The early language and literacy skills of children at family risk of dyslexia

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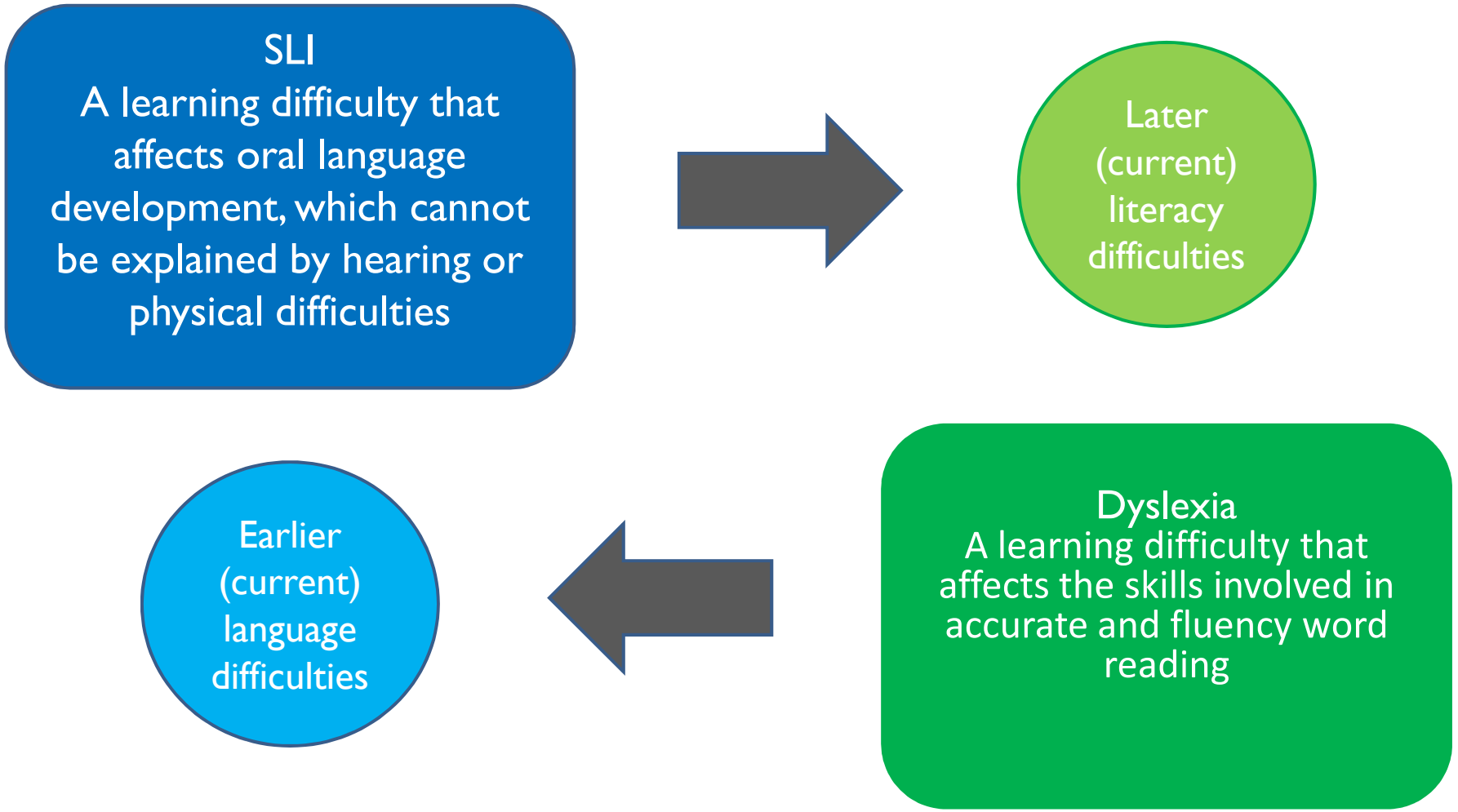
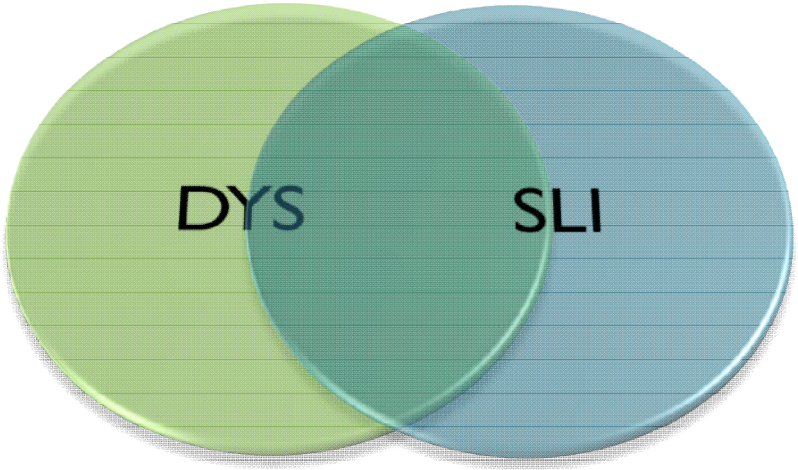
SLI and Dyslexia



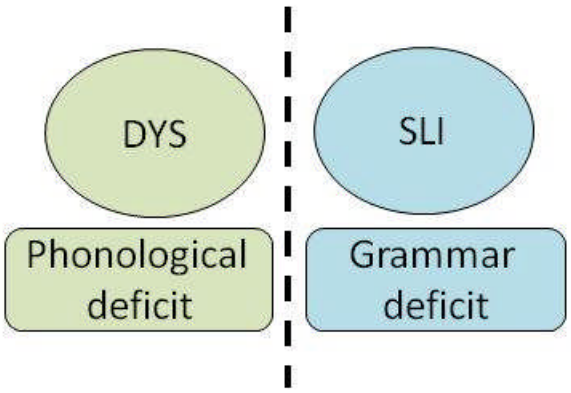
Overlap



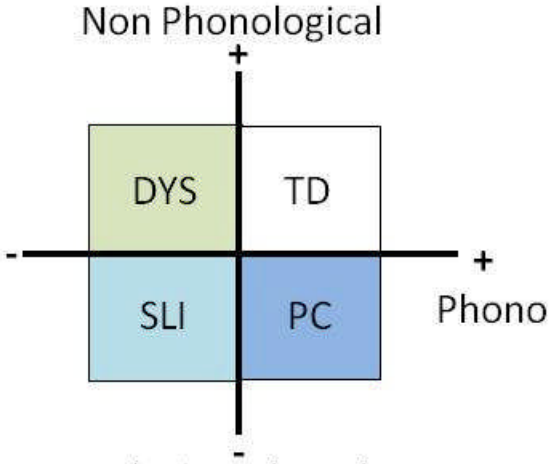
Concurrent overlap in school years ~50% (McArthur et al, 2000)

- Family risk (FR) children - increased risk for literacy difficulties ~50% will develop dyslexia
- Opportunity to study the precursors of dyslexia
- Affected FR show preschool weaknesses in articulation, MLU, vocabulary, phonological memory (NWrep), comprehension of grammatical inflections
- **Clinical or subclinical weaknesses?**
- Unaffected FR show subtle literacy and phonological weaknesses, but better broader oral language skills
- Utrecht (Dutch) Group
  - TD > FR > LI grammar & phonology

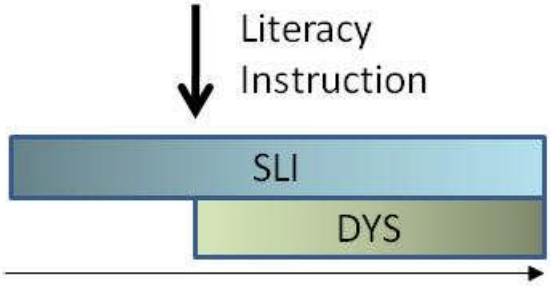
Modelling the overlap



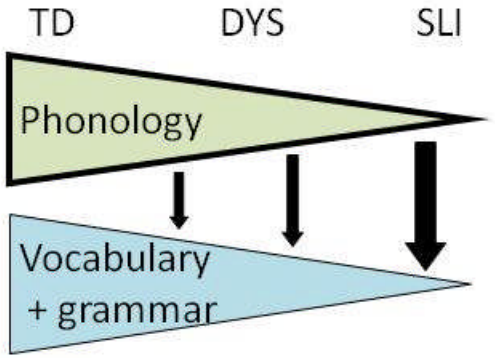
Separate disorders
Modular deficits



Dyslexia = Phonology
SLI = Phonology +



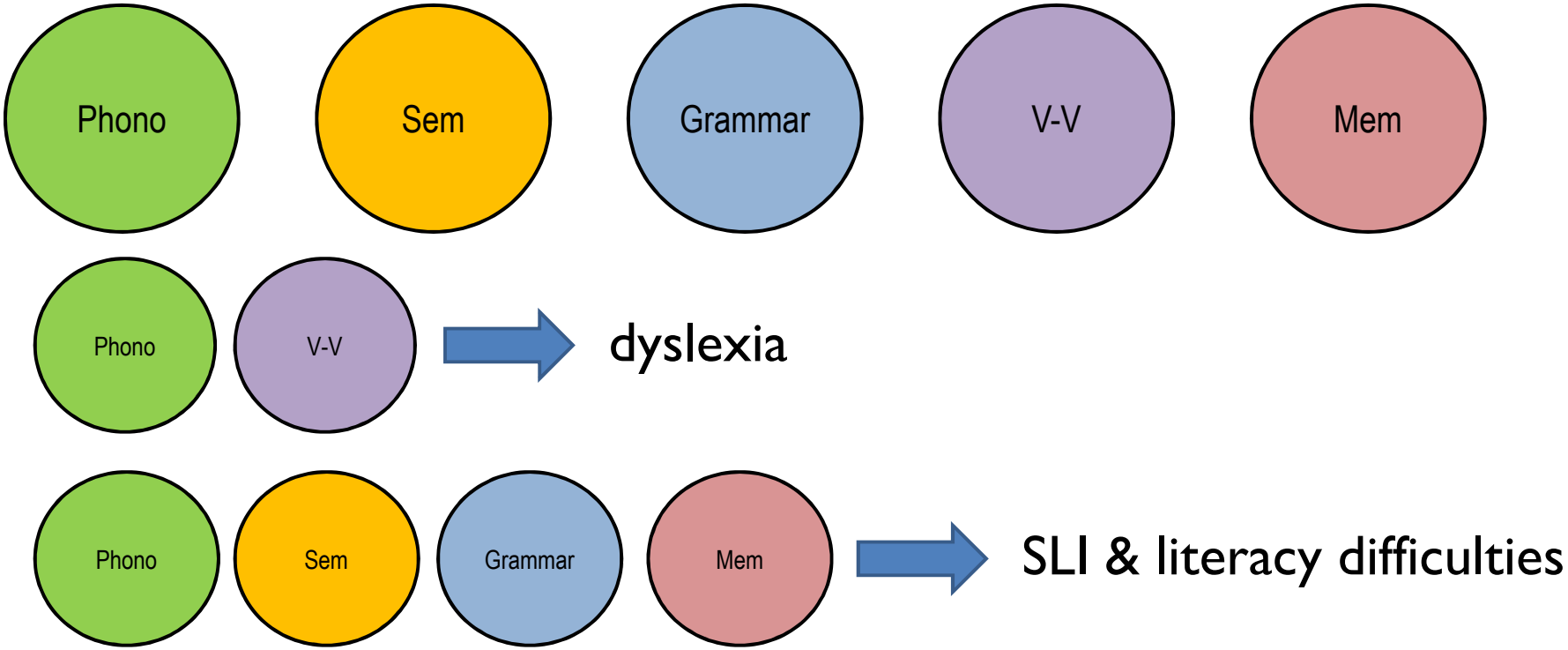
SLI as an early manifestation of dyslexia (A single language learning disorder)



Phonological deficit Severity Hypothesis

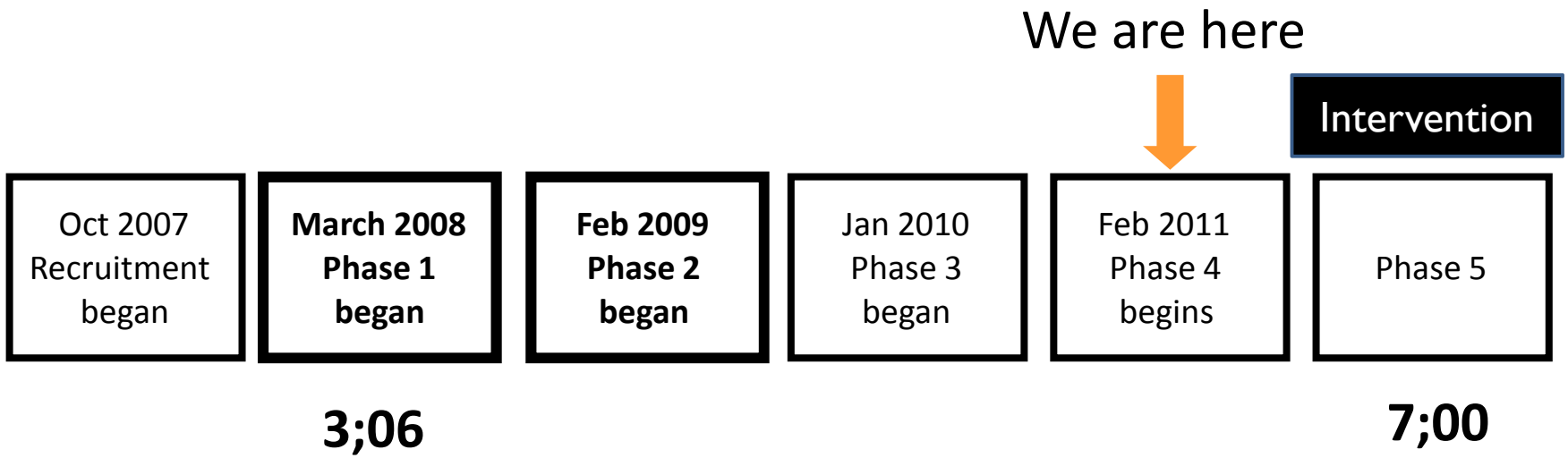
Multiple deficits (risk factors)

- This allows us to go beyond two dimensions of language and to consider deficits in other domains
  - Letter-sound integration / visual-verbal (V-V) mapping
  - Serial memory



NB severity of deficit will also be important

Wellcome at-risk project



5 year longitudinal study investigating the relationship between early language skills and later literacy development

Following ~240 children from age 3 to age 7

1. Children at family risk of dyslexia (FR)
2. Children who have current language difficulties (SLI)
3. Typically developing children (TD)

First direct comparison of FR and SLI preschool children in English

Aims

Dyslexia

What % FR → dyslexia

Cam we predict who based on preschool cognitive profiles?

Do some FR children resemble SLI children in preschool years?

SLI

Persistence of SLI

Literacy difficulties in SLI

Causal theories:

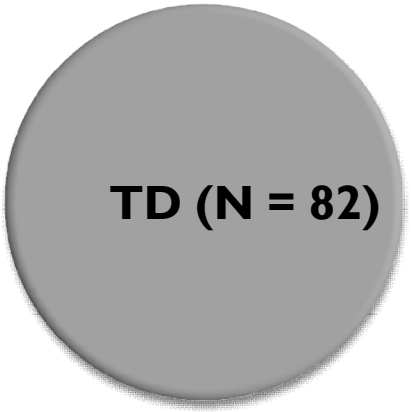
Auditory processing

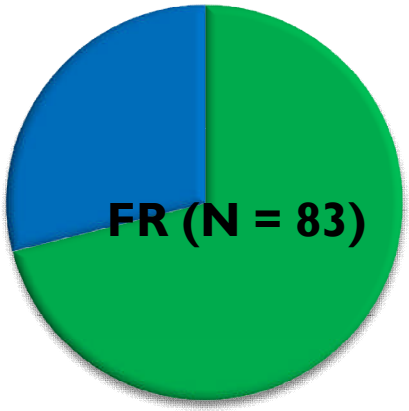
Speech processing

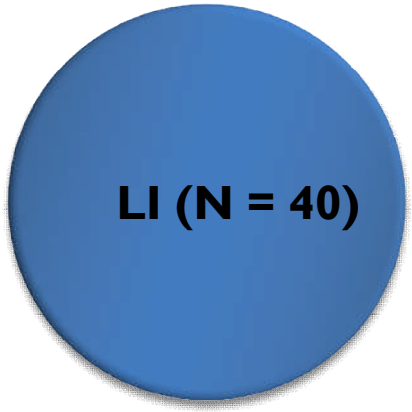
To investigate the role of the HLE & the relationship between parent and child language & literacy skills

Hypotheses

- On the basis of previous FR studies we predicted that
  - FR children would be characterised by phonological difficulties (both affected and unaffected children found to have such difficulties)
  - Some FR children would have broader oral language difficulties (likely to be the later affected children) – accompanied by more severe phonological difficulties
  - Q would the FR children with more severe and pervasive language difficulties resemble children with pre-school SLI in their language profile







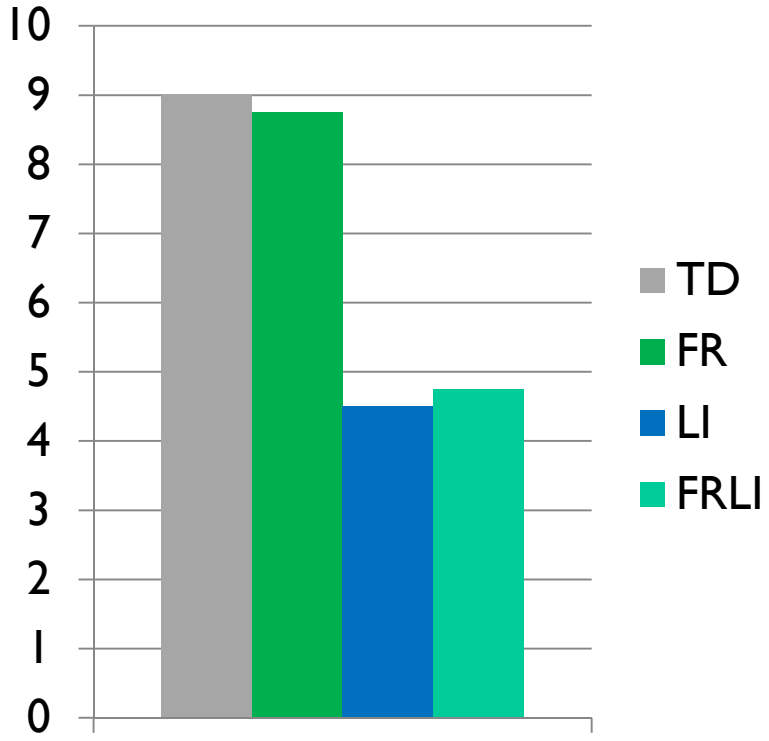
FR (N = 59) FR + LI (N = 24)

LI = <85 or criterion on 2/4 language tests

	TD (82)	FR (59)	LI (40)	FR+LI (24)	F	*p*	Post-hoc
T1 Age (mths)	45	46	44	45	2.40	ns	n/a
T2 age (mths)	56	57	55	57	1.49	ns	n/a
T1 NVIQ (ss)	114	109	98	100	13.63	sig	(TD=FR) > (FRLI=LI)
SES Postcode rating (%)	68	65	55	51	3.44	.02	None
% males	54	54	68	75		Chi Sq = 5.26, ns	

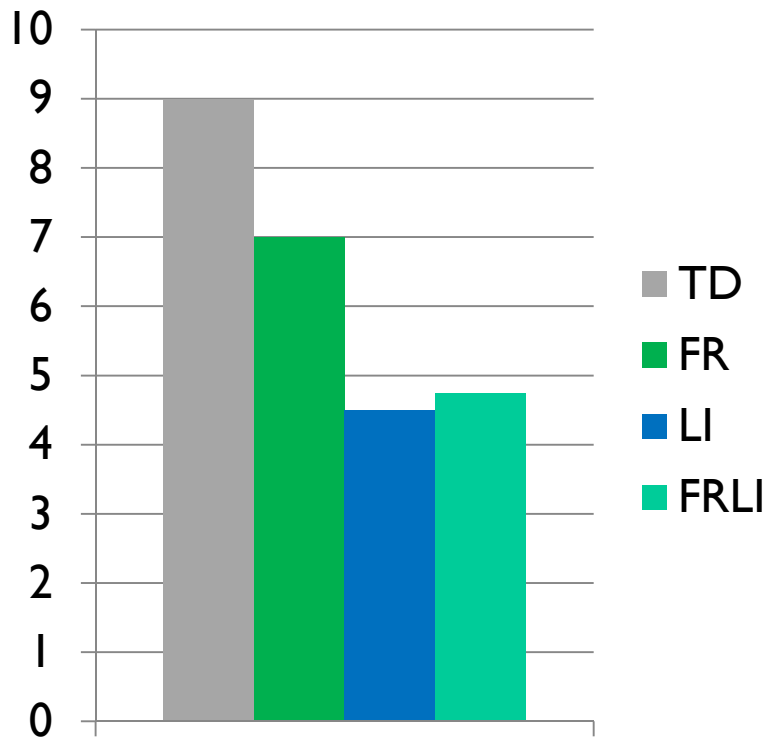
T1 language profiles

Non-phonological



Vocabulary, sentence comprehension, MLU, grammatical inflection

Phonological



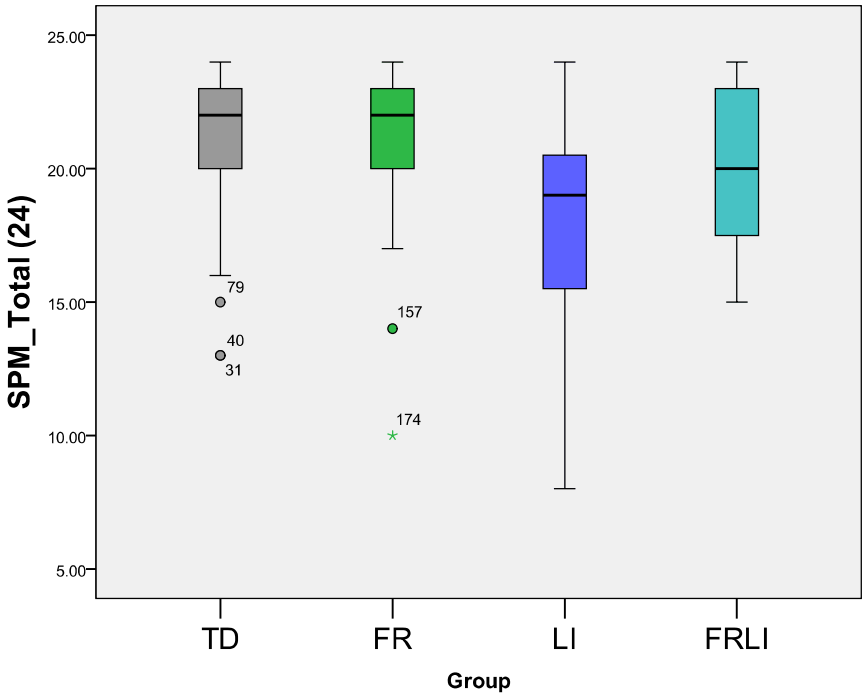
Articulation, NWrep

T2 – Language & Literacy

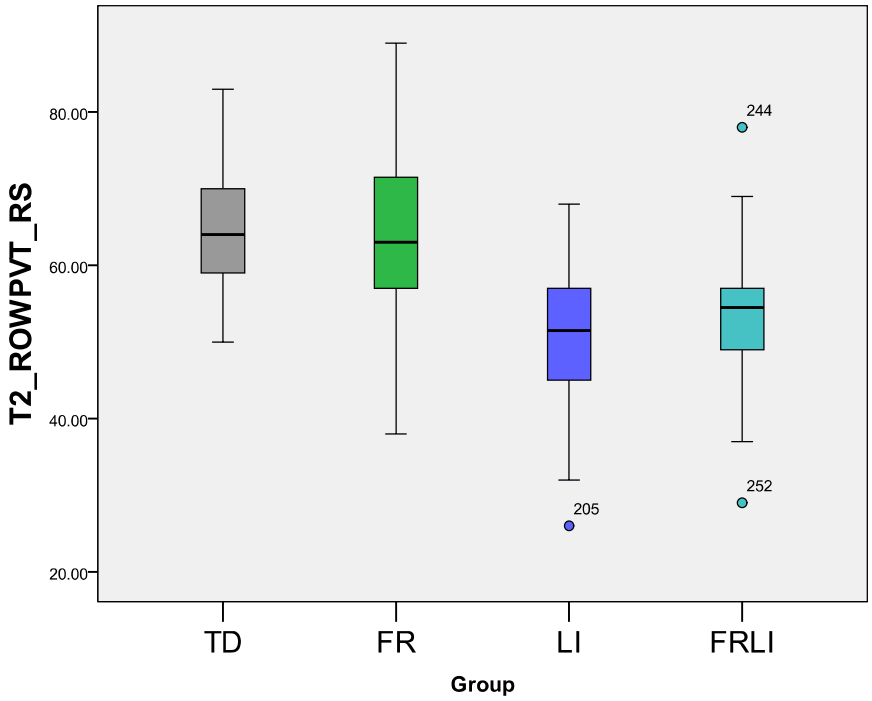
Semantics	Phonology	Morpho-syntax	Literacy
• Semantic picture matching • Receptive vocabulary	• Mispronunciation detection • Alliteration matching • Phoneme isolation • Nwrep • RAN objects	• Sentence comprehension • Verb inflection • Sentence repetition	• Letter Sound Knowledge • Early Word Reading • Letter writing

NB same sample, T1 groupings

Semantics

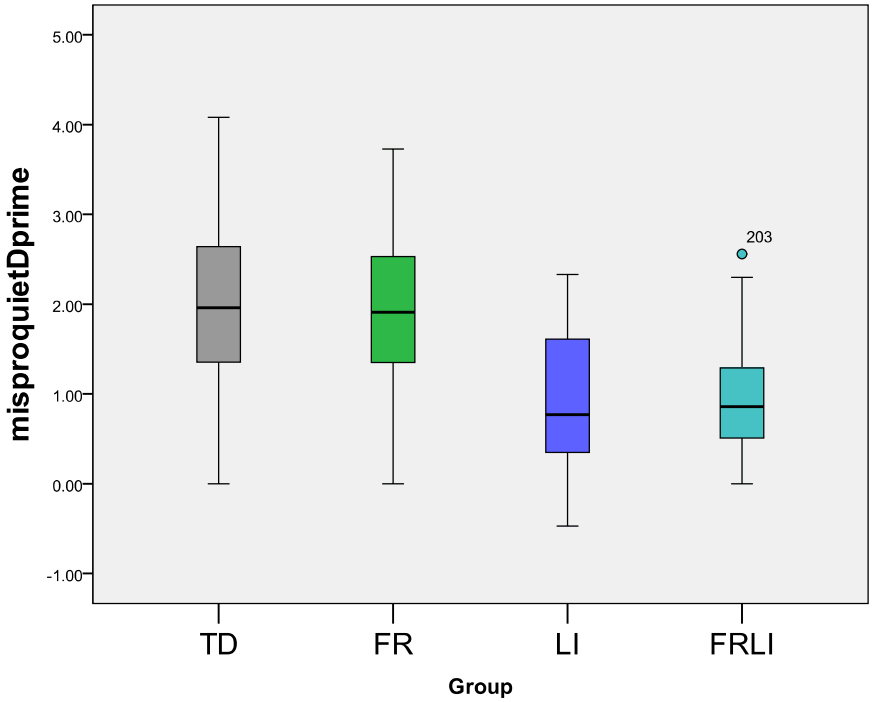


Semantic matching
(TD = FR = FRLI) > LI

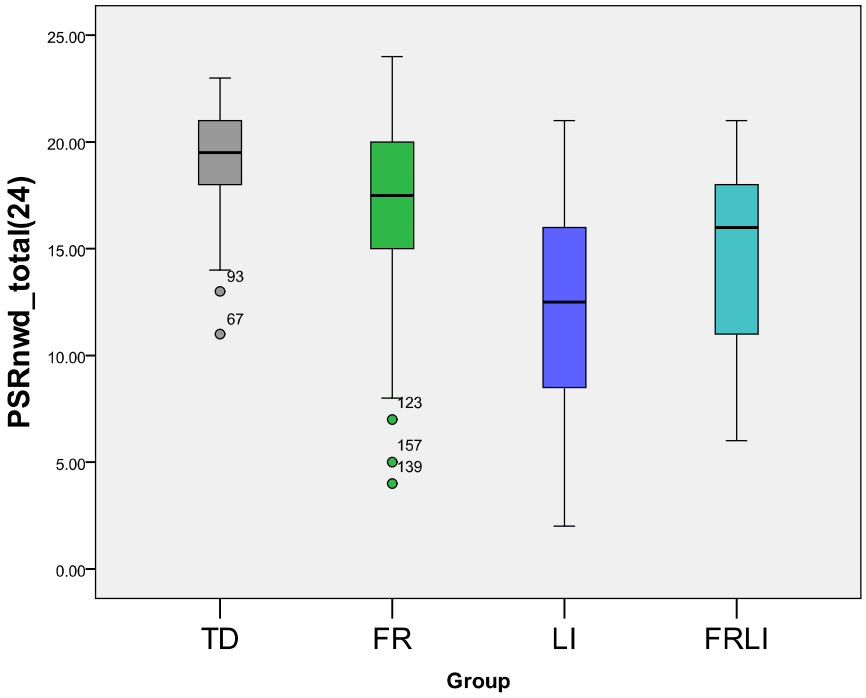


Receptive vocabulary
(TD = FR) > (FRLI = LI)

Phonological processing

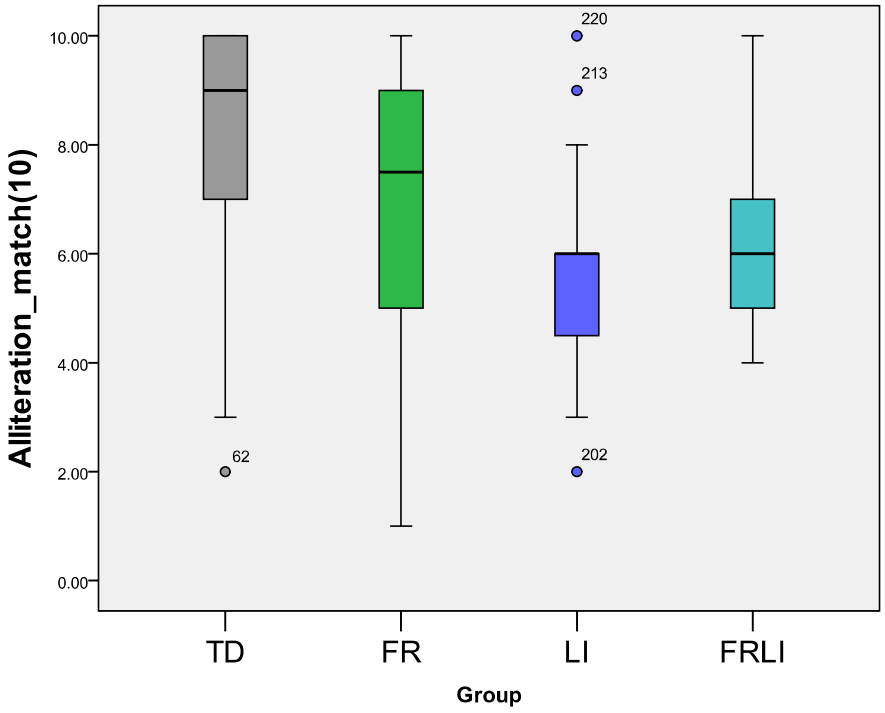


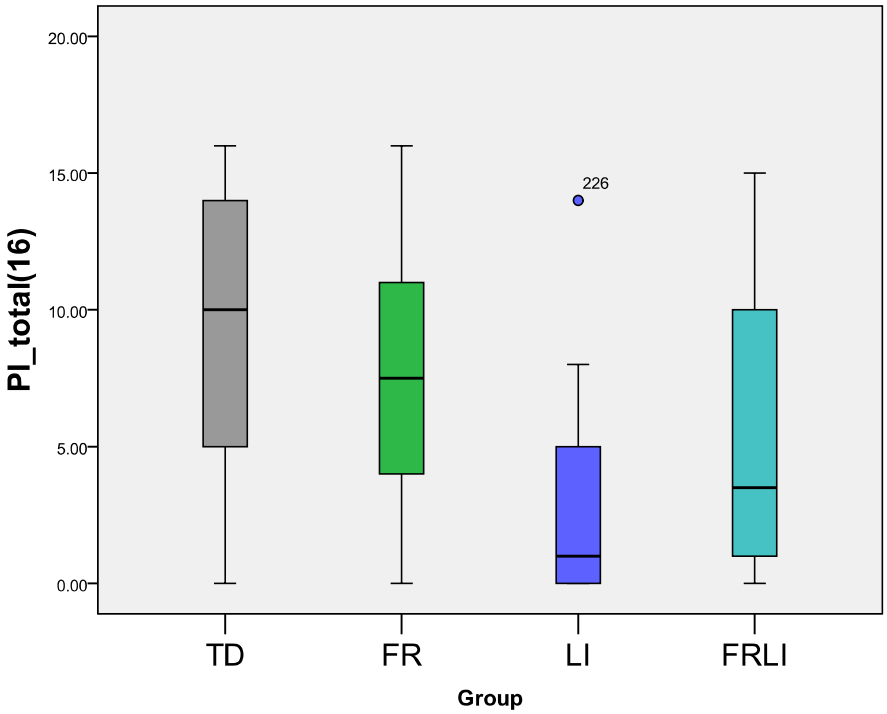
Mispronunciation detection
(TD = FR) > (FRLI = LI)



NWrep
TD > FR > (FRLI = LI)

Phonological awareness





Alliteration matching

TD > FR = FRLI = LI

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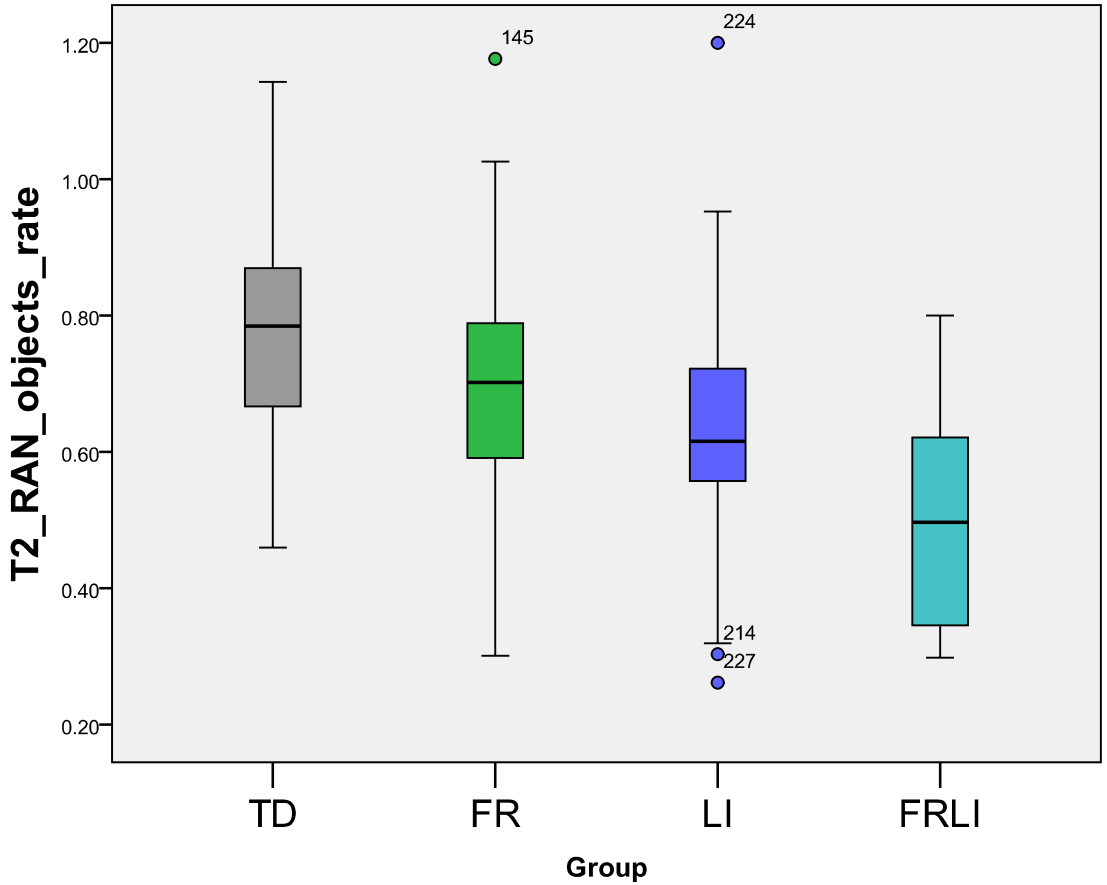
Phoneme isolation

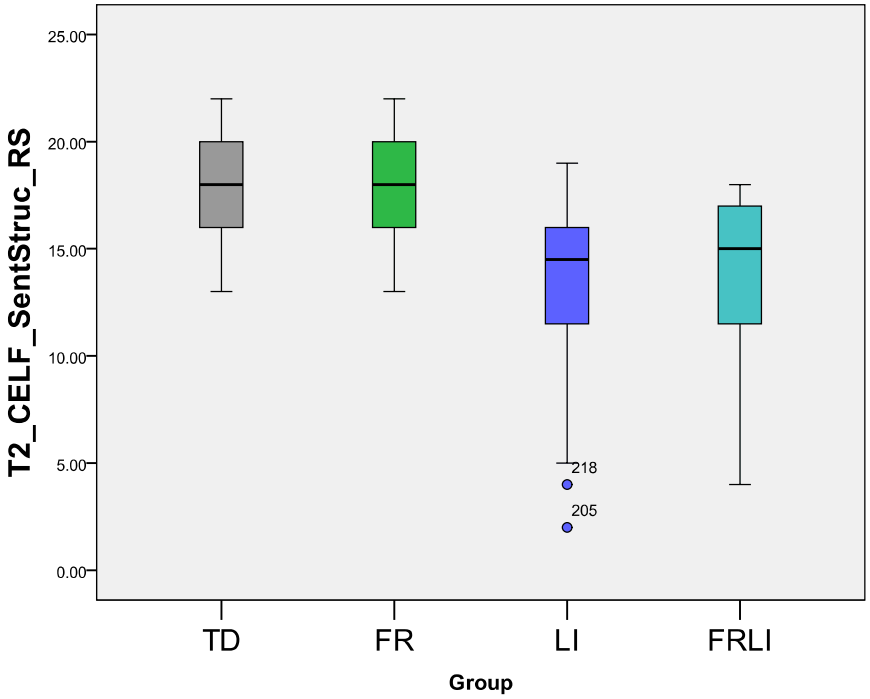
TD > FR = FRLI = LI

>

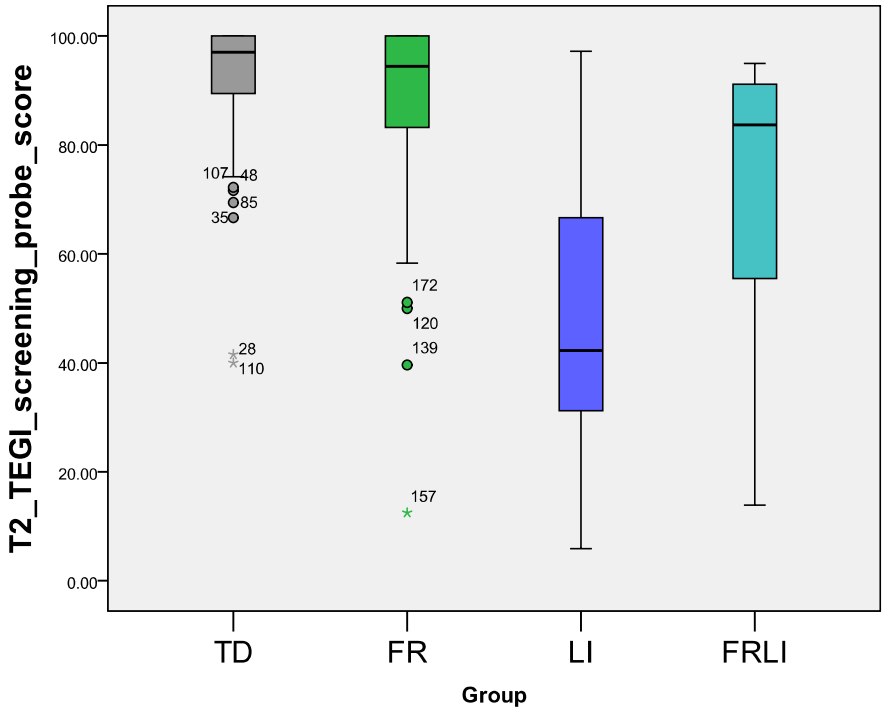
RAN objects


T2_RAN_objects_rate
1.20
1.00
0.80
0.60
0.40
0.20
145
224
214
227
TD
FR
LI
FRLI
Group

Morpho-syntax 1

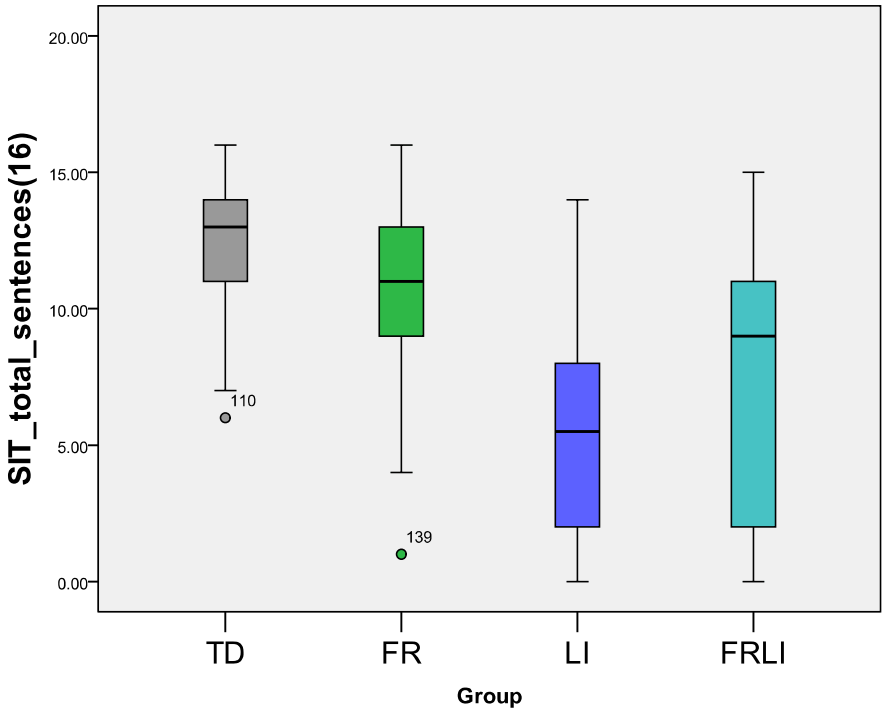


Sentence comprehension
(TD = FR) > (FRLI = LI)



Verb inflection
(TD = FR) > FRLI > LI

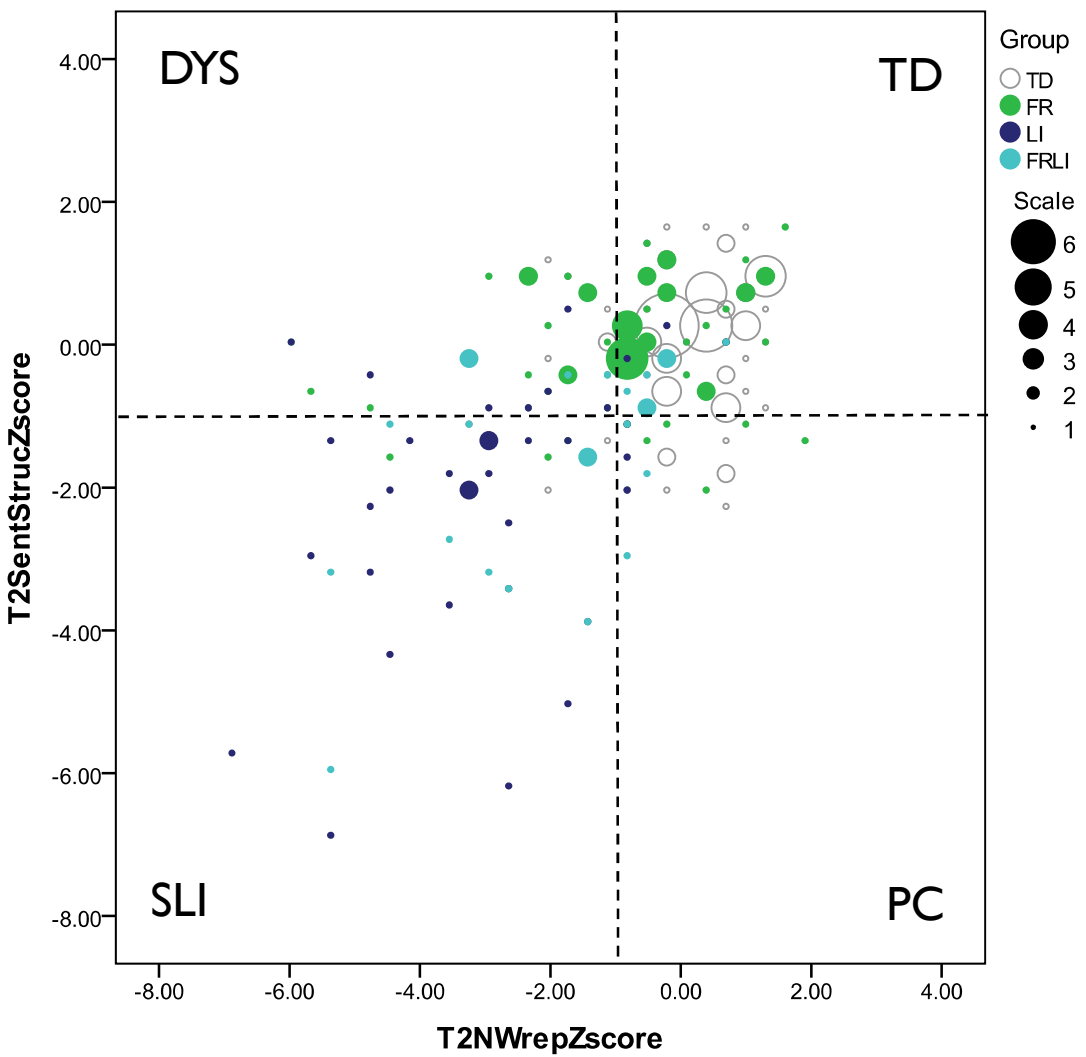
Morpho-syntax 2



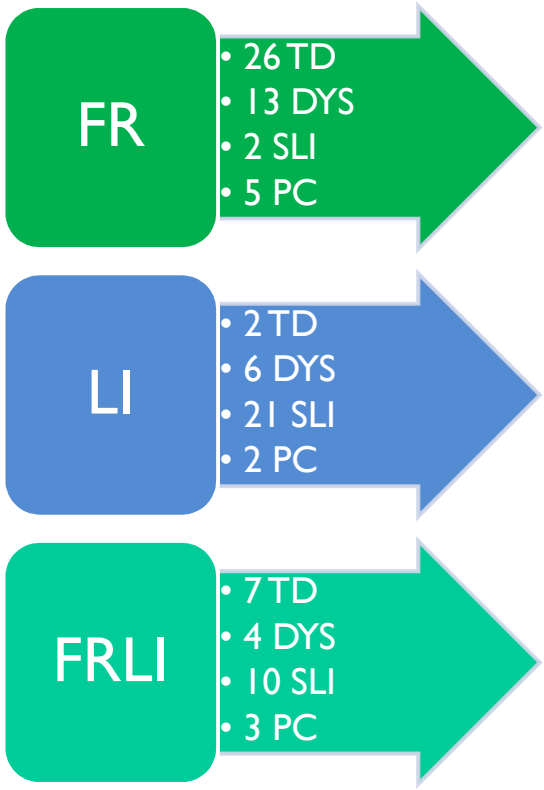
Sentence repetition

TD > FR > (FRLI = LI)

2D model



Scale

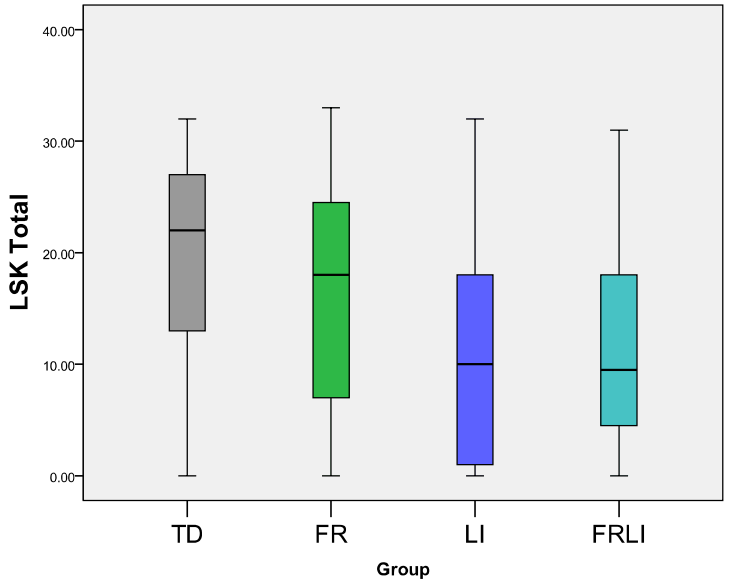


T2 language profiles summary

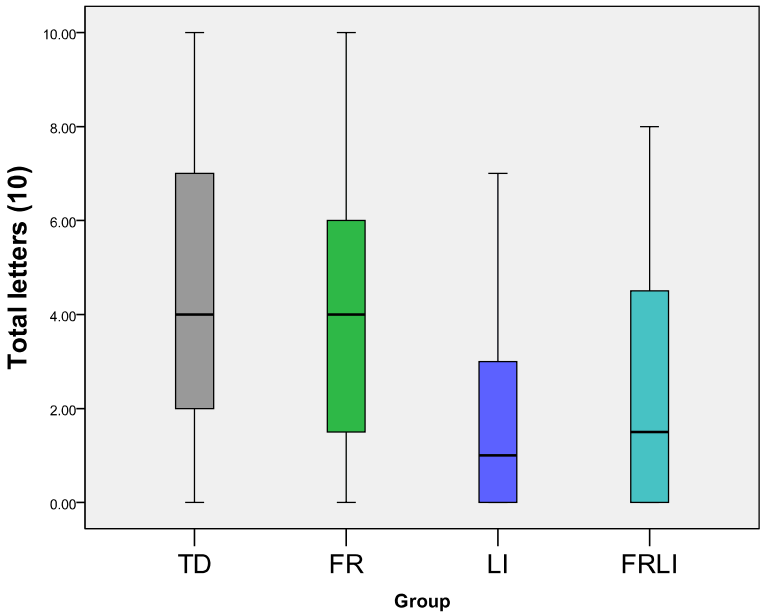
- LI children have severe difficulties in all domains of language
- FRLI children resemble LI children with the exception of
  - Better semantic knowledge
  - Better able to correctly inflect verbs
  - Poorer RAN
- Remaining FR children show weaknesses in
  - Phonological processing
    - with the exception of mispronunciation detection
  - Sentence repetition
  - *But there is a great deal of variability within this group*

Letter knowledge

- Based on their language profiles and the 2D model we would expect the LI, FRLI and some of the FR only children to be experiencing early literacy difficulties



LSK
Only FRLI & LI impaired



Letter writing
Only FRLI & LI impaired

Predicting letter knowledge (composite)

TD + FR (all) Model fit R = .715, R^2 = .511

Predictor	Std Beta	t	Sig?
Age	**.282**	**4.756**	**.01**
NV ability	.024	.348	
T1 LSK	**.408**	**6.131**	**.01**
Mispro detection	.088	1.312	
Nwrep	.063	.892	
Allit matching	**.252**	**3.703**	**.01**
RAN objects	**.154**	**2.403**	**.05**
Sentence comp	-.030	-.411	
Rec Vocab	-.056	-.768	

- Model with just the 4 significant predictors explains ~50% of the variance in letter knowledge
  - Whole sample R^2 = .526
  - TD only R^2 = .517
  - FR (all) R^2 = .586
- All 4 predictors make a significant unique contribution

Preliminary conclusions

- Language
  - Approx 1/3 of children at family risk have a preschool language impairment
  - Some FR children have a less severe phonological deficit
- Literacy
  - Many of the LI and FRLI children and some of the FR only children are experiencing early literacy difficulties
- Risk factors
  - The core deficit appears to be phonological – but this varies in severity
  - Are deficits in other language domains additional risk factors or the result of a more severe phonological deficit?
    - 2D diagram suggests it might be the latter
    - Scores on phonological and 'non-phonological' tasks are correlated, but measures of oral language do not emerge as predictors of letter knowledge once phonological skills are accounted for
  - RAN is a unique predictor, is visual-verbal mapping an additional risk factor?

The end

With thanks to

- The children and their families
- The research team

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