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Grammatical expression in discursive contexts in early childhood education pupils with Developmental Language Disorders

La expresión gramatical en contextos discursivos en alumnado de educación infantil con Trastorno del Desarrollo del Lenguaje

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Abstract

Introduction. The present investigation has been designed with the purpose of analyzing grammatical expression in pupils with typical development (DT) and with Developmental Language Disorder (DLD) and implementing an educational proposal. Methodology. The final sample consisted of 128 5-year-old pupils belonging to educational centers on the Island of Tenerife. They were divided into four groups: (1) a treatment group for children with TDL (TDL-T); (2) an untreated group of children with TDL (TDL-C); (3) a treatment group of children with typical language development (DT-T) and (4) a group of untreated children with typical language development (DT-C). For the assessment of the pupils, the Clinical Evaluation of Language Fundamentals Spanish (CELF-4, Semel et al., 2006) was used, while the indications of Castilla-Earls and Eriks-Brophy (2012) and Jackson-Maldonado (2013) were followed for the analysis of grammatical expression. The intervention program was organized following a Multi-Tiered System of Supports, carrying out a total of 20-minute long 55 sessions. A hybrid approach was used with stories, supported by icons and pictographic planning. Results. The intervention

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was effective for the TDL-T and DT-T groups, more specifically, there was an increase in the production of simple, compound and complex sentences. Conclusions. The intervention through a SAMN allows the presence, participation and progress in syntactic skills both in students with TDL and with DT, providing empirical evidence to advance in a more inclusive education.

Keywords: early childhood education; intervention; grammatical Expression; Developmental Language Disorder.

Resumen

Introducción. La presente investigación se ha diseñado con el propósito de analizar la expresión gramatical en alumnado con desarrollo típico (DT) y con Trastorno del Desarrollo del Lenguaje (TDL) e implementar una propuesta educativa. Metodología. La muestra final estuvo compuesta por 128 estudiantes de 5 años pertenecientes a colegios de la Isla de Tenerife. Se dividieron en cuatro grupos: (1) un grupo de tratamiento para niños/as con TDL (TDL-T); (2) un grupo sin tratamiento de niños/as con TDL (TDL-C); (3) un grupo de tratamiento de niños/as con desarrollo típico del lenguaje (DT-T) y (4) un grupo de niños/as sin tratamiento con desarrollo típico del lenguaje (DT-C). Para la evaluación al alumnado se utilizó Clinical Evaluation of Language Fundamentals Spanish (CELF-4, Semel et al., 2006), mientras que para el análisis de la expresión gramatical se siguieron las indicaciones de Castilla-Earls y Eriks-Brophy, (2012) y de Jackson-Maldonado et al. (2013). El programa de intervención se organizó siguiendo un Sistema de Apoyo de Múltiples Niveles (SAMN), llevando a cabo un total de 55 sesiones de 20 minutos de duración. Se utilizó un enfoque híbrido con cuentos, apoyados por iconos y planificación pictográfica. Resultados. La intervención resultó eficaz para los grupos TDL-T y DT-T, concretamente se produjo un aumento de la producción de oraciones simples, compuestas y complejas. Conclusiones. La intervención mediante un SAMN permite la presencia, la participación y el progreso en habilidades sintácticas tanto en alumnado con TDL como con DT, aportando evidencia empírica para avanzar en una educación más inclusiva.

Palabras clave: educación infantil; intervención; expresión gramatical; Trastorno del Desarrollo del Lenguaje.

Introduction and objectives

The study of grammatical expression or grammaticality has generally been used as a clinical marker to differentiate students with Developmental Language Disorder (DLD) from those with typical development (TD). Knowledge of it provides a detailed description of grammatical processing tasks that allows the identification of a number of red flags for the early detection of SLD. Although initially most research has been conducted in English (Rice et al., 2023), in recent years some studies have appeared in Spanish and other Romance languages (Bahamonde et al., 2021; Crespo et al., 2020; Ferinu et al., 2021; Valle et al., 2018). They usually address grammatical expression to refer to both grammatical and ungrammatical forms, using a variety of methodologies including sentence completion, story-telling, analysis of conversational samples and spontaneous narratives. Although more research proliferation is needed, there is no doubt that the

emergence of these studies has been crucial, as English data are not easily transferable to languages such as Spanish (Jackson-Maldonado and Maldonado, 2017).

Using story retelling methodology, Spanish-speaking students with TDL have been reported to use more simple sentences with poorer performance in subordination (Coloma, 2012; Jackson-Maldonado et al., 2013) as well as the presence of considerable ungrammaticality, specifically errors in the omission of determiners, less use of clitic pronouns and problems in verb inflection, affecting verb agreement (Valle et al., 2018).

Knowledge of grammatical problems in students with TDL has led to the design and implementation of intervention programmes, mostly in English. Methodologically, they have been organised through two different approaches: implicit and explicit. The former is based on the extraction of statistical regularities from the environment by means of techniques such as bombardment, recast, modelling and focused stimulation (Freeman, 2023). Whereas an explicit approach aims to teach grammatical rules and demands that the learner understands instructions and memorises facts and rules. Explicit approaches often rely on imitation, direct instruction and visual coding systems for shapes and colours (Baron and Arbel, 2022). In recent years, however, a more hybrid approach combining the two learning systems has been suggested (Finestack et al., 2020). In line with this, programmes using fictional stories, games, conversations and multisensory information have been developed, such as the Functional Language Intervention Program for Narratives (Gillam et al., 2008), Story Champs (Spencer and Petersen, 2020), Supporting Knowledge in Language and Literacy (Gillam and Gillam, 2016), and the Plan for the Stimulation of Narrative Development (Pavez et al., 2008).

With the aim of providing new intervention strategies in educational contexts, the present research has been designed with a twofold objective. Firstly, to evaluate and compare the performance in grammatical expression and ungrammaticality in students with TDL and TD. Secondly, to demonstrate the efficacy of an intervention programme on the improvement of grammatical expression and agrammaticality in TDL and TD students. Specifically, the hypotheses are as follows:

- Hypothesis 1: TDL learners show less grammatical expression with less production of complex sentences than TD learners.
- Hypothesis 2: TDL learners are more ungrammatical than TD learners.
- Hypothesis 3: Students with TDL who receive treatment (TDL-T) show improvement in grammatical expression after the intervention, compared to TDL control students (TDL-C).

Method

Population and sample

The study applied a pretest-treatment-posttest design for an experimental group of TDL learners (TDL-T). To complete the design, a non-equivalent experimental group

(consisting of typically developing students, TDL-T) and two control groups (one equivalent and one non-equivalent, TDL-C and DT-C) were included.

The independent variables were the group (with 4 levels) and the time of the assessment (2 times). The pre-test assessment was conducted at the end of the 2017-2018 school year. The intervention programme was implemented between January and March 2019 (11 weeks). It should be noted that this intervention is part of a global programme to stimulate the language skills of pupils in the 3rd year of Infant Education. Therefore, after the initial assessment, we began with the stimulation of the areas of expressive and receptive language, to finally apply the intervention programme of grammatical expression in the discursive context. Finally, the post-test evaluation was carried out in April 2019.

The dependent variables were Grammatical Expression through the analysis of the following sentences: simple, coordinated, juxtaposed, noun, relative, causal adverbial, final adverbial, temporal adverbial, adverbial of manner and adverbial of place. And ungrammaticality, which was differentiated into the following categories: ungrammatical sentences, morphological error of agreement, syntactic error of omission, syntactic error of substitution and syntactic error of addition.

A total of 128 students enrolled in schools on the island of Tenerife (Canary Islands, Spain) participated in this study. They were divided into four groups: (1) a treatment group for children with TDL (TDL-T); (2) a non-treatment group of children with TDL (TDL-C); (3) a treatment group of children with typical language development (TD-T) and (4) a non-treatment group of children with typical language development (TD C).

Table 1 shows the descriptive statistics for each group on the variables age and non-verbal IQ. Both are used to match the groups.

Table 1

Descriptive statistics of age groups and non-verbal IQ groups

Gr.	n	Gender		Age				Non-verbal IQ			
		Man	Woman	Min	Max	M	SD	Min	Max	M	SD
TDL-T	32	20	12	5.2	6.3	5.6	0.3	80	106	96	7
TDL-C	32	20	12	5.2	6.3	5.8	0.3	89	113	111	6
DT-T	32	19	13	5.3	6.2	5.7	0.3	80	106	98	8
DT-C	32	19	13	5.2	6.3	5.8	0.3	80	120	107	8

Notes: TDL-C = Control group of children with TDL. DT-C = Control group of typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children.

The groups were tested for age and IQ balance by performing a normality test and a hypothesis test for each. The normality of age was tested by means of the Kolmogorov Smirnov test ($z = .04$; df = 128; $p = .174$). To verify that the groups matched on this variable, a hypothesis test was performed. As a preliminary step, homogeneity of variances was

determined using Levene's test (F(3,124) = 0.6; p = .640). The ANOVA showed no significant differences ($F(3,124) = 3.5$; $p = .120$; $\eta^2 = .01$). The K-BIT intelligence test was used to assess non-verbal IQ (Kaufman and Kaufman, 2000). The normality of non-verbal IQ was verified by the Kolmogorov-Smirnov test ($z(128) = .05$; $p = .098$). To confirm that the groups were equal on this variable, a hypothesis test was performed. As a preliminary step, homogeneity of variances was determined by Levene's test ($F(3,124) = 1.9$; $p = .139$). The ANOVA showed no significant differences ($F(3,124) = 5.1$; $p = .097$; $\eta^2 = .03$).

Two of the groups were chosen by convenience sampling (TDL-C and TDL-T), given that the pupils had to meet specific selection criteria. In order to select them, an initial assessment was carried out in all schools on the island of Tenerife, in collaboration with the school management teams and the educational psychology guidance teams. These professionals were asked to refer all pupils who showed possible signs of TDL, i.e. problems of comprehension or expression in one or more components of language, but especially in morphosyntax and lexical-semantics; or pupils with a history of language difficulties since their entry into school, without any auditory, social or neurological alterations that could justify them. A total of 147 students were administered a language assessment protocol to confirm the diagnosis, consisting of a language test, the CELF-4 (Semel et al., 2006), in which the scores obtained had to be below 77.5 (1.5 SD). In addition, the K-BIT intelligence test was administered with the purpose of measuring non-verbal intelligence in children from the referred sample, discarding those whose non-verbal IQ was below 75.

This administration of the assessment protocol led to the selection of a sample of 64 students with a diagnosis of TDL, who were randomly assigned to one of two equivalent groups in the study, on the basis of gender only. A total of 51 students were excluded from the study for presenting only simple language delay, i.e. a slight chronological developmental delay characterised more by phonological difficulties than by structural problems, and 32 infants were excluded for not completing the tests due to repeated absences or lack of collaboration.

Students in the typically developing groups were selected by discretionary sampling to ensure that the four groups were balanced on variables that could distort the results. These groups were also administered the CELF-4 and the K-BIT. A total of 64 typically developing students were selected from the classmates of the TDL children. The participants in this group had no language difficulties and were being educated within the usual parameters.

Therefore, the final sample consisted of 128 students from different social backgrounds, both from public and public schools and from rural and urban areas.

Instruments for the selection of participants

Students were assessed and diagnosed using the CELF-4 (Semel et al., 2006). Composite scores for the diagnosis of TDL must be below 77.5 (- 1.5 DT), taking the criteria that at that time had been set for the Spanish-speaking population, in one of the three main indices of the test (Main Language Score, Expressive Language and Receptive Language) as stated by Leonard (2014). The CELF-4 allows for the identification, diagnosis and

monitoring of language and communication disorders. It is also an effective tool for the detection of TDL (Acosta et al., 2013).

The use of the CELF-4 allowed the construction of the linguistic profiles of the sample by providing information through the application of the following subtests:

(1) Concepts and following directions (C&SD): following oral indications.

(2) Word structure (EdP): complete the sentence by adding a slogan.

(3) Recalling sentences (RO): repetition of short and long sentences.

(4) Formulation of sentences (FO): construction of sentences with one or two slogans.

(5) Receptive word classes (R-WC): semantic word association.

(6) Word Classes-Total (CP-T).

(7) Sentence structure (SS): understanding of sentences and association with their meaning.

(8) Expressive vocabulary (EV): naming of persons, objects or actions.

(9) Understanding paragraphs (EP): oral comprehension of a story.

(10) Repetition of direct (RN-F) and inverse (RN-B) numbers.

(11) Familiar Sequences (SF): auditory and verbal sequence.

The administration of the K-BIT (Kaufman and Kaufman, 2000) made it possible to determine and specify the verbal and non-verbal intelligence quotient (IQ) of the participants. This diagnostic test can be applied to children, adolescents and adults. In addition, it has several subtests; however, in this study we selected the one called *Matrices*, which consists of solving a series of reasoning dynamics by means of visual or figurative support.

Narrative Evaluation Procedure

The elicitation of the narrative corpus to obtain the language samples was carried out using the retelling technique. The illustrations of the story were presented while the evaluator orally narrated what happened in each scene, in a space free of noise and distractions. The child was then asked to retell the story with the help of the story pictures, while being recorded with a smartphone *app*. The transcriptions of the narrative corpora were made as soon as possible after the recordings, and were carried out through an inter-judge process to ensure greater reliability. The story used was "Tito, the gluttonous dog", developed by the Acentejo research group specifically for narrative performance tasks. The story consists of 9 illustrations telling the story of Tito, a dog whose food is stolen by a mouse. The scenes were linked through temporal and causal relationships that explain the different events in the story. The script of the story is shown below:

> *Once upon a time there was a dog called Tito who lived in a beautiful garden. Tito liked to eat so much that he was the greediest dog in the world. In the garden there also lived a little mouse among several plants. One day, Tito's owner, named Ana, put food in his food bowl and took him for a walk. When Tito came back from the walk, he saw that the food had disappeared.*
>
> *Then Tito thought: What can I do? So he started looking all over the garden for it. When he looked on the ground, he saw some leftover food near one of the plants and there was the mouse in its burrow! with all the food it had stolen. Tito tried to get in, but he couldn't fit through the door because it was such a small burrow. The dog was still so hungry that he wouldn't stop barking.*
>
> *Then the dog started to dig to make a bigger entrance, but there was a huge stone that prevented him from doing so. Then Tito, who was very stubborn, pulled out all his strength, removed the stone, and at last Tito reached the food. As he was very greedy, he began to eat very quickly, very quickly. But at that moment, when he looked at the mouse, he saw that he was very sad and thought: I'll share my food with him!*
>
> *Finally, the two animals were happy because they had managed to eat. And after that day, Tito always left some food in the garden for his friend the mouse.*

The narratives were segmented according to grammatical rules. The criterion for establishing a sentence was carried out using the rules of Spanish grammar. In this way, a distinction was made between 3 types of sentences: simple sentences, where there is a single central nucleus, a verb, and around it a subject. The subject can be present explicitly or intrinsically in the verb "lavaron el coche", and verbal periphrases are also included in these sentences; compound sentences, in which two simple sentences with a central nucleus in each, and independent of each other, are joined by a conjunction "and/or" (coordinated) or a punctuation mark (juxtaposed); finally, complex sentences, which comprise the subordination of a secondary sentence with respect to another main sentence within the same production. The analysis of complex sentences is valuable because it indicates the participants' ability to integrate, elaborate and subordinate a secondary sentence with respect to the main sentence, while maintaining grammatical rules and meaning (Castilla-Earls and Eriks-Brophy, 2012).

Within the subordinate clauses, 3 modalities of action of the secondary sentence with respect to the main sentence were distinguished: noun subordinate, adjective/relative subordinate and adverbial subordinate (time, manner, cause, end and place). The score for this analysis was 1 point for the production of each sentence and 0 points if there was no production in any of the 3 categories; finally, the total number of sentences produced was collected.

On the other hand, ungrammaticality was analysed through the production of categorical errors that make up ungrammatical sentences and the presence of functional errors within the sentences, hereafter referred to as sentences with grammatical errors. Agrammatical sentences have categorical errors that make them imprecise, ambiguous, incoherent; in short, they make it impossible to access their meaning and identify who performs the actions or what the consequences are.

Grammatical errors, on the other hand, affect the functionality of the linguistic elements within a sentence, but do not alter its comprehension. Errors are classified as morphological and syntactic according to their nature; the former affect the rules of agreement and the latter include errors of substitution, omission and addition, mainly of the functional lexicon (Castilla-Earls and Eriks-Brophy, 2012; Jackson-Maldonado et al., 2013). Table 2 shows examples of the complete classification of ungrammatical sentences and sentences with grammatical errors used in our study:

Table 2

Agrammaticality

Ungrammatical element		Examples
Agrammatical sentences		When I came there, the food was full. There was a stone, a stone that did not try to jam.
Morphological matching error		The comidita was not there. The dog was looking for her.
Syntactical Errors	Omissions	The dog (went) to get the food. (The) little mouse took the food quickly. The dog saw the food, but did not take it. The dog was so strong that he had to dig fast. He dug (with) all his might.
	Substitutions	The dog saw the mouse with his food. He shared the food and (because) the mouse was sad. He pulled for (with) his strength and pulled it out.
	Addendum	His owner Ana took him for a walk. The mouse was taken away by the food. The dog was looking for food everywhere.

Procedure for intervention in narrative skills

The implementation of the intervention programme took place between January and March 2019 (11 weeks) with a total of 55 sessions of 20 minutes, preferably in the early morning hours. The teacher was in charge of intervening four times a week in the context of the regular classroom. For her part, the hearing and language teacher carried out one day a week the specific intervention in her classroom, reinforcing the work developed by the tutor, with students with TDL and DT.

Given that research has shown that both group and individual intervention are effective for students with TDL (Benjamin et al., 2019), the programme was organised under a *Multi-Tiered System of Supports* (MTSS) that allows for early detection and intervention for students with language difficulties, as well as promoting the generalisation of learning by providing numerous communicative and linguistic opportunities in the school context, through 3 levels of action.

In the first level, the intervention programme was carried out with the whole group in the regular classroom context. In the second level, work was carried out in small groups (2-5 members) still in the regular classroom, following the same activities as in level 1. The third level took place outside the classroom context, in the hearing and language teacher's work space, in which 3 schoolchildren participated, one of them with TDL and two children with TD (the TD of the study and a second TD); they were always the same to avoid expectation and to create a stable working habit. In these situations, the aim was to offer more repeated practice of the contents worked on in the regular classroom on grammatical expression.

The activities presented a gradual structure of complexity, beginning with the ordering and narration of sequences and scripts; discussions in large and small groups on the topics worked on; retelling of stories using connectors to facilitate the elaboration of complex sentences and graphic support to guide narrative production; open and closed questions with the use of abstract vocabulary; identification and oral production of causal and temporal relationships in which the use of complex syntax is a fundamental requirement for their successful elaboration; the use of concept maps related to the stories worked on to support the elaboration of complex sentences and graphic support to guide narrative production; identification and oral production of causal and temporal relationships in which the use of complex syntax is a fundamental requirement for their successful presentation; the use of concept maps related to the stories worked on to support the elaboration of the linguistic production required to carry out the retellings; and dramatisation of the text, with this activity the linguistic skills were put into operation, as it entails good training in vocabulary, syntax and in the skills of narrative production and comprehension.

Also, following the contributions of Gillam et al. (2008), Gillam and Gillam (2016), Spencer and Petersen (2020) and Favot (2021) for the design of narrative intervention programmes, the content of the intervention was organised in a stepwise sequence. First, the cognitive schema or formal structure of a story is constructed. From there, it is possible to delve into other aspects of a more macro- and micro-structural nature. A hybrid approach was followed with a combination of implicit and explicit intervention techniques: recast or reformulation, extensions, open questions, vertical structuring and imitation. In turn, learners were offered a set of resources based on visual support such as pictographic planning and the use of icons (simple drawings or sketches of the story accompanying the icons to represent characters, place, initial event or problem, internal response or feelings, plan, action, complication and consequences).

Data collection and analysis procedure

First, an overall MANOVA was conducted to determine the significance of the formal structure of narrative discourse and an ANOVA for each dependent variable studied with the pretest measures, which allowed us to assess the initial differences between the groups and thus establish the baseline. Subsequently, an overall MANOVA and an ANOVA for each dependent variable was conducted with the pretest-posttest difference for each dependent variable studied to determine whether there were differential gains after the intervention. As a preliminary step for all contrasts performed, homogeneity of variances

was determined using Levene's test. In the contrasts that showed heterogeneity, Welch's robust test was used. Orthogonal contrasts were performed as post-hoc comparisons in those assessments that showed significant differences, to identify between which groups the differences were between. A generalised η^2 was used as an indicator of effect size for both main effects and simple effects ANOVAs. A η^2 around .01 is generally considered a low effect, a η^2 around .06 indicates a medium effect, and a η^2 greater than .14 is already a large effect. All analyses were conducted using SPSS v26.

Results and discussion

First, the analysis of grammatical expression was carried out. Table 3 shows the descriptive statistics of the four groups for the pretest and post-test results for sentence types, as well as the gains obtained after the intervention programme.

Table 3

Descriptives for pre-test and post-test measures and gains in each type of sentence.

	TDL-C			**DT-C**			**TDL-T**			**DT-T**		
	Pre ***M*** ***(SD)***	**Post** ***M*** ***(SD)***	**Gan.** ***M*** ***(SD)***	**Pre** ***M*** ***(SD)***	**Post** ***M*** ***(SD)***	**Gan.** ***M*** ***(SD)***	**Pre** ***M*** ***(SD)***	**Post** ***M*** ***(SD)***	**Gan.** ***M*** ***(SD)***	**Pre** ***M*** ***(SD)***	**Post** ***M*** ***(SD)***	**Gan.** ***M*** ***(SD)***
Simple	2.0 (2.6)	2.1 (2.5)	0.1 (3.6)	4.3 (2.0)	3.4 (2.3)	-0.9 (2.5)	1.5 (3.0)	3.4 (2.5)	1.9 (3.4)	4.2 (2.6)	6.1 (2.2)	1.9 (3.1)
Coordinates	1.0 (0.9)	0.8 (1.0)	-0.2 (1.4)	2.3 (1.3)	1.3 (1.3)	-1.0 (1.7)	1.2 (1.5)	1.1 (1.1)	-0.1 (1.6)	2.5 (1.6)	1.8 (1.0)	-0.7 (1.7)
Juxtaposed	0.1 (0.3)	0.0 (0.2)	-0.1 (0.4)	0.5 (0.6)	0.3 (0.6)	-0.2 (0.8)	0.1 (0.4)	0.2 (0.5)	0.1 (0.6)	0.7 (0.8)	0.3 (0.5)	-0.4 (0.9)
Substantive	1.7 (1.1)	1.8 (1.5)	0.1 (1.6)	2.7 (1.1)	2.8 (2.1)	0.1 (2.2)	1.8 (0.7)	2.9 (1.1)	1.1 (1.3)	2.5 (1.1)	3.7 (1.7)	1.2 (2.2)
Relative	0.9 (0.5)	1.6 (1.0)	0.7 (1.2)	1.4 (0.9)	2.0 (1.2)	0.6 (1.3)	0.9 (0.3)	1.5 (0.7)	0.6 (0.8)	1.2 (0.6)	2.0 (0.9)	0.8 (1.0)
Adverbials	0.3 (0.6)	0.5 (0.6)	0.2 (0.8)	1.0 (1.1)	1.2 (1.1)	0.2 (1.6)	0.1 (0.3)	0.5 (0.8)	0.4 (0.8)	0.9 (0.9)	1.4 (1.2)	0.5 (1.5)
Composed	1.1 (1.0)	0.9 (1.1)	-0.2 (1.3)	2.8 (1.5)	2.6 (1.5)	-0.2 (2.0)	1.4 (1.6)	2.5 (1.3)	1.1 (1.6)	3.2 (2.0)	4.1 (1.2)	0.9 (2.2)
Complex	1.0 (1.3)	2.1 (1.9)	1.1 (1.7)	2.7 (2.2)	3.7 (2.6)	1.0 (2.7)	0.9 (0.9)	3.4 (1.6)	2.5 (1.7)	2.0 (1.5)	5.0 (2.1)	3.0 (2.3)

Notes: TDL-C = Control group of children with TDL. DT-C = Control group of typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children.

Figure 1 also shows graphically the pre- and post-treatment means obtained, where the TDL treatment group shows gains in all sentence types except for *Coordinate* sentences.

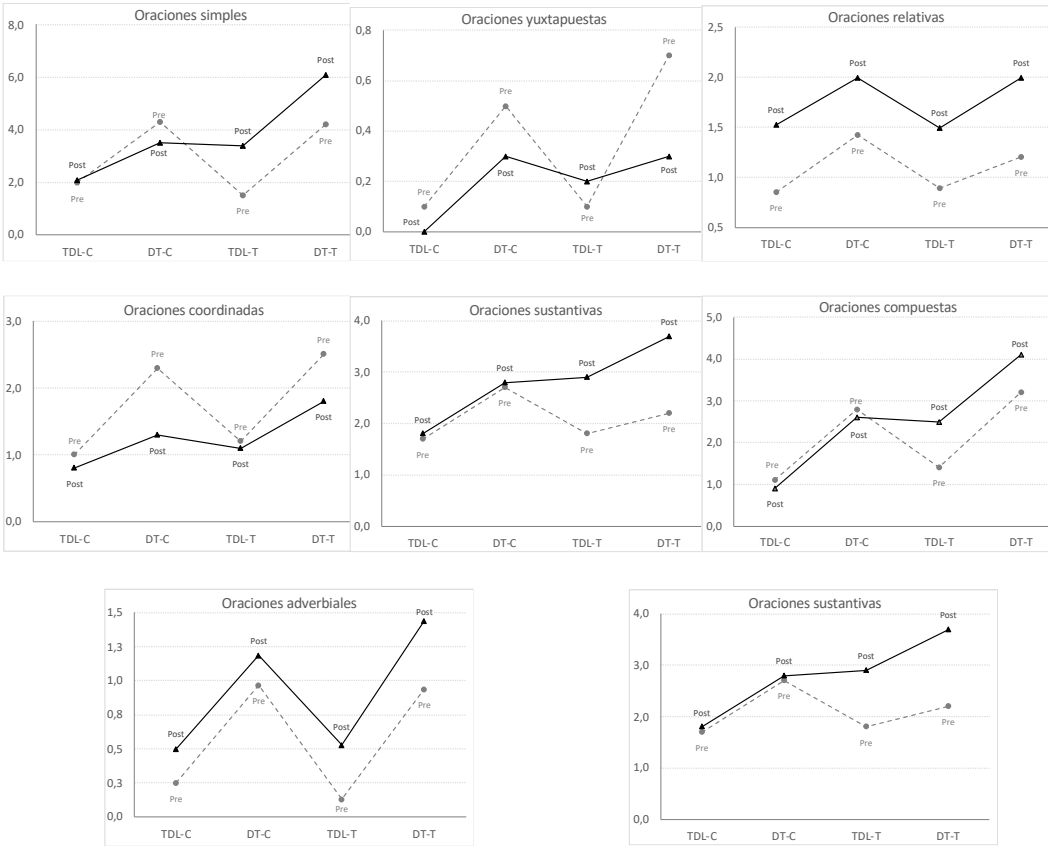


Figure 1. Means for pre-test and post-test measures for each type of sentence.

Table 4 shows an ANOVA for each type of sentence before applying the intervention programme. As can be seen, all show significant differences with a large effect size.

Table 4

ANOVAs: Main effect and orthogonal contrasts of the pre-tests on each sentence type.

			TDL-C vs DT-C		**TDL-C vs TDL-T**		**TDL-C vs DT-T**		**DT-C vs TDL-T**		**DT-C vs DT-T**		**TDL-T vs DT-T**	
	F	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**
Simple	10.3***	20	13.2***	10	0.5	00	11.9***	09	18.8***	13	0.0	00	17.2***	12
Coordinates	9.3***	18	14.5***	11	0.7	01	19.0***	13	9.0**	07	0.0	00	12.5***	09

Juxtaposed	8.0***	16	6.2*	05	0.0	00	16.6***	12	6.2*	05	2.5	02	16.6***	12
Substantive	7.1***	15	15.1***	11	0.4	00	9.6**	08	10.7***	08	0.6	01	6.2*	05
Relative	6.4***	13	14.3***	10	1.1	01	5.5*	04	12.2***	09	2.1	02	4.2*	03
Adverbials	10.0***	20	13.1***	10	0.4	00	12.0***	09	18.0***	13	0.0	00	16.7***	12
Composed	13.5***	25	17.8***	13	0.4	00	27.7***	18	12.7***	09	1.1	01	21.3***	15
Complex	9.7***	19	19.1***	13	0.1	00	6.4*	05	21.2***	15	3.4	03	7.6**	06

Notes: TDL-C = Control group of children with TDL. DT-C = Control group of typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children. *p ≤ .05. **$p \leq .01$. ***$p \leq .001$.

On all indicators, the two groups of TDL children (TDL with treatment and TDL without treatment) showed significantly lower scores than the two groups of TD children (Control with treatment and Control without treatment) with medium or large effect sizes. Meanwhile, the equivalent groups TDL-T with TDL-C and DT-T with DT-C showed no differences between them.

Table 5 shows an ANOVA on the gains obtained for each type of sentence after applying the intervention programme. As can be seen, four sentence types (*simple*, *compound*, *noun* and *complex)* showed significant differences, all with large effect sizes. In these sentence types, the two groups with treatment showed greater gains than the two groups without treatment with medium or large effect sizes, with these two intervention groups showing a similar level of gains.

Table 5

ANOVAs: Main effect and orthogonal contrasts of the gains in each type of sentence.

			TDL-C vs DT-C		**TDL-C vs TDL-T**		**TDL-C vs DT-T**		**DT-C vs TDL-T**		**DT-C vs DT-T**		**TDL-T vs DT-T**	
	F	**η²**	**F**	**η²**	**F**	**η²**	**F**	**η²**	**F**	**η²**	**F**	**η²**	**F**	**η²**
Simple	6.3***	13	1.8	01	5.2*	09	4.9*	04	13.1***	10	12.6***	09	0.0	00
Coordinates	1.8	04												
Juxtaposed	2.1	05												
Substantive	3.6*	08	0.0	00	5.2*	04	6.4*	05	4.3*	03	5.5*	04	0.1	00
Relative	0.3	01												
Adverbials	0.4	01												
Composed	4.9**	11	0.1	00	8.9**	07	7.2**	06	7.3**	06	5.8*	05	0.1	00
Complex	6.8***	14	0.0	00	6.7*	05	12.4***	09	7.4**	06	13.3***	10	0.9	01

Notes: TDL-C = Control group of children with TDL. DT-C = Control group of typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children. **p ≤ .05. **$p \leq .01$. ***$p \leq .001$.

The results for ungrammaticality are presented below. Table 6 shows the descriptive statistics for the pre-test and post-test measures and gains in each type of *grammatical error* and in the *agrammatical sentences*.

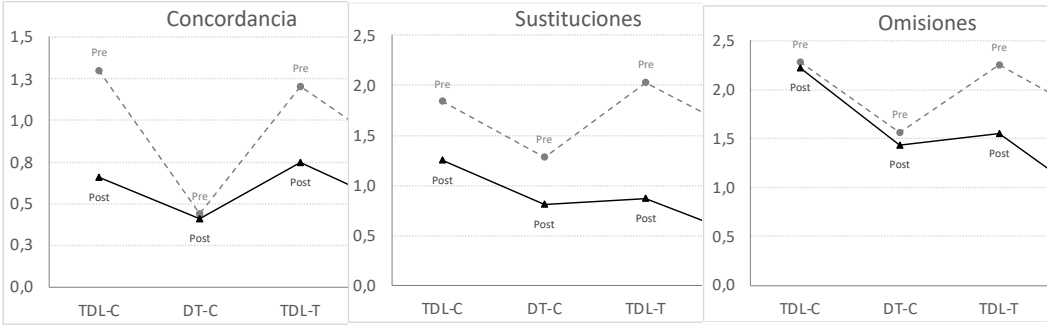
Table 6

Descriptives for pre-test and post-test measures and gains in each type of grammatical error and in ungrammatical sentences.

	TDL-C			**DT-C**			**TDL-T**			**DT-T**		
	Pre *M* *(SD)*	**Post** *M* *(SD)*	**Gan.** *M* *(SD)*	**Pre** *M* *(SD)*	**Post** *M* *(SD)*	**Gan.** *M* *(SD)*	**Pre** *M* *(SD)*	**Post** *M* *(SD)*	**Gan.** *M* *(SD)*	**Pre** *M* *(SD)*	**Post** *M* *(SD)*	**Gan.** *M* *(SD)*
CO	1.3	0.7	-0.6	0.4	0.4	0.0	1,2	0.8	-0.4	0.8	0.5	-0.3
	(0.7)	(1.1)	(1.1)	(0.7)	(0.7)	(0.9)	(0.7)	(0.4)	(0.8)	(0.8)	(0.7)	(1.0)
OM	2.3	2.2	-0.1	1.6	1.4	-0.2	2.3	1.6	-0.7	1.7	0.8	-0.9
	(1.3)	(1.0)	(1.7)	(0.6)	(0.8)	(1.0)	(0.5)	(0.8)	(0.6)	(0.9)	(0.3)	(1.0)
SU	1.8	1.3	-0.5	1.3	0.8	-0.5	2.0	0.9	-1.1	1.5	0.5	-1.0
	(0.3)	(0.5)	(0.5)	(0.6)	(0.4)	(0.7)	(0.7)	(0.3)	(0.7)	(0.3)	(0.3)	(0.3)
AD	0.4	0.4	0.0	0.3	0.2	-0.1	0.5	0.2	-0.3	0.7	0.4	-0.3
	(0.7)	(0.8)	(1.0)	(0.5)	(0.5)	(0.6)	(0.7)	(0.4)	(0.8)	(1.1)	(0.6)	(1.1)
OA	2.8	2.2	-0.6	1.7	0.5	-1.2	2.5	1.6	-0.9	1.7	1.0	-0.7
	(2.2)	(2.2)	(3.0)	(1.1)	(0.8)	(1.3)	(2.2)	(1.7)	(2.3)	(1.8)	(0.7)	(1.8)

Notes: TDL-C = Control group of children with TDL. DT-C = Control group of typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children. CO = Morphological errors of concordance. OM = Syntactic errors of omission. SU = Syntactic substitution errors. AD = Syntactic errors of addition. OA = Agrammatical sentences.

Likewise, in Figure 2, we can graphically observe the means obtained pre- and post-treatment, where the TDL treatment group shows a decrease in the production of *grammatical errors* and in *ungrammatical sentences*, except in *syntactic errors of addition*, which are maintained.



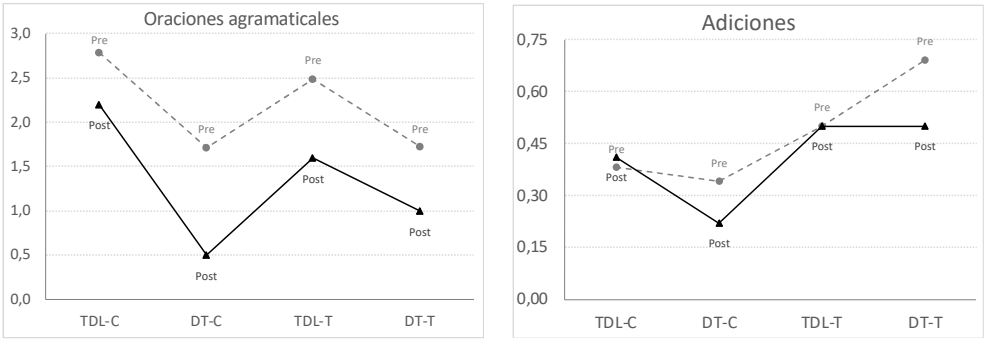


Figure 2. Means for pre-test and post-test measures for each type of grammatical error.

Table 7 shows an ANOVA for each type of *Grammatical Error* and for *Grammatical Sentences*. As can be seen, all errors, except *Syntactic addition errors*, showed significant differences with a large effect size.

Table 7

ANOVAs: Main effect and orthogonal contrasts of the pre-tests on each type of grammatical error and on the ungrammatical sentences.

			TDL-C vs DT-C		**TDL-C vs TDL-T**		**TDL-C vs DT-T**		**DT-C vs TDL-T**		**DT-C vs DT-T**		**TDL-T vs DT-T**	
	F	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**	***F***	**η²**
CO	10.0***	20	23.4***	16	0.3	00	8.5**	06	18.6***	13	3.7	03	5.7*	04
OM	5.9***	13	11.1***	08	0.0	00	7.4**	06	10.1**	08	0.4	00	6.6*	05
SU	9.8***	19	13.57***	10	1.6	01	5.0*	04	24.3***	16	2.1	02	12.1***	09
AD	1.2	03												
OA	2.7*	06	5.3*	05	0.4	00	5.1*	04	2.8	02	0.0	00	2.7	02

Notes: TDL-C = typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children. CO = Morphological errors of concordance. OM = Syntactic errors of omission. SU = Syntactic substitution errors. AD = Syntactic errors of addition. OA = Ungrammatical sentences. *p ≤ .05. **$p \leq .01$. ***$p \leq .001$.

In all errors showing differences, the two groups of TDL children (TDL with treatment and TDL without treatment) showed significantly lower scores than the two groups of TD children (Control with treatment and Control without treatment) with a large effect size. While the equivalent groups, TDL-C with TDL-T on the one hand and DT-C with DT-T on the other hand, showed no differences between them.

Table 8 shows an ANOVA for each type of *Grammatical Error* and for *agrammatical Sentences*. As can be seen, only *Syntactic errors of omission* and *Syntactic errors of substitution* showed significant differences with a large effect size.

Table 8

ANOVAs: Main effect and orthogonal contrasts of the gains in each type of grammatical error and in ungrammatical sentences.

			TDL-C vs DT-C		**TDL-C vs TDL-T**		**TDL-C vs DT-T**		**DT-C vs TDL-T**		**DT-C vs DT-T**		**TDL-T vs DT-T**	
	F	**η^2**	***F***	**η^2**	***F***	**η^2**	***F***	**η^2**	***F***	**η^2**	***F***	**η^2**	***F***	**η^2**
WITH	1.9	04												
IMO	3.1*	07	0.1	00	3.8*	03	6.1*	05	3.0	02	5.1*	04	0.3	00
YOUR	6.4***	13	0.4	00	9.5**	07	5.6*	04	13.7***	10	8.8**	07	0.5	00
ADI	0.4	01												
OGR	1.3	03												

Notes: TDL-C = Control group of children with TDL. DT-C = Control group of typically developing children. TDL-T = Experimental group of children with TDL. DT-T = Experimental group of typically developing children. CON = Morphological concordance errors. OMI = Syntactic errors of omission. SUS = Syntactic substitution errors. ADI = Syntactic errors of addition. OGR = Ungrammatical sentences. *p ≤ .05. **p ≤ .01. ***p ≤ .001.

Discussion

The results presented above show that the first of the hypotheses has been demonstrated, since students with TDL show a lower production of complex sentences in grammatical expression than students with TD. These results are interesting because they highlight the inability of students with TDL to produce sentences which are integrated into the main sentence and which also help to provide coherence in narratives (Pavez et al., 2008). However, although these results are supported by previous research in both Spanish-speaking (Jackson-Maldonado et al., 2013) and English-speaking (Botting, 2002) students, there are also contradictory data indicating that there are no significant differences in complex sentences (Coloma, 2012). Despite this, most of the literature shows a poor development of complex morphosyntax in students with TDL, which oscillates between a deficit model with slow growth and a cumulative delay model (Valle et al., 2018).

It should also be noted that students with TDL in the present study show greater agrammaticality than students with TD, as defined in the second hypothesis. This finding is contrasted in previous research such as those carried out by Coloma (2012), Jackson-Maldonado et al. (2013) and Valle et al. (2018). This finding is not surprising as it is a typical feature of this disorder. It has been very common to find frequent grammatical errors in

the narratives of students with SLD, commonly explained by their limited processing skills and a certain blindness to syntactic features (Leonard, 2014). All this contributes to the fact that their productions may involve categorical errors (incomprehensible, disorganised sentences) and functional difficulties affecting sentence elements in the form of omissions, substitutions and additions. As stated in the study by Valle et al. (2018), this circumstance makes discourse coherence difficult for learners with TDL and may even be incomprehensible to the listener.

As for the third hypothesis, it could be verified given that the two groups TDL-T and DT-T who received the intervention programme made greater gains in the type of sentences (simple, compound, noun and complex). The increase in the structural complexity of the students' sentences can be considered a significant achievement. It is estimated that once a minimum level of syntactic complexity has been achieved, rapid generalisation will occur (Leonard, 2014). It is important to highlight this fact as very relevant, since with a methodology that favours a hybrid intervention, based on play and intervention techniques such as recast, extensions, vertical structuring or imitation, very important results are achieved. The professionals incorporate new information with a more complex syntax into the children's production, correct it and extend it to add new structures, while the pupils establish comparisons and hypotheses between their syntax and the adult forms. In addition, the repetition of linguistic structures strengthens language processing. Learners who receive the programme actively participate in meaningful language experiences and begin a gradual adjustment of their language to an increasingly complex pattern (Freeman, 2023).

Along with the above, there is a decrease in the TDL-T group in ungrammatical sentences and in the main types of grammatical error, i.e. omissions and substitutions. The decrease in categorical and functional errors means considerable progress in syntactic processing (decrease in incomprehensible sentences, changes of order and omission errors), which is vital to ensure the development of students with TDL. In short, achieving progress in morphosyntactic organisation makes it possible to consolidate the different types of sentence so that they can be produced without difficulties in both categorical and functional elements.

Limitations and foresight

The results obtained in the present research are encouraging, but there are also some limitations. It is indeed an initial step in examining the role that storytelling intervention can play in improving grammaticality in TDL learners. It would probably have been desirable to measure the impact of the programme on everyday language use, in situations of interaction and relationship with the environment. In addition, grammatical skills were only recorded before and after the intervention, but it would have been desirable to carry out a new assessment some months after the end of the programme.

For the future it would be good to have more control over the number of times an intervention strategy needs to be used to achieve a particular syntactic goal, in the direction of a stronger connection to evidence-based practice.

Conclusions

After the results obtained and analysed, several conclusions can be drawn which are directly connected with the objectives of this research. Firstly, there is a lower structural length and syntactic complexity in students with TDL, a circumstance that compromises their grammatical expression. Together with this, there is a greater presence of agrammaticality when compared with the TD group, which, if action is not taken early, would cause a considerable limitation in their linguistic, cognitive and academic progress. Secondly, however, the intervention programme improved the production of simple, compound and complex sentences (specifically noun subordinate clauses) in the TDL-T and DT-T groups, but was not effective in improving the performance of adverbial and adjective subordinate clauses. With respect to the production of agrammatical sentences, no significant differences in gains were shown between the different groups. However, considering the data from a qualitative perspective, it could be argued that there was a decrease in these categorical errors, which also affected the two groups that received the intervention programme. As for grammatical errors, a considerable decrease in omissions and substitutions was achieved in the two groups receiving the programme, but there was no significant difference when their respective gains were compared. Finally, the progress of students with TDL may contribute to neutralising their problems in communication, social-emotional relations and academic progress, serving as a stimulus for greater inclusion and quality of life.

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