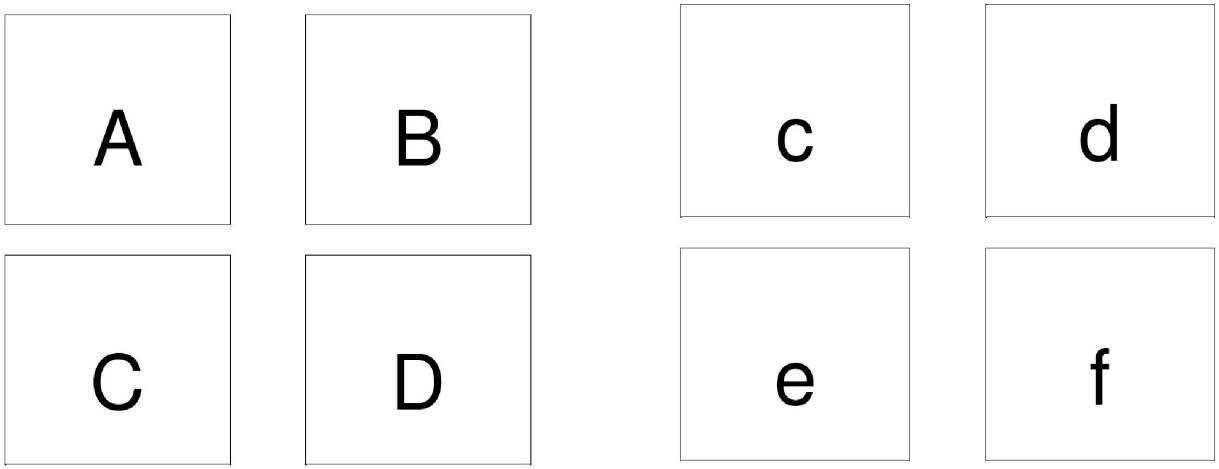
  - expect the ***same universal precursor skills*** to "drive" early word-level literacy

  ∴ Early **markers of risk for word-level** literacy skills -- Dyslexia -- **Universal**

  - expect PT children to acquire ***basic reading skills more slowly than , e.g., Spanish*** peers,
  - and ***slower emerging impacts of OL on reading comprehension than, e.g., Spanish***.

∴ Early **markers of risk for RC** skills need to **consider OL** skills along with **efficiency of decoding**.

Sample of letter cards for Letter Naming



Sample instruction…."*Here is a card with a letter from your name. Do you know what sound this letter makes?*"

The letter cards are NOT ordered alphabetically. Important to follow the order set out in the test.

RAN Tests

RAN tasks	Practice items	
RAN (Colours)		Pre-readers
RAN (Objects)		Pre-readers
RAN (Letters)	**a s d p o**	Readers
RAN (Digits)	**2 3 6 7 9**	Readers

Test building approach -- Key considerations

- How we went about it in the ELDEL project –
  - **Item selection** – Guiding principles
    - **Nonword Items**: Parity in item form (CV structure, length, phonological legality/plausibility)
    - **Word Items**: Parity in form and in frequency, familiarity, meaning (when relevant)
  - **Ensuring scale parity** -- length, difficulty, validity
  - **Cultural factors** – educational and societal considerations
    - Age of schooling, typical literacy curricula in early stages of schooling, etc.

Examples of commensurability aims of PA, LK, RAN measures across languages

- LK – stimulus form and content equivalence
  - E.g., English, French, Spanish, Czech, Welsh

Language	Number of Letters in task	Order of Administration	Maximum Raw Score	Cronbach's Alpha
English	26 letters	Child's initials, all remaining letters in order of familiarity	104	.98
French	29 (26 letters + é, è, and ê)	Child's initials, vowels, consonants	116	.98
Spanish	29 (27 letters + ch, ll)	Child's initials, vowels, consonants	116	.99
Czech	34 letters	Child's initials, vowels, consonants	136	.98
Slovak	32 letters	Child's initials, vowels, consonants	128	.98

- PA – Stimulus form equivalence x-ling
  - E.g., CVC, CCVC and CVCC structure

  in English, French, Czech, Spanish

PHONEME ISOLATION TEST EXAMPLE ITEMS

	English	French	Spanish	Czech	Slovak
Initial-CVC	zik /zik/ dal /dal/	pun /pyn/ lod /lod/	Ner /neɾ/ Ris /ris/	zik /zɪk/ nur /nʊr/	zik /zɪk/ nur /nʊr/
Initial-CCVC	kraf /kræf/ swip /swɪp/	flum /flym/ drok /dɹok/	Clur /klʊɾ/ Bras /βɾas/	trač /tratʃ/ švit /ʃvɪt/	trač /tratʃ/ švit /ʃvɪt/
Final-CVC	fidge /fɪdʒ/ bim /bɪm/	pout /put/ bad /bad/	Can /kan/ Rus /rus/	kan /kan/ mir /mɪr/	kan /kan/ mir /mɪr/
Final-CVCC	bast /bɑːst/ gand /gænd/	balp /balp/ koulm /kulm/	Blar /βlaɾ/ Frud /fɾuð/	dast /dast/ korš /korʃ/	dast /dast/ korš /korʃ/
Chronbach's Alpha	.94	.96	.97	.97	.97

- RAN – Stimulus content equivalence x-ling
  - E.g., colours objects digits letters

r= .80 - .90

Colours r= .82-.89

English	French	Spanish	Czech	Slovak
Blue	Bleu	Azul	Modrá	Modrá
Red	Rouge	Rojo	Červená	Červená
Green	Vert	Verde	Zelená	Zelená
Brown	Marron	Marrón	Hnědá	Hnedá
Black	Noir	Negro	Černá	Čierna

Objects r= .79-.84

English	French	Spanish	Czech	Slovak
Lion	Lion	León	Lev	Lev
Eye	Œil	Ojo	Oko	Oko
Dog	Chien	Perro	Pes	Pes
Key	Clé	Llave	Klíč	Kľúč
Table	Table	Mesa	Stůl	Stôl

Digits r= .85 - .92

English	French	Spanish	Czech	Slovak
two	deux	dos	dvě	dve
three	trois	tres	tři	tri
six	six	seis	šest	šesť
seven	sept	siete	sedm	sedem
nine	neuf	nueve	devět	deväť

Two Approaches to Matching Reading Tests in ELDEL (& MABEL)

Sampling comparable frequency strata

- **Frequency-matched lists:**
- **in ELDEL relatively High Frequency items, conceptually familiar to young school children**

Criteria: 140 HF words of 1, 2, 3 syllables.

Proportion of 1, 2, 3-syll words to reflect their distribution in the language.

Sample of Words from the One Minute Word Reading Test

English	French	Spanish	Czech	Slovak
a	à	y	a	a
my	bon	tu	ty	ty
was	dans	bien	hned	dom
can	branche	esta	plán	zima
school	maison	cada	slunce	možno
balloon	autour	abajo	krásný	člověk
enough	difficile	enseguida	protože	hovorit'

Item matching

Match on factors such as frequency, length, syllable structure, N, familiarity, AoA, imageability, etc.

The ***ultimate*** in matching: **Cognates**

Sample of Words from the Picture-Word Matching Test

ENGLISH	roads ☐	daisy ☐	rose ☐	cage ☐
FRENCH	robe ☐	lis ☐	rose ☐	bain ☐
SPANISH	roca ☐	árbol ☐	rosa ☐	silla ☐
CZECH	ruce ☐	váza ☐	růže ☐	bota ☐
SLOVAK	ruky ☐	listy ☐	ruža ☐	mäso ☐

Phoneme Isolation Accuracy	Phoneme Isolation Percentile Ranks						
	5	10	25	50	75	90	95
ENG Reception	0.00	0.00	3.00	6.00	**9.00**	10.00	10.00
ENG Year 1	0.00	**1.00**	5.00	8.00	10.00	10.00	10.00
ES Kindergarten	0.00	0.00	1.00	3.00	**6.00**	9.00	10.00
ES Grade 1	0.50	**1.00**	6.00	9.00	10.00	10.00	10.00
SK Kindergarten	0.00	1.90	4.00	7.00	**9.00**	10.00	10.00
SK Grade 1	4.00	**4.00**	7.00	9.00	10.00	10.00	10.00

Letter Writing Acc.	Letter Writing Percentile Ranks						
	5	10	25	50	75	90	95
ENG Reception	1.60	4.20	10.00	15.00	**16.00**	16.00	16.00
ENG Year 1	8.00	**11.00**	14.00	15.00	16.00	16.00	16.00
ES Kindergarten	5.15	7.00	8.00	14.00	**16.00**	16.00	16.00
ES Grade 1	12.00	**14.00**	14.00	16.00	16.00	16.00	16.00
SK Kindergarten	0.00	2.00	4.00	12.00	**16.00**	16.00	16.00
SK Grade 1	10.00	**12.00**	15.00	16.00	16.00	16.00	16.00

Phoneme Isolation Accuracy	Phoneme Isolation Percentile Ranks						
	5	10	25	50	75	90	95
ENG Reception	0.00	0.00	3.00	6.00	**9.00**	10.00	10.00
ENG Year 1	0.00	**1.00**	5.00	8.00	10.00	10.00	10.00
ES Kindergarten	0.00	0.00	1.00	3.00	**6.00**	9.00	10.00
ES Grade 1	0.50	**1.00**	6.00	9.00	10.00	10.00	10.00
SK Kindergarten	0.00	1.90	4.00	7.00	**9.00**	10.00	10.00
SK Grade 1	4.00	**4.00**	7.00	9.00	10.00	10.00	10.00

Letter Writing Acc.	Letter Writing Percentile Ranks						
	5	10	25	50	75	90	95
ENG Reception	1.60	4.20	10.00	15.00	**16.00**	16.00	16.00
ENG Year 1	8.00	**11.00**	14.00	15.00	16.00	16.00	16.00
ES Kindergarten	5.15	7.00	8.00	14.00	**16.00**	16.00	16.00
ES Grade 1	12.00	**14.00**	14.00	16.00	16.00	16.00	16.00
SK Kindergarten	0.00	2.00	4.00	12.00	**16.00**	16.00	16.00
SK Grade 1	10.00	**12.00**	15.00	16.00	16.00	16.00	16.00

RAN Pictures - Percentile Ranks

RAN Time	95	90	75	50	25	10	5
ENG Reception	36	43	**53**	67	75	100	116
ENG Year 1	34	36	42	50	65	**78**	91
ES Kindergarten	41	44	**49**	60	71	89	101
ES Grade 1	34	37	41	47	57	**69**	77
SK Kindergarten	35	38	**46**	55	62	71	90
SK Grade 1	34	36	39	45	52	**61**	72

Basic Word Reading Percentile Ranks

Word Reading Acc.	5	10	25	50	75	90	95
ENG Reception	0.00	0.00	0.00	0.00	**2.00**	6.00	6.55
ENG Year 1	0.00	**0.00**	1.00	2.00	4.75	7.00	9.35
ES Kindergarten	0.00	0.00	0.00	0.00	**2.00**	6.00	9.00
ES Grade 1	2.00	**4.00**	7.00	9.00	10.00	10.00	10.00
SK Kindergarten	0.00	0.00	0.00	0.00	**2.00**	9.00	9.05
SK Grade 1	0.00	**0.00**	1.00	7.00	10.00	10.00	10.00

MABEL measures are proving effective in research in numerous languages.

PA, LK, RAN markers – show comparisons
-correlations, regressions of longitudinal predictors of reading, spelling.

Reading and Writing
https://doi.org/10.1007/s11145-023-10441-3

Check for updates

RAN and two languages: a meta-analysis of the RAN-reading relationship in bilingual children

Victoria Kishchak[1] · Anna Ewert[1] · Paulina Halczak[1] · Paweł Kleka[2] · Marcin Szczerbiński[3]

Accepted: 29 March 2023

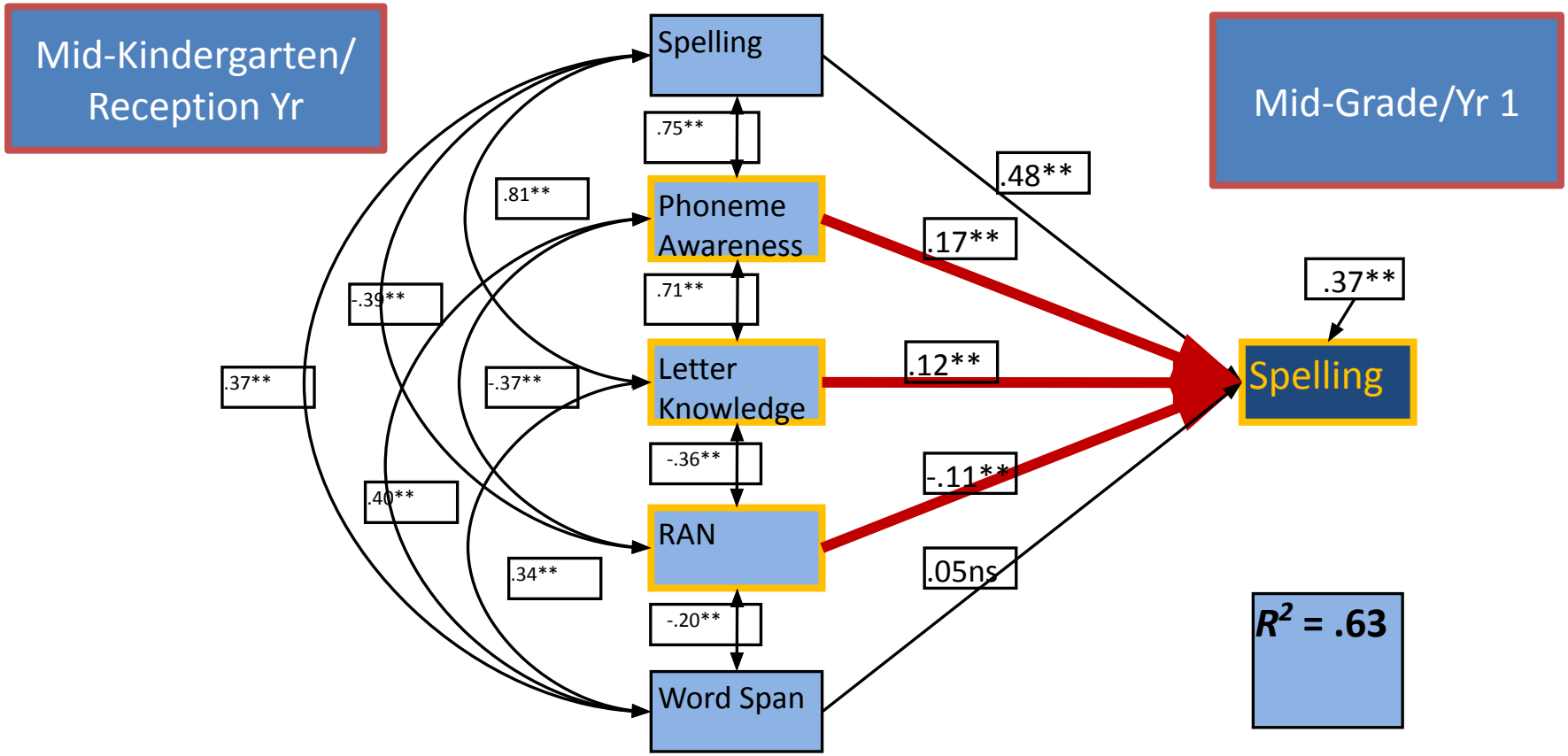
Abstract
RAN (Rapid Automatized Naming) is known to be a robust predictor of reading development in different languages. Much less is known about RAN predictive

Psychological Science
XX(X) 1–9

DOI: 10.1177/0956797611434536
http://pss.sagepub.com
SAGE

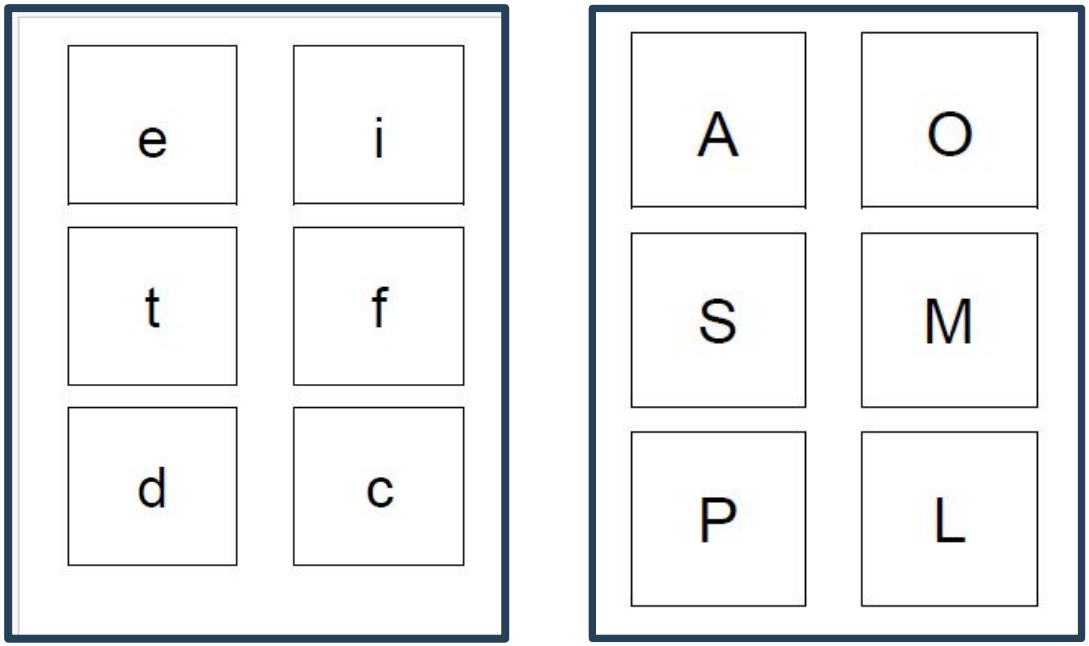
Spelling results

Multi-group path model predicting the growth in early spelling



Model fit: χ^2 (63, N = 675) = 55.93, p < .724, CFI =1.00, TLI =1.00, RMSEA = .000 [.000-.036], SRMR =.041.

What the children see…

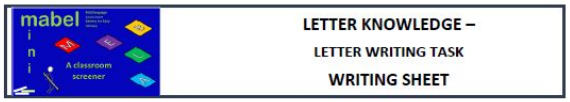


Mini-Mabel version – only 6 letters of each

Letter **names OR sounds** accepted

What children hear and use to write…

Script
Now try /a/. Can you make the letter /a/? *(If the child says "no", try also the letter name, /**ei**/).*
Try /**d**/.
Now try /**o**/.
Now try /**i**/.
How about /**m**/? Try to write the letter that makes /**m**/.
Now try /**l**/.
Now try /**t**/.
Now try /**e**/.



mabel i n i A classroom screener

PHONEME ISOLATION TASK

Instructions for Administration and Scoring

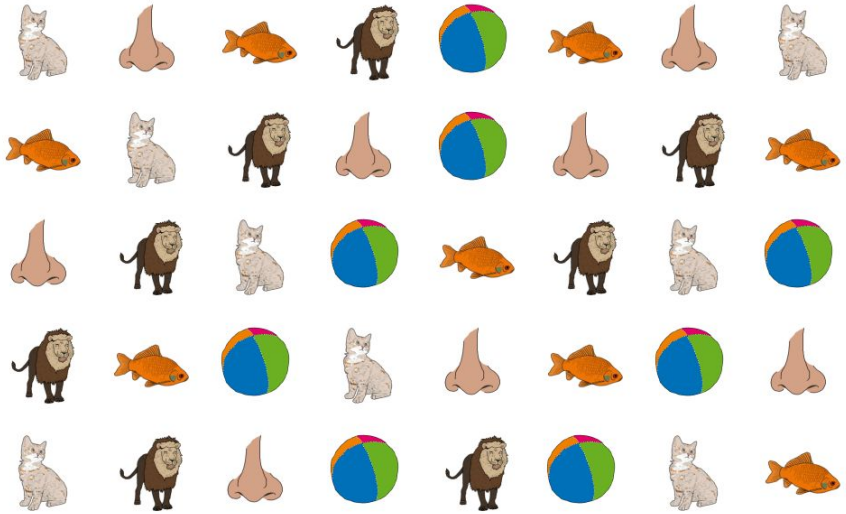
What the children hear…

“Here is a pretend word - Boff, can you say it?
What is the first sound in Boff?”

RAPID AUTOMATISED NAMING - OBJECTS

PRACTICE AND TEST CARDS

What the children see…



What the children see…

BASIC WORDS – PRIMER LEVEL,
DECODABLE,
NO TIME PRESSURE (BUT RECORD TIME FOR REFERENCE)

- 1- and 2-syllable words
- Simple CV structure and more complex structures with CC (clusters)

FORM A	FORM B
hat	bat
bag	hug
baby	lady
city	solo
frog	skip
step	drop
tree	free
elf	ant
pilot	robot
basket	carpet

- **Administer only ONE form at "baseline"**
- **The other form is for retesting at a later date (follow-up)**

Basic Word Reading
What the children see…

FORM A

hat
bag
baby
city
frog
step
tree
elf
pilot
basket

Example Videos

RAN - English

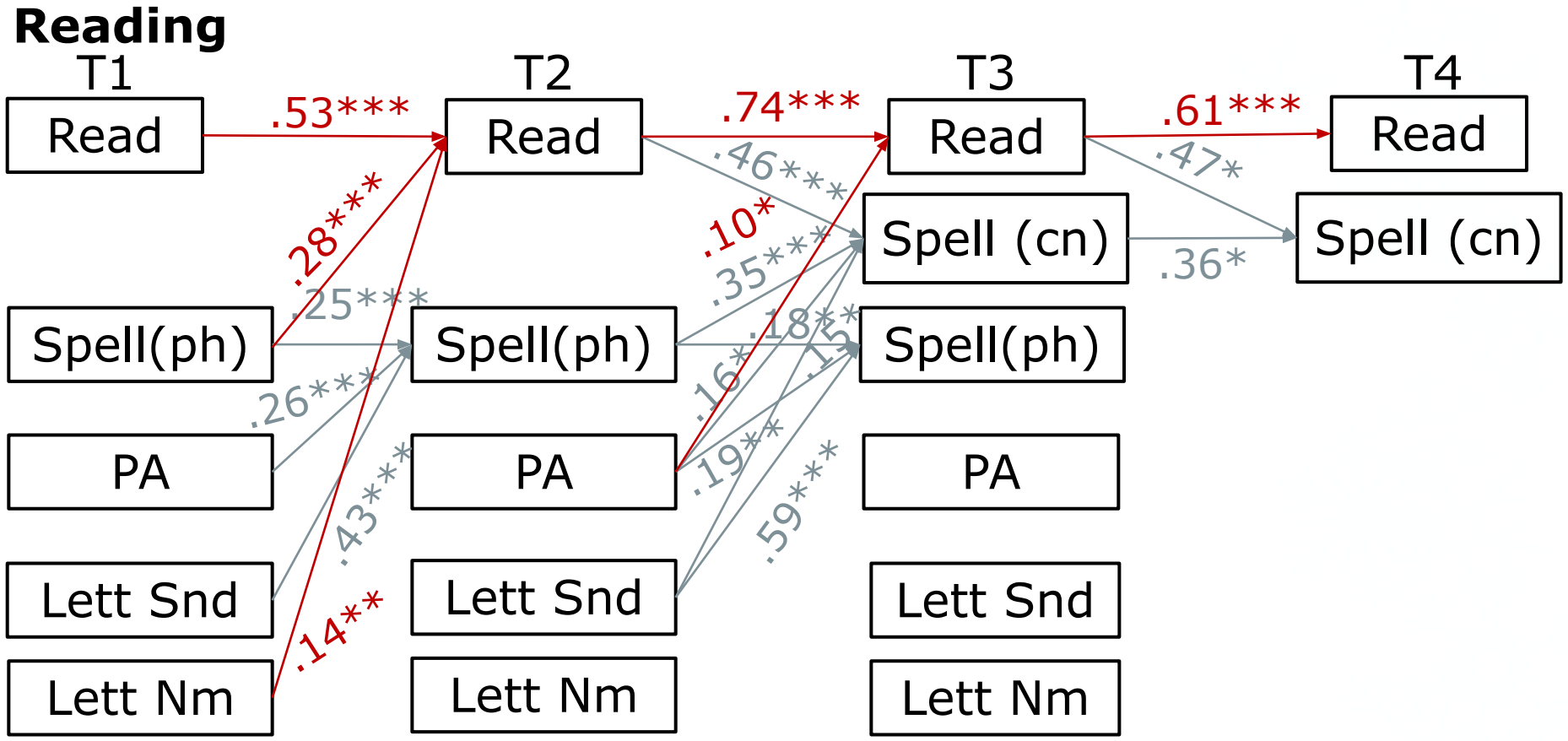
RAN- Cymraeg

Presentation Background

- We now have evidence of the relative universality of the foundations and early cognitive markers of literacy difficulties, but confirming directly across languages is useful for advancing our knowledge and our confidence in our current understanding.
  - This was the cross-linguistic aim of the European research project – ELDEL
  - ELDEL gave rise to Project MABEL
- The MABEL project is predicated on the idea that best cross-linguistic evidence comes from like-with-like comparisons.
- Original MABEL battery included 5 languages varying in alphabetic consistency
- Now we have added several new languages that complement the original set in terms of consistency and other important features --- e.g., alphabet type…
- Including PT, so would like to include a look at the reliability and validity of this version.
- In addition, the MABEL consortium has been serving an international practitioner population (give indication of extent) and have responded to several clear needs : e.g., screener for school use. Mini MABEL.

Foundations of Reading Development

(Caravolas, Hulme, & Snowling, 2001)

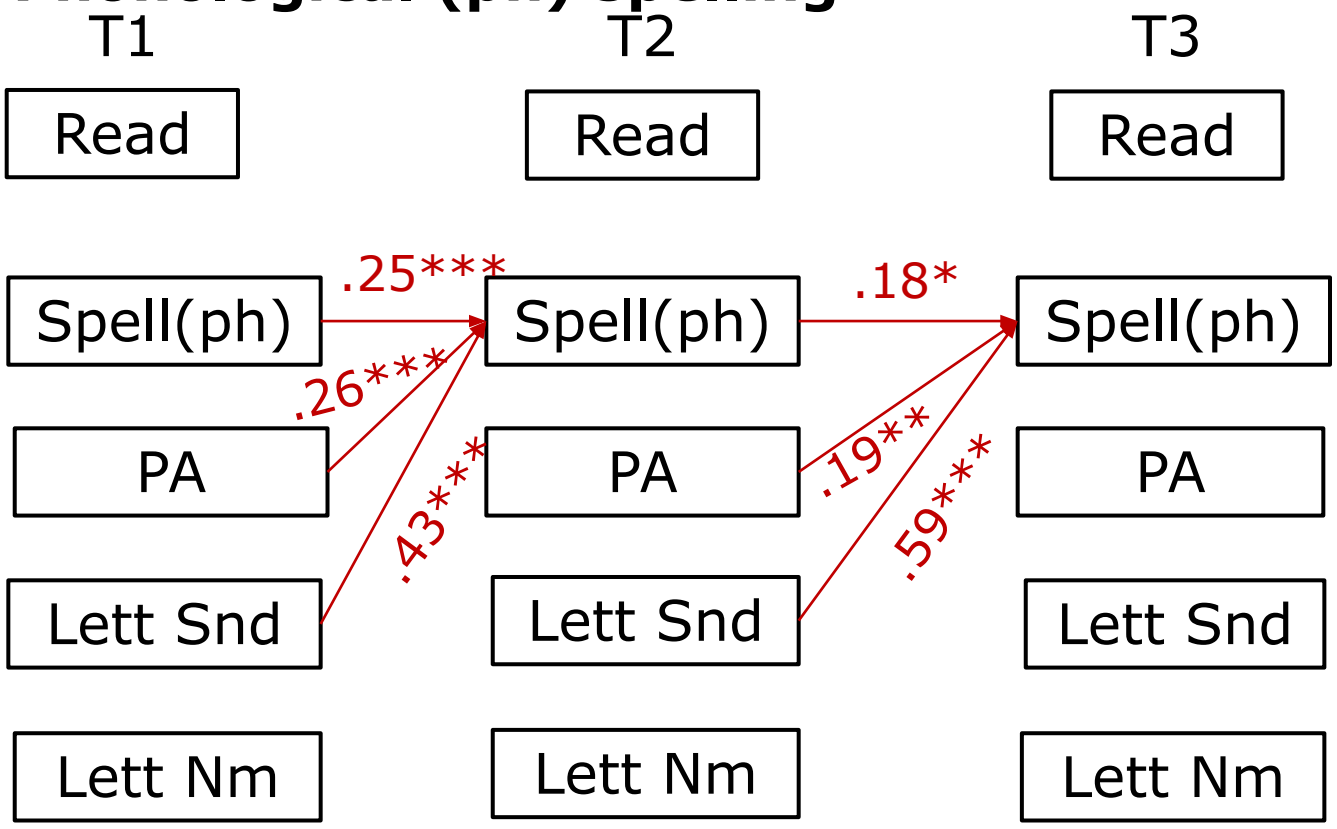


Foundations of Spelling Development

Journal of Memory and Language **45,** 751–774 (2001)
doi:10.1006/jmla.2000.2785, available online at http://www.academicpress.com on IDEAL®

(Caravolas, Hulme, & Snowling, 2001)

Phonological (ph) spelling



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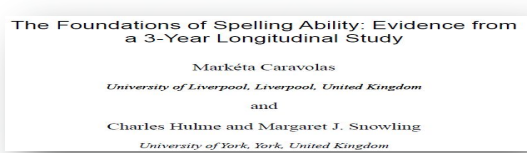
The Foundations of Spelling Ability: Evidence from a 3-Year Longitudinal Study

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and

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