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Developing Analytical Writing: Learning to Connect Information, Learning to Take a Stance

El desarrollo de la escritura analítica: aprender a enlazar la información, aprender a posicionarse

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Abstract

The development of analytical writing requires mastery of specialized linguistic forms and functions. Students of all educational levels have problems with the organization of information and the use of specific formal resources. We focus on intra-sentential connectives and discourse markers that contribute to text cohesion and guide the logical-semantic relationships between units of discourse, as they are considered predictors of writing development and indicators of text quality. We analyze the texts produced by 128 Catalan high school and university students in order to identify the difficulties they have in establishing connectivity and defining developmental trajectories. The texts were produced after implementing a didactic sequence on academic writing. We examine the repertoire of markers (conjunctions, parenthetical markers, lexical markers) and the discursive functions they perform (propositional, structural, modal). The results show differences between the two groups in the use of conjunctions, which are used more frequently by high school students, and parenthetical markers, which are more commonly used by university students. With regard to discourse functions, differences between the groups also appear in modal markers. The structural efficacy and coherence of a text are related to proficient use of connectivity markers, their function within a text, and the expression of the writer's stance. The use of structural markers is uncommon for both groups, but university students are more willing to use them in order to express their stance.

Keywords: analytical writing, intra- & inter-sentential connectivity, connectives, discourse markers, later language developments

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Resumen

Estudiantes de todos los niveles muestran problemas con ciertas convenciones del discurso escrito consideradas indicadoras de desarrollo y predictoras de la calidad de los textos: la organización de la información y el uso de recursos específicos. El uso de conectores y marcadores discursivos contribuye a la cohesión del texto y guía la interpretación de las relaciones entre sus componentes. Analizamos los textos analíticos en catalán de 128 alumnos de secundaria y universitarios para identificar las dificultades y las trayectorias evolutivas en la conexión intra e interoracional. Los textos fueron producidos tras aplicar una secuencia didáctica sobre escritura académica. Examinamos el repertorio de marcas de conexión (conjunciones, marcadores parentéticos, marcadores léxicos) y las funciones que desempeñan (proposicional, estructural, modal). Las diferencias entre grupos aparecen 1) en el uso de conjunciones, más empleadas en secundaria, y marcadores parentéticos, en universitarios, y 2) en las funciones de marcadores modales que expresan el posicionamiento del autor. La coherencia de los textos depende del uso de marcas de conexión, su función en la estructura textual y el posicionamiento del autor. Aunque las marcas de conexión interoracional de adolescentes y adultos son escasas, la expresión del posicionamiento discursivo por medio de marcadores modales sí evoluciona.

Palabras clave: escritura analítica, conexión intra e interoracional, conectores, marcadores del discurso, desarrollos posteriores del lenguaje

Introduction

When students start their academic life, they must become familiar with the conventions of analytical writing, which is to say, the language of texts produced in academic contexts (Schleppegrell, 2004; Snow & Uccelli, 2009). The term 'analytical writing' typically refers to texts that are focused on analysis and argumentation (Schleppegrell, 2004; Uccelli, Deng, Phillips Galloway, & Qin 2019), with components that are both expository and argumentative, which require the appropriate use of specific linguistic forms and functions (Ruiz Bikandi & Tusón, 2002)[1], the quality and effectiveness of which have direct social and academic consequences on students' chances of access to higher education and promotion in qualified professional fields (Uccelli et al., 2015). Compared with less cognitively complex discursive genres that appear developmentally earlier, such as narrative, analytic genres are characterized by the author's need to express their point of view on a theme, present arguments for and against, and provide adequate evidence or possible refutations (Toulmin, 2002). The expected result is for the reader to share the author's perspective, having been persuaded by the strength of their argumentation (Driver, Newton, & Osborne, 2000).

Production of this type of texts is a constant concern for teachers of all levels and disciplines, because, although they are introduced in elementary education and—in the Spanish educational system—are specifically taught and addressed in compulsory secondary and pre-university education, they cause difficulties for students that persist into their transition to university education and even beyond. Various developmental studies show that difficulties

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1. The paper includes the results of the research project *Posicionament i Informació (PI): La forma i el fons dels textos analítics en educació secundària i educació superior.* IP.: E. Rosado (PI-REDICE-18-1920; Institut de Desenvolupament Professional - Institut de Ciències de l'Educació, Universitat de Barcelona).

in writing effective argumentative texts do not end when students enter university (Bañales, Vega, Araujo, Reyna, & Rodríguez, 2015; Carlino, 2005; Castelló, 2007). Indeed, a not inconsiderable number of graduate students and novice researchers experience difficulties in writing academic papers and scientific reports (Gavari & Tenca, 2017).

The problems commonly identified by teachers of all educational levels in their students' texts are commonly related to: 1) learning the conventions of written discourse in relation to the organization of information and the competent use of the linguistic forms and functions characteristic of this type of texts, and 2) "flexible use of a repertoire of later-acquired lexico-grammatical and discourse forms to organize ideas and express a stance in a variety of school texts" (Uccelli, Dobbs, & Scott, 2013, p. 39). Adopting a clear discursive stance and presenting an argument require the author to have developed critical thinking that allows them to take a position with regard to specific topics, but, they must also recognize and utilize the resources that their language offers to argue for or against an idea. In analytical texts, authors are expected to be capable of using diverse but accurate vocabulary, condensing information through syntactic complexity or nominalizations, for example, and also making the organization of the discourse clear by using intra- and inter-sentential connective markers, which indicate not only textual transitions, but also the author's stance (Aparici, Cuberos, Salas, & Rosado, 2021; Schleppegrell, 2004; Snow & Uccelli, 2009).

Inter-sentential connective markers indicate the relationships established between discourse components that are larger than a sentence (Aparici, Rosado, & Salas, 2016; Aparici et al., 2021; Choi, 2007), and the ability to make these relationships clear by means of these elements, discourse markers, occurs late in development (Katzenberger & Cahana-Amitay, 2002). Intra-sentential connectives, on the other hand, help signal the relations between clauses and are also a late development.

The use of explicit connectives (e.g., conjunctions in coordinate and subordinate sentences or discourse markers in inter-sentential connections) is a complex cognitive development that takes place relatively late in the process of language acquisition (Aparici, 2010; Berman, 1988). Moreover, development of this skill is directly influenced by discourse genre in the same way as the development of general text production (see Aparici, 2010; Berman, 2008; Rosado et al., 2014, Aparici, Rosado, & Oliver, 2014). Thus, characteristics related to syntactic complexity vary across genres, and, for example, while complex nominal syntagms are preferably used in analytical genres that are typical of academic contexts, subordination that goes beyond the modification of these syntagms is more typical of other genres (Biber & Gray, 2010; Biber, Gray, Staples, & Egbert, 2020). However, in most studies on the development of discourse, subordination, understood as a measure of grammatical complexity, is seen as a sign of maturity that is characteristic of non-narrative genres (e.g., expository or argumentative texts). Studies such as that by Aparici et al. (2016) or Cuberos (2019) support both the influence of discourse genre on the use of discourse markers and the relevance of these forms in genres with an expository component, such as the ones which we are addressing (Montolío, 2001).

Discourse markers and syntactic complexity achieved through the use of intra-sentential connectives both provide valuable information when assessing a text. Their use determines the perception of the quality of its structure, the soundness and efficacy of the arguments made, the reasoning and conclusions proposed, or, decisively, the logical-semantic relationships established between the parts of the discourse. By definition, syntactic connectives and discourse markers contribute to the cohesion of a text and function as a guide to interpret the relationships between the parts of the text (Givón, 1992; Hyland, 2002).

In previous studies that consider the use of intra-sentential connectives and inter-sentential markers separately, different developmental patterns have been identified for both types of elements (Aparici, 2010; Tolchinsky, Aparici, & Salas, 2011; Aparici et al., 2014; Rosado, Aparici, Horcada, Cuberos, & Salas, 2017). However, recent studies that consider intra- and inter-sentential connection marker together, following criteria that are eminently functional, have produced results that point to the advantages of employing criteria that go beyond the formal.

Following the approach of Cuenca (2006; 2013), the work of Gras, Galiana, and Rosado (2020) compares the use of intra- and inter-sentential connection markers by native and non-native speakers of Spanish classified into three discourse macro-functions: propositional, structural, and modal (see the section on Categories and Criteria of Analysis). According to the results, the differences in use between the two populations are determined by the interaction between the syntactic or discursive role of these forms and the nature of the function they perform. While very few differences are observed in the case of markers with a propositional function, non-native speakers have more problems in assigning the appropriate discourse values when using modal and structural connectives.

In previous research, in addition to possible developmental changes, we have attempted to identify how students of different educational levels are sensitive to specific pedagogical work on the characteristics of analytical writing (Aparici et al., 2021). With respect to the use of markers, the results indicate that an analysis of discourse markers that dispenses with semantic or functional criteria could partly explain why no significant differences are observed: the use of markers turns out to be an 'umbrella' category that is too broad to be able to capture the multiple nuances of these elements.

However, when looking at semantic-functional criteria, as in the study by Aparici et al. (2014) on oral and written texts, the results allow us to identify developmental patterns and also reveal an effect of the modality of production that suggests that cohesion in written texts relies to a greater extent on other linguistic resources such as syntactic connectors than cohesion in oral texts.

As we can see, and based on results such as those described above, there are greater benefits from employing functional criteria that are capable of revealing developmental changes in the syntax-discourse interface in addition to the usual formal criteria (Brandes & Ravid, 2019) and thus having a more complete and adjusted perspective.

In this study we examine how high school and university students connect the information provided in analytical texts. On the one hand, we are interested in describing the use of connective elements that operate at the sentence level and at the discourse level (intra- and inter-sentential connection), and, on the other, we want to identify how these forms perform specific discursive functions when offering arguments, evidence, and examples in order to convince the potential reader of the validity of their arguments. For this purpose, the analytical texts were collected in a pedagogically controlled and ecologically valid context; the application of the same didactic sequence and the use of the same activities and materials in the two groups of participants allow 1) the input they receive to be explicitly controlled and 2) a comparable corpus in the two age groups.

Thus, with the aim of describing and classifying the way in which information is connected in analytical texts written by high school and university students, we proposed to 1) identify the uses of connective markers used by the participants in the two age groups at the intra- and inter-sentential level (forms) and 2) describe how information is introduced and related by establishing specific logical-semantic relationships (functions).

Given that validated tools for specific assessment of the quality of analytical texts are not yet available in these contexts, we expect our results to provide information on which connective markers cause most problems for students of different levels that would therefore deserve special attention for the design of pedagogically informative assessment tools (Uccelli, Dobbs, & Scott, 2013).

Method

Participants

The study involved the participation of 128 students from two educational levels: the fourth grade of Compulsory Secondary Education (ESO) (equivalent to 10th grade in the United States) and the first years of university-level education. The participants lived in Barcelona or the surrounding area and belonged to six class-groups from four schools and two class-groups from a university. The sample consisted of 72 (34 females, 38 males) secondary school students (M = 15.80 years of age [18.00;15.10]) and 56 (42 females, 14 males) university students (M = 20.01 years of age [24.80;19.10]). No participants were excluded because of their sociolinguistic background, and none of them had known learning or behavioral difficulties[2].

Due to the importance of sociodemographic and sociolinguistic variables in the development and production of writing, we collected this information by means of a questionnaire[3]. The language in which the participants' texts were written was Catalan, which is also the language of the school in our context (Catalonia, Spain). Through the sociolinguistic questionnaire applied, we found that all of the participants were bilingual in Catalan and Spanish to some extent (Tolchinsky, Aparici, & Vilar, 2021)[4].

Materials and Procedure

The texts analyzed were written after the application of a didactic sequence designed to sensitize the participants to the characteristics of academic writing (Aparici et al., 2021). In seven sessions, the participants carried out a set of activities during regular classes with their teacher, who had received training on the implementation of the activities and the execution of the tasks, respecting the study design to ensure the same pedagogical context for all groups. These activities included lectures on the topic addressed, class discussions, production of analytical texts, and assessment of fragments of texts by peers based on a subject, as well as reflection on key aspects of these texts, such as the adoption of different enunciative positions: author, reader, and evaluator (for more detail, see Alonso-Cortés, Llamazares, & Zapico, 2017).

During these sessions, each participant produced five texts: text 1 on topic A (freedom of dress), before beginning the didactic sequence; texts 2, 3, and 4 on topic B (freedom of movement between countries), respectively before, during, and immediately after the sequence; and text 5 on topic C (rewards and punishments), one month after the end of the didactic sequence. In this study we analyze Text 4.

The texts were written by the students on a computer, accessing a *Google Form* in which they were recorded. All texts (128) were transcribed and coded for analysis in CHAT format (CHILDES project; MacWhinney, 2000), and the data were analyzed using CLAN software (CHILDES project). The texts were separated into clauses as the basic unit of analysis, following the indications of Berman and Slobin (1994).

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2. The corpus was formed within the ESCANDILING project *Escritura analítica y diversidad lingüística: Cambios evolutivos y microevolutivos desde la educación primaria a la educación superior.* IP.: L. Tolchinsky, J. Perera. (EDU2015-65980-R; Ministerio de Economía y Competitividad).

3. The information on the linguistic experience of the participants was collected using the MUAQ (*Multilingual Use Assessment Questionnaire*), a questionnaire designed to assess multilingualism, carried out in the context of the ESCANDILING project to obtain information on sociolinguistic and socioeconomic aspects, and the general cultural habits of multilingual speakers (Aparici & García-Palau, 2019). The questionnaire emphasizes the uses of language in the family, school, and social environments for this type of population.

4. Informed consent was obtained from the participants or their parents/guardians in the case of minors, in accordance with the procedures specified for research projects in the UB regulations contained in its Code of Good Research Practices (http://diposit.ub.edu/dspace/bitstream/2445/28543/1/codibonespractiques_spa.pdf).

Categories and Criteria of Analysis

The tool that we used to analyze the connective markers in the texts is a taxonomy according to which these elements form a functional class that includes different types of words and which considers both lexical forms and discursive functions. Initially validated for Catalan, and based on the proposal of Gras et al. (2020), this taxonomy is defined according to two criteria[5]. Following strictly formal criteria, we identified 1) coordinate and subordinate conjunctions that connect units at the sentence level; 2) parenthetical markers, fixed lexical units that constitute a closed class and mostly coincide with traditional discourse markers (Martín Zorraquino & Portolés, 1999); and 3) lexical markers, which also operate at the discourse level, but constitute an open repertoire of elements that show a variable degree of grammaticalization (Cuenca, 2017); being prototypically metadiscursive, they are usually constituted by a clause that maintains its compositional meaning and can be replaced by a parenthetical grammatical connective.

Meanwhile, from a functional perspective, we differentiated between three types of markers: 1) propositional, typically conjunctions that connect compound sentences and which articulate content such as addition, contrast, temporality, cause, consequence, etc.; 2) structural, which signal the demarcation of text units and generally imply discursive progress, for example, in the plot of the narrative or in the structure of the argument, in openings or closings, in reorientations or reformulations, or in the continuation of a theme or argument, etc.; and 3) modal, which express the stance of the author and typically indicate the link between the interlocutors or the attitude of the speaker, who uses them to express doubt, justifications, opinion, emphasis, etc.

All the connective markers were categorized according to the two criteria. In order to ensure the suitability of the tool, we carried out an interjudge reliability analysis for the identification and categorization of connective markers (four judges) for 20% of the texts. The results of the intraclass correlation coefficient (internal consistency) indicated a high degree of interjudge reliability (.845) with a 95% confidence interval (.845) (CI) [.21, .98].

Data Analysis

After coding the markers, we conducted an independent-samples t-test on the total number of connective markers in order to compare their use between the two educational levels. The analyses of the markers by form and function were conducted independently. Because the data did not fit the assumptions to apply normality and equality of variances, we used a mixed Friedman rank test of variance with the educational level as the inter-subject variable and the marker type as the intra-subject variable. All of the analyses were performed in the R computational environment (RStudio Team, version 3.5.2), using the ARTools (Wobbrock, Findlater, Gergle, & Higgins, 2011) and nparcomp (Konietschke, Placzek, Schaarschmidt, & Hothorn, 2015) packages.

Results

In order to provide a characterization of the texts that goes beyond the analysis of the connective markers being studied and to determine the frequency with which these elements are used, we first present measures referring to the length of the texts produced. Table 1 shows the descriptors of these measures: total number of words and clauses, total number of connective markers, and the proportion of these considering the total number of words in the texts, for each educational level.

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5. The tool was developed and validated as part of the project *Posicionament i Informació (PI): La forma i el fons dels textos analítics en educació secundària i educació superior.* IP.: E. Rosado (*PI-REDICE*-18-1920; Institut de Desenvolupament Professional - Institut de Ciències de l'Educació, Universitat de Barcelona).

Table 1
Length of the texts and use of markers. Secondary and university groups (mean and SD)

Educational level	Length				Connective markers			
	Nº of words		Nº of clauses		Nº of markers		Nº of marker / Nº of words	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Secondary (ESO)	238.16	74.42	20.65	16.19	11.22	4.33	4.83	1.64
University (UNI)	367.66	109.99	33.80	24.23	12.78	6.68	3.48	1.45

Source: Prepared by the authors.

With respect to the length of the texts, we observed that those produced by the UNI group have a greater average length than those written by the ESO group, both in terms of the number of words and the number of clauses, as well as having greater variability for the two length indicators. Comparison of means for two independent samples with Welch's correction between the two groups confirmed that the UNI group produces significantly longer texts than the ESO group in terms of the total number of words (t = -7.564, gl = 92.126, p < 0.001, d = 1.41, 95% CI [-163.49, -95.49]), with a difference greater than one standard deviation. The results for the same test on the total number of clauses confirm this significant difference (t = -3.498, gl = 91.323, p < 0.001, d = 0.65, 95% CI [-20.61; -5.68]), with a medium-high effect size in this case. Meanwhile, looking at the columns *Nº of clauses* and *Nº of markers*, we see that connective elements are present in an average of half (ESO) and one third (UNI) of the clauses in a text (see Table 1), indicating that these are elements that are used frequently.

Because the participants produced texts of different lengths, the analyses of the use of connective markers were carried out on the basis of the means of the proportions of connectors-markers considering the total number of words in each text. Although the texts of the university students contain a higher total number of markers than those of the secondary school group, after weighting the total use of markers by the length of the text, we observe that the relationship between the two groups is inverted, so the frequency of these elements in the ESO texts is actually higher than in the UNI texts. Comparison of the means of the proportions confirms that the secondary school students use a significantly higher proportion of markers, with a high effect size (t = 4.924, gl = 123.84, p < 0.001, d = 0.86, 95% CI [0.81, 1.90]); this suggests prolific use of markers in analytical texts written by secondary school students, but there is a readjustment in later stages of education. The results on the form and function of the markers identified in the texts will allow us to specify with which type of markers this readjustment occurs between the two groups of participants. The results of both analyses are shown below.

In order to analyze the use of the different types of intra- and inter-sentential connectives according to their form, we calculated the proportion of conjunctions, parenthetical markers, and lexical markers considering the total number of markers in each text, obtaining their distribution. Table 2 shows a summary of the descriptives of the distribution for the two age groups. While conjunctions are the most frequent type of marker in the secondary students' texts, the university students' texts show a higher proportion of parenthetical markers than other types. Lexical markers were the least commonly used by both groups. Meanwhile, conjunctions are more frequent in the ESO texts than the UNI texts, and the opposite is true for parenthetical markers.

Table 2
Distribution of the proportion of markers according to their form. Secondary and university groups (mean and SD)

Educational level	Type of marker					
	Conjunctions		Parenthetical		Lexical	
	M	*SD*	*M*	*SD*	*M*	*SD*
Secondary (ESO)	54.44	19.29	31.26	18.69	14.27	12.69
University (UNI)	38.92	19.47	48.55	17.99	12.52	11.92

Source: Prepared by the authors.

To confirm the existence of significant differences in the distributions between the two groups, we checked the conditions to apply mixed variance analysis, with the group variable (ESO and UNI) as the inter-subject variable and the type of connective element as the intra-subject variable. Since the result of Levene's test did not enable us to assume equivalent variances between groups ($F(5.378) = 3.78$, $p = 0.002$), we carried out a Friedman's rank ANOVA. This test is more robust with the sum of squares when the data are not normal and belong to an unbalanced design, which is the case here.

The results confirmed a significant effect for the type of connective element ($F(2.21487) = 20.43$, $p < 0.001$, $2 = 0.44$) with a large effect size, and no significant effect of the educational level was found ($F(1,378) = 0.01$, $p = 0.914$, $2 < 0.01$). A significant effect of the interaction between marker type and educational level was also confirmed with a medium effect size ($F(2,378) = 32.18$, $p < 0.001$, $2 = 0.14$). The results indicate that there are significant differences in the distributions of the ESO and UNI groups in terms of marker types according to their form.

In order to define the nature of these differences, we conducted a series of pairwise comparisons between the levels of intra- and inter-subject variables with the Bonferroni correction on the level of the contrast tests. In the first set of comparisons, we contrasted the means of the two groups within each type of marker.

The results confirmed that the ESO group used a significantly higher proportion of conjunctions than the UNI group ($t = 5.44$, $p < 0.001$) and the UNI students used a higher proportion of parenthetical markers than the ESO students ($t = -5.82$, $p < 0.001$). The use of intra-sentential connections, which establish coordinate or subordinate relationships, is obligatory in the context in which they appear. In addition, if the production of less expert writers includes the repetition of conjunctions that are stripped of their original value in order to join propositions, the proportion of conjunctions shoots up. As we see in example (1), the conjunction *and* loses its value of addition and instead functions as an inter-sentential marker. This phenomenon, known as *discourse glue*, has been confirmed at earlier stages and is mostly typical of oral discourse (Aparici, 2010; Aparici et al., 2016; Berman, 1996).

(1) Trobem notícies cada dia de gent que intenta creuar una frontera i no ho aconsegueix i ho paga amb la vida i això em fa pensar. [Secondary, 015]

Translation: Every day we found news about people who were trying to cross a border and they didn't manage it and they paid with their life and that makes me think.

At the same time, and despite the explicit instruction implied by implementing the didactic sequence in the two groups, it is the university students who feel the need to include parenthetical markers to relate content and structure their texts in an explicit manner, as illustrated by the example of (2):

(2) Així_doncs, han recollit una sèrie de dades sobre camps de refugiats. [University, 18]

Translation: So, they have collected a series of data on refugee camps.

Finally, as suggested by the descriptive data, the proportions of lexical markers in the texts of both groups are statistically equivalent ($t = 0.96$, $p = 0.333$), with the repertoire of forms including examples such as those in (3a) and (3b).

(3a) I què me'n dieu dels que moren al mar ofegats? [Secondary, 01]

Translation: And what about those who drown in the sea?

(3b) Estic segur que si aquí, a Europa hi haguessin les guerres que hi ha a Àfrica,
ells estarien encantats d'ajudar-nos i de donar-nos una casa i un treball. [Secondary, 01]

Translation: I am sure that if the wars that happen in Africa were here in Europe, they would be happy to help us and give us a home and a job.

With the second set of comparisons, we explored the differences between the three types of markers used by each group. For the secondary school group, the results indicate a significantly higher proportion of conjunctions than of parenthetical markers ($t = 7.28$, $p < 0.001$) and lexical markers ($t = 15.73$, $p < 0.001$). Meanwhile, the proportion of parenthetical markers is also significantly higher than that of lexical markers ($t = 6.51$, $p < 0.001$). Within the UNI group, the proportion of conjunctions is also significantly higher than that of lexical markers ($t = 9.06$, $p < 0.001$), as in the secondary school group. In contrast, their use of parenthetical markers is significantly higher than that of conjunctions ($t = 3.03$, $p = 0.003$), and lexical markers ($t = 13.54$, $p < 0.001$). Figure 1 illustrates the behavior of the dataset on the marker types according to the forms used by group.
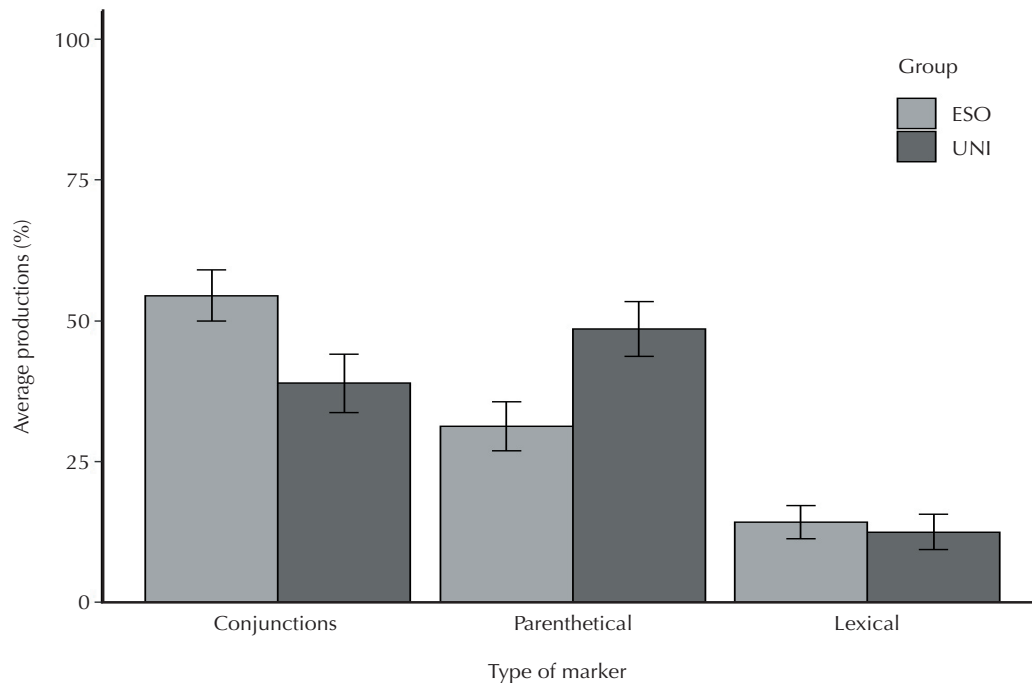

Figure 1. *Use of markers according their form between secondary and university groups*

Source: Prepared by the authors.

In the second analysis, we examine the use of markers based on the function they fulfill in the construction of the text. We calculated the proportion of the three types of markers according to their function (propositional, structural, modal) considering the total number of markers for each text. Table 3 shows the measures of centrality and dispersion of these markers for the ESO and UNI groups.

Table 3
Distribution of the proportion of markers according to their function. Secondary and university groups (mean and SD)

Educational level	Type of marker					
	Propositional		Structural		Modal	
	M	*SD*	*M*	*SD*	*M*	*SD*
Secondary (ESO)	69.25	15.67	13.41	10.97	17.33	14.55
University (UNI)	63.69	19.60	14.59	13.32	21.70	15.34

Source: Prepared by the authors.

Propositional markers are the most frequent ones in the texts written by both groups, followed by modal markers, which help the author of the text position themselves. Finally, structural markers, which organize information at the inter-sentential level, are the least common in both groups. After verifying the lack of normality in the distribution of the data and also rejecting the assumption of homogeneity of variances (F(5,378) = 3.84, p = 0.002), we applied a mixed design Friedman rank ANOVA test once again. The test results showed no significant main effects for either the education level (F(1.378) = 0.154, p = 0.694, 2 < 0.01) or marker function (F(2.18221243) = 1.491, p = 0.225, 2 = 0.63). However, we did find that the effect of the interaction between the educational level and type of marker according to the function was significant F(2.378) = 5.139, p = 0.006, 2 = 0,02, albeit with only a small effect size. Therefore, we observe that the distribution of proportions between the marker types according to function differs significantly between the two groups. Figure 2 shows the direction of the interaction between the two factors.
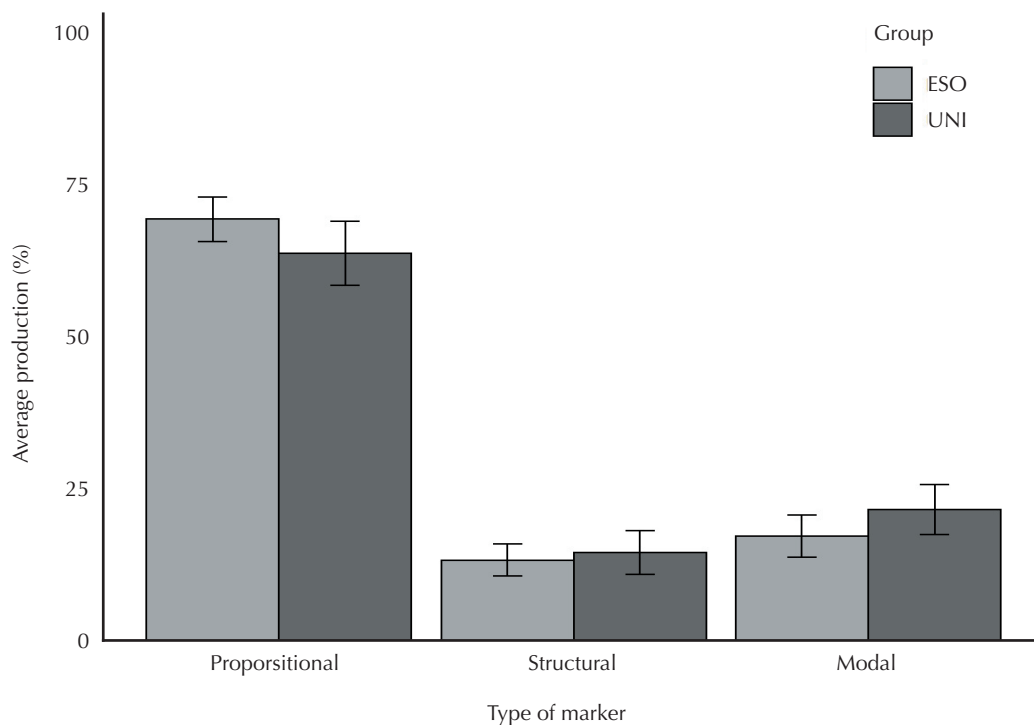

Figure 2. *Use of markers according to function. Secondary and university groups.*

Source: Prepared by the authors.

To find out between which levels the differences in the interaction lie, we again conducted a series of pairwise comparisons by applying the Bonferroni correction on the   level of the contrast tests. Firstly, we applied a set of comparisons to contrast the estimated means of proportions of the two groups for each type of function. The proportion of structural markers is statistically equivalent in the two groups (t = -0.56. p = 0.57). Their use is shown in example (4).

(4) *Per altra banda* n´hi han persones que només volen anar a un altre país amb intencions dolentes, *com és en el cas de* les persones que porten una bomba o fan un atemptat sense cap motiu [Secondary, 09]

Translation: *On the other hand*, there are people who just want to go to another country with bad intentions, *as in the case of* people who carry a bomb or carry out an attack for no reason.

The presence of propositional markers, which relate conceptual contents, as shown in example (5), is significantly higher in the secondary school group than in the university group (t = 2.33, p = 0.02).

(5) No tots som iguals, *és per això* que la societat no es pugui relacionar(-nos) [Secondary, 09]

Translation: We are not all the same, *that is why* society cannot compare (us).

In the case of modal markers, the relationship is reversed, that is, the texts produced by the UNI group contain a greater number of markers that have this function (t = -2.13, p = 0.03). As we have seen, these elements signal the relationships between the participants and, crucially in these texts, the stance of the author regarding the information they contain. Therefore, the commitment of the university students to their text seems to be greater as they position themselves with respect to what they say, protecting their discursive image by introducing sources of information, as in example (6); assessing the credibility of that information, as in example (7); or even evaluating it by offering their opinion, as in example (8).

(6) Segons les dades de Welcome Refugees si tots els països acollissin... [University, 39]

Translation: According to the information from Welcome Refugees, if all countries were to take in …

(7) Aquestes situacions podrien abolir-se al cap d' un mes, desafortunadament no tots els casos acaben així. [University, 39]

Translation: These situations could be ended within a month, but unfortunately not all cases end up like this.

(8) Crec que, en casos que no són per culpa de guerres i situacions extremes, no és just que nosaltres estiguem treballant i pagant impostos i els immigrants visquin de nosaltres. [University, 64]

Translation: I think that, in cases that are not due to wars and extreme situations, it is not fair that we are working and paying taxes and the immigrants live off us.

The second set of comparisons involves analyzing the differences between the three types of function within each group. While the order of the distributions is equivalent in the two groups (propositional > modal > structural), the extent of the differences between the types of function could be different. In the ESO group, the results indicate a significantly higher proportion of propositional markers than of structural markers (t = 20.63, p < 0.001) and modal markers (t = 16.87, p < 0.001). In contrast, the comparison between the two types of non-obligatory markers (modal and structural) produces no significant differences (t = 1.64, p = 0.305) and

the comparisons in the university students' texts yield similar results. The proportion of propositional markers in these texts is also significantly higher than that of structural markers (t = 16.60, p < 0.001) and modal markers (t = 12.66, p < 0.001). However, the proportion of modal connective markers is significantly higher than that of structural markers in this group (t = 2.73, p = 0.022), although this difference, despite reaching a level of statistical significance, is less conclusive considering the value of the associated statistic. So, in the university group, and in contrast to the secondary school group, modal markers are slightly more frequent than structural markers. Therefore, the structural function is the least common in the texts analyzed for the two groups.

Discussion

In order to characterize how the intra- and inter-sentential connection occurs in analytical texts written by Catalan speakers and to provide an approximate outline of the development experienced by secondary school students in their transition to becoming university students, we examined the differences between the two groups by considering these connective markers according to their form and the discursive function they perform.

Generally speaking, the participants in the university group produced significantly longer texts than those in the secondary school group. This result, observed in previous studies on different languages, provides additional evidence that productivity, also understood in previous studies as the amount of text produced, is an indicator of progressive/academic development and text quality (Berman & Nir-Sagiv, 2007; Crossley & McNamara, 2010; Salas, Llauradó, Castillo, Taulé, & Martí, 2016). The ability to produce longer texts seems, for example, to be a prerequisite for developing topics and arguments in a more specific manner by means of adverbial sentences that introduce justifications and causes, clarifications, or examples with which to support the argument (Aparici et al., 2021; González Manzanero & Rosado, in press).

In spite of the fact that the texts increase in length with age, and in contrast to the developmental trend found in a parallel study on texts in Spanish (Aparici et al., 2021), according to our results, the texts by secondary school students contain a higher proportion of connective markers. The readjustment towards lower proportions of these markers observed among university students is consistent with the idea that the coherence of a text may reside in the absence and not the abundance of cohesion markers (Crossley, Weston, McLain Sullivan, & McNamara, 2011). In fact, in these written texts, alternatives such as punctuation marks perform the functions of markers in oral discourse (Aparici et al., 2014). On the other hand, in learning about certain linguistic resources, studies have previously reported overproduction followed by a later readjustment; for example, excessive connectivity in oral contexts when children 'discover' connectors at an early age (Kupersmitt, 2004; Sebastián & Slobin, 1994) or later face non-narrative genres of discourse such as expository discourse (Aparici, 2010). In the type of text that we are concerned with, which is particularly complex and is learned later, this phenomenon of 'readjustment' would seem to take place later in developmental terms, since, in order to produce it, cognitive resources must be dedicated to multiple aspects that have not yet been mastered.

Analyzing the forms used as connective markers reveals the existence of a kind of trade-off where conjunctions are the most frequent resource utilized by secondary school students, but the most commonly used markers among university students are parenthetical ones. The different nature of the forms analyzed should be noted: although conjunctions (coordinating and subordinating) necessarily introduce the sentence they lead, markers are, by definition, optional in their context, and their use constitutes a rhetorical choice on the part of the author (Ravid & Berman, 2006; Katzenberger & Cahana-Amitay, 2002). Furthermore, as we have seen, in the secondary school group, some of these intra-sentential connectives may lack their original value and function as discursive glue, thus partially justifying their overproduction. Although it is a typical phenomenon of earlier ages and oral texts (Berman, 1996; 2008), our results also demonstrate this in typical writing in formal contexts.

As stated, the proportion of lexical markers is equivalent in the two groups. Lexical markers are unconventional, as well as being parenthetical and therefore non-obligatory, operating at the inter-sentential level (Cuenca, 2013). The hybrid nature of this open class, midway between a marker and a clause, could explain why they are not the preferred option in formal genres or registers and this merits detailed analysis in future research. Indeed, the identification and recording of the forms appearing in our corpus is one of the contributions of this study and has great linguistic and didactic potential. With regard to our results on discursive functions, in both groups we observed a predominance of propositional markers and less frequent use of structural markers, as well as a slightly higher presence of modal markers among university students compared with secondary school students, who use modal and structural markers to the same extent. The explanation of this distribution in the frequency of functions of connective markers can be found, on one hand, in the configuration of the language itself, which makes the use of many of the propositional markers almost obligatory to relate contents at the intra-sentential level and, on the other, in the relative inexperience of the participants to write texts that require, or at least favor, the use of structural markers to demarcate larger units of discourse.

Structural markers, which demarcate textual units and indicate discursive progress at the inter-sentential level, are the least frequent in the texts analyzed for the two groups, despite the fact that the participants are familiar with them, having been presented and exemplified during the didactic sequence. We also know that in Catalan secondary school classrooms, explicit work is done on the use of discourse connectors and their role in the organization of analytical texts. In this respect, in teaching there seems to be an interesting paradox, because teachers of all educational levels *cooperate* with their students in some way when they assess the content of the text according to what they say and not how they say it: the use of connective marks, specifically textual markers, is a good example. Instead of assessing texts in terms of discursive adaptation, teachers sometimes infer from things the text that have not been stated, taking arguments that are formulated erroneously as valid or making inferences that go beyond what is stated, reinterpreting the content (Fernández, 2010; Rosado, Aparici, & Perera, 2014). This 'complicity', which at early stages of development is a valuable learning mechanism (e.g., in the form of expansions and extensions of children's utterances by adults in a context of oral production; see Serra, Solé, Serrat, Bel, & Aparici, 2000), does not actually produce any benefit for students who have to learn how to write academic texts.

The expression of the author's distanced perspective, which is typical of expository discourse (Tolchinsky, Rosado, Aparici, & Perera, 2005), takes place in a series of formal resources that allow the author to become more or less involved or committed to their text (Tolchinsky & Rosado, 2005). Modal markers are one of these resources through which the author links and constructs their discourse, arguing and counterarguing, modifying or attenuating their stance. Our results indicate that there is an evolution in the use of these markers in texts produced by university students who, furthermore, use them more frequently than structural markers.

Learning to link sentences by using the connective elements offered by a certain language is a skill that begins to develop at a relatively early age (Berman & Slobin, 1994; Serra et al., 2000). Relating the information contained in these sentences or in larger units of discourse in a competent and effective way, however, seems to be a learning that goes beyond adolescence and which, as has been observed for other discursive skills, is closely linked to the discursive genre produced and the circumstances in which it occurs (Berman, 2008; Tolchinsky, 2004), and is subject to a high degree of variation between individuals (Aparici et al., 2021). According to our results, the use of modal connectives to assemble the different parts of a text allows the author to deliberately position themselves regarding the information transmitted, adopt an implied discursive perspective with respect to that information, and thus produce the expected effect on the recipient of the text. Examining the connection at both the sentence and text level allows the identification of problems that transcend the ability to connect sentences and have the available resources to do so, and which affect the structure of the analytical text (Tolchinsky et al., 2021). Furthermore, if we consider what the function of this connection is, what relationship is established between the constituent parts of the text, we identify problems that affect the general aim of the text and that of

its author. In a given text, it is the presence or absence of supporting information and relevant evidence, of relevant justifications or clarifications, of explanations and definitions of specific concepts, supporting information, or the appearance of fallacies caused by the inclusion of inadequate information, or the establishment of erroneous semantic relationships that allow us to determine the quality of the text (Tolchinsky, Aparici, & Rosado, 2017). The transition to university does not seem to bring an end to the problems found in secondary school and writing analytical texts entails difficulties that persist beyond undergraduate education. Appropriate use of the conventions used in this type of texts therefore remains a constant concern for educators at all levels and in all disciplines.

When considering the limitations of this study and prospects for future research, one of our aims is to extend the analysis to other texts of the didactic sequence in order to better understand which of the observed changes are typical of evolutionary development and which are the result of specific pedagogical work that is limited in terms of time, that is, during the application of the sequence.

We also identify the desirability of conducting an additional qualitative approach that considers 1) the use of connective markers in the context of the different components of the argumentation structure and in relation to its quality, in the vein of Tolchinsky et al. (2021), and 2) whether the forms used by the participants are adequate in terms of placement and suitability, that is to say, whether their use is as expected in each context, along the lines of Alonso (2019). In establishing the connection of the text, the use of inadequate or non-canonical forms or functions will not only affect the quality of the text in terms of grammaticality or style, but will also be responsible for the appearance of fallacies due to the establishment of erroneous semantic relationships that corrupt and distort the initial purpose of the text, of its author: to persuade the reader of the validity of their argument.

Finally, we also highlight the didactic potential of a proposal such as this in order to foster improvement in the written expression of students at secondary school and in the first years of university. The application of this analysis, which is based on real problems and examples, lies in the preparation of a guide for assessment and self-assessment guide of analytical texts for students and teachers, which is designed to respond to the inherent difficulties in these stages of education (see Yúfera, Rosado, & Aparici, 2020).

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