AN INVESTIGATION INTO THE USE OF MORPHOLOGY AS A CLINICAL MARKER IN CHILDREN WITH DEVELOPMENTAL LANGUAGE DISORDER

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Abstract: 5 children with developmental language disorder were compared to 5 typically developing children matched by their mean length of utterance. Children were compared on their incorrect uses of two grammatical morphemes: finite verbal third person singular *-s* and nominal possessive *-s*, which is not marked for finiteness. The present study investigates the use of finite forms as clinical markers in children with developmental language disorder. The extent to which the finite form third person *-s* could be considered a clinical marker was assessed through both a comparison of the morpheme's use by children with and without developmental language disorder, and a comparison of children's use of the non-finite form possessive *-s*. Chi-square tests found the difference between children with developmental language disorder and typically developing children to be statistically significant for both morphemes, with possessive *-s* being slightly more statistically significant. From this it is concluded that the results of this study do not support the idea that finiteness can be used as a clinical marker for developmental language disorder.

Keywords: developmental language disorder, grammatical morphology, corpus linguistics, clinical marker

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An investigation into the use of morphology as a clinical marker in children with developmental language disorder

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1. Introduction

Developmental Language Disorder (DLD) is a language impairment thought to affect around 8% of school-age children (Paul and Norbury, 2012). For a language disorder that is so common in the community, it is one which has prevailed in causing controversy across the linguistic and medical world alike (Paul and Norbury, 2012). Disputes over DLD's inclusion criteria (Volkers, 2018), causes (Bishop, 2006), and the interventions best suited to treat it (Baron and Arbel, 2022) all mean that while this topic is highly studied, there is a way to go in order to build a conclusive image of what a diagnosis of DLD truly means. The need to recognise and treat this disorder more successfully cannot be highlighted more explicitly than by the overrepresentation of people with DLD in prison populations, with young offenders with DLD being twice as likely to reoffend than their peers without the disorder (Winstanley *et al.,* 2021). The presence of clear and conclusive clinical markers would go some way to ensuring DLD is diagnosed and treated as early as possible.

1.2 The Present Study

Whilst there has been frequent research into the language of children with DLD, there is still much disagreement amongst their findings. It is undisputed that children with DLD struggle in their acquisition of morphology and specifically grammatical morphemes. Previous research presents evidence of a marked difference between the language development of children with DLD and their typically developing (TD) peers (Leonard, 1989). There is, however, a distinct disagreement around the morphemes which may warrant use as a clinical marker, defined as a linguistic form which appears to be 'characteristic' of children with DLD (Rice and Wexler, 1996), as well as a particular lack of investigation into nominal inflection possessive -*s* outlined by Caldar *et al.* (2022). By comparing this morpheme to the more frequently investigated third person singular -*s* I will attempt to provide answers to the following research question:

1. Can incorrect uses of finiteness marking be used as a clinical marker in children with DLD's spontaneous speech?

To provide evidence to answer this question, I will subsequently be asking:

2. Do children with DLD show more incorrect use of the finite verbal inflection third person singular *-s* compared to the nominal inflection possessive *-s,* which does not mark finiteness, in comparison to TD children?

In order to provide answers to these research questions, I use the CHILDES corpus (MacWhinney, 2000) to investigate children with DLD's use of the grammatical morphemes possessive *-s* and third person singular *-s*. Using CLAN [Computerised Language Analysis] I compare 5 children with DLD to 5 typically developing children matched by the Mean Length of Utterance (MLU) of their earliest point of data collection. Defining delay as more frequent incorrect use of a morpheme, I assess and compare the children's language abilities from data collected over a year.

Based on the conflicting results of previous studies, I am led to suggest that one of two hypotheses are possible for the present study. First, a hypothesis based on the findings of Rice and Wexler (1996), henceforth referred to as the finite morphology hypothesis, would predict that the difference between the results of children with DLD and TD children will be more apparent in their use of the finite verbal third person singular *-s* than nominal possessive *-s,* which is not marked for finiteness. This would support the idea that morphemes marked for finiteness could be used as a clinical marker amongst these populations. Second, a hypothesis based on the conflicting findings of Caldar *et al.* (2022), henceforth referred to as the no difference hypothesis, would suggest that the present study will find no significant difference in the DLD children's use of the finite verbal third person singular *-s* when compared to nominal possessive *-s*. This would suggest that that morphemes marked for finiteness do not warrant use as clinical markers among these populations. The present study seeks to compare its findings to these two previous analyses of children with DLD's use of morphology and assess which is more acceptable as a result. I further discuss the relevance of these previous findings in Section 2.5. In addition to these findings, I also touch on the relationship between my findings and the wider discourse surrounding DLD itself, such as the potential for subgroups within the disorder (Lely, 1994).

The present study will begin in Section 2 with an overview of the existing research on children with DLD, outlining a profile of their language development, and the existing controversies surrounding explanations for the disorder. Within this section I also give insight

into the trajectory of development of TD children and conclude by stating the hypothesis' drawn from the previous research outlined in that section. Section 3 describes the methodology used to collect and analyse the data, giving profiles for the children involved in the study. Results, shown in Section 3.3, are presented in tables showing both raw numbers and percentages, and graphs based on these percentages. Chi-square tests are conducted from the results to assess the statistical significance of the findings. The results are subsequently outlined and compared within this section, noting patterns, and comparing the TD children and those with DLD. Section 4 presents a discussion of these results in relation to the previous research outlined in Section 2. In this section I also outline the repercussions of these findings on interventions used on children with DLD. Section 4.5 then evaluates the proceedings of the present study and proposes a direction for future research based on the findings that third person singular *-s* does not appear to warrant use as a clinical marker. Finally, Section 5 concludes the findings of this study.

2. Literature Review

2.1 Defining Developmental Language Disorder

For language learning to take place the learner must receive input, possess the adequate sensory apparatus to perceive the input, and the capability to detect and learn the underlying structure of the language (Bishop, 1993: 2). Children with DLD comprise a group that meet all these requirements for language learning, and yet are unable to acquire language the same way TD children do. DLD is a deficit and delay in language where learners differ in the pace and the course of their language learning (Leonard, 2014).

Unlike other language impairments DLD is classified by the traits not possessed by a learner as opposed to the ones that are (Watkins, 1994). Children with DLD must have no hearing impairments, no signs of neurological impairment and normal cognitive ability to attain the diagnosis (Watkins, 1994). Historically referred to, and often associated with, Specific Language Impairment (SLI), the constraints and terminology were updated regarding the 'nonverbal' cognitive ability of a child with the disorder (Toseeb *et al.,* 2022: 172). Children with SLI's nonverbal IQ must be within a normal range, whereas children with DLD can score anywhere on an IQ test and still receive a diagnosis (Toseeb *et al.,* 2022). This prevents the exclusion of certain individuals from receiving support based on their nonverbal cognitive

abilities alone, and subsequently means that while all people with SLI can be referred to as having DLD, not all people with DLD have SLI (Toseeb *et al.,* 2022). These criteria ultimately mean that unlike other disorders that cause language impairments, those with DLD do not make up a homogenous group due to their categorisation by elimination of traits (Watkins 1994).

Explanations for the occurrence of DLD can be important to consider when understanding the language development of children with the disorder. The specific structures that cause DLD remain widely debated, with arguments suggesting that it presents small indicators for another disorder, or sometimes being referred to as a subtle cognitive deficit of its own (Stark and Tallal, 1988). Explanations also attempt to account for genetic grounds that that could cause DLD, finding individuals have an increased likelihood of presenting with the disorder if there is a family history of it and even pinning a correlation with language disorders with the FOXP2 gene (Nation, 2008). Other explanations do not rule out environmental factors in their contribution to the disorder (Bishop, 1993). Although lack of verbal stimulation alone is not deemed to be a sufficient cause of major language delay, a combination of genetic predisposal to language delay and 'additional adverse experiences' have been theorised to be influential in the occurrence of DLD (Bishop, 1993: 15).

2.2 The Language of Children with Developmental Language Disorder

Children with DLD show difficulty across many areas of language, with the typical characteristics of DLD being delay in one or more area of language resulting in an overall slower rate of development than their TD peers, both of the same chronological age and matched by MLU (Moraleda-Sepúlveda and López-Resa, 2022). While the present study assesses only children with DLD's use of grammatical morphology, the true picture of children with DLD's language shows that the disorder encompasses much more than this. There is a general delay in learning new word labels and encoding semantic features to these words for children with DLD, which as a result means they need to hear a new word more times in order to learn it (Paul and Norbury, 2012). Children with DLD can have a limited vocabulary, with their language skills at times centring around telegraphic speech (Leonard, 2014), as well as showing difficulty conveying meaning, and delays in use of grammatical rules and production of phonology (Kuiack and Archibold, 2019). For example, English DLD children have been found to struggle with production of wh- questions, omit obligatory verb arguments, and show evidence of impaired understanding of passive sentences, complex

syntax and prenominal references (Paul and Norbury, 2012). Although, it is not thought that DLD children's receptive vocabularies are always affected, meaning they do not lack the understanding of these features altogether (Loke, 1994). In terms of the present study, the acknowledgement of other language difficulties is essential in contextualising delays found in morphology, including how any morphological delay could be entwined with the difficulties in other areas.

The language profile of children with DLD also differs in accordance with the learner's native language (Leonard, 2014). Leonard (2014) discusses the association between areas of difficulty for DLD children and properties of the language they are learning to speak, such as Swedish children struggling with subject-verb placement, as well as Italian, French and Spanish DLD children struggling with direct object pronouns preceding inflected verbs. This distinction is important to acknowledge in order to outline that conclusions drawn in a study such as the present one are not transferrable across speakers of other languages with DLD.

2.3 The Language of Typically Developing Children

The present study draws a comparison between children with DLD and TD children. The importance of defining what language acquisition in TD children looks like is therefore equal to understanding that of children with DLD. In outlining this it becomes possible to understand the extent of children with DLD's deviation from typical development, as well as ensuring the validity of the methods and justification in comparisons drawn between these groups. TD children show mastery of various grammatical morphemes between 19 and 50 months (Hulit *et al.,* 2011). Around this time the MLU of TD children is around 2.0 to 2.5 morphemes (Hulit *et al.,* 2011). The order in which morphemes are acquired within this time is generally agreed to be outlined by Brown's (1973) study into TD children's development of morphology. Brown (1973) observed the presence of the progressive inflection, the plural, possessive, past regular, and third person singular regular inflection, finding that they were acquired by children in this order. He deemed acquisition to have occurred when children used the morphemes in 90% of obligatory contexts in spontaneous speech (De Villiers and De Villiers, 1973)

Initial uses of possessive *-s* are typically on alienable objects, while third person singular *-s* may be likely in young children to be dictated by the qualities of the noun, whereby animate objects are more likely to receive the morpheme (Owens, 2016). During the process of learning morphology TD children are also well documented as having inconstant use of

verbtense and subject-verb agreement (Finneran and Leonard, 2010). Common observations of TD children during their acquisition of morphemes are of their overgeneralisation of inflections (Anglin *et al.,* 1993). This results in production of words such as *goed,* and *mouses* (Kuczaj, 1977 cited by Anglin *et al.,* 1993: 28) whereby a child has assumed these inlfections are applicable to all respective verbs or nouns (Hulit *et al.,* 2011). This is taken by some as evidence indicating children's understanding of the grammatical rules and their purposes, and that they are 'searching for rule governed patterns', although evidence of this is not conclusive (Hulit *et al.,* 2011: 188).

Although phonological development could not be measured in the present study, it should be acknowledged that it is still a relevant factor in the development of morphology, particularly *s* (Owens, 2016). Phonological acquisition of /s/, /z/ and /əz/ takes longer in children than the understanding of the grammatical possessive rule, which could require consideration when observing the results of a study such as the present one analysing their acquisition (Owens, 2016). In using two morphemes that take the same form, the question of phonological differences found through a comparison of the two morphemes themselves can be removed from the discussion.

2.4 Previous Research into Clinical Markers

Research into clinical markers is largely motivated by the goal of reaching criteria for DLD that does not involve the exclusion of traits, as is outlined in the Section 2.1. Past attempts to define the potential clinical markers for children with DLD have focused on the idea that phonological short term memory is the main cause of their language difficulties, and subsequently a clinical marker for the disorder (Conti-Ramsden *et al.*, 2001). Typically, researchers have used a nonword repetition task as an assessment of this features' reliability as a clinical marker, with largely successful results. Bishop *et al.,* (1996) reports findings that support the use of these methods in identifying individuals with the disorder, with suggestions that underlying language difficulties remain detectable using these methods even after the treatment of language impairments (Conti-Ramsden *et al.*, 2001). Although these findings are promising, motivation remains to find a clinical marker which may be more prevalent, and therefore can be noticed, in spontaneous speech. If the markers for DLD were able to be noticed in daily speech the diagnostic process for the disorder could be altered and improved by clinicians, as well as being more noticeable to those who are not experts in language such as teachers and parents (Conti-Ramsden and Botting, 2001). The process of quicker as well as

earlier diagnosis would allow for necessary interventions to be implemented sooner, which could have lasting impacts on an individual's language. This could be made possible by the presence of a definitive morphological marker for the disorder, therefore motivating the present study's investigation into the reliability of the finite form third person singular *-s* being used in this way.

2.5 Use of Morphology a Clinical Marker

An area seen to cause some of the most prevalent errors in the language of children with DLD, and the focus of the present study, is morphosyntactic development (Leonard *et al.,* 1999). Children with DLD have been found to frequently omit and simplify morphemes, auxiliary verbs and pronouns (Moraleda-Sepúlveda and López-Resa, 2022), with some suggesting that difficulty using elements of morphology could prove to be a clinical marker for the disorder, as will be further explored in the present study (Rice and Wexler, 1996). The most frequent reports are of omission of compulsory morphemes, rather than commission (Paul and Norbury, 2012).

Rice *et al.* (1995) attempted to explain why children with DLD become delayed in their acquisition of morphology using the idea of the Extended Optional Infinitive (EOI) account. This account builds on the idea that children, for a period use finiteness markers, which mark for tense and agreement, as though they are optional, positing that this period is extended in children with DLD (Rice *et al.*, 1995). Under this model they suggest that the main cause of impairment children with DLD's grammar is a lack of understanding that finiteness marking is obligatory in matrix clauses, therefore leading them to produce significantly more incorrect infinitive forms than TD children (Rice and Wexler, 1996).

Based on this account, which was later explored in further studies, Rice and Wexler (1996) subsequently evaluated the extent to which multiple finite tense markers have the potential to be used as clinical markers for DLD. Their investigation into the finite forms *-ed,* third person singular *-s, DO* and *BE* in 37 children with DLD caused them to argue in favour of using these features as clinical markers (Rice and Wexler, 1996: 1239). They state that low levels of accuracy for these finite morphemes in DLD children by age 5 compared to TD equivalent children, in both spontaneous speech and using a probe, highlights a significant difference between the two groups (Rice and Wexler, 1996). Their results showed children with DLD to produce on average between 63-66% of incorrect morpheme use while using the third person

singular -*s* morpheme in spontaneous speech, and between 74-81% using a probe (Rice and Wexler, 1996). The TD MLU matched children showed a production of 35-44% incorrect uses of third person singular -*s* in spontaneous speech, and 55-58% using a probe (Rice and Wexler, 1996). They also found that the results of children with DLD were not significantly different to TD children when using morphemes plural -*s, in/on, a/the* and -*ing,* which are not marked for finiteness, furthering their belief that finiteness marking could be used as a clinical marker (Rice and Wexler, 1996). The contrasting results for these morphemes that are not marked for finiteness demonstrated incorrect use to be between 1240% (Rice and Wexler, 1996). Rice and Wexler (1996) state that their findings meet criteria which support the use of finite forms as clinical markers: children with DLD show low levels of accuracy for the target morphemes compared to TD children, and morphemes marked for finiteness show lower levels of accuracy than morphemes that are not marked for finiteness. These criteria will be used to assess the results in the present study. The finite morphology hypothesis in the present study is formed as a result of these findings (Rice and Wexler, 1996). However, Rice and Wexler (1996) were only able to confirm these findings based on a comparison of a small number of morphemes not marked for finiteness. Other studies have looked at morphemes that do not mark for finiteness and found results that are at odds to finiteness marking being used as a clinical marker, predicting that their use also presents as a challenge to children with DLD.

The findings of Leonard *et al.* (1992) partially refute the claims that are made by Rice and Wexler (1996). They agree that third person singular -*s* is seen to be used by children with DLD in a way that differentiates them from TD children. They also, however, predict plural *s* to take on this same role (Leonard *et al.*, 1992). While this suggestion partially supports the finite morpheme hypothesis (Rice and Wexler, 1996), it simultaneously demonstrates that the findings of Rice and Wexler (1996) are not always replicated in a comparison of finite morphology to that not marked for finiteness. In relation to my own study, Leonard *et al.'s* (1992) suggestion welcomes a comparison of finite morphemes and those that do not mark finiteness in order to assess the extent to which clinical markers may lay outside of finiteness marking alone. This idea is explored more extensively by Caldar *et al.* (2022).

Caldar *et al.* (2022) explored the use of third person singular -*s*, possessive -*s* and -*ed* using an elicitation task on early school age children with DLD. Their study was motivated in part by a lack of research into children with DLD's use of possessive -*s* nominal inflection, with

their findings showing children with DLD were delayed equally in their use of this morpheme comparatively to other verbal, finite inflections included in the elicitation task (Caldar *et al.,* 2022). They therefore evidenced an argument which they suggest contradicts that of Wexler and Rice (1996), as by comparing finite verbal inflections to nominal inflections that cannot be marked for finiteness, they found no preference towards morphological forms not marked for finiteness comparatively to any other morphological forms (Caldar *et al.,* 2022). From this it is evidenced that the debate over whether nominal or finite verbal inflections present greater difficulty, along with the specifics of what can be classified as a clinical marker for DLD, is not conclusive. Therefore, from Caldar *et al.'s* (2022) study, the no difference hypothesis is formed, in contrast to that of the finite morphology hypothesis (Rice and Wexler, 1996).

2.6 Subgroups Within the Disorder

Despite showing signs of difficulty across multiple areas of language, hypotheses have been put forward suggesting that there are potential subgroups for individuals with DLD, whereby certain children show particular difficulty with some areas more than others. Lely (1994: 35) describes a subgroup which has 'disproportionate grammatical impairment' comparably to other areas of their language. These children are subsequently labelled as having 'G-SLI' by Bishop *et al.* (2000), who aimed to further explore the characteristics of this group. Although certain studies explore the bounds this idea, others dispute the presence of distinct subgroups of DLD, stating there is insufficient evidence to support this claim (Paul and Norbury, 2012). A middle ground has been proposed through the idea that children may at times fit into distinct subcategories, but they may move in and out of them over the course of their development (Paul and Norbury, 2012). The possibility that there indeed are subgroups for children with DLD, and that any number of the children included in the present study fit into them, cannot be accounted for. This idea is therefore explored further in both Sections 4.2 and 4.5.1

2.7 Interventions Targeting Children with Developmental Language Disorder

Interventions are used by Speech and Language Therapists (SALTs), teachers and parents to target areas of language difficulty in children with disorders and delays. Interventions suggested for children with specific disorders such as DLD do not differ that greatly from those for TD children in their content but need more frequent application and narrower focus

(McCauley *et al.*, 2006). Particular areas of language can be targeted by different interventions. Morphosyntactic interventions can come in both implicit and explicit forms, with explicit interventions focusing on teaching the rules of morphosyntax themselves (Caldar *et al.,* 2021). Children with DLD's potential deficit in their procedural memory system means that some research suggests explicit tasks appealing to the declarative memory system, whereby they can learn grammatical rules, may be better suited (Balthazar *et al.,* 2020). Ebbles (2007) heads this debate in calling for a move away from entirely implicit interventions for young children with DLD, asserting that the highly explicit Shape Coding produces significant results when used on children with DLD in their use of grammatical morphology (Caldar *et al.,* 2021). The results of the present study will be analysed in their compatibility with Ebbles' (2007) Shape Coding intervention in Section 4.4.

2.8 The Debate in the Present Study

Section 2 has outlined that there is a stark difference between the language development of TD children and those with DLD. The difference in these children's language profiles highlights a need to identify children with DLD at a young age in order to diagnose and treat their various language difficulties as early as possible. The presence of a morphological clinical marker would go some way towards achieving this. However, there is conflicting evidence in previous research into this idea.

Considering the previous research into the potential for finiteness marking to be a clinical marker for DLD, the present study draws a comparison between children with DLD's use of the finite verbal morpheme third person singular *-s,* and nominal possessive *-s* which is not marked for finiteness. Between the studies outlined in Section 2.5, it is demonstrated that there are potential obstacles in drawing a direct comparison between previous findings. Rice and Wexler (1996) observed use of finiteness markers but did not compare the possessive *-s* morpheme. Caldar *et al*. (2022) compared the two morphemes but using an only an elicitation task rather than spontaneous speech. The present study aims to provide a comparison through using both spontaneous speech, and a comparison of these specific morphemes both marked and not marked for finiteness. Therefore the finite morpheme hypothesis (Rice and Wexler, 1996) predicts that the difference between the results of children with DLD and TD children will be more evident in their use of the finite verbal third person singular *-s* than nominal possessive *-s,* which is not marked for finiteness. This idea supports the notion that that morphemes marked for finiteness could be used as a clinical marker in children with the

disorder. However, the no difference hypothesis (Caldar *et al.,* 2022) suggests that the present study will find no significant difference in the children with DLD's use of the finite verbal third person singular *-s* when compared to nominal possessive *-s*. Such findings would suggest that that morphemes marked for finiteness do not warrant use as clinical markers among these populations.

3. Methodology

Given the disparity between the findings of previous research, I was motivated to answer the research question: Can incorrect uses of finiteness marking be used as a clinical marker in children with DLD's spontaneous speech? I collected data from children with DLD and TD children's spontaneous speech with the aim of researching further the potential differences in use of finite verbal third person singular *-s* and nominal possessive *-s,* which does not mark finiteness. This section outlines the methods of collection, profiles of the children that data was collected from, and the results.

3.1 CHILDES corpora

The data in this study was retrieved from the child language section of the TalkBank system: Child Language Data Exchange System (CHILDES) (MacWhinney, 2000). The corpora that are accessible on CHILDES consist of child language data from a variety of language backgrounds, including different native languages and clinical populations. As all data is accessible to the public, the results of this study are entirely replicable.

The data from children included in this study was collected by two researchers. The files from typically developing children were gathered by Wells (1981), two children with DLD were from Conti-Ramsden (1991) and three were from a later Conti-Ramsden (2002) study.
The exact files used in this study can be found in Appendix 1.

3.1.2 Participants

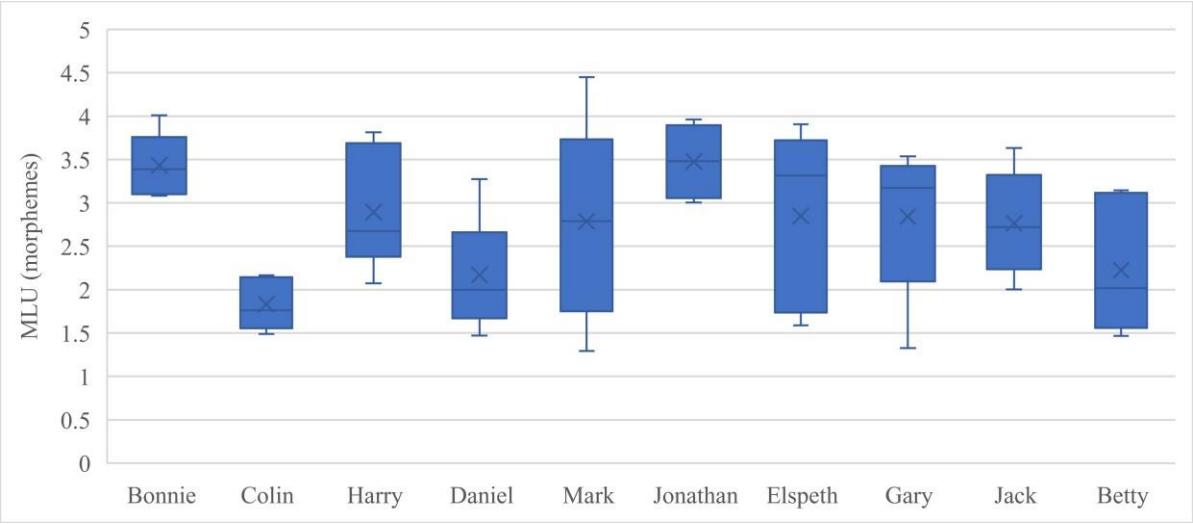
The children with DLD included in this study are aged between 2;11 and 6;10, compared to the TD children who are between 1;06 and 3;05. The difference in chronological age between these two groups allowed them to be matched by MLU. Matching by MLU rather than chronological age is standard practice across studies analysing children with DLD (Rice *et al.,* 2006). This information is depicted in both Table 1 and Figure 1 below. Each of the typically developing children had an MLU in their earliest recording within 0.1 of one of the

children with DLD. The children with DLD had all received a diagnosis of the disorder and were participating in speech therapy clinics or were enrolled at language specialist classrooms aimed at children with this language disorder the time of the data was collected. Data from all children comes from bimonthly intervals throughout the year in which data was collected.

Table 1: Information about the subjects at the time of data collection.

DLD Children	MLU (morphemes)	Number of Files	Chronological Age Range	TD Children	MLU (morphemes)	Number of Files	Chronological Age Range
Bonnie	3.1	7	4;00-5;00	Jonathan	3	5	1;11-2;11
Colin	1.5	5	5;11-6;10	Elspeth	1.5	5	2;00-3;00
Daniel	1.4	8	2;11-3;11	Gary	1.3	5	2;00-3;00
Harry	2	8	3;08-4;08	Jack	2	5	2;05-3;05
Mark	1.5	6	3;08-4;09	Betty	1.5	6	1;06-2;08

Figure 1: All children's MLU's over all files used.



3.1.3 Coding Scheme

CLAN was first used in order to extract the relevant instances of where both morphemes were used correctly and incorrectly. Using the "freq" command in CLAN allowed for all word final *-s* morphemes to be identified throughout each child's files. This search allowed me to identify every correct use of the two morphemes made by each child. From this it was then possible to exclude tokens ending in *-s* that were not relevant instances of either morpheme,

for example *yes*, and calculate a frequency value for each file. I was also able to read into each individual instance in order to identify potential false positives such as *ducks*- used as a noun rather than a verb- and use the context to decide if they were a correct use.

Example *(a)* shows the command used to retrieve all -*s* morphemes.

(a) freq @ +t*CHI +s*s

Following this, the "kwal" command was used to locate instances where possessive -*s* and third person singular -*s* had been used incorrectly. To find where each child had incorrectly used possessive -*s* I observed all of the bare noun forms produced by each child, and the bare verb forms for third person singular -*s.* The commands used to collect this data are shown in *(b)* and *(c).*

(b) kwal +s"m;*,|n" +t*CHI +t%MOR @ +f +u -w2 +w2

(c) kwal +s"m;*,|v" +t*CHI +t%MOR @ +f +u -w2 +w2

These commands retrieved every noun or verb form itself as spoken by the children, as well as two lines preceding and following, providing context to further indicate what morpheme the child was intending to produce. From the results of the above searches, I read each sentence containing the noun or verb in question and recorded omission and overuse of the morpheme, counting both as an incorrect use, in line with Caldar *et al.* (2022). The examples in Table 2 show instances of phrases that made up these categories, with examples of both incorrect use of possessive -*s* and incorrect use of third person singular -*s*.

Table 2: Examples of Incorrect use of possessive -s and third person singular -s taken from the data.

Incorrect use of possessive -*s*	Incorrect use of third person singular -*s*
We broke the nice one['s] tail	*She want[s]*
My Mummy's has that	*I takes it*

The searches discussed above also retrieved instances of use of the bare forms of both nouns and verbs shown in Table 3 from the children which were not relevant to the data in this study and were therefore excluded altogether. This process ensured the most accurate results could be obtained from the data.

Table 3: Examples of bare forms taken from the data.

Bare verb forms	Bare noun forms
Can't pull it	*A doggie*
Read something Mummy	*I want a bath*

3.2 Predictions

Based specifically on the findings of previous studies conducting research on the morphology of children with DLD it is possible to hypothesise the possible findings of the present study. The studies discussed in Section 2.5 emphasise the difficulty observed in DLD children's acquisition of finiteness marking in particular (Rice *et al.*, 1995), as well as suggestions that *s* used to represent third person singular could behave as a clinical marker for DLD (Wexler and Rice, 1996). Therefore, the finite morpheme hypothesis suggests my findings will show support for the idea that third person singular -*s* could appear to be a clinical marker for DLD. These studies also therefore predict children to demonstrate more incorrect use of the verbal inflection third person singular -*s*, which can be marked for finiteness, than the nominal inflection, which is not marked for finiteness, possessive -*s*. Rice and Wexler's (1996) results for both spontaneous speech and a probe predict that findings for the present study should find the 5 children with DLD to present 63-81% of incorrect uses for third person singular -*s*, compared to between 12-40% incorrect uses for possessive -*s.* The results of the TD MLU matched children are predicted to fall between 35-58% of incorrect uses for third person singular -*s* (Rice and Wexler, 1996). The finite morpheme hypothesis therefore predicts that the present study will fulfil both of Rice and Wexler's (1996) criteria that support finiteness marking's use as a clinical marker. This also predicts that statistical analysis of the results will find third person -*s* to be more statistically significant than possessive -*s.*

This being said, Caldar *et al.* (2022) found, using an elicitation task, that there was no difference in DLD children's abilities in using third person singular -*s* compared to possessive -*s*. If we are to expect these findings to be replicable in spontaneous speech, forming the basis of the no difference hypothesis, then the results of the present study will show both third person singular -*s* and possessive -*s* to demonstrate equal amounts of incorrect use from the 5 children with DLD. Such a finding would assert that the finite form third person singular -*s* alone would not make an adequate clinical marker for children with DLD.

Additionally, it must be acknowledged that the presence of an unaccounted-for subgroup of children with DLD could have a bearing on the results of the present study. Children who may fit into the suggested 'G-SLI' subgroup would present inflated numbers of incorrect use for both grammatical morphemes, compared to their TD and DLD peers alike. Due to the lack of consensus on this topic, and previous studies equal inability to account for such affects, I do not predict the occurrence of such an outcome.

3.3 Results

This Section outlines the results of the data collected from the children described in Table 1. All tables show results as both raw numbers and percentages. All figures are representations of those percentages.

The children with DLD produced between 33.3-90% of incorrect uses of third person singular *-s.* The TD children produced between 7.1-42.9% of incorrect uses. Table 4, Figure 2 and Figure 3 show the children's correct and incorrect use of third person singular -s. All of the TD children demonstrate a higher percentage of correct uses than incorrect uses, compared to 3 children with DLD. Across the two groups, four children showed similar levels of correct and incorrect production of this morpheme. Elspeth, from the TD group, showed similar patterns of use to Harry, Bonnie and Colin, with Bonnie and Colin both showing a lower percentage of incorrect than correct uses. When compared to their MLU matched age equivalent, shown in Figure 3, one of the DLD children, Colin, showed a lower percentage of incorrect uses then their TD MLU equivalent, whereas all other DLD children showed more use of incorrect use of the third person singular *-s* morpheme.

Table 4: Results for the children's use of third person singular -s.

DLD Children	Correct uses of third person *-s* (N)	Correct uses of third person *-s* (%)	Incorrect use of third person *-s* (N)	Incorrect use of third person *-s* (%)	TD Children	Correct uses of third person *-s* (N)	Correct uses of third person *-s* (%)	Incorrect use of third person *-s* (N)	Incorrect use of third person *-s* (%)
Bonnie	67	63.21	39	36.8	Jonathan	13	92.9	1	7.1
Colin	2	66.7	1	33.3	Elspeth	4	57.1	3	42.9
Daniel	2	18.2	9	81.9	Gary	17	77.3	5	22.7
Harry	29	56.9	22	43.1	Jack	19	67.9	9	32.1
Mark	1	10	9	90	Betty	6	75	2	25

Figure 2: Bar chart showing children's use of third person singular -s.

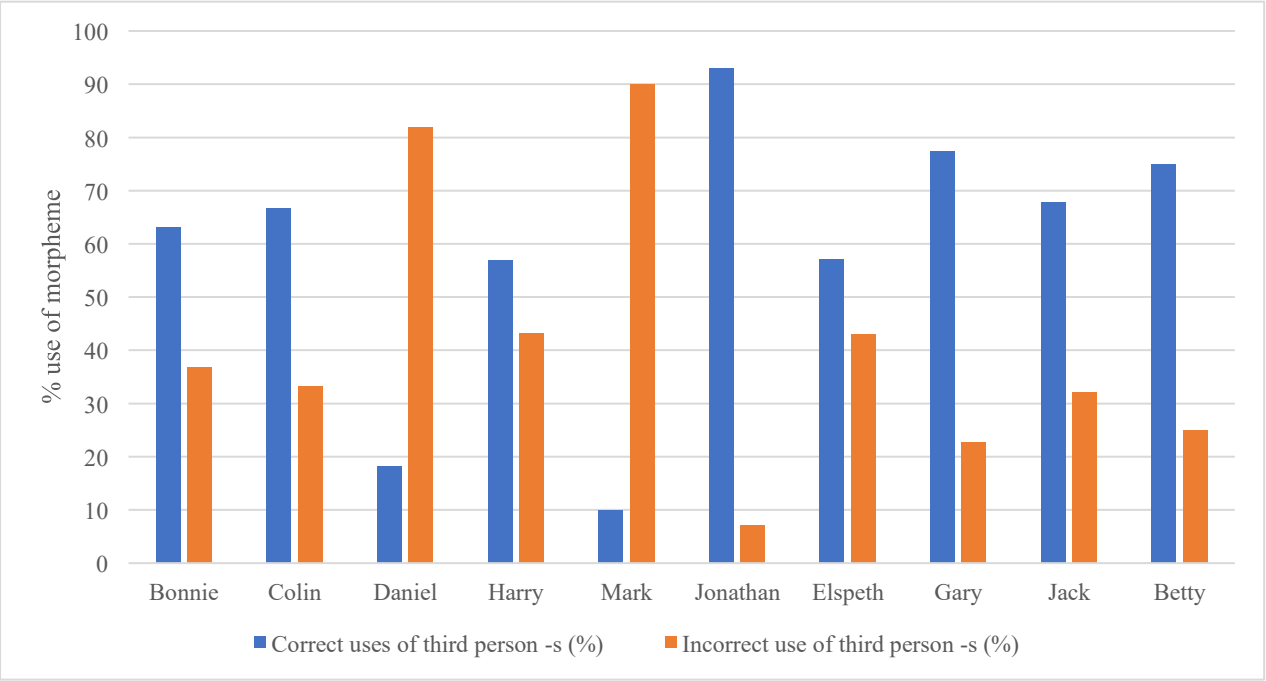
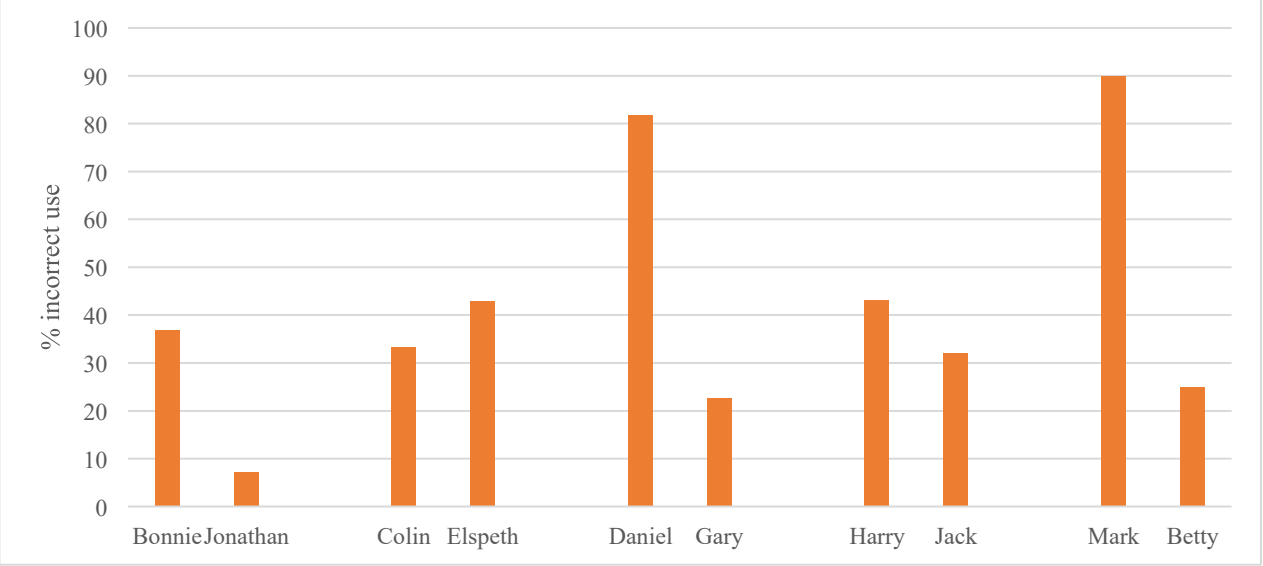


Figure 3: Bar chart comparison of the DLD and TD children's incorrect use of third person singular -s with their MLU matched equivalent.



The DLD children produced between 41- 66.7% of incorrect uses for possessive *-s.* The TD children produced between 11.8-25% of incorrect use of possessive *-s.* The results shown in Table 5, Figure 4 and Figure 5 show that all the TD children produced more correct than incorrect instances on possessive *-s* than their TD MLU matched equivalent. Comparatively, 3 of the children with DLD produced a larger percentage of incorrect than correct uses. However, Bonnie and Harry, who did produce more correct than incorrect instances, did not show levels of correct usage that were equivalent to their TD peers. When comparing the children with DLD to their MLU matched equivalents, as shown in Figure 5, all of the TD children demonstrate a lower percentage of incorrect uses than their DLD counterparts.

Table 5: Results of the children's use of possessive -s.

DLD Children	Correct uses of possessive *-s* (N)	Correct uses of possessive *-s* (%)	Incorrect use of possessive *-s* (N)	Incorrect use of possessive *-s* (%)	TD Children	Correct uses of possessive *-s* (N)	Correct uses of possessive *-s* (%)	Incorrect use of possessive *-s* (N)	Incorrect use of possessive *-s* (%)
Bonnie	20	57.2	15	42.9	Jonathan	15	88.2	2	11.8
Colin	4	40	6	60	Elspeth	9	75	3	25
Daniel	14	48.3	15	51.7	Gary	13	86.7	2	13.3
Harry	13	59	9	41	Jack	14	87.5	2	12.5
Mark	2	33.3	4	66.7	Betty	26	81.3	6	18.8

Figure 4: Bar chart showing children's use of possessive -s.

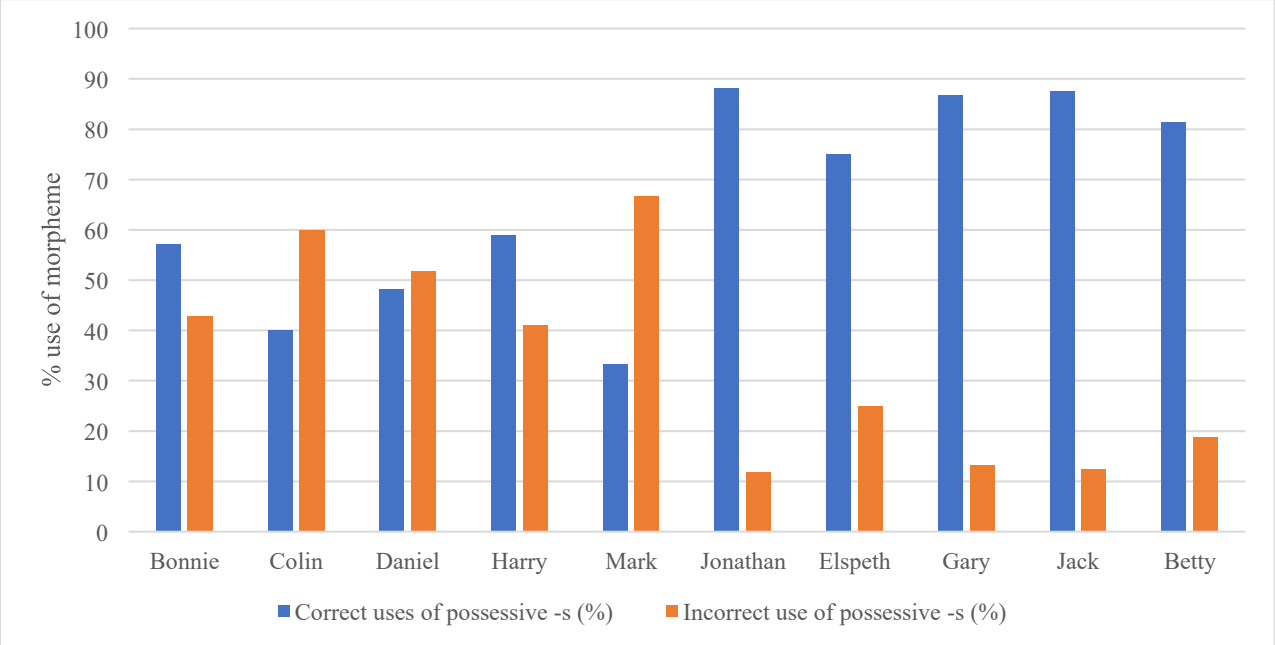
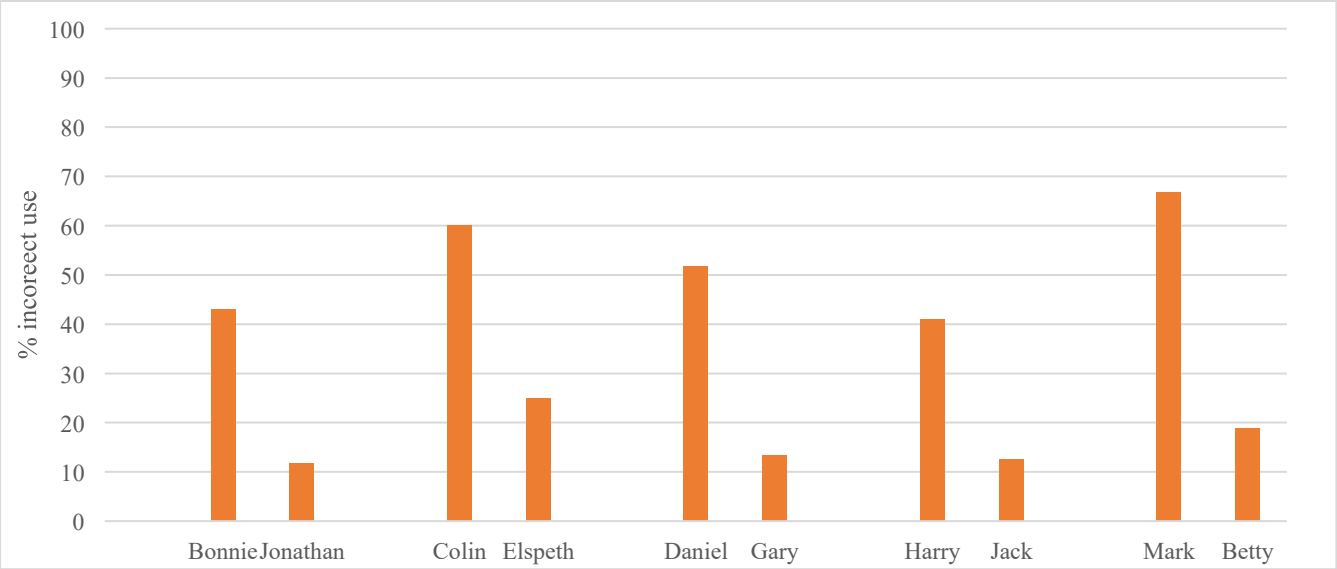
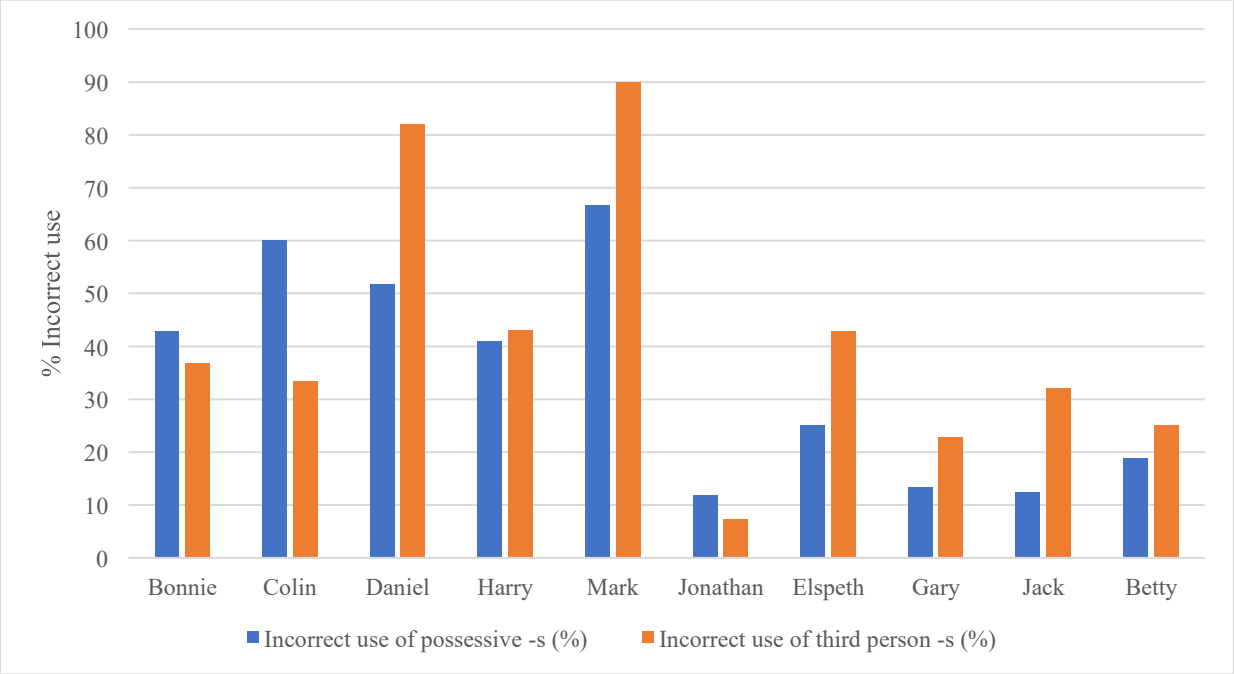


Figure 5: Bar chart comparison of the DLD and TD children's incorrect use of possessive -s with their MLU matched equivalent.



When comparing the children's performance across both morphemes, shown in Figure 6, three out of the five DLD children showed a higher number of incorrect uses for third person singular *-s*, and four of the five TD children showed more incorrect use of third person singular *-s*. However, the highest percentages of incorrect use were not equivalent across groups, with Mark showing the most incorrect uses in the DLD group at 90%, compared to the highest percentage of incorrect uses from the TD children was Elspeth at 42.9%.

Figure 6: Bar chart showing children's incorrect use of both possessive -s and third person singular -s compared to their MLU matched equivalent.



The table below shows the results for the Chi-square test conducted on the results for the third person singular -*s* morpheme. Fisher's exact test was carried out, finding that the twotailed P value is less than 0.0054. The association between groups and outcomes is therefore considered to be statistically significant.

Table 6: Results of chi-square test conducted on the results for third person singular -s.

	Correct uses of third person -*s*	Incorrect uses of third person -*s*	Total
DLD children	101	80	181
TD children	59	20	79
Total	160	100	260

The table below shows the results for the Chi-square test conducted on the results for the possessive -*s* morpheme. Fisher's exact test was carried out, finding that the two-tailed P value is less than 0.0001. The association between groups and outcomes is therefore considered to be extremely statistically significant.

Table 7: Results of chi-square test conducted on the results for possessive -s.

	Correct use of possessive -*s*	Incorrect use of possessive -*s*	Total
DLD children	53	49	102
TD children	77	15	92
total	130	64	194

The Chi-squared tests show that of the differences in the two groups use of both of the morphemes is statistically significant, however possessive -*s* had a greater statistical significance than third person singular -*s.*

4. Discussion

4.1 Discussion of Results

Firstly, based on a comparison of the children with DLD's use of third person singular -*s* and possessive -*s* compared to their TD MLU matched peers, the finite morpheme hypothesis cannot be accepted. My results do not demonstrate support for Rice and Wexler's (1996) hypothesis stating that finiteness marking can be a clinical marker in children with DLD. The results of Daniel and Mark appear to be in line with this prediction, with both showing incorrect uses of third person singular -*s* within the same range as Rice and Wexler's (1996) study. However, the other children did not show such a strong tendency for incorrect use third person singular -*s* and were therefore not in this 63-81% incorrect uses range*,* making it unwarranted to label the feature 'characteristic' of the population. The TD children did produce a lower than predicted percentage of incorrect uses of third person singular -*s,* which does maintain a contrast between the groups as was seen in Rice and Wexler's (1996) results. However, the finding that one TD child, Elspeth, produced a higher percentage of incorrect uses than her MLU matched DLD equivalent, Colin, provides further evidence that a high production of incorrect uses of finiteness marking is not always characteristic of the DLD population. Children with DLD also showed a higher than predicted percentage of incorrect uses of possessive -*s,* with all children showing more than 40% incorrect use. The Chi-square test confirms that statistically, the difference between the groups' use of the morphemes was more significant for possessive -*s*, further supporting that this hypothesis has not held up in

the results of the present study. The present study therefore does not show evidence for both the criteria outlined in Rice and Wexler's (1996) study, as while children with DLD show a statistically significant difference in morpheme use to TD children, finite third person singular -*s* does not appear to show markedly different results to possessive -*s.* From this, it can be concluded that in answer to the research question outlined in Section 1.2, the present study does not show support for the idea that finiteness marking is a clinical marker for children with DLD.

My findings also, therefore, oppose Leonard *et al.'s* (1992) suggestion, that third person singular -*s* should be used as a clinical marker for DLD. However, this study highlighted in their inclusion of plural -*s* as a significant difficulty to children with DLD, that clinical markers for DLD may lay outside of inflections marked for finiteness (Leonard *et al.,* 1992). This suggestion is ultimately supported by the findings of the present study, as is further explored in the following analysis.

Subsequent to the rejection of the finite morpheme hypothesis (Rice and Wexler, 1996), it appears that the no difference hypothesis (Caldar *et al.,* 2022), predicting no significant difference in children with DLD's use of the finite verbal third person singular -*s* when compared to nominal possessive -*s,* is more in line with the findings of the present study. Caldar *et al.* (2022) found, in their study of children with DLD's elicited speech, that these children showed no difference in their language abilities between third person singular -*s* and possessive -*s* forms. In the present study, children with DLD's percentage of incorrect uses of possessive -*s* was between 41-66.7%, and so was inside the same range of 33.3-90% recorded for third person singular -*s.* Although the individual children in the current study differ in which morpheme they find more difficult, with Bonnie and Colin showing their highest percentage of incorrect uses in possessive -*s,* whereas the other three children in the DLD group struggled more with third person singular -*s* in varying levels, statistically the differing use between TD and DLD groups was found to be significant across both morphemes. The difference was in fact slightly more statistically significant for children's incorrect use of possessive -*s.* From this, it can be concluded that the differences seen between the children with DLD's use of the two morphemes is largely in line with the no difference hypothesis.

Based on this, along with the fact that incorrect use of both morphemes was statistically significant, it does not appear these two morphemes have shown a difference in the way they are used with enough consistency to consider third person singular -*s* a clinical

marker. Furthermore, based on the differences found between the present study and the others observing spontaneous speech, I am not inclined to suggest that differences between the findings of Caldar *et al.* (2022) and the previously discussed studies (Rice and Wexler, 1996) can be due to their differing methodologies. The findings of the current study suggest that perhaps previous research has assigned too much weight to verbal inflectional morphology, in particular finiteness markers, in claiming that characteristic differences between children with DLD and TD children are seen in their use of these morphemes and not elsewhere. This means that a comparison of these two morphemes has not provided evidence that a sought after morphological clinical marker has been found in the use of third person singular *-s.* This finding has implications that undermine the use of all aspects of finiteness marking as a distinct characteristic of children with DLD, however further research would be required to substantiate this claim. In relation to the treatment of DLD, these results have implications for interventions that have presently been found to be successful, as is discussed further in Section 4.3.

4.2 Discussion in Relation to Subgroups of Developmental Language Disorder

The idea of subgroups for children with DLD cannot be ruled out by the results of the present study (Lely, 1994). While a lack of consistency in the correct and incorrect uses of the children with DLD could be due to person or external factors, Mark appears to show greater difficulty with the use of the two grammatical morphemes more consistently than the other DLD children. Particularly when compared to the use of grammatical morphology by Bonnie and Harry, it appears that the Mark's results deviate more significantly from those seen in the TD children. Although further tests would be required to assess whether Mark's language difficulties are akin to a subgroup of children with DLD who struggle disproportionately with grammar, the lack of consistency between the results of the children with DLD cannot rule out the possibility of such a hypothesis. Therefore, this finding opens the possibility that third person singular *-s* could be observed as a successful clinical marker amongst some specific subgroups of children with DLD. The impact of the possibility of such a phenomenon on the present study will be further explored in section 4.5.1.

4.3 Insights into Typically Developing Children

Brown's (1973) study and predictions of TD children also allow us to draw distinctions between the two groups observed in this study. His work defined acquisition as 90% use in obligatory contexts, which is recorded as the correct use in this study. It can be seen from the

results that no children from either the TD or DLD groups reach this, other than Jonathan in his use of third person singular *-s*. This result is largely to be expected due to the children's MLUs indicating they are around the stage where morphology is being acquired rather than where it should emulate adult like grammar (Brown, 1973). However, in setting this as the boundary it is possible to assess the severity of the differences seen between the two groups of children. For TD children's use of possessive *-s* they were all on the cusp of Brown's (1973) definition of acquisition, between 88% and 75%, whereas the DLD children did not reach this range across either morpheme. Furthermore, Brown's (1973) predictions for TD children, stating that third person singular *-s* occurs later in their acquisition also appears to have held true in this data, as all the TD children, other than Jonathan, successfully produced a higher percentage of correct possessive *-s* morphemes than third person singular *-s*. This prediction did not hold true across children with DLD in this data set. Bonnie and Colin showed a more consistent use of third person singular *-s* than possessive *-s*, with Harry showing very similar results for both morphemes, which is the reverse of the order predicted by Brown (1973). This could provide evidence in favour of a hypothesis which suggests that DLD children are not simply delayed in their acquisition of inflectional morphology (Leonard *et al.,* 1992) but are on a different and unique trajectory in comparison to their MLU matched peers. This finding is encouraging for future research into morphological clinical markers for children with DLD, as it evidences a strong distinction from typical development that can be harnessed to find conclusively the features that are characteristic of this population.

4.4 Implications for Interventions

The findings of the current study have implications on interventions frequently prescribed for children with DLD. Ebbles (2007) Shape Coding is an explicit intervention used with many children, including those with DLD. The intervention sees pre-made diagrams including symbols and colours used alongside sentence prompts to encourage children to engage with an explicit understanding of the rules implemented when using specific morphemes (Ebbles, 2007). Studies have highlighted the success of this interventions use on children with DLD, noting significant improvements in past tense marking over a 10 week period (Caldar *et al.,* 2021). Shape Coding is able to resource support for third person singular *-s*, which was found to be a necessary target of such an intervention by the present study. However, Shape Coding presently does not allow for interventions carried out on the possessive *-s* morpheme. If this intervention is indeed highly effective for children with DLD, then the ability to target all

morphemes that are a problem for this population is vital in their successful treatment. This further recognition of possessive *-s* as a source of delay in children with DLD, as is provided by the current study, is therefore vital in encouraging interventions to broaden the scope of the morphemes they are able to target.

4.5 Limitations of this Study and Future Directions

This study was carried out within the bounds of limitations which will be outlined in this section. Corpus linguistics allows for more accessible data and encourages the maximum research to be carried out on data which has already been collected, thus saving time, resources, and ethical queries. In using the software necessary to analyse this data, in particular for the purpose of analysing morphology, limitations were made apparent. Within the available data on CHILDES (MacWhinney, 2000), those collecting the data must have provided a transcription, but also a %MOR tier in order for all the searches for morphological features to be successful. The availability of data fitting this description meant there were a limited number of children who could be considered for inclusion in the present study. This emphasises the importance of further collection of thorough data which can be used for wider purposes.

It must also be acknowledged that the analysis of more children in a study such as the present one would bring more certainty to the conclusions drawn from the findings. All findings discussed in the present study are therefore stated with the knowledge that 10 children may not account for all possible outcomes in children's acquisition of language. The presence of an outlier in such a small amount of data would greatly influence the results. With further time and resources, more data could shed light on the extent to which these findings on the spontaneous speech of children with DLD hold true on when conducted on a larger scale. This again highlights the importance of more collection of accessible child language data, particularly including clinical populations, to make such breadth of data collection possible.

The children with DLD and the TD children are MLU matched based on the earliest file used in the present study, as is generally the standard for studies comparing the language of TD children to that of children with DLD. This is widely agreed to be effective when comparing two children at one point of time, however over a longer period of time, as is the case in the present study where language is taken from over the course of a year, there is less precedent set over what is deemed standard practice. Larger studies may choose to take MLUs at set

time intervals to ensure there is a fair comparison of ability. TD children are predicted to increase their MLU by approximately 1.2 over the course of a year (Miller and Chapman, 1981), however there has been little research into any possible direct relationship between MLU and chronological age in DLD children (Rice *et al.,* 2006). Therefore, it is harder to predict whether the MLUs which are matched over a year will continue along a similar trajectory, or at what given point they may diverge. Studies can be seen to match children in 6-month intervals (Rice *et al.,* 2010), when observed over a longer period of time, however due to both time limitations and limitations to the available data, the present study draws a comparison over 1 year. This could ultimately lead to comparisons at times being drawn between children where their MLUs are no longer matched.

Further questions can arise in the use of spontaneous speech to collect data on children. A lack of control over production, which is essential to the study of spontaneous speech, can lead to the production of unwanted forms. For example, it was noted that the data contained relatively frequent instances of *wanna*, rather than *want/wants to,* allowing children to avoid explicit production or omission of the third person singular *-s* morpheme. While such a trend may have little bearing on the results found, it is worth outlining that children's methods of avoiding commitment to the morpheme is likely in the collection of spontaneous speech. Perhaps such a pattern could be explored in a further study, assessing whether such avoidance tactics are more frequent in children with DLD, and therefore possibly representative of uncertainty in where the third person singular *-s* morpheme is necessary, or whether it is simply a manifestation of colloquial language.

4.5.1 The Presence of Subgroups

Additionally, children were selected for this study based on the available information provided by those who collected and recorded the data originally. From this, no information could be gained around the potential for these children to be categorised into the previously discussed 'G-SLI', or indeed any other subgroups (Bishop *et al.,* 2000). Particularly with the small sample size analysed in the present study, the effects of this could impact the results, causing either morpheme to appear as a more or a less successful grammatical clinical marker. This highlights the need for more succinct evidence surrounding the idea of subgroups within DLD, and subsequent studies using data within the bounds of this. Distinctions similarly were not made regarding the severity of each child's DLD due to the lack of availability of this information, leading to the current study's treatment of the disorder

as equal across the group. Conti-Ramsden *et al.* (2001) predicts a difference in behaviour of children with DLD based on the severity of the disorder. If there indeed is a significant difference in the severity of the children included in this analysis, and subsequently the behaviour of these individuals, the possibility remains that finiteness marking could be used as a clinical marker in children with severe but not mild DLD. However, further research would be necessary to authenticate this claim.

5. Conclusion

The present study contributes evidence to the overall discourse surrounding individuals with DLD and their use specifically of grammatical morphology. This study's research demonstrates, in its finding that third person singular *-s* does not appear to be a strong clinical marker, that there is much surrounding the disorder which remains debated by those who seek to understand the inner workings and predict the production of children with DLD.

The results of this study are in consensus with past research in finding a difference in the use of grammatical morphology in children with DLD comparatively to their MLU matched TD peers (Leonard *et al.,* 1999). There is, however, much dispute over the potential for finiteness marking to be treated as a clinical marker for DLD. In positing the research question asking whether incorrect uses of finiteness marking be used as a clinical marker in children with DLD's spontaneous speech, my study set out to evaluate the claims of two studies on this topic. First, the finite morpheme hypothesis based on Rice and Wexler's (1996) claim that finiteness marking could be used as a clinical marker. Conflicting accounts, encompassed by the no difference hypothesis, such as that put forward by Caldar *et al.* (2022) found there to be no significant difference in the children with DLD's use of the finite verbal third person singular *-s* when compared to non-finite nominal possessive *-s,* therefore disputing the use of third person singular *-s* as a clinical marker.

My study found results in support of the no difference hypothesis, aligning more closely with that of Caldar *et al.* (2022), as ultimately the differences between the children with DLD's use of both finite morphemes and those that do not mark finiteness was similar. This means that the use of third person singular *-s* as a clinical marker due to its finite nature is not supported by the present study. As both morphemes demonstrate delay in the children with DLD included in this study, through their higher percentage of incorrect uses and confirmed by the statistical analysis presented in Chi-square tests, it cannot be concluded from the results of

this study that children with DLD show greater difficulty in their acquisition of morphemes marked for finiteness than those which are not.

Based on these findings, along with the limitations outlined in Section 4.5, this study highlights the necessity for the collection of more longitudinal data on children with DLD. Through the number of debates within the causes, behaviour, and treatment of these children, it is evidenced that there is a way to go for true conclusions to be drawn on which, if any, specific morphological features warrant use as a clinical marker for DLD. Future research should be more open to the analysis of nominal inflections, rather than verbal inflections alone, ideally comparing children's use of all morphemes in spontaneous speech. Testing and comparing children with DLD's receptive grammar abilities may also develop the picture into where their most significant difficulties exist, as well as better informing the application of interventions. My study similarly highlights the need for increased research into potential subgroups for DLD, which also could not be ruled out by the findings of the present study.

This study further highlights the need for early interventions for children with DLD. The significant difficulty noted between children with DLD and younger TD children when using both nominal and verbal inflections ultimately reinforces the need for interventions which are able to target both of these areas. The further development of Shape Coding to encompass specifically the possessive -*s* morpheme in the way it does for third person -*s* would be a priority based on the results presented in this study. The benefits of a method of early diagnosis based on daily speech, outlined in Section 2.7, also remains something that should be a central focus for future studies on this topic.

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Appendices

Appendix 1A: Weblinks to specific Conti-Ramsden (1991) transcripts analysed:

Colin: https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Colin/051123.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Colin/060301.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Colin/060530.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Colin/060824.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Colin/061024.cha

Mark:https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Mark/030821.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Mark/031121.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Mark/040320.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Mark/040611.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Mark/040820.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti2/SLI/Mark/040921.cha

Appendix 1B: Weblinks to specific Conti-Ramsden (2002) transcripts analysed:

Bonnie: https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/040009.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/040205.cha
https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/040503.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/040727.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/040908.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/041102.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Bonnie/050027.cha

Harry: https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/030822.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/030903.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/031016.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/040107.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/040404.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/040508.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/040718.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Harry/040818.cha

Daniel: https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/021121.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/030025.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/030217.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/030405.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/030629.cha
https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/030810.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/030917.cha

https://sla.talkbank.org/TBB/childes/Clinical-MOR/Conti/Conti3/Daniel/031125.cha

Appendix 1C: Weblinks to specific Wells (1981) transcripts analysed:

Jonathan: https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jonathan/011129.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jonathan/020226.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jonathan/020602.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jonathan/020901.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jonathan/021129.cha

Elspeth: https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Elspeth/020002.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Elspeth/020229.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Elspeth/020606.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Elspeth/020828.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Elspeth/030004.cha

Gary: https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Gary/020004.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Gary/020304.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Gary/020603.cha
https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Gary/020905.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Gary/030004.cha

Jack: https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jack/020513.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jack/020924.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jack/021126.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jack/030308.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Jack/030523.cha

Betty: https://sla.talkbank.org/TBB/childes/Eng-

UK/Wells/Betty/010603.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Betty/010904.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Betty/020003.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Betty/020302.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Betty/020528.cha

https://sla.talkbank.org/TBB/childes/Eng-UK/Wells/Betty/020827.cha