

HOW DO CHILDREN WITH CEREBRAL PALSY (CP) AND DEVELOPMENTAL LANGUAGE DISORDER (DLD) MANIPULATE THEIR LANGUAGE? A CASE STUDY ON LANGUAGE COMPREHENSION

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ARTICLE INFO	ABSTRACT
Received: 22-07-2025 Revised: 09-09-2025 Accepted: 13-10-2025 Published: 15-10-2025 Volume: 9 Issue: 3 DOI: https://doi.org/10.33019/lire.v9i3.498	This study explores the differences and similarities in language comprehension and expressive abilities among children with Cerebral Palsy (CP) and Developmental Language Disorder (DLD). While the two disorders impact speech and language, their causes are rather different; CP results from motor impairment, while DLD results from impaired language processing. Through the use of a qualitative case study, two children, one with CP and the other with DLD, are used to examine their communication strategies, speech production, and language output. Data were collected through video observation of fluency, articulation, syntax, and coherence. The study indicates that a child with CP shows primarily expressive language impairment due to motor constraints, with well-maintained grammar and strong receptive capabilities despite slurred and late speech. Conversely, a child with DLD speech is fluent but disorganized, with pervasive grammatical errors and lexical difficulties, suggesting linguistic planning instead of motor impairments. Therapies, therefore, differ: CP therapy focuses on motor-based strategies like articulation and regulation of breathing, while DLD therapy targets the facilitation of grammar, vocabulary, and sentence formation by language-based activities like role play and storytelling. The study emphasizes the importance of tailored intervention, noting that therapy must be tailored to each child's unique language profile. It also emphasizes the relationship between language and Theory of Mind (ToM), suggesting that therapy for both conditions includes scope for the expression of thoughts and feelings. These findings shape a better view of speech-language disorders, improving diagnostic methods and treatment interventions for children with CP and DLD.
KEYWORDS <i>Cerebral Palsy, Developmental Language Disorder, language comprehension.</i>	

1. INTRODUCTION

Language development serves as a critical indicator of a child's overall growth. Delayed speech development in children often goes unnoticed by parents, as it may be perceived as a normal variation in developmental milestones. Based on Barnes (2023), the survey found that 41% of speech therapists say caregivers often miss speech delays for 1–2 years, while only 28% believe most parents recognise early warning signs. Children between the ages of 0 and 8 are in a critical



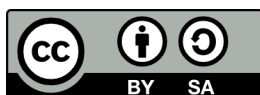
stage for developing listening and speech skills (Sari et al., 2018; Rahmawati & Sudarwati, 2023). During this critical period, children actively develop language skills through interaction, with 80% of brain growth occurring during these years (Jessy & Diswantika, 2019; Rahmawati & Sudarwati, 2023). Based on Rahmawati and Sudarwati (2023), by the age of five, a typically developing child demonstrates significant language proficiency, including the ability to produce coherent speech and construct grammatically accurate sentences. At this stage, their vocabulary expands to approximately 8,000 words, enabling more complex verbal expression and communication (Sari et al., 2018). However, children with Cerebral Palsy (CP) and Developmental Language Disorder (DLD) experience significant challenges in language acquisition and development, differing markedly from those of typically developing children.

Children who have CP and DLD are no doubt at risk for social difficulties and have likely faced the counsels of low hopes, scepticism about their capacity and obstacles to obtaining the education they require. Its severe impact considerably disrupts the daily life and life as a whole of those who develop the symptoms, including severe distress and restrictions on their quality of life; however, some medical treatments (including physical therapy) are existing (Apolo et al., 2021). These challenges manifest in the everyday lives of these children in various ways, including impairing their potential to interact with peers (Fujiki et al., 2001; Elm et al., 2024).

Both CP and DLD originate from neurological deficits that interfere with motor and language processes, although they have different causes. CP is a non-progressive neurological disorder that results from damage or abnormal development in the immature brain, typically affecting movement, posture, and motor coordination (Bax et al., 2005; Rosenbaum et al., 2007; Cans et al., 2007; Sadowska et al., 2020). The CP children may have effortful, slow, and slurred speech due to the impaired oral-motor control of the jaw, tongue, and lips. Moreover, CP is a chronic disease with no cure. The diagnosis of cerebral palsy is primarily determined by the presence of motor function and posture disorders that emerge in early childhood and persist throughout life. Although the condition does not worsen over time, its symptoms may evolve with age (Sadowska et al., 2020).

Hustad et al. (2013) Speech impairment in children with CP is due to oral motor control deficits, and it may be expressed by the following signs: (i) **sensory feedback from lips, tongue, and jaw**, which hinders learning and refinement of speech movement. (ii) **coordination lack among articulators** due to sensory deficits, leading to indistinct or strained speech. (iii) **limited speech development** due to damaged motor learning and feedback mechanisms.

In contrast, DLD is a neurodevelopmental disorder characterised by persistent difficulties with language development. Children with DLD exhibit delayed speech development, which is attributed to structural and functional differences in the brain that are responsible for language processing. Additionally, deficits in motor coordination may further contribute to these speech difficulties. Some children with DLD may also exhibit motor coordination difficulties, attention deficits, or below-average nonverbal IQ. However, these additional challenges do not affect the core diagnosis of DLD, as the relationship between these factors and language impairment remains unclear (Bishop et al., 2017; Leonard, L. B., & Schroeder, M. L., 2023). Analysing children with CP and DLD certainly presents significant challenges, but researchers have reasons to get involved.



Leonard, L. B., & Schroeder, M. L. (2023) indicate that the characteristics of a child with DLD can be delineated as follows: (i) brain developmental factors: DLD is classified as a neurodevelopmental disorder, which implies that it originates from atypical development of the brain's language-related systems. This disrupted development can affect various aspects of language acquisition and processing. (ii) genetic factors: The article suggests that genetic influences play a role in the manifestation of DLD. However, it is important to note that no specific gene variant or mutation has been conclusively identified as the primary cause of the disorder.

This is the motivation that draws us to study CP and DLD; CP and DLD cases are similar in terms of speech development and speech delay. Both are a result of neurological impairments that affect motor function as well as language acquisition; these impairments also lead to difficulties in communication, social interactions, and academic performance. Impaired articulation and limited vocabulary, coupled with challenges within sentence formation, mark both conditions and symptoms that overlap. Overlapping symptoms make the differential diagnosis plus intervention complex. Researchers and practitioners will examine children with these conditions in order to identify connections between each of them, analyse their similarities and also their differences, and refine therapeutic approaches which are tailored for their specific needs.

Although CP and DLD differ in terms of clinical etiology, their common symptom, such as poor articulation, late initiation of speech, limited vocabulary, and sentence construction difficulty, typically render differential treatment and treatment planning problematic. These similarities indicate very important issues concerning speech-language therapy flexibility or optimisation according to shared linguistic impairment rather than diagnostic classes. Furthermore, such deficits in language may go a long way towards preventing children from engaging in rich social interactions. They may also impair the Theory of Mind (ToM) of children, a concept used to explain the cognitive ability to attribute mental, mind states to oneself and other individuals.

The goal of this study is to explore some of the main problems in comparing CP and DLD children on the basis of their speech and language abilities, and its implications in terms of therapy. This study seeks to address two key questions:

1. Which group of children demonstrates a greater level of language comprehension, those with CP or DLD?
2. How do therapeutic approaches vary between these two conditions, and what are their relative effectiveness in addressing language deficits?

By exploring these questions, this study aims to contribute both theoretical and practical contribution. Theoretically, this study will enrich the body of knowledge on nuanced understanding of the linguistic profiles of children with CP and DLD. Practically, the result of the study will also be beneficial as the references for those who need to have more effective intervention strategies to cope with children with CP and DLD.

2. LITERATURE REVIEW

Existing research has conducted in-depth examinations of CP and DLD. To the best of our knowledge, no detailed and thorough study has been constructed with the view to comparing the speech features of children with CP and DLD. The majority of previous research has been focused on investigating each condition in turn instead of making a direct comparison.



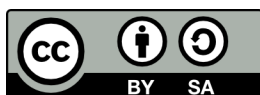
A national cohort study by Stadskeiv et al. (2025) addressed the cognitive testing of children with CP, revealing systemic differences, in particular in the testing of children with profound impairment. Pursuing a different direction, Wang et al. (2024) turned to Traditional Chinese Medicine and applied data mining for the identification of core symptom patterns in spastic CP, with priority given to motor and speech dysfunctions from a non-Western, holistic medical perspective. By contrast, Saar et al. (2023) aimed at DLD, examining the effect of varying levels of nonverbal cognitive ability on verbal function in preschoolers and thus offering precious data on the heterogeneity within DLD diagnoses. To supplement this, a case study tutorial by Hamdani et al. (2024) facilitates the intricate task of identifying DLD in multilingual children, offering clinicians practical advice to differentiate between language disorder and typical bilingual development. Despite the contributions of these individual studies, there is nothing that bridges the two conditions. Comparative studies of speech characteristics in children with CP and DLD remain largely uncharted, thus indicating a gap in the literature.

Manipulation of language, particularly in speech and language disorders in children, is referred to as the manner in which individuals purposefully select, organise, and adjust linguistic forms in an effort to achieve communicative goals within the constraints of physical and cognitive capabilities. Psycholinguistics is interested in exploring the psychological processes that operate when using language to create and interpret sentences (Altmann, 2001). Manipulation of language involves complex cognitive mechanisms, including lexical access, syntactic processing, and pragmatic understanding (Garman, 1990). In normally developing children, these processes are done to a significant degree automatically. But in children with disorders such as CP or DLD, manipulation of language is a compensatory mechanism, showing how they deal with their respective neurological or linguistic constraints.

The majority of research on children with CP has focused on how speech intelligibility is affected by movement impairments. According to Pennington et al. (2003), children with CP have stiffness and poor oral-motor control, which drastically impairs speech clarity and pace and frequently makes verbal communication difficult to understand. According to Hustad et al. (2010), who studied the acoustic patterns in the speech of children with cerebral palsy, poor intelligibility is a result of deficiencies in the respiratory, phonatory, and articulatory subsystems. These studies emphasise the difficulties children with cerebral palsy have producing speech, but they provide little information about how well they comprehend language, especially in naturalistic settings.

The study of DLD, on the other hand, has concentrated on deficiencies in linguistic areas like vocabulary, grammar, and morphology. While Bishop et al. (2017) highlighted the diversity and persistence of language impairments throughout time, Leonard (2014) offered substantial evidence that children with DLD struggle with sophisticated sentence patterns and grammatical morphemes. The pragmatic and interactive features of language comprehension in ordinary contexts are rarely examined by such studies, despite the fact that they provide insight into the structural aspects of language impairment.

Furthermore, research on DLD and CP is frequently done separately, with little cross-population comparability. Because of this, little is known about how children from these two groups differ—or converge—in their capacity to absorb meaning, manipulate language, and modify their communication styles in response to social situations. Instead of integrating



understanding, interpretation, and pragmatic language use, the few comparison studies that do exist typically place more emphasis on expressive language or vocabulary assessment.

In an attempt to gain a better insight into speech feature similarities and differences evident in children with CP and DLD, a more systematic approach is therefore needed. As such, there have been few studies on how these factors impact speech production, articulation, fluency, and communicative competence. The present study can help in sharpening diagnostic models and give important insights into the mechanisms of speech disability in these groups.

3. METHODOLOGY

The researcher utilised a qualitative research design. Qualitative research seeks to explore and understand a phenomenon by addressing questions related to “how,” “why,” and “what,” providing deeper insights into its underlying processes and meanings (Green & Thorogood 2014). Qualitative research relies on language-based data, either in written or spoken form, but can also include visual and behavioural records such as photographs and videos. Researchers collect data through interviews, focus groups and observations (Haven & Grootel, 2019). To obtain the data, the authors employed video-based observational methods.

This study presents a detailed case analysis of children with CP and DLD, focusing on the distinctions in their language impairments. The authors examine and articulate the specific differences in language disorders observed in children with CP compared to those with DLD. Utilising a qualitative research framework, this study employs video analysis as a methodological approach to systematically investigate and interpret the data.

The subjects of this study are two children: Katie, who has been diagnosed with CP, and Amelia, who has DLD. Both individuals experience challenges associated with their conditions, particularly in language production and social interaction skills. Furthermore, the authors selected Katie and Amelia as the focal participants of the study based on the following criteria: (i) Katie has been diagnosed with CP and Amelia with DLD; (ii) both participants are under the age of 18 and are therefore classified as children; and (iii) both individuals experience significant challenges in interpersonal communication.

Methods for collecting qualitative data consist of various approaches, one of which is observation and interview (Lau, A., & Bratby, M., 2023). The Authors employed video-based observation as the primary method of data collection in the current study. The data were gathered through the following procedures:

1. Watching two videos; one is a Child with CP and the other is a child with DLD. The duration of the first video is 1 minute 38 seconds, and the second is 2 minutes 37 seconds.
2. The researchers observed how the subjects formed sentences when answering questions, focusing on their ability to produce correct sentence structures.
3. Conduct a comparative analysis and make a table to highlight the similarities and differences in communication styles between Katie (child with CP) and Amelia (Child with DLD). This comparison focused on both the quantity and quality of language output, as well as the effectiveness of each participant’s communicative strategies.



Data analysis is the process of arranging and structuring raw data to extract meaningful and useful information Tamara (2018, cited in Islam, 2020). In response to the research questions outlined in the background, the writer carried out data analysis using the following steps:

1. Transcription of verbal data.
2. The researchers analysed the transcripts to identify key communicative behaviours exhibited by Katie (CP suffer) and Amelia (DLD suffer). These included how they maintained the topic and response latency.
3. Examination of the subjects' difficulties in forming syntactic clauses as part of their expressive language disorder, using relevant theoretical frameworks for support.
4. Description of the types of language disorders.
5. Drawing conclusion

4. RESULTS AND DISCUSSION

The outcomes of this study show variations and similarities in the nature of speech delay and impairment among children with CP and DLD. Specifically, the analysis shows the way that each condition on its own affects various aspects of speech production, such as articulation and fluency. In assessing the language disorder, we used the theories advanced by (Dahlgren et al., 2010), which include impairment of the primary sense of how it affects a child's language development, communication, and social interaction, all of which are vital to learning Theory of Mind (ToM).

In the present study, the data showed that although both children faced speech and language challenges, the underlying mechanisms were different: Katie's difficulties are largely motor and expressive, while Amelia's are linguistic and structural. The findings from this study reinforce the view that CP and DLD, despite sharing the same communicative delays, require different lenses of analysis and treatment approaches to accurately support each child's development.

4.1. Distinct Language Impairment Profiles in CP and DLD

The findings of this study highlight clear differences in how children with CP and DLD experience language impairment. See the video (see LSVTGLOBAL (2023, November 13): *Short speech treatment sample of LSVT LOUD for KIDS® in a child with cerebral palsy*). Katie, a child with CP, showed significant challenges in expressive language due to motor limitations that affected her speech production. Her speech was often slow, slurred, and difficult to understand, which is consistent with CP-related muscle spasticity and impaired oral-motor coordination.

Katie: "Hello, this is Katie" [slowly]

Speaker 1: "Perfect"

Katie: "Good morning" [slowly]

"Stop it"

"Okay, yes, please" [delayed articulation in the beginning]

Speaker 1: "Don't forget to breathe"

Katie: "Mom, Dad, come in here"

"Can I wake up?"

"Stacy, thank you" [slowly]

"Excuse me"



In this conversation, Katie's delayed and slow articulation, mentioned earlier in this article, is common in children with CP due to impaired motor planning. Katie's speech is characterised by slow articulation, a result of oral-motor coordination difficulties, which are common in individuals with CP. This is evident in the phrases *'Hello, this is Katie'*, *"Good morning"*, and *"Stacy, thank you"*. These phrases reflect low speaking speed due to physical effort and muscle tension. The utterance of *'Okay, yes, please'* has a delay at the beginning, indicating difficulty in initiating speech, which may stem from oral-motor impairment.

Speaker 1: "Good, all right. Now with your 'AAAAH' let me hear another little a go"

Katie: "AAAAAAH"

Speaker 1: "Good, with that voice, explain what that is"

Katie: "This is something you cook with, and it has different buttons that you can push" [unclear pronunciation]

Speaker 1: "Oh, try that again"

Katie: "This is something you cook with, and it has different buttons that you can push"

The repetition of the sentence following Speaker 1's (likely the therapist's) request (*"Try that again"*) after Katie initially said, *"This is something you cook with, and it has different buttons that you can push"* demonstrates that she is experiencing articulation difficulties. However, upon repetition, Katie produced the sentence with greater clarity, indicating improved articulation, which was likely to result from increased motor planning and enhanced speech coordination.

Despite these expressive difficulties, Katie demonstrates a foundational understanding of verbal input, indicating that her receptive language abilities may be relatively intact and stronger than her expressive language skills. While she is able to comprehend spoken language effectively, her capacity to respond verbally is hindered by motor impairments, resulting in delayed and effortful speech production.

Speaker 1: "What did you get?"

Katie: "I got 953" [slowly]

Speaker 1: "Good, are you ready with your big, beautiful voice?"

Katie: "Yes"

This conversation highlights the difference between Katie's receptive and expressive language skills. When Speaker 1 asked, *'What did you get?'*, Katie was able to respond appropriately with *'I got 953'*, indicating that she understood the question (which is a receptive ability) and could formulate the correct answer. However, the simplicity and conciseness of her answer suggest a challenge with expressive outcomes. The follow-up conversation, *'Good, are you ready with your big, beautiful voice?'* indicates that Speaker 1 is asking Katie to prepare to speak. Katie's response, *'Yes,'* again showed understanding and willingness to participate, despite motor difficulties that made verbal expression slow, and when she was about to make a sound, there was a moment of silence of one second to prepare her to move her lips and make a sound. Moreover, Katie's grammatical structures appear to be largely intact and appropriately used; her utterances demonstrate correct syntax, word order, and sentence formation. Katie's response, *'I got 953'* demonstrates syntactically accurate sentence construction consistent with standard English grammar. The utterance appropriately employs the past tense verb "got" in response to the

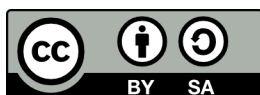


past tense question, ‘*What did you get?*’, and adheres to the conventional subject-verb-object word order.

Meanwhile, Amelia, a child diagnosed with DLD, demonstrated physically clear speech but was characterised by significant linguistic deficits. Her expressive language was characterised by limited syntactic complexity and frequent grammatical inaccuracies, indicating an underlying disorder of core linguistic processing rather than motor function. In contrast to Katie, whose expressive challenges were largely due to motor impairments associated with CP, Amelia's difficulties stemmed from deficits in the formulation and organisation of language. The fact that Amelia's articulation improved over time further suggests that the primary issue lies in her linguistic processing rather than her speech-motor execution. So while neurological factors could play a role in the underlying cognitive impairment (Saar, 2022), the focus would be on the specific neural mechanisms responsible for language processing and development, rather than issues related to speech production or motor function. This supports the view that DLD can stem from broader neurocognitive impairments affecting language formulation and comprehension, rather than issues related to motor function. This supports the view that DLD can stem from broader neurocognitive impairments affecting language formulation and comprehension, rather than issues related to motor function. The video (see RADLD. (2022, October 15). Amelia: growing up with Developmental Language Disorder), according to the video, at the age of two (see Ziegenfusz, S. 2020) Amelia exhibited significant delays in speech and language comprehension. She had a small vocabulary of real words and mostly made incoherent noises, like babbling (heard at 0:21). Children should normally have a vocabulary of at least 200–300 words at this developmental stage (Bridges, 1986), indicating that Amelia's speech and comprehension abilities were noticeably lacking. Amelia's language development improved noticeably as she grew older.

Amelia: “We could... I could hick empty his heart and to get a road out and we get closer to the fence”

It appears that Amelia intended to express a plan or course of action that she wished to undertake in collaboration with someone else. Her sentence “I could hick empty his heart and to get a road out and we get closer to the fence” likely reflects an attempt to convey something closer to: ‘*I could sneak past him and find a way out, and then we can get closer to the fence*’. In this context, what she may be trying to communicate is that she wants to sneak past a person who may be preventing them from proceeding, and find a path to move forward. Once she successfully finds a way out, she and her companion (whether it be a friend, her mother, or another person present, such as the individual holding the camera) can progress together and approach the fence, which may represent their destination or a place of safety. Although her words are jumbled and confusing, the main idea she is attempting to express is that she is formulating a plan to escape their current situation and move toward a more desirable, and possibly safer, location. In addition to this, in Amelia's sentence, there are a few linguistic mistakes that show she is struggling with choosing the right words and putting them in the proper order. For example, she began the sentence with “We could” and then switched it with “I could” means that she was confuse with the choosing the right word. By replacing “We” with “I,” it seems she originally intended to express a collaborative plan with someone else, but then shifted her focus to herself, indicating that she wanted to carry it out on her own instead. Moreover, instead of “sneak past him,” she says “hick empty his heart.” “Empty his heart” is a perplexing phrase that indicates she is struggling to find the words she



wants, and "hick" is most likely a stand-in for "sneak." She also uses somewhat disorganised sentences. Instead of using a clear, connected sentence, she begins with "I could..." and then adds "and to get a road out." Here, the words "to get a road out" are awkward and unclear, and the conjunction "and" is not used quite correctly. All of these errors highlight the challenges that kids with DLD face when it comes to word choice, sentence structure, and ensuring that their messages are understood and make sense.

Amelia's language profile demonstrates a marked discrepancy between her expressive and receptive language abilities. While her speech is frequently characterised by grammatical omissions, simplified syntactic structures, and lexical retrieval difficulties, her overall communicative intent is generally preserved, and her utterances remain comprehensible. This receptive-expressive gap is a recognised feature of DLD and suggests that Amelia's underlying linguistic knowledge is stronger than her ability to access and organise it for spoken production. This distinction is particularly evident when contrasted with children with motor-based impairments such as Katie, whose expressive limitations are primarily attributable to difficulties in the physical execution of speech, rather than deficits in grammatical or linguistic competence.

4.2. Comparative Analysis of Language Manipulation in CP and DLD

As a reflection of their respective developmental stages, CP and DLD, Katie and Amelia displayed distinct linguistic profiles. Katie's output was extremely limited in terms of language quantity, consisting of brief, laborious utterances with little elaboration. In terms of language quantity, Katie's output was very limited, characterised by short, effortful utterances with minimal elaboration. Her physical motor impairment limited her ability to produce speech fluently, resulting in reduced speech rate and low speech length. However, the quality of her language, although brief, remained relatively well-structured; she demonstrated intact syntax and appropriate word choice despite her expressive limitations. Katie's communicative strategies included effective use of non-verbal cues (e.g. gestures), repetition for emphasis, and occasional pauses to support her message. These strategies appeared compensatory and purposeful, allowing her to remain engaged in conversation despite her motor challenges.

In contrast, Amelia demonstrated a greater quantitative output of language; however, the quality of her speech was notably compromised. Her utterances frequently exhibited syntactic and grammatical inaccuracies, indicating that her communicative strategies were less effective. Unlike Katie, whose expressive limitations were primarily due to motor speech difficulties, Amelia's challenges appeared to stem from more profound deficits in linguistic processing that affected both her expressive and receptive language abilities. Thus, while Katie produced fewer utterances, her communication was relatively clear and purposeful. Amelia, despite producing a higher volume of speech, conveyed her intended messages less effectively due to reduced linguistic coherence and structural accuracy.



The Detailed Comparison Table of Katie (CP) vs Amelia (DLD) is shown below.

4.3. Table

No.	Aspect	Katie (CP)	Amelia (DLD)
1.	Quantity of language output	Low, short utterances, low MLU (Mean Length of Utterance), slow speech rate	High-frequency and long utterances, high MLU
2.	Speech Fluency	Disfluent due to a motor planning issue	Fluent in rate but disorganised
3.	Articulation and Intelligibility	Poor, speech is often unclear due to motor impairments	Quite good, the speech is clear enough
4.	Grammar structure	Relatively intact, basic grammar used correctly	Impaired, frequent morphological and syntactic errors
5.	Sentence coherence	Coherent	Often incoherent or tangential
6.	Response latency	High due to motor planning delays	Moderate, linked to word-finding or organisational difficulties

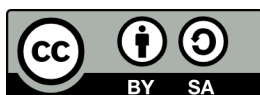
The following are several approaches used to address the language difficulties experienced by the children. These approaches are based on the findings from in-depth examination with the participants.

4.4. Therapeutic Approaches

Heightening speech intelligibility, articulation, and engagement in communication are the treatment intervention goals for children with CP and DLD speech disability conditions, ultimately empowering them to communicate more effectively, behave more confidently in social interaction, and be fully engaged in everyday communication.

4.4.1. Motor-Based Interventions for Children with CP

Katie, with CP, underwent intensive and highly structured therapy interventions designed to address her primary challenge of oral motor impairment. Her therapy programme was designed to improve her ability to produce intelligible speech through targeted exercises focused on improving articulation, breath control and vocal strength. Therapy sessions were conducted four times a week, for 60 minutes each, for four consecutive weeks. The core components of Katie's therapy included practising long 'AH' vocalisations, functional phrases, and a structured set of hierarchy exercises. The long 'AH' exercise helped her maintain vocal output, which in turn supported the development of consistent breath support and vocal control. Meanwhile, the use of functional phrases, everyday expressions such as "Thank you," "Excuse me," and "Okay, yes, please", enabled Katie to rehearse speech in contexts relevant to her daily communication, thereby enhancing both the practicality and motivation of her speech training.



4.4.2. Speech Motor Treatment Hierarchy

A hierarchical framework is implemented to gradually build complexity, from isolated sounds and syllables to more complex sentence-level speech, allowing skills to develop in systematic and sustainable manner.

a. Sound Therapy Techniques

This was evident during "AAAH" exercises. It was used to increase the intensity and resonance of her voice so that her speech improved and became audible more easily. The practice of the "AAAH" exercise also increases coordination between the respiratory and phonation systems. To individuals with speech motor impairments, such as Katie, the exercise is crucial as it impacts core speech mechanisms that require systematic strengthening. In addition, the employment of sustained, monotone sounds allows the therapist to address and work on discrete vocal challenges without adding to the levels of whole word articulation complexity, thereby making it an effective stepping stone towards more sophisticated speech functions.

b. Functional Phrases Therapy

This therapy is used to support practical communication and provide repetition within a meaningful context. This is relevant to Katie's daily and reinforced motor planning.

Katie: "Thank you"
"Excuse me"
"Okay, yes, please"
"Can I wake up?"

Functional Phrase Therapy can be used to improve practical communication and the use of commonly used expressions in meaningful and familiar contexts. In Katie's case, the therapy was relevant to her everyday communication needs, in simple but meaningful conversations and providing repeated practice of phrases that were not only functional but also personally significant.

c. Repetition Therapy

The therapist asked Katie to repeat the unclear word to enhance clarity. This strategy supports the development of clearer speech, making it easier for others to understand her. It also reflects the importance of reinforcing motor planning and coordination through repetition.

Katie (first attempt): "This is something you cook with, and it has different buttons that you can push."

Speaker 1: "Oh, try that again."

Katie (second attempt): "This is something you cook with, and it has different buttons that you can push."

These steps systematically allowed Katie to enhance motor planning, increase breath support, and increase vocal control and coordination at all levels of speech production. The general goal of this intervention was to improve Katie's articulation, breath support, and overall speech intelligibility, thereby enabling her to communicate more effectively in social and academic settings.

4.4.3. Language-Based Interventions for Children with DLD

The therapeutic approach for Amelia, with DLD, focused on improving her structural language processing abilities, particularly in areas such as word retrieval, syntax formation and



coherent sentence production. Despite her clear articulation, Amelia faced significant challenges in organising her thoughts into grammatically accurate and semantically meaningful expressions. To address this specific linguistic deficit, various supportive methods have been utilised in her therapy, including:

a. Pictures and Symbol Treatment

This method is Amelia's therapy to make abstract language more real. seen in the video (0:33) Amelia communicates using pictures. Although this method does not directly help Amelia to practice developing her speech, visuals and images support vocabulary retrieval and sentence construction.

b. Singing Treatment

In the video (1:04), although Amelia's singing initially is covered, it demonstrates a more effective avenue for language development than working from images and symbols. Singing enables her to rehearse language directly and on a consistent basis, which supports greater spontaneity and naturalness of language use. Through the passage of time, this method demonstrates concrete progress; by timestamp 1:11, her vocalisations are much clearer and easier to understand, with incremental yet notable improvement in her expressive language abilities.

c. Acting (Dramatic Play/Role Play)

It is comprised of structured and semi-structured scenarios where the child acts out a role and, in the process, uses language. For Amelia, role play provides an opportunity to try out spontaneous language and communication. At 2:05 of the video, one can see Amelia talking quite fluently, and it is very evident how her language is developing at a rapid pace, even though she is still stammering. Role-playing is an excellent means of bridging the gap between organised language activities and daily communication. Although it is not shown in the video how Amelia proceeds to role-play, this activity is very effective for children with language development disorders like Amelia's. In role-play activities, not only does she get to practice her expressive language but also develop her understanding of social cues and pragmatic use of language.

These strategies are designed to provide visual and kinesthetic reinforcement, thus making abstract language concepts more concrete and easily understood. Among all these methods, acting has proven to be the most impactful technique for Amelia's language development. Through acting, Amelia is encouraged to construct sentences, pick up relevant vocabulary and use language in a way that is appropriate to the context. This multi-sensory and interactive framework not only strengthened her expressive language skills but also supported her receptive skills by helping her understand social cues and narrative structures. Ultimately, the goal of this therapeutic intervention was to improve Amelia's language formulation, grammatical accuracy and semantic retrieval, allowing her to communicate more effectively.

Therapeutic approaches for children with CP and DLD differ based on the nature of their disorder. Children with CP have difficulties in motor planning and speech execution, so therapy focuses on improving articulation, breath control, and vocal strength through structured motor-based techniques. Whereas children with DLD face challenges in language processing, including word retrieval, grammar, and sentence coherence, despite having fairly clear speech. While CP therapy targets motor deficits, DLD therapy focuses on improving linguistic structures, and both approaches show better results when customised to each child's specific needs.



5. DISCUSSION

Children with CP and severe speech impairments also demonstrate delayed ToM development, particularly on verbally dependent tasks (Dahlgren et al., 2010). Language skills play a crucial role in ToM development for children with CP, with restricted language capacity potentially impacting their ability to understand others' thoughts and feelings (Tajadini et al., 2021). The results of this study fit with ToM which discusses how language impairment, i.e. speech impairment and language development disorders are related to the ability to understand that other people have their own thoughts, beliefs, desires, and perspectives, which are different from one's own thoughts, beliefs, desires, and perspectives (Dahlgren et al., 2010).

Katie's impairment is not in understanding other individuals but in expressing her understanding due to motor constraints, and Amelia's impairment is in accessing the linguistic structures to encode for mental states. This resonates with findings that link the acquisition of syntax and ToM performance, particularly in children with DLD.

These differences in language comprehension profiles have direct implications for the therapeutic process. Motor speech interventions for children with CP have shown improvements in speech legibility at the sound, word, or sentence level, but the strength of evidence ranges from very low to moderate (Korkalainen et al., 2023). In contrast, interventions for children with DLD combine structural language goals with pragmatic and social cognitive activities. Improved grammatical comprehension can be enhanced through linguistic variety, diverse sentence structures and explicit instruction (Finestack et al., 2023). Structured role therapy has been shown to be effective in improving grammar skills (Brooks & Benjamin, 1989). A bibliotherapeutic approach using story sharing and enactment activities has been proposed to address language form, pragmatics, and social-emotional learning simultaneously (Brinton & Fujiki, 2019). Narrative-based interventions can target story structure and specific syntactic goals, potentially influencing working memory and academic skills (Pauls & Archibald, 2021).

Comparing these approaches, CP therapy benefits from repetitive motor planning and execution tasks, DLD therapy requires a broader focus on linguistic formulation and discourse-level coherence. In both cases, it provides an opportunity to discuss mental states and perspectives, linking language use with ToM, which can strengthen not only expressive and receptive language outcomes but also the child's social adaptability.

Results from the present study and research by Dahlgren et al. revealed important differences in language comprehension between children with CP and those with DLD.

To address the first research question: ***Which group of children demonstrates a greater level of language comprehension, those with CP or DLD?*** The study presents an insightful comparison. The findings of the present study show that children with CP, like Katie, often exhibit relatively strong receptive language abilities despite having severe speech-motor impairments. Katie can understand and respond appropriately to questions, although her verbal output is limited and difficult due to physical constraints. In contrast, Amelia, a child with DLD, showed more fluent articulation but struggled with grammatical accuracy, sentence formulation and lexical access, signalling language processing difficulties. This pattern is in line with the findings of Dahlgren et al., where children with CP and severe speech and physical impairment (SSPI) performed comparably to typically developing peers in vocabulary and grammar comprehension tasks, despite lower performance on verbal ToM tasks.



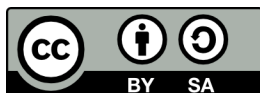
The second research question addressed in this study is: *How do therapeutic approaches vary between these two conditions, and what are their relative effectiveness in addressing language deficits?* For children with CP, therapy primarily targets motor planning, articulation, and speech execution. As shown in Katie's treatment, structured speech-motor interventions and breath control exercises help improve vocal strength and clarity while speaking. These approaches are effective in improving functional communication, although their impact on complex language use is limited. In contrast, therapies for children with DLD, such as Amelia's, focus on improving linguistic processing, especially grammar, word retrieval, and sentence coherence. Present research finds that speech-motor therapies for CP show more consistent improvements in speech intelligibility, whereas language-based therapies for DLD have modest and variable effects, especially on expressive grammar and narrative skills. However, therapeutic interventions for CP and DLD are designed to address distinct underlying deficits. Thus, while interventions for CP often yield consistent and substantial outcomes, their application to DLD populations would likely result in limited effectiveness due to mismatched therapeutic targets. In addition, since language skills and ToM development are interrelated, therapy for children with CP or DLD should also provide opportunities to focus on thoughts and feelings. This can help improve communication skills while supporting the child's social and cognitive development. Ultimately, a nuanced, individualised strategy is required: one that still targets motor coordination in CP and language formulation in DLD, but also nurtures cognitive-linguistic growth through social cognition and Theory of Mind-based content.

6. CONCLUSION

The current study has explored aspects of language comprehension and expressive language problems in children with CP and DLD. It has been found that although both groups exhibit communication impairments, the underlying causative factors are different. Children with CP, like Katie, have good receptive language but have impaired speech production due to a motoric disorder. In contrast, a DLD child like Amelia would produce fairly fluent speech but have impaired grammatical accuracy, syntax, and word retrieval, which are signs of impaired language processing. These differences require different therapies, accordingly. Motor-based speech therapy has proven to be more consistent in improving intelligibility in CP conditions, whereas treatments that address linguistic structure would be best for DLD children. Additionally, since language development has a relationship with ToM, the aforementioned treatments would also involve ToM content, i.e. discussions about thoughts, feelings, and viewpoints that can improve social cognition and communication ability in this population.

Future research is recommended to expand the sample size to include a wider and diverse population of children with CP and DLD, thus allowing for more generalisable results. Longitudinal studies are also highly recommended to monitor the development of these children over time, especially concerning ToM development and its interaction with expressive and receptive language abilities.

Recent research has highlighted the importance of proper differential diagnosis of CP and DLD, conditions with equally possible overlapping language-presentation but with distinct causal mechanisms. Determining these differences is crucial for assessment to be effective as well as targeted intervention.



The implications of these findings are significant for clinical practice, education, and research in language development. Both therapeutic and educational, dual-focused interventions can optimise the use of language and foster a healthier understanding of social interaction, thereby improving the quality of life and academic performance among affected children. Furthermore, this research also indirectly brings to light the need for increased awareness and early detection of speech and language disorders among children. Ultimately, by increasing our understanding of the complexities between different language disorders, this research helps pave the way towards better systems of communication assistance.

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