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Manifestations de la dyslexie chez les élèves arabophones de l'enseignement primaire

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# Manifestations of dyslexia in Arabic-speaking primary school students

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## Manifestations de la dyslexie chez les élèves arabophones de l'enseignement primaire

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### Introduction

Reading is one of the basic skills an individual must have in his daily life. However, some children in many elementary schools suffer from dyslexia, according to one study, about 20 of the total students in the world suffer from learning disabilities, and 10 of them suffer from dyslexia. Dyslexia is a specific disorder of learning to read which results in a deficit in the procedures of identification of written words. Knowing that intelligence and oral comprehension are conserved, dyslexia leads also to significant difficulties in the acquisition of spelling (dysorthography), which often persist into adulthood<sup>1</sup>.

Several studies on dyslexia have been conducted in foreign languages, among them, we note that studies comparing the spelling performance of dyslexic and non-dyslexic students of the same age and grade<sup>2</sup> found similar error profiles between two groups of students. However, dyslexic children make significantly more errors than non-dyslexic children. Besides that, dyslexics make atypical errors that are never found in the writings of non-dyslexic students, especially in agreement and conjugation<sup>3</sup>.

In the same way, Anne Plisson, Rachel Berthiaume & Daniel Diagle compared the spelling skills of dyslexic children and deaf children, both of whom have phonological deficits that affect writing development, so the results revealed a delay in spelling production in dyslexic children compared to deaf children<sup>4</sup>.

1. Palandre, Mazur A. (2018). La dyslexie à l'âge adulte: la persistance des difficultés orthographiques. In SHS Web of Conferences (Vol. 46, No. 1003, p. 8).

2. Mazur, P. (2018). La dyslexie à l'âge adulte : la persistance des difficultés orthographiques. SHS Web of Conferences, 46. doi:10.1051/shsconf/20184610003. - Abu-Rabia, S., & Taha, H. (2004). Reading and spelling error analysis of native. (Netherlands, Ed.) Reading and Writing, 17, 651–689.

3. Bodard, J. (2020). Spécificités des erreurs d'orthographe des personnes dyslexiques : analyse d'un corpus de productions écrites. Journées d'Études sur la Parole (JEP, 31e édition), (pp. 15–28). Nancy.

4. Plisson, A., Berthiaume, R., & Diagle, D. (2016). Compétence orthographique chez l'élève dyslexique et chez l'élève sourd : Étude comparative. CJAL \* RCLA, 164-187.

However, we record a few studies in the Arabic language which are summarized in the evaluation of dyslexia in Arabic-speaking readers, and in the relationship of some skills with dyslexia, namely phonological awareness<sup>5</sup> working memory,<sup>6</sup> and rapid naming<sup>7</sup>.

In other words, the analysis of reading and spelling errors in Arabic-speaking dyslexic readers has not yet been studied, and this is the objective of our study, we investigate the profile of Arabic-speaking dyslexics while comparing them chronologically age-matched groups. and to determine the most common manifestations of dyslexia in Arabic-speaking primary school students.

To understand the pattern of errors made by the Arabic-speaking dyslexic, it is necessary to illustrate the orthographic characteristics of the Arabic language.

## **I. The characteristics of Arabic spelling**

### **I.1 Difficulties with Arabic spelling**

The Arabic language is a transparent Semitic language, read from right to left, and consists of 28 letters that are consonants and long vowels, while the short vowels are optional; they consist of three small signs, whose place is above or below the letters, they represent the three short sounds (a, u, i). When these diacritical marks are present for didactic needs, Arabic orthography offers transparent relations between grapheme and phoneme<sup>8</sup>.

Thus, Heithem Ibrahim Saleh (2015) notes that the absence of the diacritical sign carries an ambiguity for the reading of a child. Evidence suggests that vowelization helps both beginner and more experienced Arabic readers improve their reading comprehension and accuracy<sup>9</sup>.

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5. Layaes, S., Lalonde, R., & Rebaï, M. (2014). Reading Speed and Phonological Awareness Deficits Among Arabic-Speaking Children with Dyslexia. *Dyslexia*, 21(1). doi: <https://doi.org/10.1002/dys.1491> - Taïbah, N., & Haynes, C. (2011). Contributions of phonological processing skills to reading skills in Arabic speaking children. *Reading and Writing*(24), 1019–1042

6. Zayed, A., Roehrig, A., Arrastia-Lloyd, M., & Gilgil, N. (2013). Phonological Awareness and Working Memory in Arabic-Speaking Egyptian Preschool Children at Risk for Dyslexia. (C. C. Education, Ed.) *International Journal of Psychological Studies*, 5(1).

7. Layaes, S., Lalonde, R., & Rebaï, M. (2014). Loc Cit.

8. Ammar, M. (1997). *Les strategies d'identification des mots écrits en arabe* (Doctoral dissertation, Nantes).

9. Abu-Rabia, S. (1997). Reading in Arabic orthography: The effect of vowels and context on reading accuracy of poor and skilled native Arabic readers in reading paragraphs, sentences, and isolated words. *Journal of Psycholinguistic Research*, 26, 465–482. - Abu-Rabia, S., Share, D., & Mansour, M. (2003). Word recognition and basic cognitive processes among reading-disabled and normal readers in Arabic. , *Reading and Writing: An Interdisciplinary Journal*, 16, 423–442.

When the words are taken in an indeterminate sense, the diacritical sign tanwin » is added; this feature is indicated in writing by doubling a diacritical sign, (َ / an /, ُ / un /, ِ / in /), and orally by the addition of the « /n/ » sound, which leads to difficulties in writing and dictating Arabic words. A study by Lettad and Badaoui (2020) on spelling errors in 3rd, 4th, and 5th-grade primary learners, revealed that the percentage of errors of the duplication of the diacritical sign « tanwin » was lower compared to other spelling errors<sup>10</sup> in contrast to the study by Rima Azzam, which recorded a high frequency of Tanwin errors<sup>11</sup>.

Among the difficulties of spelling and reading in the Arabic language and the confusion of letters and their identification, we distinguish letter similarity, which refers to groups of letters that have a similar shape and are discriminated by the number and location of diacritical points, and allography, which refers to the use of different forms of the same letter depending on where they are used in a word (beginning-middle-end). For example (خ - ح - ج) / χ / - /ħ/ - / dʒ / → (حبل / ħabl/ → rope - جبل / dʒabal/ → mountain) this is errors arising from visual similarities, and according to studies by Wessam Mohamed, Karin Landerl and Thomas Elbert (2014) these orthographic features slow down the reading process in Arabic<sup>12</sup> Moreover, Abu-Rabia states that this similarity between letters and the existence of allographs in the Arabic language leads to reading problems in Arabic that can occur in the phonological encoding phase<sup>13</sup>.

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10. Badaoui, F., & Lettad, K. (2020). Spelling errors among learners in grades 3, 4 and 5. *The American Journal of Human Research*, 86-102.

11. Rima, A. (1993). The nature of Arabic reading and spelling errors of young children: A descriptive study. *Reading and Writing*, 5(4), 355-385. doi:10.1007/BF01043112

12. Wessam, M., Karin, L., & Thomas, E. (2014). An Epidemiological Survey of Specific Reading and Spelling Disabilities in Arabic Speaking Children in Egypt. In S.-H. Elinor, & M. R., *Handbook of Arabic Literacy* (pp. 99-117). Springer.

13. Abu-Rabia, S. (1995). Learning to read in Arabic: Reading, syntactic, orthographic and working memory skills in normally achieving and poor Arabic reader. *Reading Psychology*, 16. - Rima, A. Loc Cit.

in Arabic (Wessam, Karin, & Thomas, 2014). Moreover, Abu-Rabia states that this similarity between letters and the existence of allographs in the Arabic language leads to reading problems in Arabic that can occur in the phonological encoding phase (Abu-Rabia S., 1995., Rima, 1993).

## 1.2 Difficulties related to the phonatory system

Despite the transparency of the Arabic language, there are some word irregularities, which make the reading and writing of these words are obscure either in adding a sound without writing it, as in the example of (أولئك → those) or the extension to the /l/ sound of the word /ʔulāʔika/ was added, or increase some letters in writing without pronouncing them in example: مائة [miʔatun] >hundred, we note the addition of the long open vowel /ʕalif el medd/ after the consonant /m/, but we do not pronounce it orally.

Next to the non-emphatic letters (/t/, /d/, /ð/, /s/), the arabic consonants contain emphatic letters (/ tʕ/, / dʕ/, / ðʕ/, / sʕ/), they are phoneme homologs characterized phonetically by a velarized coarticulation. Most spelling mistakes, according to Abu-Rabia and Sammour (2013), happen when emphatic consonants and their non-emphatic counterparts are confused. (Abu-Rabia & Sammour, 2013)

The presence of an emphatic in a word causes the emphatization of the neighboring letter for example (مسطرة /misʕaratun/ ruler → [méʕʕaratun] The letter /s/ in contact with the emphatic letter / tʕ / has become a phonologically emphatic letter ʕ), as well, the kasra weakens the emphatization of the phoneme as an example (شطيرة /ʕati:ra/ sandwich [šati:ra]). These phonological rules conduct novice subscribers and dyslexics to error.

Among the errors that a student may make in the first years of primary education are those related to solar and lunar words, as we find, according to the study of Al-Sawafi (2003), that the common errors among students in the first and second years of primary education lie in the inability to distinguish between the so-called solar words and lunar words, Thus, As shown by Firdaws Ismail al-Jawad in 2012, the errors of solar alif lam appear in the spelling test. After spelling the word, the student highlights some letters in error, such as mentioning the alif heard in the word solar, without adding the letter lam as in the example (أشمس < الشمس → sun) and its error rate was 42 %.

According to the reviewed literature on reading and writing difficulties in reading learners, on our part, we describe the types of errors made by a developmental dyslexic based on the isolated word and pseudoword reading,

text reading, dictation, and spelling test. The current study aimed to probe the prevalence rates of specific reading and spelling deficits in an Arabic-speaking fourth-grade dyslexia case.

## 2. Materials and methods

### 2.1 Participants

We conducted the study in two stages; the first stage involved 640 normal cases in the third, fourth, and fifth grades in seven elementary schools in central, eastern, and western Algiers, to extract norms from the applied tests. These schools were chosen to represent a wide range of socioeconomic backgrounds and included schools from a neighborhood of medium socioeconomic status and schools of high and low socioeconomic status. The second step is to study a case in fourth grade with a learning disability.

Child B-A, aged 9 years and 4 months, the first of 03 siblings, with no pathological history, the psychomotor and linguistic development did not reveal any abnormality. He also had normal visual and auditory acuity.

B-A had developmental dyslexia at the age of 8, he did not know all the letters of the Arabic alphabet, had major difficulties in reading words, difficulties mastering grapheme-phoneme correspondences, and difficulties with long vowels.

### 2.2 Materials

Linguistic and non-linguistic tests were administered to the participants to case B-A. The linguistic tests contained reading, spelling, and dictation tests of isolated words and pseudowords, as well as the morphological judgment test. while the non-linguistic tests contained matching tests, intruder tests, and the bell barrage test.

The non-linguistic tests are designed to designate visual-attentional and visuospatial disorders.

The linguistic tests cover :

- The phonological domain which is presented in this work by the identification of the initial phoneme; is represented by 15 panels, each panel contained 6 frequent images of which one is in the top and the center of the panel and considers the target. The test is marked out of 15 points (1 point per circled image).
- Reading: children must read 3 lists of words; a list of 22 frequent words, a list of 22 infrequent words, and the 3rd list of 20 pseudo-words. One point is awarded for each item correctly read.

- Spelling: Children must orally spell letter by letter 3 lists of words; a list of 20 frequent words, a list of 20 infrequent words, and a list of 19 pseudowords. One point is awarded for each correctly spelled item.
- Dictation: Children must write 3 lists of words by dictation; a list of 20 frequent words, a list of 20 infrequent words, and a list of 19 pseudo-words. One point is awarded for each correctly misspelled item.
- phoneme blending: In this task, isolated phonemes are presented (/;/ك ب /ت/), and the child is asked to join them mentally and say the resulting word (/كتب/). This task showed a Cronbach’s alpha reliability coefficient of.82 in the present study.

### 2.3 Procedure

Before extracting the norms in the groups of school children, we made the test on three groups of 120 children in 3rd, 4 th, and 5 th fundamental primary school, to verify the validity and the stability of the test

Table 1. The Reliability Test of Dyslexia

	stability test	Alpha Cronbach	Half split
	phoneme blending	0,82	0,81
	Phonological awareness	0,85	0,71
Oral spelling	Frequent word	0,84	0,83
	Infrequent word	0,84	0,78
Reading test	Frequent word	0,83	0,77
	Infrequent word	0,82	0,77
	pseudo-word	0,87	0,83
dictation	Frequent word	0,88	0,85
	Infrequent word	0,85	0,77
	pseudo-word	0,95	0,86

Source: Kahina Lettad, 2022

It can be seen from Table 1 that the stability coefficients of the subtests varied between an estimate of (0.78) at the minimum and (0.95) at the maximum, which indicates that the test that was prepared to diagnose dyslexia in Algerian schools has a high degree of stability and indicates the consistency between the different items of the subtests and, therefore, the test is ready to be used as a tool for the diagnosis of dyslexia.

Once the test was validated, we passed the two stages detailed before.



First, we administered in case of B-A the test of “Non-verbal pictorial mental abilities RAVEN” to make sure that the child’s intellectual abilities were preserved; then, the spelling test was performed. The examiner read the words aloud one by one and articulated them well. Once the dictation task was completed, the answer sheets were collected. Next, three separate one-minute frequent, infrequent, and pseudoword reading tests were administered in a quiet area (speech therapy office). Patient B-A was encouraged to read the words aloud as fast as he could. The examiner had a stopwatch to measure each subtest.

The purposes of the above psycholinguistic test assessment were (1) to determine her reading skills, and (2) to identify her specific reading difficulties.

The frequent words used in the above psycholinguistic tests were extracted from the word count used in school books.

In addition, a comparison of the subject’s performance with that of younger readers with a similar Reading Age indicates the severity of the delay and the nature of any deviance.

#### 2.4 Case report

- B-A was a 9-year-old, right-handed boy who was the older of 3 siblings. B-A’s mother tongue is Arabic, he was educated at the state normal school in Hussein Dey, Algeria. His father has a medium level of education, while his mother has obtained a bachelor’s degree in management. There was no family history of learning disabilities or psychiatric or other illnesses. B-A was born at the natural term. screamed right after birth. His health after birth was good. Psychomotor and language developmental milestones were within normal limits.
- B-A attended preschool for 10 months and began formal schooling at age 6. His level of non-verbal intellectual functioning on the “RAVEN” test was “moderately bright”. He had mixed laterality and spatial difficulties, as well as deficits in visual memory, and auditory discrimination. His expressive language was weak, reading and spelling were substandard, and arithmetic skills were moderately good. B-A never repeated a grade.

### 3. Results and discussion

The results of the assessment of B-A and the chronological age-matched control group are summarized in Table 2.

Table 1. Summary of Performance on Assessment Tests for BA and Chronological Age-Matched Control Group

	Type of task	Type of stimuli	Percentage of Correct Responses	
			AB	Control
Test 1	Phonological awareness		62.5	93.75
Test2	Reading Aloud	Frequent words	52.63	83.26
		Infrequent words	30	74.3
		Nonwords	30	70.15
Test 3	Oral Spelling	Frequent words	31.25	64.75
		Infrequent words	25	62.12
Test 4	Dictation	Frequent words	15.78	60.26
		Infrequent words	9.52	47.14
		Nonwords	10	44.7
Test 5	phoneme blending		40	90

Source: Kahina Lettad, 2022

According to Table 2, we show that the performance of B-A is significantly lower than the performance of the control group of the same age in all subtests. Thus, we note that the performance of BA in the tests of phonological awareness, reading, oral spelling, dictation and of Phoneme blending task are at the 5<sup>o</sup> percentile, which explains a pathology in reading and writing skills.

BA’s ability to read familiar and unfamiliar words was determined by Test 2, which required reading aloud words and nonwords.

- Reading task

BA’s performance was poor in the reading test compared to the control group (see Table 2). He was better at reading high frequent words (10/19 = 52.63% correct responses) than infrequent words (6/19 = 30% correct response), ( $\chi^2 = 7.67$ ,  $df = 1$ ,  $P < 0.01$ ). suggesting that the phonological pathway is impaired. The phonological errors have been reported in the BA reading task. The overwhelming BA errors in reading words are comprised of short and long vowel errors,

e.g. فُول /fu: l/(bean) (فَوْل /fawl/),  
 سُقُوط /suqo: t/(Tumbles) → سَقُوطَ /saqo: ta/,  
 فَيْل /fi: l/ (elephant) → فَيْلَ /fayl/  
 قَيْلَ /qi: la/ → قَيْلَنَا /qaylanā/.



- Dictation (written spelling)

For the written spelling task, the experimenter pronounces a word, two to three times and is well-articulated, and asks the child to write the word heard on a white paper, while respecting the vowels. The results obtained compared to the control group were too low.

B-A's dictation results were focused on the following errors:

- Confusion between closed taa (marbutas) and open taa (maftouha) (ت)

مُرْسَلَات /mursala: t/ → رسالة

مَحْفُوظَات /mahfuḏ'a: t/ → محفوظة

Addition of the phoneme "Waw" "and "nun" at the end of the word instead of the double vowel "tanwin" (ون.)

فَتَاتُون /fata: tun/ → فتاتون

مِيزَرُون /mi?zarun/ → ميزرون

مَسْأَلَتُون /mas?alatun/ → مسألون

مِشْكَاةُ /miʃka: tun/ → مشكتون

خَصْلُون /xaʃlun/ → خصلون

- Addition or removal of long vowels

مَحْفُوظَات /mahfu: ḏ'a: t/ → محفوظة /mahfu:ḏ'a:t/ (omission of voyelle longue "alif" "after" "ḏ'ad")

مُرْتَفَعَات /murtafaḥa:t/ → مرتفعة /murtafaḥat/

الْحِنْتُ /alḥintu/ → الحنتو /alḥintu:/ (addition of long vowel "waw el med" at the end of the word)

- Not mastering the grammar

خَرَجُوا /xaradzu:/ → خرج

هَؤُلَاءِ /ha: ʔula: ʔi/ → هؤلاء

However, we noted the same type of errors in the frequent and infrequent words and the nonwords

Contrary to what Rima AZZEM mentioned, the most relevant type of error in the dictation task in the BA case is the use of the double vowel "tanwin" which was replaced by the addition of "waw" "and "nun" with a percentage of 28.03% and which was not noted in the control group, followed by errors in grammar mastery with a percentage of 22.84%.

The addition and deletion of long vowels are one of the most important difficulties that BA suffers from, and this is not only found in the task of dictation but also goes beyond that to both the task of oral spelling and reading. However, the patient showed phonological dysgraphia in written spelling suggesting an impairment of the phoneme-grapheme conversion procedure

- Phoneme blending task

It can be observed in Table 2 that the score of the alliteration awareness is higher than that of the phoneme blend, probably, the letter blending task involves several cognitive factors namely working memory, assembly, and evocation. While alliteration requires attention to the beginning sound in words. Both tasks focus on the sound properties of words as distinct from their meaning. Errors in the alliteration awareness task were much more related to image recognition than to initial phoneme detection errors.

- For the first target image, BA did not recognize the picture of the egg, and we did not notice any response. Similarly, for the images of hat, car, and bird, BA named them in dialect and not in standard Arabic, which resulted in a false answer.
- The target image of the dog was named wolf, and apple by tomato, donkey per horse, which left BA to not answer correctly.
- Some image names were named by their synonym and not by their assigned name in the test, therefore, the patient did not find an appropriate answer, as in the case of horse حصان/hīṣa: n/by عود/ʕu: d/, bird/ʕusfu: r/by/ṭa: ʔir/

This set of errors suggests that BA, despite its academic level, has a limited linguistic background which affects the reading and writing tasks.

## Conclusion

The goal of this case study was to define the reading and writing mistakes in Arabic developmental dyslexia.

The results of the test were used to analyze BA's reading and writing abilities, which were at the 5 th percentile, which explains a pathology in the development of reading and writing skills.

The results showed that there were more phonological errors in the BA. All types of words, including frequent, infrequent, and pseudowords, were affected as well as short and long words. However, we found no evidence of a frequency or length effect. These mistakes were marked by phonological errors.

Since BA is not aware of the sound extension, he either omits it in his responses or adds it. As noted earlier, long vowel errors were the most frequently repeated error in the tasks given to BA's case. Additionally, the vowel "tanwin" was split, showing that the latter was not mastered, and the letter "n" was added in its place.

From what has been said above, it appears to us that the case B-A response data do not match the theoretical data on the different forms of dyslexia. This may be because Arabic is an orthographic language, which is transparent and heavily based on phonological processing.

Therefore, we first suggest reconsidering the functional engineering of learning to read and write in Arabic, which differs from other languages. And the diversity of studies on the manifestations of dyslexia in Arabic.

We emphasize the value of phonological awareness in education, which is the foundation for learning to read and write Arabic.

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## Abstract

The current investigation focuses on the spelling errors made by a dyslexic Arabic-speaking student in the fourth grade. BA scored in the fifth percentile on the exam used to evaluate his reading and writing skills, which suggests a dysfunction in the growth of such skills. BA's errors were characterized by phonological errors in all words types, there for BA did not show lexicality impact. Long vowel and" tanwin "vowel errors dominated these phonological errors.

We believe that the case B-A response statistics do not correspond to the theoretical data on the various types of dyslexia. This might be due to the fact that Arabic is a transparent language, that is strongly focused on phonological processing.

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## Keywords

Dyslexia, Arabic language, reading skills, writing skills, error types

## مستخلص

تركز هذه الدراسة على الأخطاء الإملائية التي يرتكبها طالب في الصف الرابع معسر القرائياً. يتمركز حالة ب.أ في المئين الخامس في الاختبارات المطبقة لتقييم مهاراته في القراءة والكتابة، ما يفسر وجود اضطراب في مهارة القراءة والكتابة.

تميزت أخطاء حالة ب.أ بوجود أخطاء فونولوجية في جميع أنواع الكلمات، ولم نسجل أي تأثير معجمي. تميزت الأخطاء الفونولوجية الأكثر تواتراً في حروف العلة الطويلة وأخطاء في حركة التنوين. ونعتقد أن إحصائيات أجوبة الحالة ب.أ لا تتوافق مع المعطيات النظرية حول الأنواع المختلفة من عسر القراءة. وقد أرجعت السبب إلى خصوصيات اللغة العربية التي هي لغة شفافة، صوتية.

## كلمات مفتاحية

عسر القراءة، اللغة العربية، مهارات القراءة، الكتابة، أنواع الأخطاء

## Résumé

La présente étude porte sur les erreurs orthographiques commises par un élève arabophone dyslexique en quatrième année. BA s'est classé dans le cinquième percentile à l'examen utilisé pour évaluer ses compétences en lecture et en écriture, ce qui suggère un dysfonctionnement dans l'acquisition de ces compétences.

Les erreurs de BA étaient caractérisées par des erreurs phonologiques dans tous les types de mots, et nous n'avons pas décelé un effet de lexicalité. Les erreurs de voyelles longues et de voyelles "tanwin" dominaient ces erreurs phonologiques. Nous pensons que les statistiques de réponse du cas B-A ne correspondent pas aux données théoriques sur les différents types de dyslexie. Cela pourrait être dû au fait que l'arabe est une langue transparente, qui est fortement axée sur le traitement phonologique.

## Mots-clés

Dyslexie, langue arabe, compétences en lecture, compétences en écriture, types d'erreurs