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DYSLEXIA IN ARABIC-FRENCH BILINGUAL CHILDREN: A MULTIPLE-CASE STUDY

Summary. Dyslexia and L2 appropriation have been extensively documented separately; however, few studies have brought them together. Our research sheds linguistic light on dyslexia in Arabic-speaking bilingual children. The aim is to study phonology, reading and spelling in dyslexic and non-dyslexic children learning French as a second language to better distinguish between what a reading disorder is and what typical appropriation is, with possible transient difficulties related to L2 development. The general hypothesis is that there are specific markers of dyslexia in Arabic-speaking children learning French as a second language. A multiple-case study was conducted. It consisted of four dyads of children aged 8-10 years: two bilingual dyslexic children, two bilingual non-dyslexic children, two monolingual dyslexic children and two monolingual non-dyslexic children. The bilingual children were Arabic speakers who had arrived in France at the age of six. In a diachronic and synchronic approach, spontaneous and experimental data were collected over a period of nine months. The experiment was based on the Phonoludos, Odedys 2, ELFE and ELDP2 tools. Parental questionnaires were also administered to parents. A synthesis of the most important results is presented. A phonological deficit is manifested in all dyslexic subjects by difficulties in speech perception/production, weaknesses in phonemic unit manipulation and decoding. In reading and spelling, atypical phonemic and phonetic errors are found in large numbers, whereas they are absent in non-dyslexics. This study is a first step in understanding how to identify dyslexia in bilingual children. It is now important to extend the study to a larger number of subjects, with a view to adapting tools that will facilitate the identification and assessment of children who speak several languages.

Keywords: acquisition of a L2; dyslexia; phonological skills; speech perception/production; reading and spelling.

Introduction

In France, from 10% to 15% of children have difficulties in learning to read, but not all have specific language disorders and/or learning difficulties (Habib, 2014). Learning to read at the beginning of schooling is essential, as it has a powerful impact on other short and long-term learning. Early treatment of language and learning disorders is a public health issue: the consequences of disorders on daily life, school learning and professional integration can be significant, but prevention and appropriate treatment make it possible to reduce them.

Dyslexia is a significant and long-lasting disorder in learning to read.

Ramus et *al*. (2021) point out that definitions vary and evolve according to international world classifications. Shaywitz et al. (2003, p. 27) state that dyslexia has a neurobiological origin and "is characterised by difficulties in accuracy and/or fluency in identifying written words, as well as weaknesses in spelling and decoding. These difficulties typically result from a phonological deficit which is often unexpected (...)". The Diagnostic and Statistical Manual of Mental Disorders (DSM 5) proposes three degrees of severity: dyslexia can be mild, moderate, or severe.

Dyslexia is a disorder that interferes significantly with academic achievement or activities of daily living requiring reading and spelling skills. This disorder cannot be cured and will exist for life - although it can be compensated. In France, about 4-5% of school-age children have dyslexia. Males are more affected, with a ratio of three/four boys and one girl (Habib, 2014). The diagnosis can be made at around the age of 7 or 8, after three years of learning to read. However, identification can be made at the end of first grade or the beginning of second grade.

Universals and Specificities in Dyslexia

A deficit in phonological skills is prevalent and central to dyslexia (see the review by Melby-Lervag et al., 2012; Everatt & Zabell, 2002). In dyslexic children speaking different L1s, phonological deficits are found (Ziegler & Goswami, 2005) and "make dyslexics have similar problems" regardless of language (Leonova et al., 2017, p. 7). For example, weaknesses in phonological skills, particularly phoneme identification and manipulation, rapid naming and phonological short-term memory have been found in dyslexic children in numerous studies of alphabetic and non-alphabetic, transparent and opaque languages (Abu Rabia et al., 2003; Goswami, 2002; Kim & Davis, 2004). There is some variability among other markers of dyslexia across languages.

Dyslexia Across Languages

Depending on the typological characteristics of languages, dyslexia impacts

differently on decoding, reading and spelling tasks (Van Orden & Kloos, 2005; Goswami & Ziegler, 2005; Goswami, 2007; see the review by Price, 2012). Orthographic transparency refers to the degree of correspondence between the orthography and phonology of a given language. A transparent language brings out difficulties in reading fluency and spelling. For example, Finnish or Italian are transparent languages in which dyslexic children can accurately decode words and non-words, but very slowly. Furthermore, an important marker of dyslexia in these languages is significant difficulties in spelling: according to Goswami (2007), it is more the spelling than the reading that is imprecise.

Dyslexic children learning to read in opaque languages have difficulty mastering grapheme-phoneme relationships, as they cannot rely on spelling to be more accurate in phonological tasks. The development and automation of decoding is difficult, and dyslexia manifests itself in imprecise reading and significant weaknesses in spelling.

Dyslexia in French

A dyslexic child often dislikes reading and may reject activities that involve the written word. Phonology, decoding and reading, reading comprehension and spelling production are strongly affected. Re-education has a beneficial effect on these tasks if it is regular and sustained (Leloup, 2017).

Phonology. Phonological deficits are manifested by difficulties in speech perception/production, identifiable in phonological discrimination tasks and repetition of pseudowords and non-words. The phonological skills of dyslexics are weak, particularly in phonemic segmentation and manipulation and phonological short-term memory. Difficulties in accuracy and speed of access to the lexicon are also found.

Decoding and reading. Most dyslexic children have severe difficulties with the process of decoding written words and establishing grapho-phonological correspondences (Goswami, 2002, 2007). The implementation and automation of decoding is difficult. According to Leloup (2017), the child may confuse

letters that look alike or phonetically similar graphemes, such as "s" and "ch". Some letters or graphemes may be reversed: for example, "cir" may be read as "cri". There are also omissions, additions, substitutions and assimilation of phonemes or syllables. Children have great difficulty in reading infrequent, irregular words and pseudowords. Word sequence analysis is difficult, which can lead to anticipation errors. There is also a lexicalisation effect of non-words: for example, "citrne" is lexicalised into /sitrɔʃ. After some time, familiar and frequent words are better read: the child can identify written words by spelling recognition. However, the development of the orthographic lexicon is delayed, and it is often poor. According to Sprenger-Charolles & Casalis (2017), the phonological deficit may be manifested more by slow response than by accuracy: the child can therefore read accurately, but very slowly.

Understanding. Difficulties in decoding and reading impact on reading comprehension, requiring the development of mechanisms for accurate and rapid identification of written words. Furthermore, Sprenger-Charolles and Casalis (2017, p. 165) state that "dyslexics experience difficulties in reading comprehension beyond what can be explained by their word recognition difficulties[1]".

Spelling. Because of the opacity of phoneme-grapheme correspondences in French, written production is particularly affected and may reveal compensated dyslexia at a later stage. In dyslexic children, spelling is generally characterised by slowness and hesitation. Word forms are not respected, and segmentation errors are common: for example, the child may write "il sé lance" instead of "il s'élance". He/she has no memory of the word form and has difficulty accessing representations of the word as a lexical unit. Phonetic errors in spelling production in dyslexic children are numerous and correspond to those found in younger children (matched in reading and spelling level). Morphological and lexical accuracy is impaired.

[1] « les dyslexiques rencontrent des difficultés de compréhension à l'écrit au-delà de ce qui peut être expliqué par leurs difficultés de reconnaissance de mots « (translation by the author)

Dyslexia and Bilingualism

It should be noted that we are studying dyslexia in a particular context of bilingualism: we are not talking here about simultaneous bilingualism (when the child is exposed to two languages from early childhood) or late bilingualism (learning a language after childhood), but about successive bilingualism, i.e., the appropriation of a language in childhood, after the basics of the L1 have been acquired. The subjects in our study arrived in France at the age of six and have been learning French as a second language for two years. According to Sanson (2010, p. 52), if there is dyslexia, the impairments are found in both languages: "if the delay (...) only concerns the language of the host country, we may ask ourselves the question of a less instrumental disorder, more related to difficulties linked to the migration situation.[2]" Ideally, therefore, it should be possible to assess the child in L1 and L2.

Strengths and weaknesses in linguistic processing of phonology, orthography, syntax, and semantics are transferred between languages (Ganschow & Sparks, 2000, Genesee et al., 2011). Furthermore, there are markers of dyslexia common to all languages: phonological skills, rapid naming, phonological short-term memory should be impacted in both languages. Cognitively and in terms of reading, the profile of L2 dyslexic children resembles that of monolingual dyslexic children, although typological differences between the languages affect L2 development in speaking and writing. According to Genesee, Paradis and Crago (2011), second language and native language readers with reading difficulties show the same weaknesses. Finally, Mortimore et al. (2012, p. 6) point out that "learning a second language is a challenge for dyslexic students because it requires skills that are often compromised when one is dyslexic - the ability to segment, phonological awareness, and short- and long-term memory".

Difficulties That May Be Encountered by Learners of L2 French

L2 appropriation - in speed and accuracy - is related to a multitude of factors

[2] « si le retard (...) ne concerne que la langue du pays d'accueil, on pourra se poser la question d'un trouble moins instrumental, plus en lien avec des difficultés liées à la situation de migration. » (translation by the author)

such as age, age of onset of appropriation (AOA), typological distance between the two languages (Flege & Fletcher, 1992), linguistic ability, motivation, personality, context of appropriation. Estimating the duration of appropriation is difficult because there is considerable variability between individuals: "the number [of] slow variables being a priori greater than five, we are entering a theoretically infinite number of possibilities, reflecting the diversity of developmental dynamics from one child to another[3]" (Sauvage, 2015, p.180).

General Markers of Linguistic Development in L2 In Successive Bilingual Children

At the phonetic-phonological level, the age and level of development of the L1, and the typological distance between the phonetic-phonological systems of the two languages seem to be factors with a very strong influence on the speed of appropriation. A study by Snow and Hoefnagel-Höhle (1977) analysed the pronunciation of words in German by 47 English-speaking learners aged between 3 and 60 years. After one year, the young children had a more intelligible pronunciation than the adults, but after 18 months of exposure, none of the children pronounced in the same way as the native speakers. For a successive bilingual child, pronunciation appropriation takes more than two years, but functional pronunciation can be acquired in a few months. Another study by Gilhool et al. (2014) of children who have been learning English for one year shows that they pronounce 90% of consonant and vowel phonemes accurately, but that the appropriation of some fricatives takes longer.

The appropriation of morphosyntax takes several years. In French, the existence of the formal form of address, the gender marker, and the definite, indefinite, and contracted articles are all elements that do not exist in all languages and can take a long time to acquire, between three and five years.

Second language vocabulary acquisition takes the longest, and sometimes even after six years of schooling there is still a gap between the

[3] « le nombre [des] variables lentes étant a priori supérieures à cinq, nous entrons dans un nombre de possibilités théoriquement infini, à l'image de la diversité des dynamiques du développement d'un enfant à l'autre « (translation by the author)

vocabulary of second language learners and monolinguals (Oller & Eilers, 2002).

Possible Difficulties in Phonology, Reading and Spelling

Children who have not learned to read in their home language must learn to read in a language they are in the process of learning. Transitional difficulties are frequently encountered, especially in relation to language differences. Discrimination of sounds not belonging to the mother tongue is difficult, and lack of knowledge of spelling, vocabulary, and syntax in the second language can slow down the development of reading comprehension.

Phonological awareness. In the mother tongue, learning to read and spell can only be successful after certain skills have been developed: it is therefore necessary to look at what happens when these skills have started to develop in the mother tongue, continue to build in the second language and others develop in the second language as well. If we refer to the emergence of phonological awareness - and more specifically phonemic awareness – in the mother tongue, we know that the bilingual child already has practical experience and an explicit awareness of sound in his or her mother tongue. However, phonemic awareness still needs to be developed and refined through various phonemic analysis tasks. But the allophone child will have to perfect this awareness in a second language "whose phonemes are different from those of language 1 in terms of their number, their sound characteristics and the relationships they maintain within the phonic system of the language.[4]" (Verdelhan-Bourgade, 1995, p. 38). Unlike a monolingual, the successive bilingual cannot "rely completely on his or her previous language experience to access phonic awareness in French[5]" (Verdelhan-Bourgade, 1995, p. 39).

Phonological skills. Fewer studies have looked at the development of

[4] « dont les phonèmes sont différents de ceux de la langue 1 par leur nombre, leurs caractéristiques sonores et les relations qu'ils entretiennent au sein du système phonique de la langue.» (translation by the author)
[5] « s'appuyer complètement sur son expérience langagière antérieure pour accéder à la conscience phonique en français « (translation by the author)

phonological awareness in bilingual children than in monolingual children. Perregaux (1994, 1995) conducted a study with immigrant children from different countries. She shows that, despite their difficulties in understanding and producing lexical material in French, bilingual pre-readers in kindergarten perform as well as monolinguals on phonemic segmentation tasks, and better on those involving pseudowords. At the end of first grade, bilinguals and monolinguals had equivalent word reading levels. However, this study concerns very young children, therefore in an optimal period of appropriation.

Decoding and reading. According to Rafoni (2007, p. 15), it is preferable to limit phonological training to broad units, which are easier to manipulate, such as the syllable or the rhyme: "It is (...) the effort to conceptualise oral language that proves to be first and foremost the major problem in the teaching of writing. However, in the case of non-French-speaking pupils, the still undeveloped mastery of French increases the difficulties and forces the teacher to give up on linguistic manipulations that are too fine (phonemes, words) to refocus on macrosegmental units.[6]" Rafoni specifies that it is not useful to encourage allophone children with perceptual and pronunciation difficulties to identify and isolate phonemes by ear. He believes that non-French speaking newcomers cannot identify and discriminate phonemes without the visual mediation of letters. He believes that allophone children should be offered a grapheme approach, going from grapheme to phoneme, and not the other way around.

In a second language, children's vocabulary is still developing and cannot yet be used as a support. Thus, the identification of the written word from the phonological value of the first graphic segments, or anticipation, is difficult: "unlike native speakers, the activation of a 'lexical proximity zone' is lacking in pupils (...) who struggle to connect vocal primers and significant

[6] « C'est (...) l'effort mené pour « conceptualiser la langue orale « qui se révèle être d'abord et avant tout le problème majeur en didactique de l'écrit. Or chez les élèves non francophones, la maîtrise encore inaboutie du français redouble les difficultés et contraint l'enseignant à renoncer aux manipulations linguistiques trop fines (phonèmes, mots) pour se recentrer sur les unités macrosegmentales. « (translation by the author)

units (or access to the mental lexicon)[7]" (Rafoni, 2007, p. 32).

Spelling. Non-exposure to written French, lack of vocabulary and orthographic, morphological and syntactic knowledge of the language can initially make it difficult and slow down the development of spelling recognition and spelling acquisition.

Possible Difficulties Related to The Differences Between Algerian Arabic and French

Phonetically, Algerian Arabic spoken by the subjects in our study and French are two very different languages in terms of both consonantal and vowel phonemes. The nasal vowel phonemes /ɔ̃/, /ɑ̃/, /ɛ̃/ and /œ̃/ of French are not relevant in the Algerian Arabic system; and the absence of the phonemes /y/, /ɛ/, /ɔ/, /ø/, /ɑ/, /ə/ and /œ/ is also notable. In French, the functional distinction between short and long vowels in Arabic does not exist "except in prosody where the vowel is longer when accented, but this never changes the meaning of the word[8]" (Hasanat, 2007, p. 44). Furthermore, the French language allows three consonants to be grouped together in the same syllable, for example in "scrupule" or "script". In Algerian Arabic, only two consonants can be grouped. These differences may have impact on the phonology of Arabic-speaking learners of French as a second language.

Research Questions

We have seen how dyslexia manifests in French, and we are also interested in the difficulties that Arabic-speaking learners of French as a L2 may encounter in phonology, reading and spelling.

The research questions are the following: (1) How can we differentiate

[7] « à la différence des élèves natifs, l'activation d'une « zone de proximité lexicale « fait défaut aux élèves (…) qui peinent à connecter amorces vocales et unités significatives (ou accès au lexique mental) « (translation by the author)
[8] « sauf en prosodie où la voyelle est plus longue quand elle est accentuée, mais cela ne change jamais le sens du mot « (translation by the author)

between transient difficulties, inherent to the appropriation of a second language, and long-lasting instrumental difficulties? (2) How do we know whether difficulties in phonology, reading and spelling in the second language are dyslexia or related to the appropriation of French as a second language?

The aim is to examine whether there are specific markers in the manifestations of dyslexia-dysorthography in L2 French in successive bilingual children.

Methods

To make a detailed and most complete observation of each child, we conducted a multiple case study consisting of eight children aged eight to ten years: two bilingual and two monolingual dyslexic children, two bilingual children and two monolingual children without disorders.

The subjects were enrolled in grade three except for one who was in grade five. The bilingual subjects were born in Algeria near to Constantine and speak a variant of Algerian Arabic. This is the language they mainly speak at home with their parents. They arrived in France between the ages of 5 years and 9 months and 6 years and 2 months.

All the participants selected had no psycho-emotional or psychiatric problems, no sensory deficits, no disabilities, or intellectual precocity. All dyslexic subjects had to be diagnosed (phonological dyslexia). However, the intensity of the disorder could not be controlled: some subjects had severe dyslexia, others moderate dyslexia. Associated disorders could not be ruled out: one of the subjects had also been diagnosed with dyscalculia.

The study was conducted diachronically and synchronously. Spontaneous speech data were collected over a period of nine months, every three months.

An experiment was developed based on the following tools: ELDP2 (Macchi et al., 2012), Odedys2 (Jacquier-Roux et al.), Phonoludos and ELFE. The test was administered in the study environment. Phonology, reading, and spelling production were studied.

Parental questionnaires were also offered at the beginning of the study to collect general data about the children's language development.

The data were transcribed and analysed using Phon (Rose et al. 2006), Praat (Boersma & Weenik, 1996) and Audacity (Mazzoni & Dannenberg, 2002)

Results

A synthesis of the most important results is presented here. The subjects are designed by Dys Bi for dyslexic bilinguals, and Dys Mo for dyslexic monolinguals, non-dys Bi for non-dyslexical bilinguals, and non-dys Mo for non-dyslexic monolinguals.

Perception, Speech Production and Phonological Skills

For perception, speech production and phonological manipulation, both spontaneous and experimental data were examined.

Table 1

Achievement scores, normal and fast speed scores and different and identical pseudoword discrimination scores (ELDP 2) (Dalle, 2020)

	Total success score / 72	Normal speed / 36 Increased speed /36	Total differents /36	Total similar /36
Dys BI 1	29	15 – 14	10	19
Dys BI 2	44	25 – 19	14	30
Dys MO 1	40	22 – 18	11	29
Dys MO 2	61	32 – 29	31	30
Non-Dys BI 1	46	24 – 22	14	32
Non-dys BI 2	64	32 – 32	34	30
Non-dys MO 1	63	35 – 28	34	29
Non-dys MO 2	57	28 – 29	27	30

We found some heterogeneity in fine phonological discrimination in different pseudoword pairs in dyslexic subjects of the same age, but the scores were

from low to very low. Rapid speech speed had a negative impact on the discrimination performance of all three subjects. Global phonological discrimination weaknesses, including phonemic units with remote phonological information, were found in two subjects (dys BI 1 and dys MO 1). In a third subject (dys BI 2), the difficulties were more related to the discrimination of consonantal phonemic units with close phonological information (deaf/sound) and to the discrimination of structural units. The phonological deficit in these three subjects was highlighted, with performance being lower or significantly lower than that of non-dyslexic subjects of the same age, particularly at fast speed.

To examine production, the PPC (Percentage of Phonemes Correct, Shriberg et al., 1997; Shriberg & Kwiatkowski, 1982) was calculated for each subject in October/November and six months later in May/June.

Table 2

PPC in October/November 2020 and May/June 2020 (Dalle, 2020)

	PPC in October/November 2019	**PPC in May/June 2020**
Dys BI 1	98,179	98,244
Dys BI 2	98,248	98,121
Dys MO 1	98,842	98,574
Dys MO 2	99,458	99,918
Non-Dys BI 1	98,474	99,974
Non-dys BI 2	100	100
Non-dys MO 1	100	100
Non-dys MO 2	100	100

The difficulties were very similar between bilingual and monolingual dyslexic children, although some difficulties related to the typological distance between the languages were added in bilingual subjects. The vowel phonemes /y/, /ɔ̃ / /ɑ̃ / /ɛ̃ / were the ones that posed the most difficulties for our bilingual subjects, although there was variability between subjects. But apart from that, many errors were common to those made by monolingual dyslexic children. Particularly in spontaneous speech, there were phonological substitution processes, omissions and additions which were not found in the productions of

non-dyslexic children. These were subtle features which were not spontaneously perceived in conversation with the child.

Table 3

Number and type of errors in the initial phoneme fusion task (Dalle, 2020)

	segmentation errors absence – syllabic or pseudo-syllabic segmentation – sub-syllabic segmentation	sequential errors	errors of addition, omission, substitution of phonological units	errors related to grapho-phonological awareness
Dys BI 1	4 – 9	4	4	
Dys BI 2	5 – 6 – 1	5	4	
Dys MO 1	9 – 3	9		
Dys MO 2	3 – 1	1		
Non-Dys BI 1	5 – 1	1	2	5
Non-dys BI 2	1 – 1			3
Non-dys MO 1				1
Non-dys MO 2	1 – 1			

Dyslexic children exhibited weaknesses in phonological skills. The greatest difficulties occurred in the task of merging initial phonemes. Errors were mainly in segmenting into larger phonological units (syllables).

In word and pseudoword repetition, only dyslexic subjects of the same age made sequential errors, inversions. For example, the subject would produce "bilbiothèque" for "bibliothèque". Difficulties in the perception and production of phonemic units were found in all dyslexic subjects.

Reading

In letter reading, not all letters are read automatically in dyslexic children, whereas this is the case in non-dyslexic children.

In reading irregular words, regular words and pseudowords, the profiles of the subjects are heterogeneous, but in dyslexics there are

marked weaknesses in both decoding and spelling recognition.

In the two dyslexic bilinguals, errors were found to be related to the influence of the phonetic-phonological system of the L1 or to the phonetic-phonological distance between L1 and L2. These errors allowed us to highlight the influence of phonological representations on orthographic representations. For example, one of our subjects still had difficulty distinguishing between "on" and "an", and when he read he would say "élon" for "élan".

In reading text, dyslexic children read in a choppy way, with perceptible grapheme segmentation within words, which means that deciphering is not automatic, and that orthographic recognition of frequent words is deficient. These characteristics were not found in non-dyslexic subjects. In all reading tasks, dyslexic subjects produced a significant number of phonemic errors. The errors found in all dyslexic subjects and absent from the output of non-dyslexic subjects were omissions of graphemes and word substitutions. For example, the child said "habite" when it was written "vit", or read "contagieux" when it was written "montagne".

Spelling

The results of spelling tasks show that phonological weakness is identifiable in dyslexic subjects: phonetic and phonogrammatical errors are found in quantity in the productions of all dyslexic subjects, and are not common in non-dyslexic subjects, in whom the most frequent errors are morphogrammatical.

Table 4

Type of errors in spelling of irregular words, regular words and pseudowords (Dalle, 2020)

	Phonetic errors	**Phonogrammatical errors**	**Morphogrammatical errors Lexical - grammatical**	**TOTAL**
Dys BI 1	12	14		26
Dys BI 2	8	11		19
Dys MO 1	24	5	4	33
Dys MO 2	5	5	3 – 1	14

	Phonetic errors	Phonogrammatical errors	Morphogrammatical errors Lexical - grammatical	TOTAL
Non-Dys BI 1	4	3	2 – 3	12
Non-dys BI 2		3	1	4
Non-dys MO 1		5	1 – 1	7
Non-dys MO 2	1		1	2

A high number of phonetic errors in spelling seems to be an important marker of dyslexia-dysorthography in French in our bilingual and non-bilingual subjects. They were found in dyslexics in the production of regular words, irregular words, pseudowords and in the production of sentences. In the two bilingual dyslexic subjects, errors were found which may be related to an influence of the phonetic-phonological system of the L1 or to the typological distance between L1 and L2. The perception of these irrelevant phonemes in L1 was found to influence spelling.

Discussion

The results validate the hypothesis that there are specific markers in the manifestations of dyslexia in successive bilinguals, and that these markers provide evidence of atypical appropriation. The profiles of bilingual Arabic-speaking dyslexics who have been in France for two years and are enrolled in a mainstream classroom show many similarities to those of a monolingual dyslexic subject of the same age, with all these children showing weaknesses in perception and production, phonological discrimination, phonological skills and marked difficulties in reading and spelling. Bilingual dyslexics have no more difficulty in any of these tasks than the monolingual subject of the same age. Atypical errors probably related to perceptual difficulties (leading to erroneous phonological representations) or to difficulties in accessing phonological representations were found in speech production, reading and spelling. Phonemic/phonetic errors are very numerous in these subjects, which is not the case in non-dyslexic bilingual and non-bilingual subjects.

It should be noted that a phonological deficit and weaknesses in

phonological manipulation were also found in a bilingual child who is not dyslexic, but she has no weaknesses in reading (decoding, fluency) and spelling. It seems important to consider the totality of phonological, reading and spelling skills in order to identify a dyslexic child more reliably.

Although some difficulties related to the influence of the L1 or to the phonetic-phonological distance between the L1 and the L2 may be added, these are identifiable through a knowledge of the differences between the phonetic-phonological systems of the languages. For example, the nasal vowel phonemes of French are still the most difficult for children, both orally and in writing. Typical errors related to the influence of the phonetic-phonological system of the L1 or to the phonetic-phonological distance between the L1 and the L2 impact only a small part of the performance compared to the other errors, and they are found in variable quantities in bilingual subjects.

The slightly smaller lexicon in L2 in bilinguals has no impact on phonological unit manipulation and decoding in reading. Phonological skills and decoding can be assessed in the second language, even if the L2 is still appropriate. After two years of formal exposure to writing, decoding is effective in non-dyslexic bilingual children and in non-dyslexic monolingual children.

In conclusion, this research is only a first step, as this study should be extended to a larger number of subjects to gather more data. It would also be necessary to look at children who speak other languages to gain a better understanding of the manifestations of dyslexia in different languages. The aim is to adapt tools to help identify and assess these children, but it would also be necessary to develop tools that could be used in supporting these bilingual populations. We have seen that phonological skills can be assessed in L2 even if the latter is in the process of being appropriated, but that some errors are linked to the distance between the languages: thus, a possible way forward would be to adapt existing tests by removing the sources of potential difficulties linked to the differences between L1 and L2. These tests should then be recalibrated on a bilingual population. Finally, it would be possible to provide each professional working in contact with bi/plurilingual subjects with reference materials containing the main characteristics of the linguistic systems of the languages, and the main differences with French. Such documents already exist (see "langues et grammaires du monde": Presentation | Langues et

Grammaires du Monde dans l'Espace Francophone (cnrs.fr)) and could allow professionals to distinguish errors linked to the distances between languages.

References

Abu-Rabia, S., & Abu-Rahmoun, N. (2012). The Role of Phonology and Morphology in the Development of Basic Reading Skills of Dyslexic and Normal Native Arabic Readers. *Creative Education*, *3*(7), 1259–1268. https://doi.org/10.4236/ce.2012.37185

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi-org.ezproxy.frederick.edu/10.1176/appi.books.9780890425596

Boersma, P., & Weenink, D. (1996). *PRAAT, a system for doing phonetics by computer*. Report 132.

Casalis, S., & Sprenger-Charolles, L. (2017). Les mécanismes de lecture chez les enfants dyslexiques : Apport des études francophones à la littérature internationale. In *Les dyslexies* (Elsevier Masson).

Everatt, J., & Zabell, C. (2002). Surface and Phonological Subtypes of Adult Dyslexia. *Dyslexia*, *8*, 160–177.

Fiches Phonoludos MS | Éditions de la Cigale. https://www.editions-cigale.com/catalogue/fiches-phonoludos-ms

Flege, J. E., & Fletcher, K. L. (1992). Talker and listener effects on degree of perceived foreign accent. *The Journal of the Acoustical Society of America*, *91*(1), 370–389. https://doi.org/10.1121/1.402780

Ganschow, L., & Sparks, R. L. (2000). Reflections on foreign language study for students with language learning problems: Research, issues, and challenges1. *Dyslexia*, *6*(2), 87–100. https://doi.org/10.1002/(SICI)1099-0909(200004/06)6:23.0.CO;2-H

Genesee, F., Erdos, C., Savage, R., & Haigh, C. A. (2011). Individual differences in second language reading outcomes. *International Journal of Bilingualism*, *15*(1), 3–25. https://doi.org/10.1177/1367006910371022

Goswami, U. (2002). Phonology, reading development, and dyslexia: A cross-linguistic perspective. *Annals of Dyslexia*, *52*(1), 139–163.

https://doi.org/10.1007/s11881-002-0010-0

Goswami, U. (2007). Typical reading development and developmental dyslexia across languages. In *Human Behaviour, Learning and the Developing Brain: Atypical Development,* Chapter: 6 (pp. 145–167).

Habib, M. (2014). *La constellation des dys : Bases Neurologiques de l'Apprentissage et de Ses Troubles*. De Boeck Solal.

Hasanat, M. (2007). Acquisition d'une langue seconde : Les avantages et les entraves de la langue maternelle chez les bilingues français-arabe/arabe-français. *Monde arabe* n°4, 209–226.

Jacquier-Roux, M., Valdois, S., & Zorman, M. (s. d.). *ODEDYS 2*.

Kim, J., & Davis, C. (2002). Loss of rapid phonological recoding in reading Hanja, the logographic script of Korean. *Psychonomic bulletin & review*, *8*, 785–790. https://doi.org/10.3758/BF03196218

Leloup, G. (2017) Evaluation et dépistage des troubles du langage écrit. In *Les Dyslexies*, Elsevier Masson.

Léonova, T., Piquard-Kipffer, A., Jumageldinov, A., Robert, M., & Berebin, M. (2017). *Education inclusive pour des élèves avec des troubles spécifiques du langage écrit* : Quelle scolarisation en fonction des pays et des langues ?

Mazzoni, D., & Dannenberg, R. B. (2002). A Fast Data Structure for Disk-Based Audio Editing. *Computer Music Journal*, *26*(2), 62–76. https://doi.org/10.1162/014892602760137185

Melby-Lervåg, M., Lyster, S.-A. H., & Hulme, C. (2012). Phonological skills and their role in learning to read: A meta-analytic review. *Psychological Bulletin*, *138*(2), 322–352. https://doi.org/10.1037/a0026744

Morrow A, Goldstein BA, Gilhool A, & Paradis J. (2014). Phonological skills in English language learners. *Lang Speech Hear Serv Sch*, *45*(1), 26–39. https://doi.org/10.1044/2013_LSHSS-13-0009. PMID: 24687765

Mortimore, D. T., Hansen, L., Fernando, J., Horobin, L., & Saunders, D. K. (2012). *Dyslexia and Multilingualism: Identifying and supporting bilingual learners who might be at risk of developing SpLD/dyslexia*. 189.

Oller, K., & Eilers, R. (2002). *Language and Literacy in Bilingual Children*. Multilingual Matters.

Paradis, J., Genesee, F., & Crago, M. B. (2011). *Dual Language Development and Disorders: A Handbook on Bilingualism and Second Language Learning*. Paul H. Brookes Publishing Company.

Price, C. J. (2012). A review and synthesis of the first 20 years of PET and fMRI studies of heard speech, spoken language and reading. *NeuroImage*, *62*(2), 816–847. https://doi.org/10.1016/ j.neuroimage.2012.04.062

Rafoni, J.-C. (2007). *Apprendre à lire en français langue seconde*. Editions L'Harmattan.

Ramus, F., Folco, C., Guez, A., Peyre, H. « Epidémiologie des troubles de la lecture en France: une comparaison du DSM-5 et de la CIM-11. » *ANAE – Approche Neuropsychologique des Apprentissages Chez L'enfant*, ANAE/PLEIOMEDIA, A paraître.

Rose, Y., MacWhinney, B., Byrne, R., Hedlund, G., Maddocks, K., O'Brien, P., & Wareham, T. (2006). Introducing Phon : A Software Solution for the Study of Phonological Acquisition. *Annual Boston University Conference on Language Development*, 489–500.

Sauvage, J. (2015). *L'acquisition du langage : Un système complexe*. Academia.

Shaywitz, S. E., Shaywitz, B. A., Fulbright, R. K., Skudlarski, P., Mencl, W. E., Constable, R. T., Pugh, K. R., Holahan, J. M., Marchione, K. E., Fletcher, J. M., Lyon, G. R., & Gore, J. C. (2003). Neural systems for compensation and persistence: Young adult outcome of childhood reading disability. *Biological Psychiatry, 54*(1), 25–33. https://doi.org/10.1016/s0006- 3223(02)01836-x

Shriberg, L. D., & Kwiatkowski, J. (1982). Phonological disorders III: A procedure for assessing severity of involvement. *The Journal of Speech and Hearing Disorders*, *47*(3), 256–270. https://doi.org/10.1044/jshd.4703.256

Shriberg L. D., Austin D., Lewis B. A., McSweeny J. L., & Wilson D. L. (1997). The Speech Disorders Classification System (SDCS). *Journal of Speech, Language, and Hearing Research*, *40*(4), 723–740. https://doi.org/10.1044/jslhr.4004.723

Snow, C. E., & Hoefnagel-Höhle, M. (1977). Age Differences in the Pronunciation of Foreign Sounds. *Language and Speech*, *20*(4),

357–365. https://doi.org/10.1177/002383097702000407

Van Orden, G. C., & Kloos, H. (2005). The question of phonology and reading. In M. S. Snowling, & C. Hulme (Eds.), *The science of reading: A handbook*.

Verdelhan-Bourgade, M. (1995). Lecture et langage en français langue seconde : Problèmes cognitifs et didactiques. *Tréma*, 7, 38–46. https://doi.org/10.4000/trema.2180

Ziegler, J. C., & Goswami, U. (2005). Reading Acquisition, Developmental Dyslexia, and Skilled Reading Across Languages: A Psycholinguistic Grain Size Theory. *Psychological Bulletin*, *131*(1), 3–29. https://doi.org/10.1037/0033-2909.131.1.3

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ARABŲ IR PRANCŪZŲ DVIKALBIŲ VAIKŲ DISLEKSIJA: DAUGELIO ATVEJŲ TYRIMAS

Santrauka. Disleksija ir L2 kalbos įsisavinimas buvo išsamiai dokumentuoti atskirai, tačiau tik keli tyrimai juos sujungė. Mūsų tyrimas lingvistiškai nušviečia arabiškai kalbančių dvikalbių vaikų disleksiją. Tikslas – ištirti disleksija sergančių ir nesergančių vaikų, besimokančių prancūzų kaip antrosios kalbos, fonologiją, skaitymą ir rašybą, kad būtų galima geriau atskirti, kas yra skaitymo sutrikimas, o kas – tipiškas įsisavinimas su galimais laikinais sunkumais, susijusiais su L2 raida. Bendroji hipotezė yra ta, kad arabakalbiams vaikams, besimokantiems prancūzų kalbos kaip antrosios, būdingi specifiniai disleksijos požymiai. Buvo atliktas kelių atvejų tyrimas. Jį sudarė keturios 8–10 metų amžiaus vaikų diados: du dvikalbiai vaikai, turintys disleksiją, du dvikalbiai vaikai, neturintys disleksijos, du vienakalbiai vaikai, turintys disleksiją, ir du vienakalbiai vaikai, neturintys disleksijos. Dvikalbiai vaikai buvo arabakalbiai, atvykę į Prancūziją šešerių metų. Taikant diachroninį ir sinchroninį metodus, devynis mėnesius buvo renkami spontaniniai ir eksperimentiniai duomenys. Eksperimentas buvo grindžiamas *Fonoludos*, *Odedys 2*, ELFE ir ELDP2 priemonėmis. Tėvams taip pat buvo pateikti klausimynai. Straipsnyje apžvelgiama svarbiausių rezultatų sintezė. Fonologinis deficitas visiems disleksija sergantiems tiriamiesiems pasireiškia kalbos suvokimo ir (arba) produkavimo sunkumais, foneminių vienetų manipuliacijos ir dekodavimo trūkumais. Skaitymo ir rašybos srityje randama daug netipinių foneminių ir fonetinių klaidų, o nedisleksikai jų nedaro. Šis tyrimas yra pirmas žingsnis siekiant suprasti, kaip nustatyti dvikalbių vaikų disleksiją. Dabar svarbu išplėsti tyrimą: įtraukti didesnį tiriamųjų skaičių, pritaikyti priemones, kurios palengvintų keliomis kalbomis kalbančių vaikų atpažinimą ir vertinimą.

Pagrindinės sąvokos: L2 kalbos įsisavinimas; disleksija; fonologiniai įgūdžiai; kalbos suvokimas / gamyba; skaitymas ir rašyba.