

# L1 orthography and quantity of exposure to L2 as (protective) factors in L2 acquisition in the context of reading disability

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# Outline

- Aims and research questions
- The languages in the study
- Materials and Method
- Evidence from the studies
- Conclusions and Pedagogical Implications



# Based on

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L1, quantity of exposure to L2 and reading disability as factors in L2 oral comprehension and production skills

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## ABSTRACT

This study investigated second language comprehension and oral skills in a control group and a reading deficit group (RDG) of 3rd graders in both Urdu and English medium schools in Pakistan. The main goal was to test the extent to which learning difficulties (such as a reading deficit in L1) negatively affected L2 achievement and whether language immersion was a protective factor in L2 attainment in the case of learning difficulty.

We used The English 2 Dyslexia test (Kaiser, Sanne, & Holland, 2004) originally designed to assess L2 skills in Fr

## DYSLEXIA

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## Predictors of Reading in Urdu: Does Deep Orthography Have an Impact?

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The aim of this study was to establish the extent to which rapid automatized naming (RAN) and non-word repetition (NWR) tasks predict reading fluency and reading accuracy in Urdu. One hundred sixty (8–9 years) children attending two types of schools (Urdu and English medium schools) were distributed into two groups, a control and a

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## L1, quantity of exposure to L2, and reading disability as factors in L2 literacy skills

### 1 Introduction

Learning a second language can be challenging, especially beyond the window of opportunity offered by the sensitive period for language acquisition (Lado 1961; Field and Roberts 1959; Lenneberg 1967; DeKeyser and Larson-Friedrich 2005) however, even more challenging for children with reading difficulties (specific learning disability) is believed to affect between 5 and 10% of the population (Siegel 2006; Shaywitz, Fletcher, Holahan, and Shaywitz 1990) characterized by problems in reading and spelling/writing (Friedrich 2005).



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# Aims

Investigate English **L2 proficiency (comprehension and oral skills) and reading skills** in a sample of 8-9 year-old control and **reading deficit 3rd graders** in Urdu and English medium schools from an underdeveloped district in Pakistan



## Children with dyslexia lag behind in L2

- Dyslexia manifests as a phonological deficit (Pennington & Bishop, 2009)
- + problems in auditory sequencing, working memory, auditory discrimination, organization skills, speed of information processing, limited attention span, impairment in visual processing (Crombie, 2000; Stein & Walsh, 1997; Witton, Talcott et al., 1998; Helland et al., in press)
- Problems in the L1 (phonology/orthography), shown to affect L2 acquisition (Ganschow, Sparks & Javorsky, 1998; Helland & Kaasa, 2005; Farukh & Vulchanova, 2014)



# Assumptions

- L2 acquisition parallels L1 acquisition (factors and mechanisms – exposure to input)
- Competencies and skills in the L1 correlate highly with L2 (STM/WM (the Phonological Loop as LAD - Baddeley, Gathercole & Papagno, 1998; Perani, 2005; Vulchanova, Foyn, Nilsen, Sigmundsson, 2014)
- High (but not complete) overlap of genetic influences on first- and second-language acquisition (Dale, Harlaar, Haworth & Plomin, 2010)
- L1 Phonological and literacy skills crucial in L2 (transfer positively to L2, Bialystok, McBride-Chang & Luk, 2005; Bialystok, Luk & Kvan, 2005)
- Literacy acquisition can benefit from different instruction methods depending on group (Kovelman et al., 2015)



# Research questions

- Role of increased exposure to L2 input (2 types of schools) for children with a reading deficit
- Role of L1 orthography in acquiring L2 reading skills (transfer)
- Can RD children benefit from increased input? Do they also transfer positively strategies from L1 orthographic skills?
- Positive «back-transfer» from the L2?



# L1 and L2 orthography

- L1 and L2 orthography and typology important
- Similarity or distance impact positively?

## Languages in the study

- Urdu and English (Indo-European)
  - ✓ Urdu - Indo-Aryan family
  - ✓ English – Germanic



# Languages

- English orthography - opaque (deep)
- ✓ less consistent grapheme - phoneme and phoneme - grapheme correspondence
- ✓ 26 letters correspond to 40 phonemes, represented by more than 500 graphemes (Helland, 2008)
- Urdu orthography - opaque
- ✓ 38 letters; 2 of the 3 proper vowel letters also represent semi-vowels; all other vowels - represented by diacritics positioned above or below the preceding letter
- ✓ typical Urdu writing omits most of the diacritics leaving only consonants behind (Rao, Vaid, Srinivasm & Chen, 2010).



# Problems in Urdu

- Omission of diacritics → homographs (reader has to identify the word/pronunciation with contextual help)
- Another problem of graphemic nature - same letters written differently in different positions within the word
- Urdu has a cursive property - many graphemes in Urdu words look similar/identical - discriminated by the presence of, the number of or positioning of, dots (Mirdehghan, 2010)
- Many to one mappings between graphemic symbols and sound (more than one letter corresponds to the same sound (Rao, Vaid, Srinivasm & Chen, 2010))

# School Systems - Pakistan

- Urdu medium schools (public and private) - all subjects taught in Urdu; English taught as a subject
- English medium schools - all subjects taught in English; Urdu taught as one of the subjects; communication in class (sometimes) and out of class in Urdu
- Children in English medium schools use oral English; children in Urdu medium schools restricted to written English only
- Minimal amount of English input in Urdu schools



# Materials and Method

- Non-word repetition task, dictation and a classical RAN battery used for screening purposes; children below the 25<sup>th</sup> percentile on three or more tasks classified as presenting a reading deficit/problem; remaining children - control groups
- 8 schools (Urdu & English) - 66 participants out of 158
- ✓ 4 groups (2 x 2)
  - reading deficit Urdu group (20)
  - reading deficit English group (14)
  - control Urdu group (18)
  - control English group (14)

## English 2 Dyslexia test

- English 2 Dyslexia test (Kaasa et al., 2004) (with adaptations) - assesses verbal and literacy skills in L2 through 7 subtests: comprehension, model sentences, pragmatics, story-telling, spelling, reading and translation
- We report only the results from the oral tasks here
- Content adapted to conform to English skills in grade 3 in Pakistan (e.g., public sector textbooks)
- administering procedure adapted (administered manually)

# Tests

- Task1 (T1) Comprehension - assesses the receptive skills in the second language in three types of sentences - declaratives, negatives and interrogatives
- ✓ Six different pictures shown while listening to the sentence → child selects the picture corresponding to the sentence
- T2 assesses expressive language skills (model sentences) – morphology, syntax and semantics
- ✓ 15 pairs of pictures



# Research Questions

- Whether the complex L1 morphology has an impact on L2 Production skills
- Whether learning difficulties (such as e.g., dyslexia) affect negatively L2 achievement
- Whether language immersion functions as a protective factor



## Predictions

- RD's will score lower than controls on all tasks
- Both groups from English medium schools (RD & control) will perform better than their counterparts at Urdu medium schools.
- At the same time our sample with an L1 with complex morphology might be better on morphology scores

# Statistical Analyses

- Independent samples t-tests for non-verbal IQ scores to rule out chances of impaired cognition
- Only **symbol coding speed** significantly different between the reading deficit groups and control groups in both types of schools ( $p = .007$ )
- A two-way MANOVA test was run to investigate the effect of group and medium of instruction/school type
- ✓ significant effect of **reading group** ( $F(2, 61) = 5.52$ ,  $p = .006$ , Wilks'  $\Lambda = .85$ ,  $h_p^2 = .15$ ).
- ✓ The between-subject effects as follows:
  - for **comprehension**,  $F = 1.38$ ,  $df = 1$ ,  $p = .24$ ,  $h_p^2 = .02$ ; and for oral **production**,  $F = 11.09$ ,  $df = 1$ ,  $p = .001$ ,  $h_p^2 = .15$ .

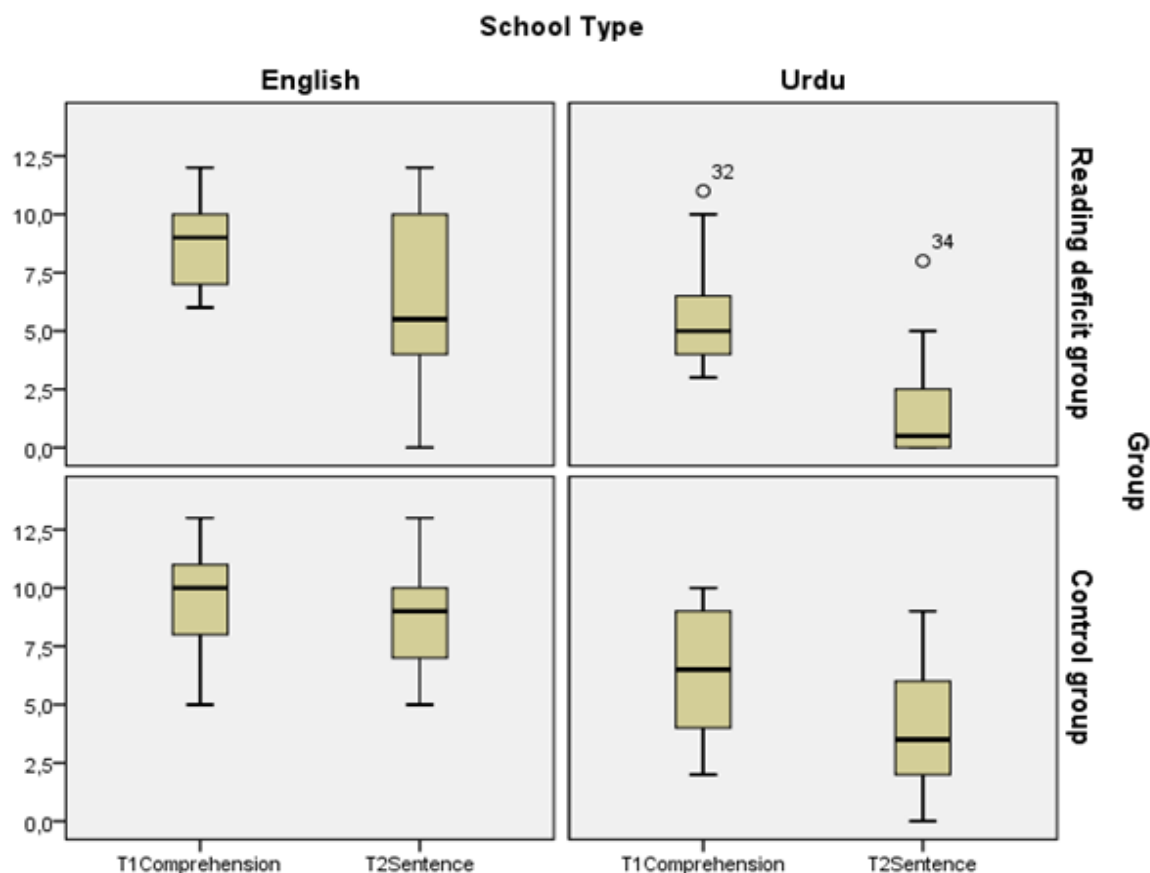
## Results

- ✓ Significant effect of **medium of instruction** = ( $F(2, 61)=28.55$ ,  $p < .001$ , Wilks'  $\Lambda=.52$ ,  $h_p^2=.48$ )
  - oral medium of instruction has an impact on comprehension and production (oral output)
- ✓ Between-subject effects
  - for **comprehension** T1,  $F=33.04$ ,  $df=1$ ,  $p < .001$ ,  $h_p^2=.35$ ;  
and for **model sentences** T2,  $F=49.84$ ,  $df=1$ ,  $p < .001$ ,  
 $h_p^2=.45$ .

# Results

- Both the RD and control groups scored better on comprehension (T1) > production task (T2) (trivial)
- RDG followed profile pattern of controls, yet scored much lower Fig.1.
- Urdu schools - far behind on both tasks than English schools
- Difference - fairly large for oral production T2

**Fig.1 Graphical representation of repeated measure ANOVA illustrating the difference in scores in the comprehension task (T1) & the production task (T2) between language groups (control & RDG) and schools (English & Urdu)**



## Language skills MANOVA

- A MANOVA for **Morphology, Syntax, & Semantics** yielded an **effect of**
  - ✓ **group**  $F(2, 63) = 2.58$ ,  $p = 0.08$ , Wilks'  $\Lambda = .92$ ,  $h_p^2 = .08$ , and
  - ✓ **school type** -  $F(2, 63) = 3.76$ ,  $p = 0.03$ , Wilks'  $\Lambda = .89$ ,  $h_p^2 = .11$
  - ✓ Between-subject effects:
    - for **morphology**,  $F=29.30$ ,  $df=1$ ,  $p < .001$ ,  $h_p^2 = .32$ ;
    - for **syntax**,  $F=39.46$ ,  $df=1$ ,  $p < .001$ ,  $h_p^2 = .39$ ;
    - for **semantics**,  $F=45.98$ ,  $df=1$ ,  $p < .001$ ,  $h_p^2 = .43$ .

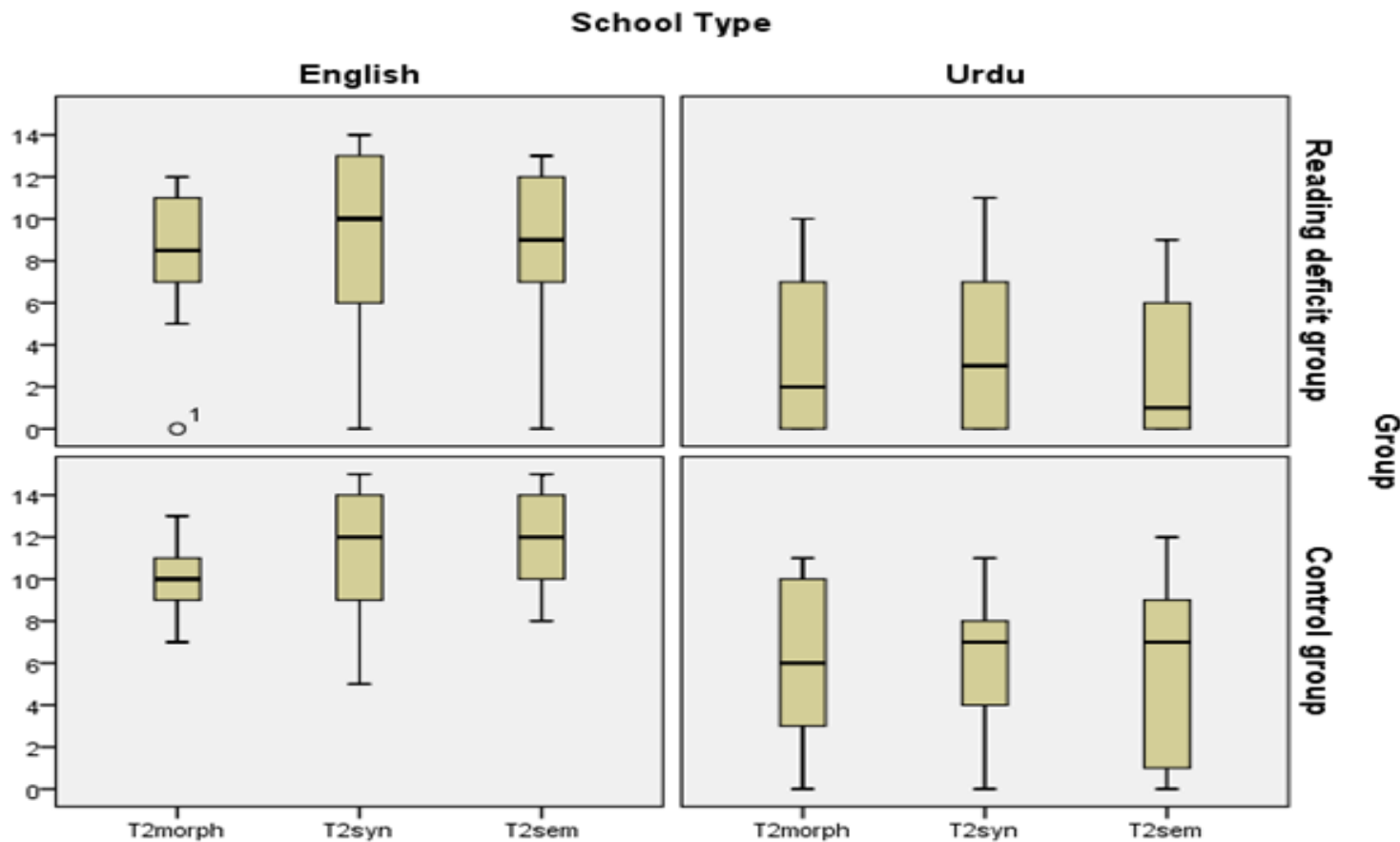


# Results

- Both the RD and control groups at both English and Urdu medium schools display similar trends in level of performance across skills (morphology, syntax, semantics) (Fig.2)
- Urdu schools - far behind on all sub-tasks than English schools



**Fig.2 Graphical representation of repeated measure ANOVA illustrating the difference in scores in morphology, syntax and semantics in the production task (T2) between language groups (control & RDG) and schools (English & Urdu)**



**Table 2. T-Test on mean scores for control group at Urdu medium schools (CG Urdu) and reading deficit group at English medium schools (RDG Eng)**

**Paradox: The RD group from English medium schools performed (significantly) better than Control group at Urdu medium schools on all L2 tasks**

	RDG Eng Mean (SD)	CG Urdu Mean (SD)	T-value	df	p
<b>T1 Comprehension</b>	8.93 (1.90)	6.28 (2.56)	3.24	30	.003
<b>T2 Model sentences</b>	6.36 (3.71)	3.78 (2.88)	2.22	30	.034
<b>T2 Morphology</b>	8.21 (3.31)	6.22 (3.67)	1.59	30	.123
<b>T2 Syntax</b>	9.21 (4.42)	6.00 (3.20)	2.39	30	.023
<b>T2 Semantics</b>	8.64 (3.90)	6.00 (3.97)	1.89	30	.069



# Comparison

- Controls & RD's (at English schools) → scored high on all tasks, indicating importance of academic exposure to a second language through medium of instruction



# Word reading

- The same sample (N=66) tested on word reading in both L1 and L2
- Materials – 3 lists in each language, 10 items each (mixed difficulty list, pseudowords, easy frequent words)
- Research questions:
  - ✓ Correlations between reading (decoding) skills in L1 and L2
  - ✓ Role of increased exposure to L2



## Descriptive statistics for control groups at Urdu schools and English medium schools

Group Statistics <sup>a</sup>					
	Lang	N	Mean	Std. Deviation	Std. Error Mean
MixedwordsEng	English	14	8,07	,917	,245
	Urdu	18	4,50	2,307	,544
PseudowordsEng	English	14	8,43	1,158	,309
	Urdu	18	5,61	2,831	,667
EasyFrequentEng	English	14	9,93	,267	,071
	Urdu	18	7,94	2,313	,545
Mixedwordsurdu	English	14	9,07	,997	,267
	Urdu	18	8,56	2,406	,567
PseudowordsUrdu	English	14	8,57	1,089	,291
	Urdu	18	7,22	3,135	,739
EasywordsUrdu	English	14	9,50	,760	,203
	Urdu	18	8,44	3,166	,746
a. Type2 = control					



## Descriptive statistics Reading Deficit groups at Urdu medium schools and English medium schools

	Lang	N	Mean	Std. Deviation	Std. Error Mean
MixedwordsEng	English	14	6,79	,802	,214
	Urdu	20	2,05	1,791	,400
PseudowordsEng	English	14	7,29	1,437	,384
	Urdu	20	3,35	3,031	,678
EasyFrequentEng	English	14	9,50	,650	,174
	Urdu	20	4,75	3,596	,804
MixedwordsUrdu	English	14	6,71	2,431	,650
	Urdu	20	4,45	4,045	,905
PseudowordsUrdu	English	14	6,29	2,268	,606
	Urdu	20	4,10	3,417	,764
EasywordsUrdu	English	14	7,50	2,066	,552
	Urdu	20	5,75	4,216	,943

**Table 1. Summary of Inter-correlations for scores on all word list in English and Urdu in controls**

Variables	1	2	3	4	5	6
MixedwrEng		.81**	.86**	.45*	.53**	.50**
PseudowrdEng			.82**	.58**	.66**	.66**
EasyfreqEng				.73**	.69**	.71**
MixedwrUrdu					.80**	.82**
PseudowrdUrdu						.89**
EasyfreqUrdu						

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).



**Table 2. Summary of Inter-correlations for scores on all word list in English and Urdu in reading deficit group**

Variables	1	2	3	4	5	6
MixedwrEng		.79**	.88**	.64**	.63**	.58**
PseudowrdEng			.86**	.72**	.75**	.72**
EasyfreqEng				.79**	.72**	.76**
MixedwrUrdu					.85**	.86**
PseudowrdUrdu						.92**
EasyfreqUrdu						

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).



# Controls (t-test)

- Significant difference between CG (UrduS) and CG (EnglishS) on all L2 word lists, but **no significant difference for any of the L1 word lists**
  - ✓ MixedW  $t$ -value = 5.45,  $df = 30$ ,  $p < .001$
  - ✓ Pseudowords  $t$ -value = 3.49,  $df = 30$ ,  $p = .002$
  - ✓ Easy frequent words  $t$ -value = 3.18,  $df = 30$ ,  $p = .00$

# RD children (t-test)

- Significant difference between RDG (UrduS) and RDG (EnglishS) on all L2 word lists
- ✓ Mixed difficulty Ws  $t$ -value = 9.23,  $df = 32$ ,  $p < .001$
- ✓ Pseudo-words  $t$ -value = 4.50,  $df = 32$ ,  $p < .001$
- ✓ Easy frequent words  $t$ -value = 4.86,  $df = 32$ ,  $p < .001$
- A significant difference for L1 (Urdu) word reading scores between the two groups of RD children, for
  - ✓ Pseudo-words  $p = .05$ , and a trend for
  - ✓ Mixed difficulty W  $p = .07$

RDG (EnglishS) scored higher even on Urdu reading tasks



# Conclusions

- Word Decoding skills in the L1 and L2 correlate highly in both typical and RD children (skills transfer)
- Higher heterogeneity in RD groups
- Increased exposure to L2 input – positive effect, a protective factor in reading deficit (role of learning)

# Our interpretation

- L2 skills (through increased exposure) «back-transfer» to L1 (in RDGs only, but not Controls)
- Learning in RD children (better outcomes) provided optimal conditions

## Conclusions

- Consistent with other studies – reading deficit affects L2 learning
- **New findings:**
- L2 immersion is a protective factor
- (Positive) transfer of L2 decoding skills in RD
- Other factors
- ✓ Language typology (Morphological nature)
- ✓ School curriculum