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Reading Instruction: Between Supraphonological Processing and Cognitive Pathways of Language Acquisition

Hana BEZZIH

Ergonomics laboratory and applied research in psychology and education, University Mohammed Lamine Dabaghine Setif 2, Algeria.

Corresponding Author* :h.bezzih@univ-setif2.dz

Abstract
In a predictive study conducted on children in kindergarten, first, and second grades of elementary school, the researcher found that supraphonological tasks (simple syllabic and suprasegmental tasks related to morphemes) remain closely related to children's reading and writing performance. Among the supraphonological (phonological) tasks used, it was found that the task of identifying the first morpheme sound and the task of identifying the final syllable predict reading outcomes, explaining 27.6% of the variance in children's reading performance. Specifically, 15.7% of the variance was explained by syllabic tasks and 24.2% by suprasegmental tasks, highlighting the significant contribution of suprasegmental tasks in explaining reading variance. The predictive value of these tasks remains considerable even when controlling for phonological tasks, and vice versa, allowing us to conclude that such tasks are strong predictors of reading and writing performance, independent of each other. This variance is explained by children's implicit cognitive abilities in acquiring the Arabic language.

Keywords : Reading, Supraphonological knowledge, Metaphonological, Suprasyllybic acquisition

Introduction

Since focusing our research on developing strategies for teaching written Arabic, we have followed neurolinguistic approaches to ensure optimal conditions for proper acquisition. Our research has also adopted a deep cognitive approach to identify all interactions between the three domains (linguistic, cognitive, and neurological) that could lead to what is termed successful linguistic achievement.

While linguistics has made significant progress in defining pathways for learning written language (reading and writing) and in creating theoretical models applied in classrooms, research remained stagnant until it integrated insights from cognitive sciences. These advancements have helped develop learners' cognitive frameworks, enabling them to transition between linguistic systems, distinguishing between Arabic words like "/كَـتب/" and "/كتب/", as well as between words across languages like "table" in French and "طاولة", or "cup" in English and "كوب" in Arabic.

Studies and research by specialized scholars have highlighted the important role of metalinguistic awareness in enhancing reading pathways and linguistic competence (Bouanani & Mustafa, 2015). These metacognitive skills form the foundation of linguistic construction and achievement in children. However, metalinguistic knowledge alone is insufficient to support children's understanding of the nuances of good reading sequences or control over phonological components. From the first grade of primary school, children encounter morphological components in reading tasks that require syllabic segmentation, indicating the need for an implicit proficiency in morphological analysis.

It is important to emphasize the role of written language as a medium for conveying linguistic meaning. In the early stages of reading and writing, phonological encoding procedures are activated, requiring learners to

develop phonological awareness to establish a correspondence between spoken and written language (Bouanani & Belmakki, 2013). Children must acquire metalinguistic skills, specifically phonological awareness (the ability to recognize phonological structures of words), which include the abilities to delete, add, replace, segment, or manipulate sounds within words (Bentin, 1992). These skills are crucial for reading development across languages (Ziegler & Goswami, 2005). It is now well established that phonological awareness plays a critical role in learning to read, and learners' awareness of their language's phonological structure is essential for accessing written language.

In alphabetic languages, learning to read requires awareness of phonemes as units of written segmentation. However, syllabic or intra-syllabic units (such as rhyme/rhythm) may not be directly relevant to language learning. This theory is based on the fact that syllable and rhyme awareness emerges during preschool years and appears independent of reading acquisition, while phoneme awareness is closely linked to this process (Liberman et al., 1974; Bryant & Goswani, 1987; Treiman & Baron, 1981; Mann, 1984; Gombert, 1993). According to this theory, syllabic and rhyme-based skills are not crucial for learning to read (Bryant, Goswani & Bryant, 1990; Bradley et al., 1983; Wise, Olson & Treiman, 1990; Gombert, 2000). At most, they may facilitate phonological awareness development. In other words, these skills have only a limited and indirect relationship with reading acquisition by facilitating the emergence and development of phonological ability, which is essential for understanding the alphabetic principle.

From this perspective, Arabic presents significant differences compared to European alphabetic languages, and it is likely that research should investigate the role of phonological awareness in reading acquisition. The Arabic phonological system consists of 30 sounds: 27 consonants and three vowels (short or long). The combination of these phonemes to form syllables and words follows specific rules that appear in the syllabic structure of the Arabic language. Generally, we distinguish between two main types of syllables: CV and CVC. This simplicity in syllabic structure is highlighted by the high frequency of such syllables in words.

According to Bassam (1988), this simple syllabic form particularly dominates Arabic verbs. In this phonological structure, characterized by the absence of consonant clusters and simplicity of syllables, the phoneme does not appear as an important unit of segmentation. Therefore, we can expect syllable segmentation to be easier than phoneme or rhyme segmentation.

Thus, combining metalinguistic transformations and the syllabic method through morpheme manipulation in reading instruction presents a challenge in this study.

Hypotheses

Reading instruction relies on suprasegmental awareness, especially in the initial stages, where children encounter vowelized scripts. Three hypotheses can be proposed to describe the relationship between phonological awareness and reading acquisition in Arabic:

1. **Segmental Awareness in Early Reading**: An Arabic-speaking child must learn to read before the age of six, equipped with developed segmental awareness. This awareness plays a crucial role in learning to read, serving as a prerequisite for acquiring phonetic decoding skills necessary for recognizing written words at the start of reading acquisition, especially when encountering written scripts.
2. **Syllabic Unit and Early Access**: Conscious access to syllabic units should precede and be easier than access to phonemes since syllables correspond to verbal actions. This is supported cognitively and linguistically.
3. **Segmental Mastery in Formal Education**: In formal education, a child should demonstrate advanced skill, particularly in the ability to segment syllables. Arabic-speaking children should be able to extract morphemes and affixes, decompose words into their original syllables, or incorporate affixes into the original syllables while resegmenting them.

Meta-phonological and Morphological Components in Syllables

The emphasis on sound as the exclusive unit for analyzing written language is justified by the fact that alphabetic writing encodes language sounds at the phonetic level only. However, we can question whether this analytical focus undermines the value of the syllable, especially since syllables play no role in this theory. In reality, this theory may not be generalizable across all alphabetic languages and could be influenced by two main factors that allow for a reevaluation of the syllable: phonetic and spelling characteristics of certain alphabetic languages and pedagogical practices in reading instruction. In some languages, the suprasegmental ability can be more critical in reading acquisition, especially regarding morphemes.

Given that Arabic is a purely morphological language, it is impossible to separate phonological knowledge from its morphemic affixes. Arabic words consist of two components: one for the specific phonetic root elements, and another for the variable vocalic elements required by the root to create singular, plural, dual, verb, subject, or object forms. For example, the word "كتب" (wrote) can become "يكتب" (he writes), "اكتب" (write!), "كاتب" (writer), or "مكتب" (office/library). Thus, phonological skills should not be taught in isolation from their morphological level unless children are taught Arabic only in its root form, excluding affixes and modifications.

Arabic differs from French in that its affixes retain the original meaning, whereas French affixes may change the meaning entirely, as in "stable" and "instable." In Arabic, the root "ثبت" (thabit) retains its meaning across

derivations like "مثبت" (fixed/stabilized). These affixes are syllables that make a significant difference in learning language and reading. For instance, removing the "م" from the word "مكتب" (office) results in "كتب" (wrote). Such syllabic manipulations during reading instruction enhance language acquisition. Suprasegmental reading instruction enables extracting and retaining multiple words in the mental lexicon, particularly in languages like Portuguese and Greek, where monosyllabic words are rare. For this reason, syllables are often used as units of analysis in reading instruction. Martinez (1994) adopted this approach to measure reading progress rather than the traditional letter/sound method used in English. Carraher & Rego (1984) found that in Brazilian children, syllabic word analysis supports reading progress more effectively than phonetic analysis. The simplicity and frequency of syllable types like CV (consonant-vowel) facilitate children's acquisition of a relatively small number of syllable patterns without the need to reconstruct syllables from isolated phonemes. Moreover, studies have shown that children taught through syllabic methods make greater progress in their first year of reading than those taught phonics. Thus, in Portuguese, syllables are an essential unit in reading acquisition.

In Greek, Aidinis & Nunes (2001) highlighted the significant contribution of syllabic analysis in reading acquisition. Their findings emphasized its necessity in reading development, particularly in the early years of primary education. Research has focused on phonological mediation, often overlooking the role of morphology in written word recognition, although some studies indicate that implicit morphological knowledge in the first two years of learning gradually becomes explicit and critical for reading competence in third and fourth grade.

Finally, Gembert (1992) referenced a study by Patel & Soper (1987), which examined the phonemic segmentation abilities of Indian children learning to read and write in Gujarati, a language that combines consonants and vowels non-sequentially. Their findings suggest a strong relationship between metasyllabic abilities and reading acquisition. These studies across different languages indicate that learning to read involves various levels and types of phonological awareness depending on the language's specific features. It seems that each language's phonetic and spelling characteristics are reflected in the development of a child's linguistic awareness (Downing & Fijalkow, 1984). Naturally, the most prominent (and accessible) unit in the language is chosen for word analysis and segmentation.

Importance of the Syllabic Unit in Arabic

The importance of the syllabic unit in Arabic arises not only from the phonetic structure of the language but also from the graphical characteristics of the syllable. Arabic script is fundamentally consonantal, represented by simple, non-linear diacritical marks attached to consonants. Vowels are optional and written separately. Arabic, therefore, uses a consonant-based alphabet (Sampson, 1985) or a semi-alphabet if we consider diacritics with phonetic value. As such, Arabic words appear as sequences of consonants that must be pronounced syllabically by assigning vowels to consonants. Thus, the minimal unit of segmentation in Arabic is the "letter," representing a consonant that often corresponds to a syllable and sometimes a sound. As a result, Arabic script works against syllabic units due to its specific use of vowels. Consequently, the letter, the natural unit of segmentation in Arabic, heightens sensitivity to the syllable level in writing.

Learning to read significantly impacts the development of syllabic awareness, as encountering written text increases children's sensitivity to the syllabic unit through letters, which are the foundation of the Arabic writing system. Therefore, syllabic awareness is both a cause and an effect of learning to read, indicating a reciprocal causal relationship between syllabic awareness and reading acquisition.

Methods and Procedures

- **Objective**: The objective of this study is to investigate the distinctive relationships between learning to read in Arabic and syllabic awareness, including suprasegmental awareness related to morphemes. The experiment was conducted in a school in Setif, Algeria.
- **Sample**: The sample consisted of 72 children with an average age of 6 years and 3 months, with criteria ensuring sample homogeneity. All children were enrolled in their first year of formal schooling, starting with two experienced teachers using methods prescribed by the Ministry of National Education. The children's native language was Algerian Arabic, varying slightly across regions depending on the child's origins. Their level of formal Arabic was minimal, with basic knowledge—they could not yet read or write but could distinguish written words from symbols or numbers. The children did not exhibit any linguistic or cognitive disabilities.
- **Test Groups**: The children were divided into three reading groups:
    - Group 1 (n=20, 14 boys and 6 girls, average age 90.44 months, SD=4.30)
    - Group 2 (n=32, 13 girls and 19 boys, average age 129.60 months, SD=5.73)
    - Group 3 (n=20, 10 boys and 10 girls, average age 99.34 months, SD=6.67)
- **Testing Procedures**: The metalinguistic abilities were assessed using a segmentation test by Bellefroid and Ferreiro (1979), comprising 12 words (six two-syllable and six three-syllable) selected from a familiar Arabic lexicon. The test was presented in the form of a game, where children segmented words into two or three parts (syllables). Another test involved deleting the initial or final sound from a list of 24 monosyllabic words. Lastly, a reading test measured the ability to recognize original words with their syllables and remove morphemic affixes.

Metaphonological Test Results

In the syllabic segmentation test, we identified four types of responses based on success: a correct response when the child provides the precise syllable in the word; two types of incorrect responses: when the child gives a verbal syllable that does not respect the syllable boundaries within the word, producing essentially a CV syllable instead of a CVC (type 2), or a sound instead of a full syllable (type 3); and finally, the fourth type, which includes all other types of responses: no response, repeating the word, or giving a word or syllable unrelated to the target word.

In the sound deletion test, children's responses were categorized as follows: the first type was when the child correctly deletes the first or last sound of the word (type 1), representing the correct responses. The second type was when the child deletes two sounds simultaneously in a CV form at the beginning or end of the word (type 2). In this response, it is evident that the child understood that the syllable is segmented into smaller sounds, though incorrectly. Lastly, the final type of response consisted of unusual or irrelevant responses.

In the reading test, correct responses were recorded if the word had been previously encountered, while silence or unusual responses were noted if the word was presented for the first time. The response method was either gestural or verbal.

Interpretation and Discussion

The results showed a significant difference between the tests, with the average performance in syllabic segmentation being much higher than in sound deletion (19.97 versus 5.77). The children easily succeeded in the first test but failed in the second, allowing us to conclude that they had good syllabic awareness before learning to read but weaker phonemic awareness. This finding aligns with several studies claiming that syllabic awareness is easier for preschool children to develop.

The results of word segmentation into suprasegmental syllables in the reading test were low. However, the success rate recorded was reasonable across all tests. Liberman et al. (1974) found that at the age of six, 48% of children succeeded in the syllabic segmentation task (using six consecutive correct answers as the success criterion). In our study, by setting a success criterion 4 points higher than the theoretical average of 19/30, we found that 61.25% of the children met this criterion. The better performance of Arabic-speaking children in syllabic segmentation compared to English-speaking American children may be attributed to the phonological characteristics of the Arabic language, which promote syllabic awareness by making children more sensitive to this phonological unit. This explanation seems more convincing than attributing the difference to task or procedural variations, as the two studies shared similar factors.

Regarding the success criterion, ours was highly selective, requiring two-thirds of the maximum performance (19/30). Although our research was not a perfect replication of Liberman's study, it is still quite suggestive.

Concerning the identification of the roots of written words in the text, the results show an average performance of 29.47, which is lower than the theoretical average. Notably, 32 out of 72 children scored equal to or higher than this effective average, meaning that 44.5% of the sample had not yet acquired the suprasegmental decoding mechanism related to morphemes. Thus, it appears that only 22.5% had developed, after one year of reading instruction, the phonological decoding process that allows them to decode written words.

The contribution of each test to the variance in reading is provided by the partial correlation coefficient. The syllabic segmentation test explained 8% of the variance in reading ($R = .276$ and $R^2 = .076$), while the sound deletion test explained 23% ($R = .48$ and $R^2 = .23$). It should be noted that the sound deletion test proved to be a better predictor of reading acquisition than the syllabic segmentation test, with significant differences (23% for the former compared to only 8% for the latter). These results deserve attention because, while they do not entirely disprove our hypothesis, they are still somewhat unexpected. It can be said that metaphonological ability, in general, is a strong indicator of reading proficiency, regardless of the language being learned. In comparison, metasyllabic ability requires more precise analysis of the phonological structure to be applicable to all systems (syllabic, suprasegmental, alphabetic). Since the phoneme is smaller and more abstract than the syllable, it is more difficult to grasp, which explains its stronger relationship with writing compared to the syllable when viewed together. This priority reflects the idea that phonemic ability logically includes syllabic ability, but the reverse is not necessarily true.

Discussion and Conclusion

Overall, the results of this study support the idea that syllabic awareness plays a crucial role in learning to read in Arabic, both as a cause and a consequence of this learning. Several findings support this view:

- Before learning to read, all children failed the reading task.
- Most children performed well in the syllabic segmentation task, while many struggled with sound deletion.
- The syllabic segmentation task is a valid predictor of reading acquisition.

- Learning to read does not have the expected effect on developing phonemic segmentation ability. However, syllabic segmentation ability improves significantly between the beginning and end of the school year.
- The written Arabic language, being alphabetic, limits phonemic segmentation in favor of syllabic segmentation.
- The correlation between the syllabic segmentation test and reading remains significant, even when controlling for the effect of the sound deletion test.

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