

# Decontextualized Language Skills in Children with Developmental Language Disorder and Developmental Dyslexia: Evidence from a Word Definition Task

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## ABSTRACT

The present study investigates the development of decontextualized language skills, by means of a word definition task, in children with Developmental Language Disorder (DLD) & Developmental Dyslexia (DD). Although these disorders have a common basis and have studied for different aspects of language abilities, no studies, to date, have compared them in terms of their word definitional skills. Addressing this gap, the present study examined thirty-six children with DLD, or DD or typically developing (TD) age-matched children. All participants were tested on their expressive vocabulary, non-verbal abilities and on their definitional skills. In the definitional task they had to define 16 words (8 nouns, 4 verbs, and 4 adjectives; simple vs. compound, abstract vs. concrete) orally. Definitions were evaluated on both content and form. Results have shown that more decontextualized language was used by the TD group than by the two impaired groups and the DD group used more decontextualized language than the DLD group. By contrast, no differences were found among the groups in form. Delving into different word characteristics more demanding were found to be abstract and compound words. The DLD group faced more difficulties than the other groups in compound abstract nouns. Fewer differences were found in verbs suggesting that formal definitions of verbs are equally demanding for all groups. Findings suggest that these two disorders have more similarities in most of the categories in terms of the use of decontextualized language. The present study offers new knowledge on the development of definitional skills and indicates that research should investigate them in the light of the interrelation of different word characteristics; otherwise, the picture we get can be misleading.

**Keywords:** Developmental Dyslexia, Developmental Language Disorder, Expressive Vocabulary, Word Definitions.

**Published Online:** October 4, 2022

**ISSN:** 2736-4534

**DOI:** 10.24018/ejedu.2022.3.5.399

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## I. INTRODUCTION

Decontextualized language is demanding and challenging (Snow *et al.*, 1989), since it is not subjected to context and it involves explicit language knowledge and cautious linguistic and cognitive planning (Schleppegrell, 2004; Dosi & Gavriilidou, 2020; Dosi, 2021). Moreover, it includes low-frequency words and complex syntax (Curenton & Justice, 2004). Children are exposed to decontextualized language through schooling (Snow *et al.*, 1989; Marinellie, 2010). Word definitions is a means of examination decontextualized language, since a 'good', i.e., formal, definition provides all the required information in a brief and informative way. Formal definitions exhibit aspects of mental lexicon organization and metalinguistic abilities (Snow *et al.*, 1991). Formal definitions entail the superordinate categories, along with other characteristics of the defined word ["apple is a fruit that is red and has seeds], and have a default form "X is a Y that Z" (e.g. apple (X) is a fruit (Y) that is red and has

seeds (Z)] (Marinellie, 2010).

Thus, the study of definitions focuses both on content (i.e., word meaning and semantic relations) and on form (i.e., syntactic structures) (Friedmann *et al.*, 2011). The development of definitional skills, hence the development of decontextualized language skills, enhances gradually (Dourou, 2019; Dourou *et al.*, 2020; Dosi *et al.*, 2021). In early childhood, definitions entail a description or a function of the word or provide examples. In other words, children use context to define words. At the age of 7 children use superordinate categories, though only in the definitions of nouns, since nouns are more frequent and conceptually less complex than verbs and adjectives (Johnson & Anglin, 1995; Gavriilidou, 2015; Colombo *et al.*, 2017; Dourou, 2019). In a similar manner, concrete words are defined in a more formal way than abstract words (Johnson & Anglin, 1995; Caramelli *et al.*, 2006; Dourou, 2019; Dosi *et al.*, 2021). Similarly, simple words receive more formal definitions than compound words (Dourou, 2019). Compound words are often

decomposed in their parts (e.g. “cheese pie: cheese and pie”), since the hierarchical relations are not fully developed (Dosi & Gavriilidou, 2022). At the end of elementary school (11-12 years old) children use more superordinate categories in their definitions even in abstract words (Caramelli *et al.*, 2006). Apart from content, form of definitions enhances with age. Children use nominal or verbal phrases and simple main clauses in early childhood. At the age of 11-12 form of definitions become more formal; thus, children in this age use more complex clauses (Friedmann *et al.*, 2011). Moreover, they combine the proper content with the appropriate form at this age.

Children with language disorders have lower linguistic, metalinguistic and cognitive abilities (Dosi & Gavriilidou 2020, 2022, Dosi *et al.*, 2021; Dosi & Maniati, 2022). Children with language disorders have shallower word knowledge and encounter more problems in word organization and association than their TD peers (McGregor *et al.*, 2013). Often, even though they know words they do not know how to define them (Wilkinson & Houston-Price, 2013). Research has shown that children with language disorders tend to use more contextualized language than their age-matched TD peers (Marinellie & Johnson 2002; Gutierrez-Clellen & DeCurtis, 2009; Dosi & Gavriilidou 2020, 2022, Dosi *et al.*, 2021; Dosi & Maniati, 2022). Therefore, they use strategies that are detected in younger TD children (Dosi *et al.*, 2021). Children with language disorders also use more general words like “something” or “thing” (Gutierrez-Clellen & DeCurtis, 1999; Marinellie & Johnson, 2002; Dosi & Gavriilidou, 2020) and they prefer predominately to use either nominal or verbal phrases or referential sentences, to a lesser extent, though (Marinellie & Johnson, 2002; Dosi & Gavriilidou, 2020; Dosi & Maniati, 2022). Moreover, children with language disorders face persistent difficulties in abstract and compound words. Concerning the latter category, it is often detected that these children struggle to fully comprehend the semantic relationship between the modifier and the head and, thus, the hierarchic relations (Grela *et al.*, 2005; Dosi *et al.*, 2021; Dosi & Gavriilidou, 2022). The vast majority of the aforementioned studies have tested children with DLD (Marinellie & Johnson, 2002; Gutierrez-Clellen & DeCurtis, 2009; McGregor *et al.*, 2013; Dosi & Gavriilidou 2020, 2022, Dosi *et al.*, 2021), while the definitional skills of children with DD are under-researched (Dosi & Maniati, 2022).

To date, no studies have compared the definitional skills of children with these two disorders. According to some researchers DLD and DD have a common basis; others, though, claim that they are two different disorders with some common characteristics that can co-occur (for a review cf. Adlof & Hogan, 2018). First and foremost, children who have either DLD or DD have normal intelligence (Adlof *et al.*, 2021). Phonological impairments and difficulties in word learning are detected in both disorders; however, more persistent difficulties in word learning exist in children with DLD or children with comorbid DLD and dyslexia (Adlof & Hogan, 2018; Alt *et al.*, 2019; Snowling *et al.*, 2020; Adlof *et al.*, 2021). Research also highlights differences in reading (decoding and comprehension) between these two disorders (Adlof & Hogan, 2018; Snowling *et al.*, 2020). Children with DD encounter difficulties in decoding that affect reading

comprehension; by contrast, children with DLD have intact decoding abilities but they have issues in reading comprehension; while children with comorbid DLD and dyslexia have severe deficits in both aspects of reading (Adlof & Hogan, 2018; Alt *et al.*, 2019; Snowling *et al.*, 2020; Adlof *et al.*, 2021). Both groups face issues in vocabulary acquisition; children with DLD, struggle, though, more on word learning (Adlof *et al.*, 2021). Notwithstanding, research has not investigated decontextualized language skills of these two groups.

To address the aforementioned gaps in current literature, the aim of the present study is twofold: (1) to investigate whether DLD and DD disorders use decontextualized language through their word definitions in a similar way; and (2) to further research whether differences/similarities between the groups still exist controlling for word characteristics (noun vs. verbs vs. adjectives; simple vs. compound; concrete vs. abstract).

## II. METHODOLOGY

### A. Participants

Forty-eight monolingual Greek-speaking children (7;3-12 yrs.; mean: 9; SD: 1.4) took part in the present study. Participants were divided into four groups (a DLD group, a DD group, and an age-matched control group).

The DLD group consisted of twelve children with DLD (age range: 7;3-11;8 yrs.; mean age: 9;1, SD: 1.2). The DD group consisted of twelve children with DD (age range: 9-11 yrs.; mean age: 9;4, SD: 1.6). Both groups, who either had a diagnosis or and met the conventional criteria (Bishop, 2017), were recruited by Speech and Language Pathologists (SLP). Children with comorbidity The TD group also consisted of twelve children without any language or other disorder (7;2-12 yrs.; mean age: 8;5, SD: 1.6).

Two baseline tasks were administered in all participants to outline their profile (Table 1); (a) a non-verbal intelligence task (Raven *et al.*, 2008) and (b) an expressive vocabulary task (Vogindroukas *et al.*, 2009).

Non-parametric criteria (Kruskal-Wallis test or Mann Whitney test) were performed since the sample was small. No differences in age or in non-verbal intelligence were detected among the groups ( $H(2) = 2.463, p = 0.292$ ;  $H(2) = 0.682, p = 0.711$ ; respectively); while differences were found in expressive vocabulary task ( $H(2) = 16.773, p < 0.001$ ). The DLD group had lower expressive vocabulary than the other two groups (DD:  $U = 14.500, p < 0.001$ ; TD:  $U = 9.000, p < 0.001$ ), while no differences were found between the DD and TD groups ( $U = 62.000, p = 0.590$ ).

TABLE I: PARTICIPANTS' PROFILE

Groups	N	Age (years; SD)	Vocabulary (% (SD))	Non-verbal intelligence (SD)
DLD	12	9;1 (1.2)	63 (12)	98.5 (4.5)
DD	12	9;4 (1.6)	84.4 (10)	99.7 (5.2)
TD	12	8;5 (1.6)	87 (8.6)	102.6 (3.4)

The participants were also matched on gender and socio-economic background. Informed consent in writing was obtained beforehand from parents/guardians of all children

included in the study. All procedures performed in the study were in accordance with the ethical standards of the institutional Ethics Committee of Democritus University of Thrace (60589/2111/31-8-2018) and the national research committee.

### B. Material

All participants were also tested by means of a definitional task (Dourou, 2019) in order to detect their decontextualized language skills. The task comprises 16 words; eight nouns (concrete and abstract, simple and compound), four verbs (simple and compound) and four adjectives (simple and compound). Words were checked for their word frequency and age appropriateness.

A warm-up session came first. The examiner gave an example of a formal definition and asked the participant afterwards to define a similar word. If the participant used an informal definition, the examiner gave corrective feedback by providing a formal definition of the word. During the main session the examiner just asked the participant “what does X mean?”, without any further prompt. Participant’s response was audio-taped and transcribed afterwards.

Participants’ answers were scored for both content and form on a five-point scale based on the coding of (Marinellie & Johnson, 2002, 2004). For content-scoring, if participants gave the Function, Description, Concrete Example, and Association, they received 1 point. If they gave a Class-Nonspecific or Class-Specific or a Synonym, they received 2 or 3 points, respectively. If they gave the superordinate category along with one or more-word characteristics, they received 4 or 5 points (for more examples cf. Dosi *et al.*, 2021). For form-scoring, participants received 1 point for the use of nominal phrase. They received 2-3 points for the use of verbal phrase or the use of the words “something/thing” along with a referential phrase. 4-5 points were given if they used the superordinate category or an infinitive or verbal phrase or a second infinitive or a nonfinite clause or a finite adverbial clause, or a prepositional phrase. If participants pointed the object or gestured, they received 0-point for both content and form.

In either content or form, the total score was 80 points. The results will be presented in percentages in the results’ section.

### C. Reliability

Inter-judge reliability of coding was evaluated for all responses given by 36 subjects (in total 576 definitions). Two independent researchers evaluated the answers with the method of double-blind marking and any identically coded response was taken as an agreement. The final percentage of agreement was determined by dividing the number of responses coded identically by the total number of coded definitions. The inter-judge agreement for content was 88.3% and for form 92.4%. To check the reliability of the task a Cronbach’s Alpha coefficient was calculated, which suggested a good degree of internal consistency (0.806).

### D. Data Analyses

To investigate our research questions, we performed non-parametric tests (Kruskal-Wallis tests or Mann-Whitney tests), since our cohort was small.

## III. RESULTS

The results in the overall scores of definitions (Fig. 1) exhibit differences among groups, though only in content ( $H(2) = 16.916, p < 0.001$ ) and not in form ( $H(2) = 2.856, p = 0.240$ ). More specifically, TD children used more formal definitions than both impaired groups (DLD:  $U = 9.500, p < 0.001$ ; DD:  $U = 21.500, p = 0.002$ ) and DD group also used more formal definitions than the DLD group ( $U = 37.500, p = 0.045$ ).

Delving into the grammatical category of nouns, differences were detected in simple concrete (in content,  $H(2) = 7.692, p = 0.021$ ) and abstract nouns (in content and form:  $H(2) = 9.516, p = 0.009, H(2) = 14.222, p = 0.001$ , respectively) (cf. Fig. 2). In simple concrete nouns, differences were only found between TD group and DLD group ( $U = 28.000, p = 0.010$ ), while no other differences were detected (DLD-DD:  $U = 49.000, p = 0.198$ ; DD-TD:  $U = 41.500, p = 0.078$ ). Similar is the picture in abstract nouns (in content; TD-DLD:  $U = 19.500, p = 0.001$ ; DD-DLD:  $U = 61.000, p = 0.551$ ; DD-TD:  $U = 41.500, p = 0.078$ ). In form, TD used more formal definitions than both impaired groups (DLD:  $U = 7.500, p < 0.001$ ; DD:  $U = 27.000, p = 0.008$ ); while the two impaired groups performed similarly ( $U = 71.500, p = 0.977$ ).

Differences were also found in compound concrete and abstract nouns (in content,  $H(2) = 6.778, p = 0.034, H(2) = 12.647, p = 0.002$ , respectively) (cf. Fig. 3). In compound concrete nouns, TD group used more formal definitions than both impaired groups (DLD:  $U = 33.500, p = 0.024$ ; DD:  $U = 34.000, p = 0.028$ ), while no differences were noted between them ( $U = 69.500, p = 0.887$ ). Definitions of compound abstract nouns found to be demanding for the DLD group (5.8%), who used less decontextualized language than TD and DD groups ( $U = 16.500, p = 0.001, U = 34.500, p = 0.028$ , respectively); while no differences were found between the DD and TD group ( $U = 42.500, p = 0.089$ ).

No statistically significant differences were attested in form of definitions of simple and compound concrete nouns ( $H(2) = 1.776, p = 0.411, H(2) = 1.706, p = 0.426$ , respectively) and in compound abstract nouns ( $H(2) = 1.566, p = 0.457$ ).

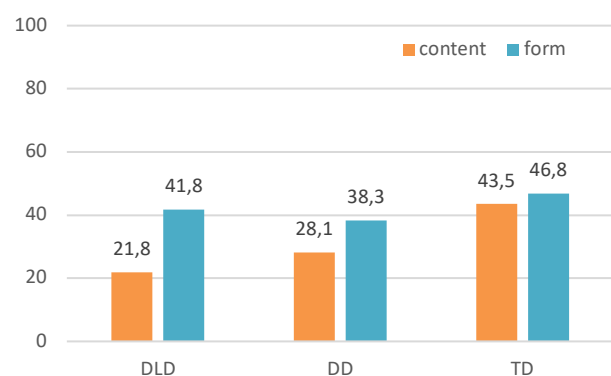


Fig. 1. Groups’ overall scores in content & form (%).

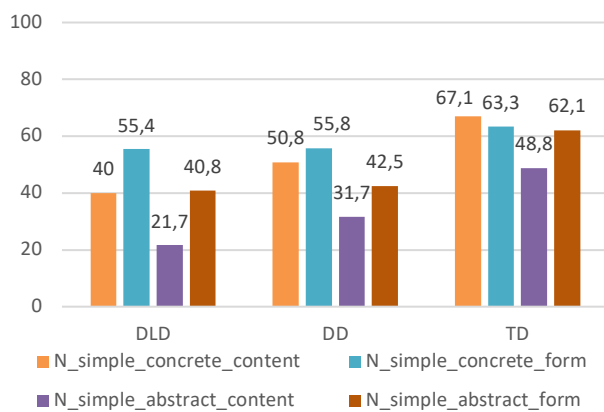


Fig. 2. Groups' scores in simple (concrete & abstract) nouns (content & form) (%).

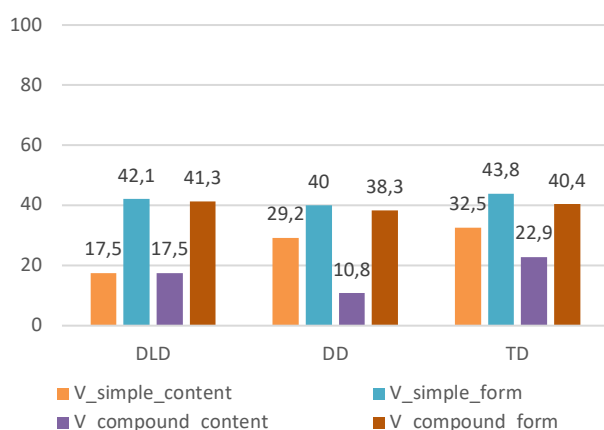


Fig. 4. Groups' scores in (simple & compound) verbs (content & form) (%).

In the definitions of verbs (cf. Fig. 4), differences were found in both categories (simple:  $H(2) = 7.379, p = 0.025$ ; and compound:  $H(2) = 21.901, p < 0.001$ ), only in content, though (form, simple:  $H(2) = 0.633, p = 0.729$ ; and compound:  $H(2) = 0.361, p = 0.835$ ). In simple verbs the only difference found was between DLD and DD group, where the latter group used more decontextualized language than the former ( $U = 30.000, p = 0.014$ ; TD-DLD:  $U = 45.500, p = 0.128$ ; TD-DD:  $U = 56.500, p = 0.378$ ); while in compound verbs the picture is different; thus, DLD and TD group used more decontextualized language than DD group ( $U = 24.000, p = 0.005$ ;  $U = 5.500, p < 0.001$ ; respectively; TD-DLD:  $U = 49.500, p = 0.198$ ).

Finally, in adjectives differences were detected in simple (content and form) and compound (content) adjectives ( $H(2) = 24.343, p < .001, H(2) = 7.048, p = 0.029, H(2) = 7.303, p = 0.026$ ; respectively; compound form:  $H(2) = 1.861, p = .394$ ) (cf. Fig. 5). In simple adjectives both in content and form TD used more decontextualized language than both impaired group (content, DLD:  $U = 1.000, p < 0.001$ ; DD:  $U = 1.000, p < 0.001$  | form: DLD:  $U = 36.000, p = 0.039$ ; DD:  $U = 32.500, p = 0.020$ ), while no differences were noted between them (content:  $U = 43.500, p = 0.101$  | form:  $U = 64.000, p = 0.671$ ). In the content of definitions of compound adjectives differences were found only between TD and DLD groups ( $U = 33.000, p = 0.024$ ); while no other differences

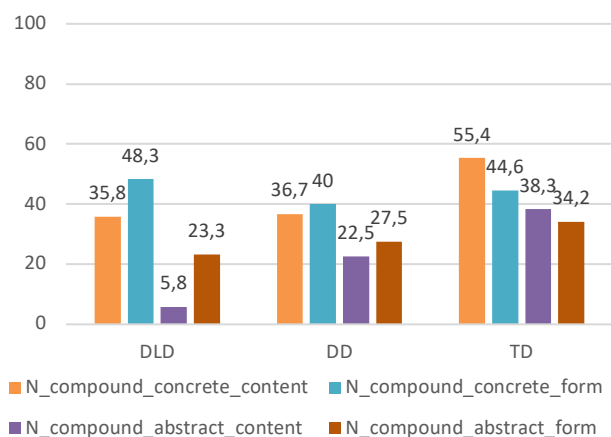


Fig. 3. Groups' scores in compound (concrete & abstract) nouns (content & form) (%).

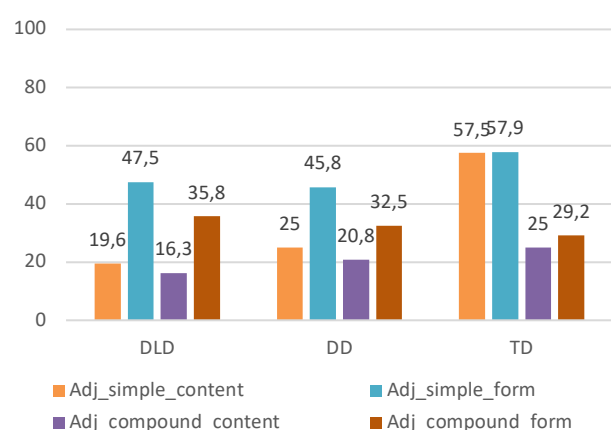


Fig. 5. Groups' scores in (simple & compound) adjectives (content & form) (%).

were observed (TD-DD:  $U = 66.000, p = 0.755$ ; DLD-DD:  $U = 43.500, p = 0.101$ ).

Some examples of each group and category are presented below.

The simple concrete noun *bicycle* was described as follows:

- 'Something that people take to drive, easier than a car' (DLD group)
- 'It is something that has wheels and you can do it for sport, cycling, let's say' (DD group)
- 'A means of transport with two wheels and a saddle' (TD group)

The simple verb *dance* was described as follows:

- 'Somebody turns all around' (DLD group)
- 'When music is playing and you move' (DD group)
- 'When I move to the rhythm of the music' (TD group)

The compound adjective black and white<sup>1</sup> was described as follows:

- 'Something that is white and black (DLD group)
- 'When someone is white and black' (DD group)
- 'Everything that consists of two colors' (TD group)

#### IV. DISCUSSION

The present research aimed to investigate decontextualized language skills of children with DLD and DD, as they are

<sup>1</sup> In Greek, compound words are monolectic.

depicted in their word definitional skills.

The main findings suggest that differences were found between the groups in terms of their decontextualized language skills. Looking to the overall skills of the groups, it was detected that TD children had better definitional skills than the two impaired groups, and DD group had also more enhanced definitional skills than DLD group. Similar are their performance in vocabulary. Focusing on word characteristics, the majority of nouns were defined in a more formal way compared to verbs and adjectives and adjectives received more formal definitions than verbs. Compound nouns, and actually, compound abstract nouns found to be challenging especially for the DLD group; while the definitions of compound verbs found to be more demanding for the DD group.

The first question was whether two groups performed in a similar or different way. Examining the overall scores in word definition task, differences were noticed between the groups, similar to those found in vocabulary task. Hence, TD group outperformed both DLD and DD groups and DD group exhibit better performance than the DLD group, confirming previous studies that found that children with DLD have more difficulties in word knowledge than children with DD (Adlof & Hogan, 2018; Alt *et al.*, 2019; Snowling *et al.*, 2020; Adlof *et al.*, 2021). It was also observed that children with language disorders used more often words like “something” or “thing” compared to their TD peers (Gutierrez-Clellen & DeCurtis, 1999; Marinellie & Johnson, 2002; Dosi & Gavriilidou, 2020).

The second question was whether groups have similar performance in definitional skills if we examine the interrelation of word characteristics. This is the most crucial question, since focusing on different word categories the initial picture changes. TD still showed better decontextualized skills than DLD group in all categories apart from the content of definitions of simple and compound verbs, confirming previous studies that suggest that the definitions of verbs are the most complex case (Dosi & Gavriilidou, 2020; Dosi *et al.*, 2021), since verbs and their definitions are cognitively more demanding. Differences between TD group and DD group were found only in the following categories: the form of definitions of simple abstract nouns and simple adjectives, the content of compound concrete nouns compound verbs and simple adjectives, suggesting that the two groups struggle to define compound words and perform better in simple words. The only differences found between the DLD and DD groups were in the content of definitions of compound abstract nouns which attested to be particularly demanding for the DLD group. Also, the content of definitions of simple verbs was more complicated for the DLD; while DD group faced difficulties to define compound verbs compared to the DLD group. These dissociations suggest that compound and abstract words are more challenging particularly for children with language disorders, since they require abstract thinking and cognitive abilities (Wilkinson & Houston-Price, 2013; Marinellie & Johnson 2002; Gutierrez-Clellen & DeCurtis, 2009; Dosi & Gavriilidou 2020, 2022, Dosi *et al.*, 2021; Dosi & Maniati, 2022); but also these difficulties suggest that the hierarchic relations have been not fully developed yet, similar to previous studies (Grela *et al.*, 2005; Dosi & Gavriilidou,

2022). The general finding that less significant differences were attested in form, confirms previous studies that noted that content is a more sensitive indicator (Dosi & Gavriilidou, 2020, 2022; Dosi *et al.*, 2021). It also indicates that children under 10 years old still do not use complicate syntactic structures.

## V. CONCLUSION

The findings of the present study suggest that these two disorders more things in common regarding their decontextualized language skills, since they performed similarly in most word categories. The differences found in the overall scores are misleading, since they reflect the differences found only in compound abstract nouns and compound verbs. Although it should be highlighted that less differences were found between TD and DD children compared to TD and DLD children, were the differences were more salient. This study also suggests that word definitional skills have to be investigated in view of interrelation of different word characteristics. Finally, this study enhances the existing work on definitional skills by examining different word characteristics in two impaired that have been studied comparatively, not for their decontextualized language skills, though. Due to the small cohort, firm conclusions cannot be drawn from our findings; however future research can work in this direction.

## ACKNOWLEDGMENT

Special thanks to the children who participated in this study, their parents who gave their consent and the Speech and Language Pathologists for their help and support. We also thank the six anonymous reviewers for their useful and insightful comments for the improvement of the manuscript.

## FUNDING

This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Program «Human Resources Development, Education and Lifelong Learning» in the context of the project “Reinforcement of Postdoctoral Researchers - 2nd Cycle” (MIS-5033021), implemented by the State Scholarships Foundation (IKY).

## CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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