

PHONOLOGICAL AWARENESS AND ITS RELATIONSHIP WITH DICTATED WRITING

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Abstract

Phonological awareness has been extensively studied in relation to reading acquisition; however, its impact on dictated writing has received less attention. This article reviews the theoretical framework supporting the relationship between phonological awareness and dictated writing, highlighting the underlying neurological processes, the levels of phonological awareness, and their development. Cuetos' (2009) writing pathways are presented along with their application in primary education, emphasizing the importance of phonemic awareness in writing acquisition. Finally, the implications of these findings for educational practice and the design of pedagogical strategies aimed at strengthening phonological awareness in early schooling are discussed.

Keywords: Phonological awareness, dictated writing, writing acquisition, neuropsychology of language.

1. Introduction

Writing acquisition is a complex process that requires the integration of multiple cognitive and linguistic skills. Among these, phonological awareness plays a fundamental role by enabling the identification and manipulation of speech sounds, facilitating phoneme-grapheme correspondence. Despite its importance, most studies have focused on its relationship with reading, leaving a gap in the analysis of its impact on dictated writing.

One of the most common challenges in the school context relates to writing processes (González, 1997). However, studies exclusively dedicated to writing difficulties are far less common than those addressing reading disorders (Berninger, Nielsen, Abbott, Wijsman, & Raskind, 2008). For this reason, this study aims to examine one of the writing modalities most affected in school settings: dictated writing.

This article aims to analyze the role of phonological awareness in dictated writing by reviewing the underlying neuropsychological processes and the writing pathways described by Cuetos (2009). Furthermore, the implications of these findings for educational practice are discussed, proposing strategies to enhance writing instruction in primary school children.

2. Background

2.1 Phonological Awareness

Phonological awareness is defined as the ability to reflect on and manipulate segments of spoken language. Various studies have demonstrated its strong relationship with literacy

acquisition (Jiménez & Ortiz, 2007; Defior et al., 2008). Among the different levels of phonological awareness, the phonemic level is the most crucial for writing development, as it allows words to be segmented into their smallest meaningful units.

According to Defior and Serrano (2011), phonological skills include the ability to identify syllables (syllabic awareness), to distinguish within-syllable units such as onset and rime (intra-syllabic awareness), and to recognize phonemes (phonemic awareness). These skills do not develop simultaneously but progress in a hierarchical manner, starting from syllabic awareness and advancing to phonemic awareness, which is the most challenging to acquire.

2.2 Neuropsychological Foundations of Writing

From a neuropsychological perspective, writing involves multiple brain areas. Luria (1983) proposed a functional systems model in which writing is divided into three stages: auditory analysis of words, phoneme-grapheme correspondence, and the motor execution of writing. This model was later expanded by Serratrice and Habib (1997), who identified the specific brain regions involved in each stage.

The perception and comprehension of the message to be written involve the primary auditory cortex in both hemispheres and the associative temporal cortex of the left hemisphere (Wernicke's area). The transcoding of the message is associated with the angular gyrus (Brodmann's area 39) and the supramarginal gyrus (Brodmann's area 40). Finally, the motor execution of writing is linked to the associative frontal motor cortex (Broca's area) and the primary motor cortex.

2.3 Processes in Dictated Writing

Cuetos (2009) describes two pathways for dictated writing: the lexical route and the phonological route. The lexical route relies on the visual recognition of words stored in the orthographic lexicon, whereas the phonological route involves phoneme-grapheme conversion and is primarily used by children in the early stages of writing acquisition.

The lexical route begins with the acoustic analysis of sounds, enabling the identification of the phonemes that compose a word. Next, access to the semantic system allows for the retrieval of the word's orthographic form from the orthographic lexicon, which then initiates the motor processes required for writing. Conversely, the phonological route is mainly employed for unfamiliar or infrequent words. In this case, the child must analyze the acoustic stimulus, retrieve its pronunciation, and convert it into its written form through the phoneme-grapheme conversion mechanism..

3. Phonological Route for Dictation Writing

From the early years of primary education, specifically from the second grade, students are expected to have adequate skills to write from dictation, as this is one of the most commonly used exercises for both evaluation and note-taking in class. However, for many children, the learning process is affected because the quality of their written output in this modality is deficient. Such cases can be observed in the study conducted by Guevara, López, García, Delgado, and Hermosillo (2008) in three public schools in a municipality within the metropolitan area of the State of Mexico. This study found that among a sample of 165 first-

grade students, dictation tasks had lower execution levels than copying, particularly concerning sentence and text dictation.

The causal factors behind these deficiencies may be related to the functional mechanisms involved in dictation writing. From the perspective of **functional systems** in Luria's neuropsychological theory, writing can be understood as a complex process with a psychological structure composed of interconnected links. Each of these must function properly to ensure that the neurological basis for writing remains intact. Luria (1983) describes the processes involved in writing as follows:

- In the first “**link**,” an **auditory analysis** of words occurs. A heard or internally generated word (as in dictation) is analyzed into phonemes that can be written as letters. This process involves the **left temporal region**, responsible for accurate phonemic perception, along with **kinesthetic support** or the **pronunciation of the word**, which is especially relevant in the early stages of writing. Additionally, preserving the correct **sound sequence** is necessary, as this facilitates the analysis of consecutive sounds in each word.
- The second **functional link** corresponds to **phoneme-grapheme conversion**, which involves recoding the phonetic elements identified in the previous stage into graphemes. This process engages distinct **physiological operations** within the **occipital and parieto-occipital areas** of the brain.
- The third **link** is related to the **motor execution of writing**. This stage requires a fluid system of highly precise, dynamic movements, primarily involving the **inferior areas of the premotor cortex**, which regulate the proper positioning of letters within a written word.

Like Luria, Serratrice and Habib (1997) divided the writing process into three stages, but they described it based on the specific brain areas involved. Expanding on these contributions, Ardila et al. (2005) provided the following illustration:

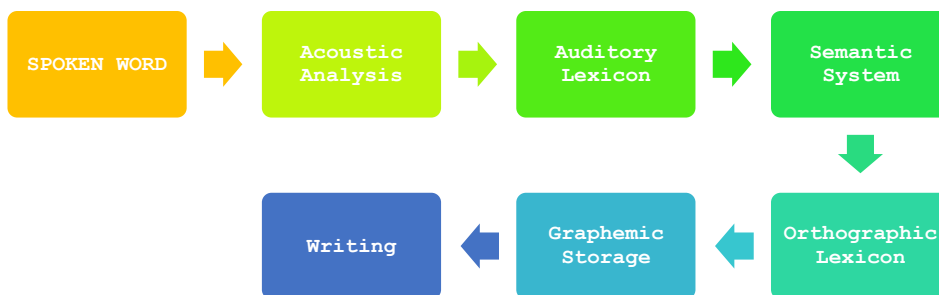


Figure 1. Lexical Route for Dictation Writing (Adapted from Cuetos, 2009)

- **The perception and comprehension of the message to be written by the brain:** In the case of dictation (auditory stimuli), this process involves the primary auditory cortex in both hemispheres and the associative temporal cortex of the left hemisphere (Wernicke's area). In the case of copying, it engages both the primary and associative visual occipital areas.
- **The transcoding of the message:** At this stage, integrative processes transform perceived messages, such as phonemes, into written forms. This process is associated with two regions of the associative cortex located at the left temporoparietooccipital

junction: the angular gyrus (Brodmann area 39) and the supramarginal gyrus (Brodmann area 40).

- **The motor act or graphic gesture:** This step requires the information processed in the previous stages to be transmitted through the sensory areas via the associative motor cortex (primarily Broca's area) to the primary motor cortex, where the movement is executed.

Additionally, other brain regions contribute supplementary information. These include the hippocampus and the associative sensory cortex, which provide mnemonic data; the right hemisphere, which facilitates the organization of visuospatial elements and offers a holistic view of the written word; and the prefrontal regions, responsible for text planning, topic maintenance, and achieving the intended writing goal.

According to Cuetos (2009), writing from dictation involves converting the spoken words of the dictating person—i.e., sounds—into graphic symbols or letters. This author also proposes different pathways for executing this type of writing.

The first pathway, represented in Figure 1, begins with the acoustic analysis of sounds, allowing for the identification of the phonemes that make up the word. Next, the auditory lexicon is activated, recognizing words that correspond to those sounds and determining whether the word is known, though its meaning has yet to be accessed. To assign meaning to the word, the semantic system is engaged, which then activates the orthographic lexicon—a repository where each word has a corresponding graphic representation. From here, the word is stored in the graphemic buffer, which initiates the motor processes responsible for generating the specific movements required to write the word.

This pathway, at least from the stage of accessing the semantic system onward, corresponds to the lexical or direct route described by Navas and García-Fernández (2011). This route requires prior knowledge of a word's spelling and the sequence of its graphemes. The use of this route ensures orthographically correct writing, as it relies on the orthographic lexicon (Cuetos, 2009).

The other route described by Cuetos (2009), which is the one most commonly used by children in the early stages of learning to write—particularly for writing less frequent words—is one in which the semantic system is not necessarily involved (Figure 2). According to the author, the processes involved in this route are as follows: it begins with the acoustic analysis of the stimulus. Then, through the acoustic-to-phonological conversion mechanism, the pronunciation of those sounds is retrieved and stored in the pronunciation buffer (from which they would be articulated if the task involved repeating them). Subsequently, through the phoneme-to-grapheme conversion mechanism, these sounds are transformed—one by one—into their corresponding letters. These letters are then stored in the graphemic buffer, ready to be written.

This route is known as the phonological, indirect, or non-lexical route. As can be inferred, it involves “transforming the phonetic chain of spoken language into the symbols that make up written language by applying phoneme-to-grapheme conversion” (Navas & García-Fernández, 2011). However, this route alone is not sufficient for correct spelling in Spanish, as the language presents orthographic ambiguity—certain phonemes can be represented by two or three different graphemes. Therefore, in order to write correctly, one must already know the orthographic form of words, making the lexical route equally indispensable.

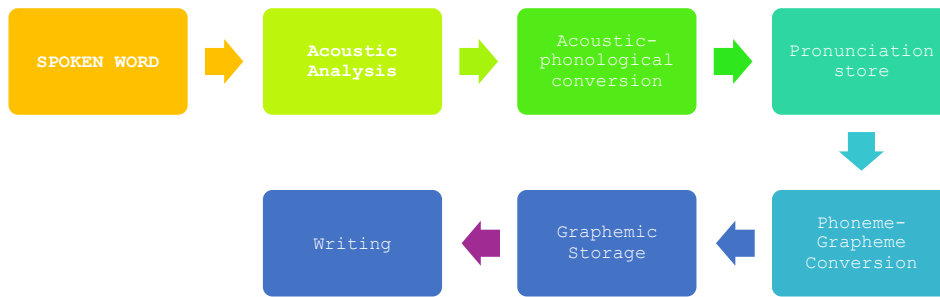


Figure 2. Phonological Route for Dictation Writing (Adapted from Cuetos, 2009)

Now, considering that, as a functional system based on sequential links, dictation-based writing requires each of its phases to develop properly, it would be logical to think that from the very first phase, it is essential for the person writing to become aware that each spoken word is divided into smaller parts. In other words, phonological awareness skills are necessary (Ardila, Rosselli, & Matute, 2005; Cuetos, Ramos, & Ruano, 2004). The importance of phonological metalinguistic skills is justified, as previously mentioned, by the very alphabetic nature of the writing system, since in an alphabetic system, graphic representations transcribe the sounds of spoken language. This requires children (especially during the acquisition stage) to understand the association between letters and speech sounds (Gutiérrez & Díez, 2015), that is, between graphemes and phonemes, and vice versa. To achieve this, skills that allow them to reflect on and manipulate spoken language segments—namely, phonological awareness—are required.

Phonological awareness is defined by Bravo (2002) as “the awareness of the phonemic components of spoken language (initial phoneme, final phoneme, sequences, etc.) and the acquisition of various processes that can be applied to spoken language, such as segmenting words, pronouncing them while omitting or adding phonemes, articulating them from phonemic sequences, reversing phonemic sequences, etc.” In other words, phonological awareness involves the ability to manipulate phonemes, integrate or articulate them within a word, or reverse their sequential order, allowing children, for example, to articulate the phonemes of the letters c-a-s-a and distinguish them from the word “pasa.”

According to Defior, Serrano, and Marín-Cano (2008), these skills include the ability to identify syllables (syllabic awareness), the ability to recognize the intrasyllabic units of onset and rhyme (intrasyllabic awareness), and the ability to identify the smallest units of speech, which are phonemes (phonemic awareness). Furthermore, when considering the levels of phonological awareness related to these three linguistic units (syllabic, intrasyllabic, and phonemic), research has shown that they do not hold equal importance in influencing written language acquisition (Defior & Serrano, 2011). It has been established that phonemic awareness is the most crucial for literacy development and is the last to be acquired.

Defior et al. (2008), in a longitudinal study analyzing the evolution of phonological skills from the pre-reading stage and their predictive power regarding literacy acquisition, found that before formal reading and writing instruction, higher levels of syllabic awareness and lower levels of phonemic awareness were observed. However, as literacy instruction begins, phonological awareness scores increase, leading to the conclusion that exposure to written language facilitates the detection of the smallest segments of spoken language.

It is therefore quite clear that phonemic awareness is the last level of phonological awareness to develop, as most studies on the subject have reached this conclusion. Among them is the study conducted by Defior et al. (2008), whose main objective was to analyze in detail the

evolution of phonological skills in children from the pre-reading stage through the first three years of primary school. According to these authors, performance on phonological awareness tests significantly increases, especially at the beginning of formal literacy instruction, with phonemic awareness showing the most substantial development when children receive explicit instruction in the orthographic system. The results of this study explicitly state that “the low level of phonemic awareness in the pre-reading stage and its doubling upon entering first grade support the idea that this is the highest level of phonological awareness,” meaning it is the last to develop.

Just like with the linguistic units that compose it, debates about the different tasks for assessing phonological awareness are extensive. However, attempts at categorization or classification have emerged, such as the one proposed by Lundberg (Carrillo & Marín, 1996), which is based on three main dimensions: the cognitive operations involved (analysis and synthesis), the size of the units (phrases, words, syllables, phonemes), and the amount of mental activity or processing complexity required (rhyme recognition, phonemic segmentation, for example).

According to the dimension related to the cognitive process involved in its execution, tasks can be classified into analysis tasks, synthesis tasks, and combined analysis and synthesis tasks (Defior & Serrano, 2011; Matute, Montiel, Hernández & Gutiérrez, 2006). Analysis tasks require identifying units (syllabic, intra-syllabic, or phonemic); for example, asking the subject, “What are the sounds in the word /más/?” Synthesis tasks require combining units to form a word; for example, asking the child, “What word is formed with the sounds /k/ /a/ /s/ /a/?” Analysis and synthesis tasks involve first breaking down the word and then recomposing it in a different way, such as asking the child to say the word /kasa/ without the /k/ sound.

According to Defior and Serrano (2011), synthesis tasks are more difficult than analysis tasks. This was confirmed in a longitudinal study conducted with 92 children from the first year of preschool education to the beginning of the second year of primary school (Defior et al., 2006). Their study established that analysis skills appear earlier in development than synthesis skills. In fact, even after a year of formal literacy instruction, phonemic awareness levels measured through synthesis tasks did not exceed 30%.

Considering the amount of mental activity required (segmenting units, counting, omitting, adding, etc.), the easiest tasks would be those related to rhyme sensitivity and classifying words based on their initial or final units, while suppression and inversion tasks would be the most difficult, as they demand greater working memory involvement (Defior & Serrano, 2011).

The classification of tasks based on the size of linguistic units (phrases, words, syllables, and phonemes) is directly related to the level of phonological awareness being assessed, allowing for data collection on its development. The difficulty is associated with the perceptual salience of each analyzed unit, as will be seen below.

Phonological awareness has been recognized as a necessary skill for learning literacy, as numerous studies confirm that children who can manipulate segments of language, such as syllables and phonemes, learn to read and write more easily, regardless of other characteristics such as vocabulary, social status, or intellectual ability. However, most studies have focused on establishing the relationship between reading and phonological awareness (Ardila et al., 2005; Jiménez & Ortiz, 2007), leading to a dense theoretical construct supporting this connection (Jiménez & Ortiz, 2007). Gutiérrez and Díez (2015) indicate that there is a scientific imbalance in favor of reading regarding the number of studies that consider the implications of phonological awareness development in early writing acquisition. The same authors cite studies by Calderón, Carrillo, and Rodríguez (2006) and

Núñez and Santamaría (2014) as examples of scientific interest in the causal relationship between phonological awareness and writing acquisition.

The importance of phonemic awareness has also been confirmed in studies seeking to determine its predictive value for literacy skills. Some of these studies, documented by Defior and Serrano (2011), not only reaffirm phonemic awareness as “the most reliable and robust predictor of reading and writing skills” but also provide evidence of a stronger association between phonological awareness, particularly phonemic awareness, and writing compared to its association with reading.

The relationship between phonological awareness and literacy acquisition has been a subject of great interest to many researchers. However, as Ardila et al. (2005) express, most have focused on analyzing its influence on reading development (Aguilar, Marchena, Navarro, Menacho & Alcalde, 2011; Bravo, 2002); fewer have investigated its relationship with writing (Defior et al., 2008; Defior & Serrano, 2011; Gutiérrez & Díez, 2017), and even fewer have studied its connection to dictation. In fact, studies focused on writing have mainly investigated preschool populations (Calderón, Carrillo & Rodríguez, 2006; Gutiérrez & Díez, 2015).

Based on the previous arguments, the need was established to validate the relationship between phonological awareness skills and dictation writing in a group of 2nd-grade primary school children. At this stage, they should have already acquired the written code, and dictation writing is much more commonly used. This study specifically considers the phonemic level of phonological awareness, given that the children have already begun formal writing instruction. This interest is based on the theoretical assumption that, for children to achieve phoneme-grapheme correspondence, they must be able to perceive the minimal meaning units that make up words (Cuetos et al., 2004). This represents a valuable contribution to the study of phonological awareness and its relationship with school learning, as, as previously mentioned, there are few studies on its connection with writing. Moreover, it helps explain writing difficulties in the school population, given that, despite dictation being a form of reproductive writing, its mechanisms serve as the foundation for children to develop productive or comprehensive writing skills.

4 Educational Implications

Research findings suggest that strengthening phonological awareness from an early age helps improve writing accuracy and speed. Recommended pedagogical strategies include:

- **Phonological segmentation exercises:** Activities in which children identify phonemes in words and break them down into their individual components.
- **Structured dictation:** Incorporating words of varying phonological complexity to develop both the lexical and phonological routes.
- **Phonological games:** Playful activities that encourage the conscious manipulation of language sounds.
- **Use of educational technology:** Apps and training programs in phonological awareness can enhance phoneme identification and their correspondence with graphemes.

2. Conclusions

Phonological awareness plays a crucial role in the development of writing through dictation. Strengthening this skill from an early age can significantly enhance children’s ability to write accurately and fluently, laying a solid foundation for literacy acquisition. Research has

consistently shown that children with well-developed phonological awareness are better equipped to establish the phoneme-grapheme correspondence necessary for reading and writing. Given its importance, it is essential to implement effective pedagogical strategies that support the development of phonological awareness in the classroom. Activities such as phonemic segmentation exercises, structured dictation with words of varying complexity, and interactive phonological games can help children refine their ability to recognize and manipulate the sounds of language. Additionally, integrating educational technology, such as apps and digital tools designed for phonological training, can provide engaging and adaptive learning experiences that reinforce these skills. By fostering phonological awareness, educators can not only improve children's spelling and dictation skills but also help prevent potential difficulties in literacy development. Therefore, a strong emphasis on phonological training in early education can lead to long-term benefits, ensuring that children acquire the foundational skills needed for proficient reading and writing.

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