

The Relationship Between the Morphosyntactic Level and Word Comprehension Among Deaf Children with Cochlear Implants Integrated in Regular Schools, Aged 11–12 Years

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Abstract:

This study explores the relationship between the morphosyntactic level and word comprehension in deaf children aged 11–12 years with cochlear implants integrated into regular schools. Research consistently shows that despite improved auditory access after implantation, these children continue to experience persistent morphosyntactic difficulties, including challenges with inflection, grammatical case markers, and sentence structure. Such deficits directly affect their ability to comprehend words within context, as lexical meaning depends on grammatical positioning and syntactic relations. Evidence also indicates that early implantation, continuous speech therapy, and supportive linguistic environments enhance comprehension outcomes, yet morphosyntactic development remains delayed compared to hearing peers. The findings highlight the need for rehabilitation programs that integrate auditory training with targeted morphosyntactic intervention to support more effective language development in cochlear-implanted children.

Keywords: Morphosyntactic Level; Word Comprehension; Deaf Children with Cochlear Implants.

Introduction:

Language acquisition represents a complex process in which biological, cognitive, and social factors interact. Information processing typically begins with the reception of stimuli from the external environment, such as sound, light, and speech. For a stimulus to enter the information-processing system, it must first be activated (Hilmi Al-Mulihi, 2004, p.22). The absence of auditory stimuli and the lack of exposure to adult speech models deprive the child of the natural development of language and prevent the formation of associations between the mental representation of sounds and their meanings.

When linking sound patterns (phonology) to meaning becomes impossible (Garabédia et al., 2003, p.74), deaf children with profound hearing loss may experience difficulties in mastering inflection, grammatical case markers, and syntactic dependencies. Their oral and written productions frequently contain errors related to grammatical rules such as prepositions, conjunctions, and incorrect language use, including confusion between definite and indefinite forms, the addition of inappropriate prepositions, and errors affecting verb tenses (Rondal, 2003, p.565).

There is no doubt that one of the major scientific achievements of the modern era, represented by cochlear implant technology, provides assistance to deaf children with profound hearing loss. However, this improvement does not necessarily guarantee the spontaneous recovery of language abilities (Samira Rekza, 2015, p.161). Language is not acquired solely through hearing but rather through complex symbolic and cognitive processes that involve discrimination, comprehension, and the structural analysis of linguistic stimuli.

In this regard, the morphosyntactic level occupies a central position, as it concerns the forms of language and the syntactic relations within sentences. It analyzes the environment and structure of the word through morphological units (morphemes), in which primary morphemes (roots) attach to prefixes, suffixes, and infixes. Morphemes are therefore classified according to type, meaning, and function (Tammam Hassan, 1985, pp.121–150).

Word comprehension in children does not depend solely on auditory or visual recognition but requires deep morphosyntactic processing that enables the child to determine the word's position and function within the linguistic structure. A word acquires its meaning only in relation to the syntactic context in which it appears, making morphosyntax a pivotal element in the development of linguistic understanding.

Recent research in speech-language pathology and psycholinguistics indicates that cochlear-implemented deaf children experience distinctive difficulties in this domain. Although they may be able to discriminate sounds and identify isolated words, they often struggle to understand grammatical relationships within complex sentences or to use the fine morphological markers that modify meaning (Benassi et al., 2021). These difficulties become more pronounced when cochlear implantation is delayed or when it is not accompanied by intensive and systematic speech-therapy follow-up.

Weak morphosyntactic analysis may result in ambiguity in semantic comprehension, as the implanted child often relies on global context or visual cues to infer meaning rather than depending on the linguistic system itself. This makes examining the relationship between the morphosyntactic level and word comprehension particularly important. Accordingly, this theoretical study proceeds from the hypothesis that there is a correlation between the morphosyntactic level and word comprehension among deaf children with cochlear implants.

Problem Statement:

Linguistic development is among the aspects most affected by hearing impairment, as such impairment negatively influences all dimensions of language, particularly articulation, due to the absence of auditory feedback during the babbling stage and the child's lack of verbal reinforcement or response when producing sounds. In addition, the child is deprived of exposure to adult speech models that are essential for imitation. This auditory deprivation leads to delays in linguistic development and places the child in a form of isolation that affects daily interactions, as the child lacks the ability both to understand and to be understood. Their concept of objects declines, and weaknesses appear in receptive and expressive language alike.

Studies indicate that this delay becomes evident in the early years of a child's life. During the babbling stage (2–6 months), verbal output is limited or entirely absent, and the child depends primarily on lip-

reading. From 6 to 8 months, the phonological loop typical of hearing children is absent. Between 18 and 24 months, the deaf child acquires between 100 and 300 signs and gradually begins to understand abstract objects; however, oral comprehension remains limited and difficult from the earliest stages (Youssef, 2014, pp.127–130).

Hilmi Al-Mulihi (2004, p.22) observes that linguistic information processing usually begins with the reception of external stimuli such as sounds and speech, and that the absence of these stimuli deprives the child of the natural development of language and the ability to form associations between the mental representation of sounds and their meanings. Garabédian and colleagues (2003, p.74) confirm that the absence of speech models prevents the formation of connections between phonological form and meaning, leading to clear linguistic deficits.

The more severe the hearing impairment, the more pronounced the linguistic difficulties: individuals with mild impairment struggle to hear low-frequency sounds and to understand general conversation; those with moderate impairment experience limited vocabulary and difficulties in expression; whereas individuals with severe impairment face major challenges in distinguishing sounds and producing speech.

The most prominent linguistic deficits among individuals with hearing impairment include weak articulation, limited vocabulary, short and simple sentence structures, a focus on concrete sensory aspects, and persistent errors in grammar, morphology, and prosody.

Early studies (Goda 1964; Brannon 1966; Geffer 1987; Lepot Froment 1996; Rondal 2003) indicate that deaf children struggle to use adjectives and adverbs, to employ pronouns and prepositions, and that their productions are often restricted to simple structures such as “verb – subject – object.” They also exhibit weak control over grammatical case markers and syntactic dependencies, with frequent errors related to grammatical rules, including verb tenses and prepositions (Rondal, 2003, p.565).

Other studies confirmed (Lenormand, 2004; Dubois Bélanger et al., 2010) that linguistic development is one of the dimensions most affected by hearing impairment, as it negatively influences all aspects of language, particularly articulation, due to the absence of auditory feedback during the babbling stage and the child’s lack of any verbal response or reinforcement when producing sounds. In addition, the child is deprived of adult speech models required for imitation. This auditory deprivation results in delayed linguistic development and creates a form of isolation that affects the child’s daily interactions, as the child lacks the ability to understand and to be understood. Their concept of objects diminishes, and weaknesses appear in both receptive and expressive language.

These studies also recorded improvement in speech comprehension among children who underwent cochlear implantation before the age of five, as they gradually became able to discriminate sounds and words, although outcomes varied depending on the age at hearing loss and the age at implantation. Basem Rahali (2020) concluded that children implanted early (between 1 and 2 years old) achieved levels of comprehension close to those of hearing children, whereas the study of Hajan Loubna (2016) showed that comprehension gradually improves after implantation, reaching 80% after two years of regular speech therapy.

Meanwhile, the study by Louise Duchsne (2008, p.242) indicated that although cochlear implantation contributes to improvements in comprehension and production, morphosyntactic difficulties continue to persist even ten years after the procedure. This finding is consistent with studies conducted in the Algerian context. Bousbetta Yamina (2010) reported that phonological development in cochlear-implanted children progresses in a manner similar to that of hearing children, but at a slower pace, and that it depends on factors such as early detection, intensive rehabilitation, and family involvement.

Based on these findings, it becomes evident that the deaf child with a cochlear implant faces clear difficulties at the morphosyntactic level and in oral comprehension, which raises questions about the nature of the relationship between these two dimensions in language acquisition among this population.

Accordingly, the problem can be formulated as follows: Is there a correlational relationship between the morphosyntactic level and word comprehension among deaf children with cochlear implants integrated in regular schools and aged between 10 and 12 years?

Research Hypothesis:

There is a correlational relationship between the morphosyntactic level and oral comprehension among deaf children with cochlear implants integrated in regular schools and aged between 10 and 12 years.

Definition of Concepts:

• Definition of Deafness:

The definitions specifying the nature of deafness are numerous, yet most agree in meaning. Some define it according to degree, others according to type, and others according to cause. Among these definitions are the following:

• Linguistically:

The term *šamm* (deafness) is derived from the verb *šamma*, meaning “to become blocked”; thus, “šammuhu šamman” means his ears became blocked, heavy, and his hearing disappeared, making him *ašamm* (deaf). It is also said “the ear šammat,” meaning it became blocked. Deafness is therefore the loss of the sense of hearing.

• Terminologically:

Deafness is a condition in which the person is unable to hear or speak, resulting from impairments within the auditory system.

Definition by Smith (Smith, 2007):

A deaf person is one who is unable to perceive environmental sounds in a functional manner, whether using hearing aids or not, and who is unable to rely on hearing as a primary sense for acquiring information.

Cochlear Implantation:

Definition from the Orthophonic Dictionary:

A cochlear implant is a technique intended for individuals with profound endocochlear deafness (*Surdit  Endocochl aire Profonde*) who do not benefit from conventional amplification. Cochlear implantation directly stimulates the auditory nerve using an electrode, or a set of electrodes, implanted at the level of the cochlea.

Definition by Benoit (2000):

Cochlear implantation is a surgical procedure that enables the implantation of an artificial device in the inner ear. This device electrically stimulates the cochlear nerve through an electrode array containing a specific number of electrodes.

Definition of the Morphosyntactic (Grammatical-Syntactic) Level:

Definition from the Orthophonic Dictionary:

Morphosyntax is the level of language concerned with examining changes in the forms of words within sentences according to rules of linking. It is a field that combines morphology (the study of word structure), syntax (sentence structure), and grammar.

The morphosyntactic level focuses on the forms of language in relation to syntactic relations within sentences. It analyzes the environment and structure of the word through morphological units (morphemes), where primary morphemes (roots) attach to prefixes, suffixes, and infixes. Morphemes are classified according to type, meaning, and function, encompassing both morphology and syntax within this level. Additionally, syntax studies the rules, principles, and organization of words within various sentence types, and functions as a core component of grammar.

Relationship Between the Morphological Level and the Syntactic Level:

There is no functional grammatical meaning without the structural foundations provided by morphology, which enables the expression of such functions and syntactic relations. This reveals the clear interdependence between grammatical meaning and the morphological form capable of conveying it. Sibawayh noted that the verb, by virtue of indicating an event associated with time, is appropriate for performing the function of predication to the subject, whereas the particle depends on other elements to convey its meaning.

Moreover, verbs do not only perform the function of predication but also extend to functions such as transitivity, becoming, reciprocity, and other morphosyntactic roles that emerge from the attachment of these verbs to augmentative particles (Muhammad Salem Saleh, 2006, p.125).

Grammar constitutes a system of meanings and relations that find no explicit formal expression except through the structural cues provided by morphology. Since morphological structures express grammatical meanings, avoiding ambiguity between one structure and another becomes a central goal that the language seeks to maintain in its formulation of morphological patterns.

To ensure the avoidance of ambiguity at the morphological level, contrastive values play an essential role in distinguishing between structures in terms of form and function. The grammatical system of the Arabic language is based on a set of general grammatical meanings—those referred to as sentence meanings or syntactic patterns—and a set of specific grammatical meanings associated with individual syntactic categories such as subjecthood, objecthood, and genitive relations. Phonetics and morphology contribute to grammar through phonological or morphological cues such as vowel markings, letters, inflectional patterns, derivational structures, and oppositions (Tammam Hassan, 1994, pp.127, 135, 178).

Words are often subject to changes in form that lead to changes in meaning. For example, in the sentences “he saw the dog” versus “I saw the dog,” the changes that occur within the words themselves

fall within the domain of morphology, whereas arranging these words into a specific structural sequence lies within the domain of syntax. Morphology and syntax together constitute what is known as grammar or structure—the equivalent of “traffic laws” that cannot be violated, so as to prevent disruption in the flow of meaning that connects one speaker to another and ensures communication, which is the fundamental purpose of language.

This contrasts with languages such as Chinese, in which syntax assumes a major role due to the absence of morphology, while in other languages like Latin the opposite occurs: syntax plays a relatively secondary role because morphological markers address most issues related to meaningful variation. In most modern Western languages, a combination of both components is found (Ahmed Mukhtar Omar, 1998, pp.53–54).

Arab linguists since early times have noted the consistent relationship between grammatical function and morphological structure. The verbal noun, as a morphological form, is associated with specific grammatical functions such as the absolute object and the object of purpose. Derived forms relate to adverbial and adjectival functions, while non-derived forms are linked to appositional and substitutional roles. Morphological structures also play a major role in differentiating grammatical functions.

Grammarians recognized a systematic relationship between grammatical function and morphological structure, and the formal features of morphological patterns—such as definiteness, indefiniteness, derivation, and lexical rigidity—serve as the basis for identifying many grammatical categories. They established conditions, most of which refer to morphological structure, for each grammatical category, and these conditions represent a frequently relied-upon criterion (Khaled Hassan Abu Amsha, 2014, pp.8–9).

Acquisition of the Morphosyntactic Level Among Deaf Children:

The earliest research concerned with the study of the morphosyntactic level among deaf children is the work of Goda (1964), which indicated that the deaf child may be unable to use adjectives and spatial and temporal adverbs. This was supported by the study of Brannon (1966), who noted that this group faces difficulties in employing pronouns and prepositions.

Children with hearing impairment experience articulation disorders as well as disorders affecting the syntactic-structural level, leading to delays in acquiring sentence structure and its grammatical components. This delay appears particularly in spoken and expressive language and in sentence formation (Al-Zuraiqat, 2005, p.16). The language of the hearing-impaired child is often short, concise, and simple due to limited linguistic richness, which negatively affects the correct and grammatically appropriate construction of sentences and structures.

Lepot Froment (1996, p.165) argues that the deaf child uses words in their isolated meanings, without considering the meanings these words acquire within sentences. Rondal (2003) observed that deaf children with profound hearing loss experience difficulties in controlling inflection, grammatical case markings, and syntactic dependencies, and that the oral and written productions of this group contain errors related to grammar, such as prepositions and errors affecting verb tenses.

The studies of (Lenormand, 2004; Dubois Bélanger et al., 2010) concluded that regardless of the degree of deafness, the morphosyntactic level remains the most difficult

linguistic level for the deaf child to acquire. This is consistent with the findings of Delage (2009), whose research indicated that the morphosyntactic level is the lowest-performing domain among deaf children compared to the morphological and lexical levels (Maureen Boulet, 2014, p.15).

Study of the Morphosyntactic Level in the Deaf Child With a Cochlear Implant:

The study by Lupfer and Domico (1994), conducted in the United States on 18 children, revealed an improvement in speech performance and comprehension among deaf children who received cochlear implants before the age of five. The study also showed that improvement in speech performance and comprehension was related to the age at which hearing loss occurred and the age at implantation. Meanwhile, the study by Waltzman (2000, pp.329–335), which examined the effect of cochlear implantation on speech perception and comprehension at the age of five and was conducted on 20 children, found that all cochlear-implanted children were able to discriminate sounds at normal conversational levels. Some were also able to identify environmental sounds, and the children demonstrated the ability to distinguish speech, whereas only a few were able to understand words exclusively through the auditory signals provided by their devices.

Basem Rahali (2020) found in his study that children who benefited from early cochlear implantation, aged between 4 and 5 years, reached a level of comprehension close to that of hearing children. He noted that comprehension is a complex process for the deaf child, as it involves acquiring abstract concepts and is connected to other cognitive processes. He added that children who received devices at an early age, around one or two years old, did not face difficulties in understanding the instructions given to them.

Hajjane Loubna (2016, pp.165–172), in her study conducted between 2009 and 2015 on 31 deaf children with cochlear implants, found that language acquisition among this group is associated with several factors, including the type of deafness, the age at onset, the communication method used with the child, family support, and speech therapy. She reported that the rate of word comprehension among this group was 15% after three months of implantation, 30% after six months, 75% after one year, and 80% after two years.

For comprehension of simple instructions, the rate was 10% after three months, 15% after six months, 35% after one year, and 80% after three years. Regarding simple sentences, comprehension reached 9% after three months, 18% after six months, 70% after one year, and 77% after three years. However, comprehension of complex sentences did not exceed 50% even after three years.

In contrast, the study by Louise Duchsne (2008, p.242), which examined the morphosyntactic level in deaf children implanted before the age of three, concluded that although the device significantly contributes to improving comprehension and linguistic production, the child continues to experience difficulties in the morphosyntactic domain, and these difficulties persist even ten years after implantation. This finding applies across languages. She further added that the earlier the procedure is performed, the more rapidly the child is able to acquire language.

In the Algerian context, the study by Jenoun Wahiba (2012), which examined the morphosyntactic and semantic levels among cochlear-implanted deaf children, found that after five years of implantation and rehabilitation, these children had not reached the same level as their hearing peers in semantic skills and

in morphosyntactic expressive and receptive abilities (comprehension). This was particularly evident in present-tense forms, grammatical gender, absent and concealed pronouns, plural forms, adverbs of time, conditional sentences, and passive-voice structures—areas directly related to the morphosyntactic component.

Some improvement was observed in elements such as interrogative and negative sentences. However, comprehension results were better than expressive abilities, as comprehension among cochlear-implanted children was superior to expression, although still below the level of their hearing peers. She added that morphosyntactic and semantic development follows the same developmental stages as in hearing children, yet the morphosyntactic difficulties experienced by this group differ from those observed among hearing individuals.

Oral Comprehension in the Deaf Child with a Cochlear Implant

Oral comprehension refers to the ability to receive auditory information and process it linguistically and semantically in order to extract meaning. This component is considered one of the most important indicators of linguistic competence after cochlear implantation, as it reflects both the effectiveness of the device and the brain's ability to reorganize auditory and linguistic networks. Researchers emphasize that oral comprehension does not depend solely on the level of auditory acuity restored after implantation, but is also linked to cognitive and linguistic factors such as working memory, lexical knowledge, and the nature of the linguistic environment (Blamey, Sarant, Dowell, Clark, & Gibson, 2001, pp.18–28).

Children who undergo implantation at an early age achieve better performance in oral comprehension than those implanted later, as neural plasticity during early childhood offers greater opportunities for the development of auditory-linguistic perception. Longitudinal studies also indicate that intensive auditory rehabilitation programs play a crucial role in improving oral comprehension after implantation, particularly those that combine auditory training, language training, and social interaction. The study by Dunn et al. (2014, pp.148–164) found that children who received regular weekly auditory sessions during the early years following implantation made significant progress in oral comprehension tests compared to children who received intermittent or limited intervention.

A recent study by Pimperton et al. (2018) revealed that oral comprehension skills are strongly associated with the child's ability to learn new words and grasp contextual relationships between vocabulary items. The findings showed that implanted children with higher linguistic awareness acquire new vocabulary more rapidly than those who lack structured linguistic exposure.

The study by Nicastre et al. (2022) further demonstrated that implanted children encounter difficulties in auditory comprehension within noisy classroom environments, despite performing well under quiet conditions. This indicates that oral comprehension in this population is influenced by both environmental and cognitive factors. The study recommended preparing an appropriate auditory environment in inclusive schools (Nicastri, Bovo, Trevisi, & Martini, 2022).

The Relationship Between the Morphosyntactic Level and Word

Comprehension in the Deaf Child with a Cochlear Implant:

The relationship between the morphosyntactic level and word comprehension in the deaf child with a cochlear implant is neither simple nor linear; rather, it is an interactive and complex relationship in

which linguistic, perceptual, auditory, and cognitive factors intersect. The morphosyntactic level constitutes the deeper structural framework upon which oral comprehension is built, as it enables the child to understand grammatical relationships between words within the sentence. Without this syntactic awareness, word comprehension remains limited and relies on surface-level or guess-based interpretation.

Following cochlear implantation, the deaf child requires a long period to reconstruct an integrated linguistic system that encompasses both morphological and syntactic structures, since the recovery of hearing does not automatically entail the recovery of language. The cochlear implant allows the reception of sound, but it does not guarantee effective linguistic processing unless accompanied by structured speech-therapy programs.

Delage (2009) confirms that the relationship between the morphosyntactic level and word comprehension in the deaf child with a cochlear implant is neither simple nor linear, but rather interactive and multifaceted, shaped by linguistic, perceptual, auditory, and cognitive components. The morphosyntactic level represents the deep framework through which oral comprehension is constructed, enabling the child to perceive grammatical relations within sentences.

In the absence of this structural awareness, word comprehension remains restricted to superficial or inferential meaning. After receiving the cochlear implant, the deaf child requires an extended period to rebuild a complete linguistic system that includes morphological and syntactic structures, as auditory restoration alone does not ensure linguistic restoration. The cochlear implant permits auditory access but does not provide efficient linguistic processing without speech-therapy intervention.

Modern studies recommend integrating targeted morphosyntactic exercises within auditory-linguistic rehabilitation programs, beginning with simple grammatical structures and gradually progressing toward more complex and passive constructions. They also emphasize strengthening morphological awareness through activities that highlight the relationship between word form and meaning. Additionally, involving the family and the school environment is advised to create a natural linguistic setting that contributes to accelerating both comprehension and expressive development.

In conclusion, improving oral and lexical comprehension in cochlear-implanted deaf children necessarily requires developing the morphosyntactic level, as it represents the mental framework through which language is constructed and meaning reconstructed. Therefore, any therapeutic or educational program directed at this group must adopt a holistic approach in which auditory, cognitive, linguistic, and interactive components complement one another, ensuring the acquisition of a more natural language that aligns more closely with typical linguistic patterns and supports the child's integration in both school and social environments.

The body of these studies demonstrates that word comprehension cannot be separated from morphosyntactic development, as understanding the structure of the word within the sentence contributes to extracting both its general and precise meanings (Guasti & Volpato, 2017; Blamey et al., 2001; Abdelmajid, 2018). Thus, morphosyntactic development constitutes a central component in word comprehension among deaf children with cochlear implants.

Conclusion

The studies clearly show that the relationship between the morphosyntactic level and word comprehension in the deaf child with a cochlear implant is neither simple nor linear, but rather an interactive and complex relationship in which linguistic, cognitive, auditory, and perceptual factors intersect. The morphosyntactic level represents the deep structure through which oral and lexical comprehension are constructed, as it enables the child to perceive grammatical relationships between words within the sentence and to understand the semantic roles of each linguistic component. Without this structural awareness, word comprehension remains limited and confined to superficial or guess-based contexts.

The deaf child, even after benefiting from a cochlear implant, requires a long period to rebuild an integrated linguistic system that includes both morphological and syntactic structures, since the restoration of hearing does not necessarily entail the restoration of language. The cochlear implant allows the reception of sounds, but does not ensure effective linguistic processing unless accompanied by consistent speech-therapy support. Any deficiency in morphosyntactic awareness inevitably results in difficulty in semantic comprehension and delays in acquiring and accurately using vocabulary.

From this, the importance emerges of linking the morphosyntactic level with oral comprehension processes in speech-language research, as this connection allows for a deeper understanding of the mechanisms underlying linguistic development in the cochlear-implanted deaf child and contributes to designing more effective intervention protocols.

Modern studies recommend integrating targeted morphosyntactic exercises within auditory–linguistic rehabilitation programs, beginning with simple grammatical structures and gradually progressing toward complex and passive sentence forms, while strengthening morphological awareness through activities that highlight the relationship between word form and meaning. It is also recommended to involve both the family and the school environment in this training in order to create a natural linguistic setting that contributes to accelerating comprehension and expression.

In conclusion, improving word comprehension in cochlear-implanted deaf children necessarily requires developing the morphosyntactic level, as it represents the cognitive framework through which language is constructed and meaning reconstructed. Therefore, any therapeutic or educational program directed toward this group must rely on a holistic approach in which auditory, cognitive, linguistic, and interactive dimensions complement one another, ensuring the acquisition of a natural language closer to typical linguistic patterns, which in turn enhances the child's integration into both the school and social environments.

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