

# Characteristics of early spelling errors in Arabic: The impact of visual-orthographic features

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Background

The present study

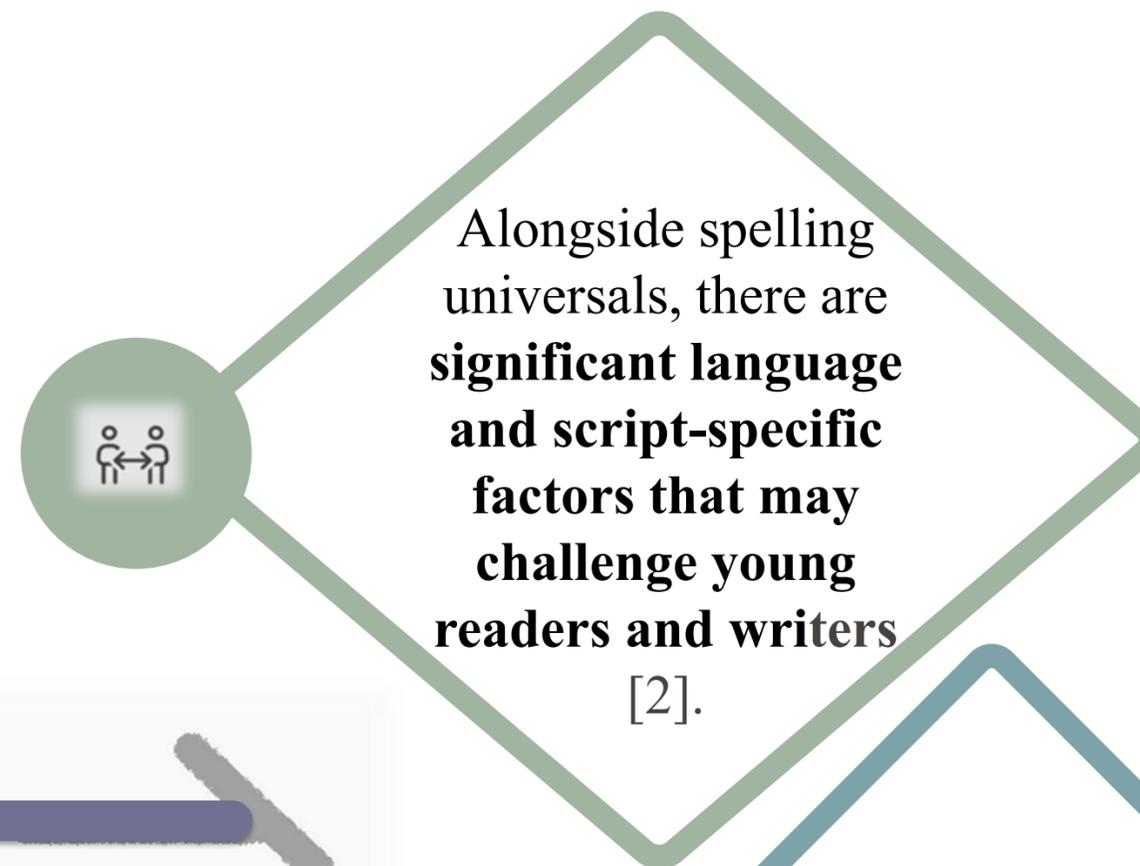
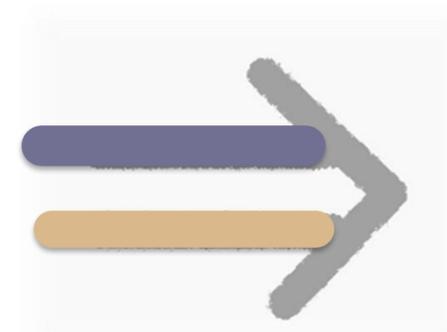
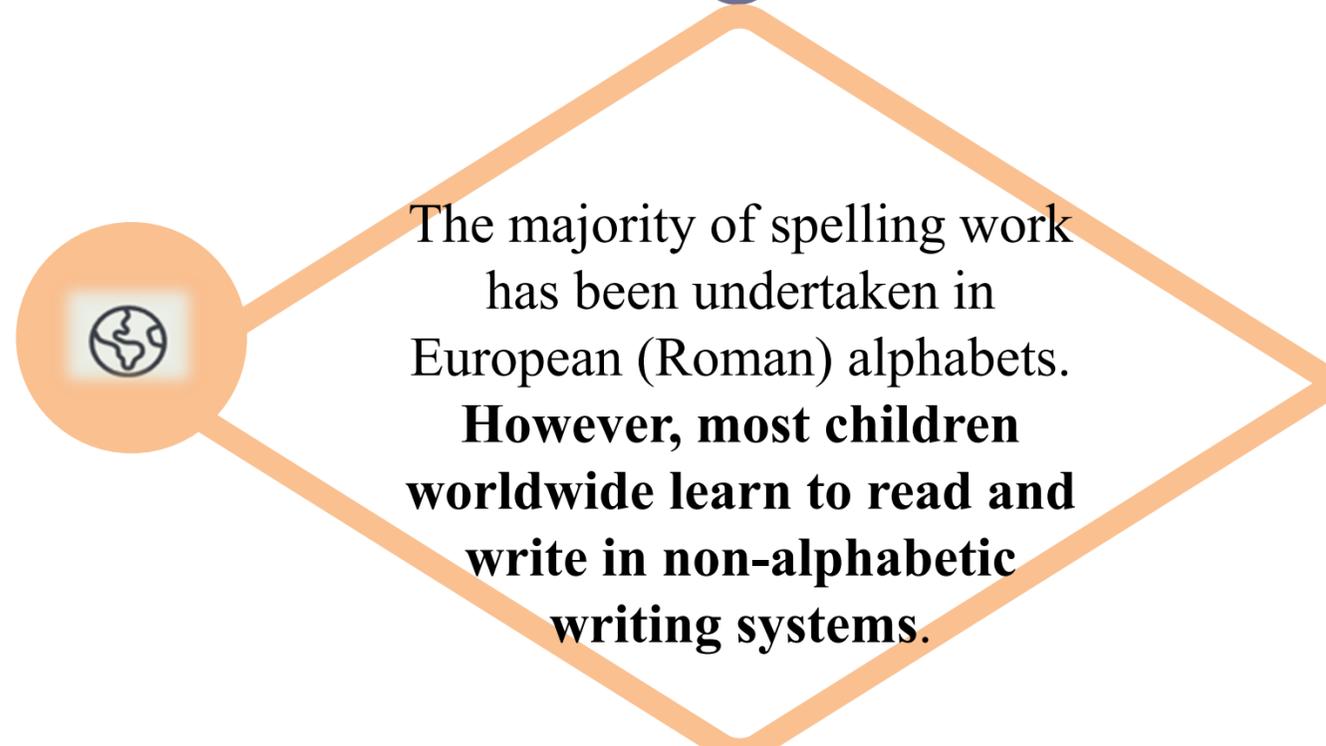
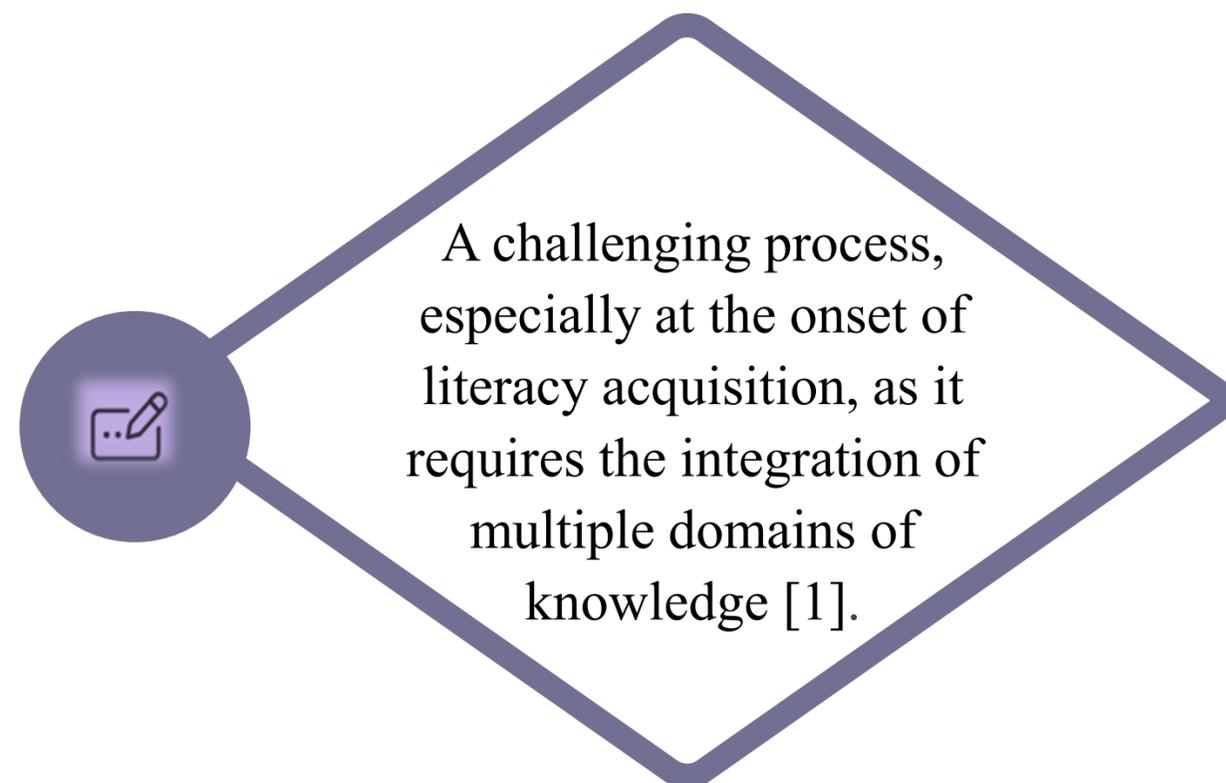
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# Early spelling acquisition: From alphabets to abjad Arabic



[1] Graham & Santangelo, 2014; Ravid, 2012; Treiman & Kessler, 2014

[2] Daniels & Share, 2018; Treiman, 2017

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# Arabic orthography



اللُّغَةُ الْعَرَبِيَّةُ هِيَ أَحَمُّ لُغَاتِ الْعَالَمِ. ←

“The Arabic language is one of the most important languages in the world”

# Visual-orthographic features

## *(i) The similarity of many basic letter forms*

ب ت ث

ج ح خ

د ذ  
ر ز  
س ش  
ع غ  
ف ق

## (ii) *Ligaturing/Cursivity*

23 letters can connect to the adjacent letter on both sides.

ح ص ف

6 letters can connect only from the right but not the left side.

ا د ذ ر ز و

Fully connected

بيت

*bayt* 'home'

Partly connected

مولود

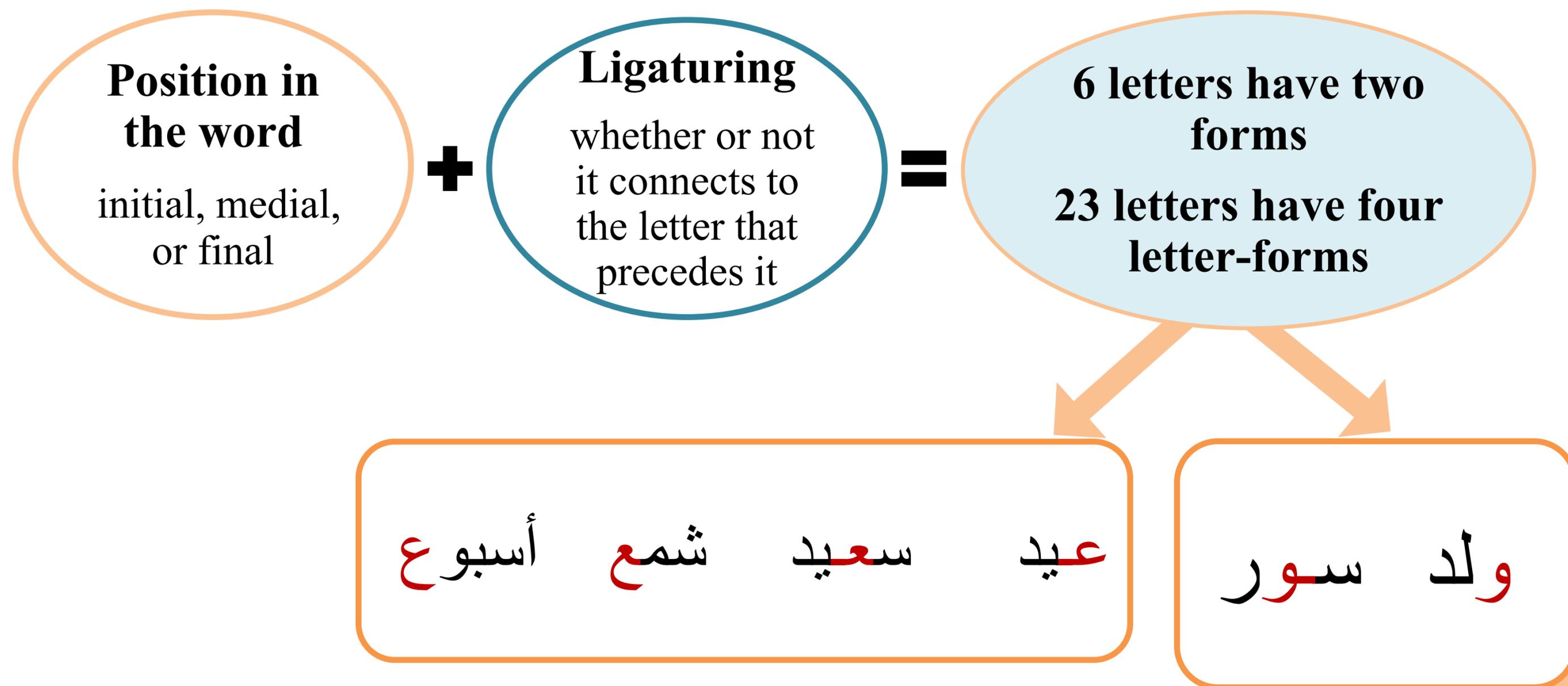
*mawlu:d* 'born'

Entirely unconnected

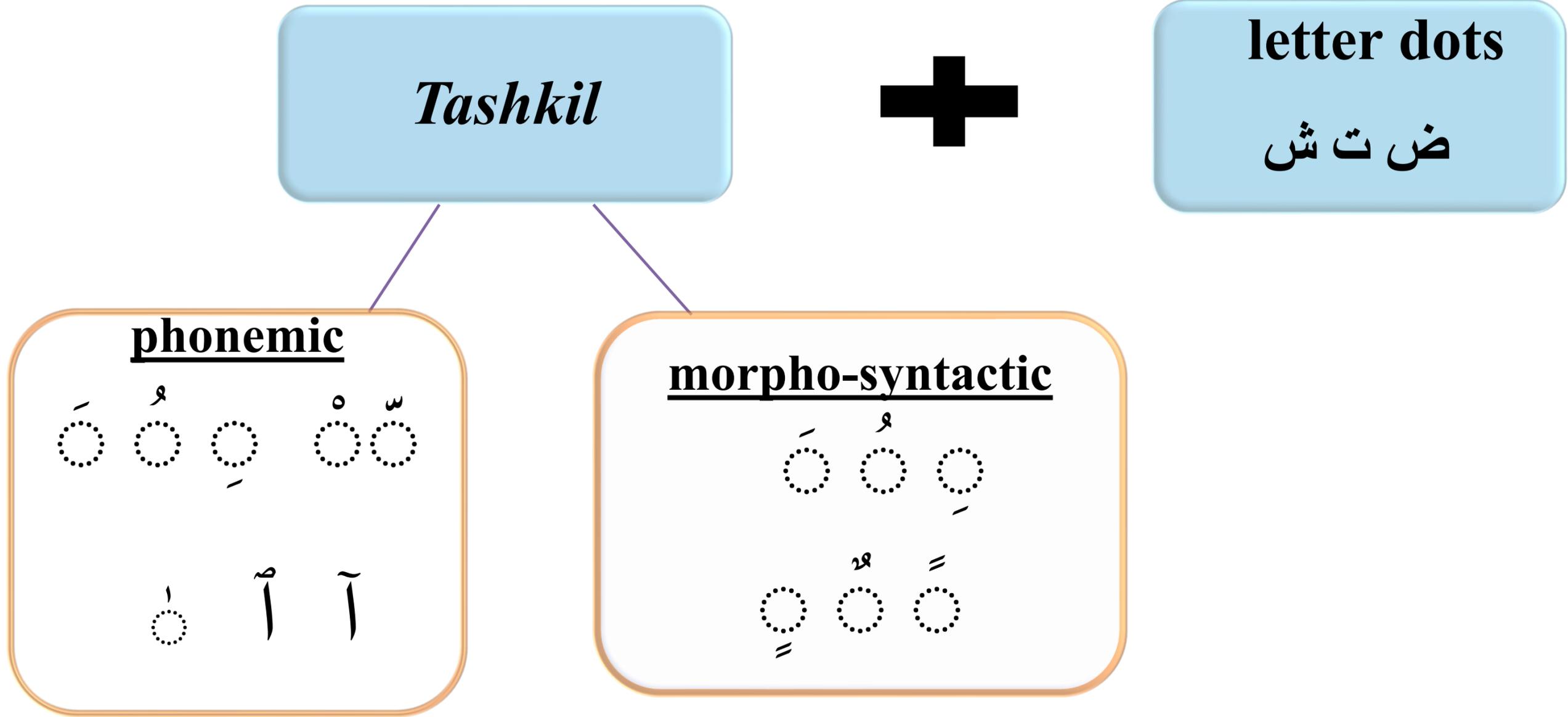
ورود

*wuru:d* 'roses'

## *(iii) Allography: The variability of the letter forms*



# (iv) Tashkil and non-linearity



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# The impact of visual-orthographic features on Arabic spelling

(Yassin et al., 2020)



**Aim:** To investigate the impact of visual features on early spelling development.



**Participants:** 96 Arabic-speaking children of Grades 1, 2, and 4.



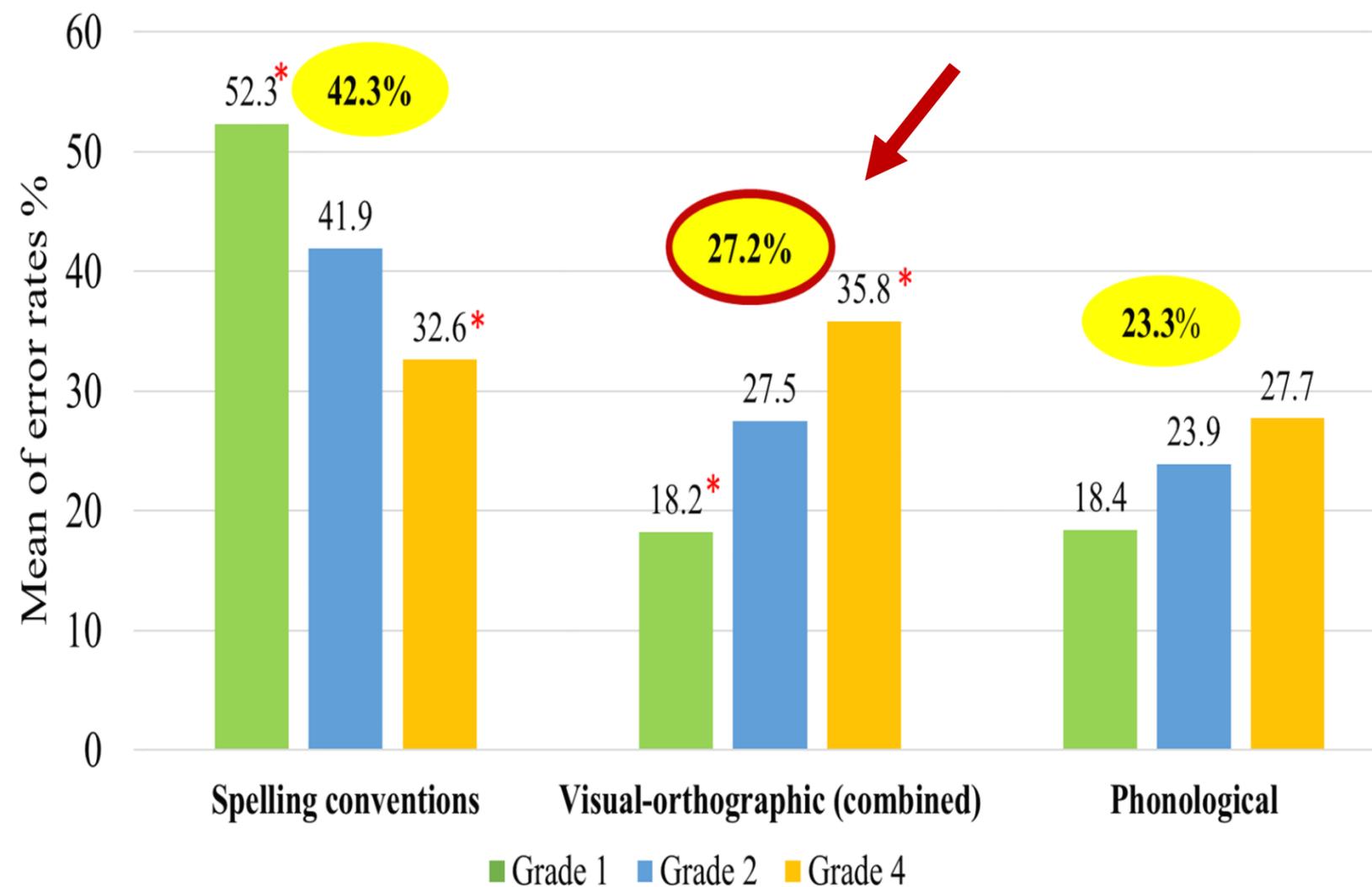
**Task:** Written expression task



**Error analysis:** Six visual-orthographic errors and six additional types related to more complex linguistic and orthographic aspects.



**Main findings:** Visual-orthographic errors constituted the second most common error category, accounting for over one-quarter (27%) of all errors.



كان الولد في الثوب والفتاة في الثوب

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## Research objective

To investigate the frequency and distribution of visual-orthographic errors and phonological errors at the onset of formal literacy instruction (mid-first grade).

using a **structured dictation task**  
administered to a **large representative sample**

## Research Hypotheses

Phonological errors would constitute a significant proportion of children's errors, but visual-orthographic errors would also account for a non-trivial proportion.



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# The study sample

This investigation is part of a larger longitudinal study conducted at the **Edmond J. Safra Brain Research Center** for the Study of Learning Disabilities at the University of Haifa.

## A representative sample

**124 Arabic-speaking children** ( $M_{age} = 6.7$  years,  $SD = 0.29$ )  
**Mid-Grade 1**



### Sector Distribution

The Northern and Haifa districts

94 Arab (Muslim & Christian)  
20 Druze,  
10 Bedouin



### School welfare index

Ministry of Education

**45 schools** with a welfare index ranging from 2 (medium-high) to 5 (low)



### The Arabic reading instruction methods

*Al-Arabiyya Lugatuna, Al-Ghaith, Al-Manaara, Al-Takween*



### Gender distribution

61 boys | 63 girls

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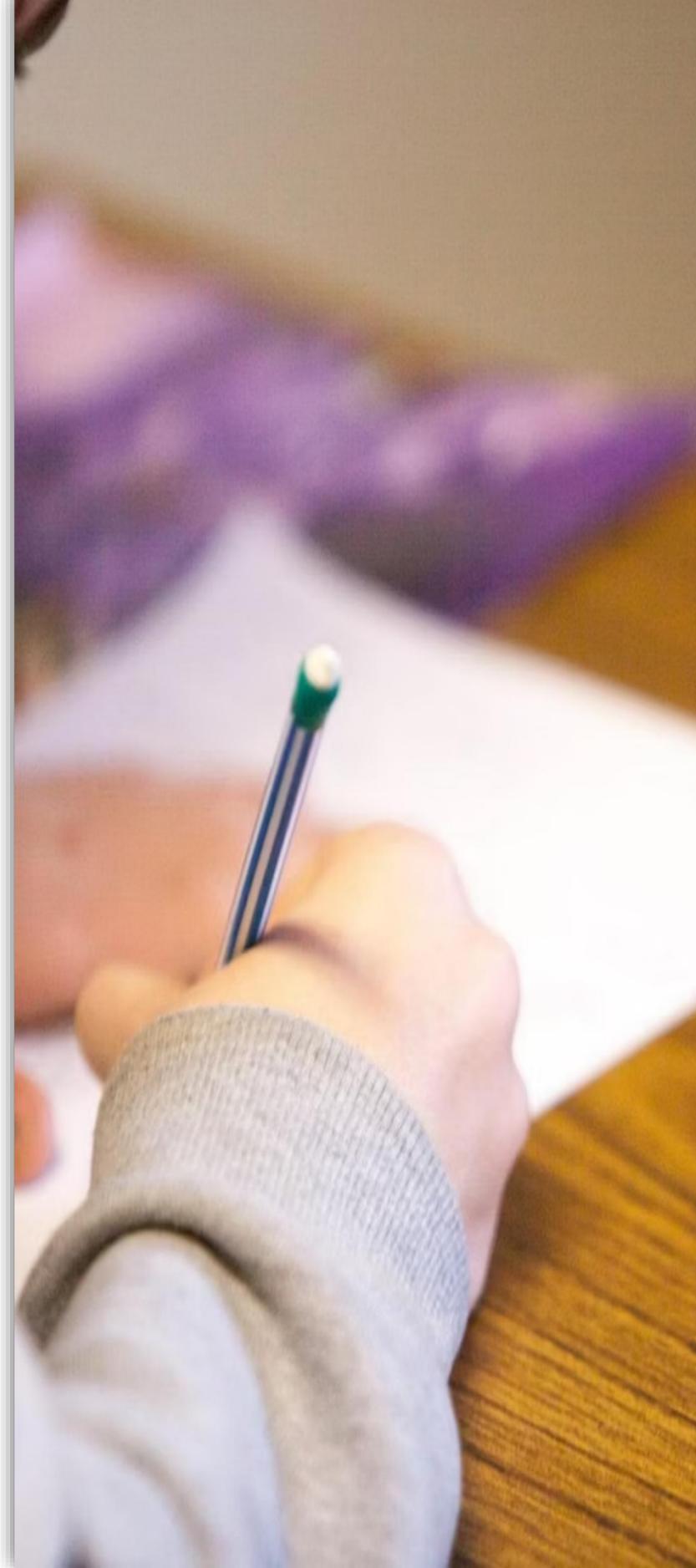
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# Word Dictation Task

Yassin et al. (2020)

8 words 

-  Representing **nouns, verbs, and proper names**
-  Contain **only taught consonant letters, long vowel letters, and short vowel signs**
-  Include **visual-orthographic dimensions**
-  **High-frequency** words taken from schoolbooks
-  Featuring a **high degree of phoneme-to-letter consistency**
-  **Phonologically and lexically identical** in Spoken and Modern Standard Arabic



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# Error Analysis

## Three major error categories

### The visual-orthographic category

- *Letter-form similarity*
- *Ligaturing*
- *Allography*
- *Non-linearity*
- *Letter formation*
- *Other*

### The phonological category

- ***Consonant representation***
  - Semi-homophony*
  - Other*
- ***Vowel representation***
  - Semi-homophony*
  - Other*

### The peripheral error category

- *Lexical*
- *Distortion*
- *Orientation*
- *Other*

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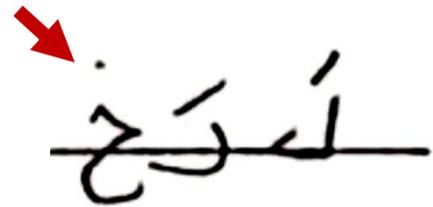
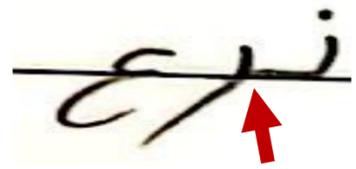
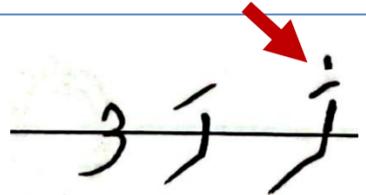
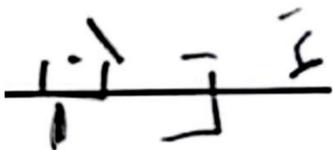
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## Examples of the six visual-orthographic spelling error types

Error types	Incorrect spelling	Correct spelling
Letter-form Similarity		دَرَج
Ligaturing		زَرَع
Allography		سَمَك
Non-linearity		زَرَع
Letter formation		سام
Other		هَرَب

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# Distribution Spelling error Categories

*Distribution of total spelling errors in each category for the entire sample*

Error category	Number of errors	%
<b>Visuol-Orthographic</b>	<b>124</b>	<b>20.3</b>
<b>Phonological</b>	<b>388</b>	<b>63.5</b>
Peripheral		
Lexical	2	0.3
Distortion	67	11
Orientation	28	4.6
Other	2	0.3
<b>Total</b>	<b>611</b>	<b>100</b>



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## Visual-orthographic errors Category

*Means of error rates per child for each of the six types of visual-orthographic errors*

Error type	Maximum possible errors	Error rate (%) <i>M (SD)</i>
Letter formation	3	8.6 (21.62)
Ligaturing	18	1.1 (3.00)
Allography	26	1.0 (2.40)
Letter-form similarity	16	1.0 (2.77)
Non-linearity	20	0.6 (2.17)
Other	8	0.1 (1.12)



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# Phonological errors Category

*The average mean error rate of the main Phonological categories*

Main category	<i>M (SD)</i>	<i>Md</i>	<i>Z (Wilcoxon)</i>	<i>p</i>	Interpretation
Vowel Representation	3.2 (3.49)	1.67	-6.09	< .001	Vowel > Consonant large effect, $r = .55$
Consonant Representation	1.3 (1.90)	0.00			

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The current study expands the existing literature by exploring early spelling acquisition in Arabic—a non-European language with a non-alphabetic script.

Arabic’s visual-orthographic features constitute a significant source of difficulty for young learners, alongside well-established phonological challenges.

These insights enhance the broader theoretical discourse on the role of writing system variation, reinforcing the importance of accommodating orthographic diversity in spelling research [1].

It offers a deeper understanding of both the unique (script-specific) and universal aspects of spelling at the very beginning of formal Arabic writing instruction.

The findings highlight the consonant-based architecture of Arabic—linguistically and orthographically—where consonants are spelled more accurately than vowels [2].

[1] Daniels & Share, 2018; Treiman, 2017; Treiman & Kessler, 2014

[2] Boudelaa & Marslen-Wilson, 2015; Share, 2017; Saiegh-Haddad, 2018

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# Educational Implications

## Raising Awareness

The findings highlight the need to raise awareness among educators, curriculum developers, and policymakers about the visual complexity of the Arabic writing system and its impact on early spelling.



## Instructional Practice

There is a need for explicit, systematic instruction on Arabic's visual-orthographic features beginning in the preschool years, and integrated with phonological awareness and phonics-based teaching, to better prepare children for the unique demands of the Arabic script.



Dziękuję Ευχαριστώ Kiitos Tak  
有り難う Obrigado 谢谢 Hvala 有り難う  
Tack תודה Merci Danke Terima kasih  
謝謝 Grazie Thank you Gracias ขอบคุณ Kiitos  
ありがとう 감사합니다 شكرا 謝謝 Спацибі  
Mulțumesc Спацибі Спацибо Dankon  
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