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Master's Thesis

Analyzing complexity in foreign language monologic oral production in a CLIL context

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Моей матери за то,
кто я есть, и за бесконечную веру в меня...

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INTRODUCTION

In the present exploratory study three quantitative analytic tools - T-unit, AS-unit, and Idea-unit - are tested against foreign language (FL) learner empirical data with the aim to investigate their appropriateness and effectiveness for the assessment of complexity of learners' oral production. The analyzed data were collected during the implementation of a Content and Language Integrated Learning (CLIL) teaching sequence. This approach aims at teaching academic contents of primary/secondary school subjects through a foreign language to students with limited proficiency in that language and nowadays is widely used to favor simultaneous learning of both areas in different age groups of students. Its effectiveness has been investigated from various positions (e.g., Mohan 1986; Sutman, Allen, and Shoemaker 1986; Crandall 1987; Artigal 1993; Escobar 1996; Wolf 1997; Coyle 1999; Escobar 2004; Nussbaum 2004; Roquet, Escobar, and Cuscó 2004; Feixas, Masats, Couso, Espinet, and Codó 2006; Codó, Masats, Feixas, Espinet, and Couso 2007; Dalton-Puffer 2007; Nikula 2007; Escobar and Unamuno forthcoming).

A CLIL teaching sequence, a small part of which served as empirical data for this study and which will be explained in more detail in section 3.1., was created by the CLIL-SI team from the Autonomous University of Barcelona within the framework of the ArtlCLE research project.¹ The principle goal of the project was to evaluate the degree of global effectiveness of CLIL methodology which was applied within the bilingual educational system, i.e. the impact which a set of CLIL communicative pair-work tasks had on the learning of non-linguistic subject-matter contents (Natural Sciences in this case) and a foreign language (English or French). The research interest focused on explaining the learning process which occurred in the CLIL classroom; with this aim a qualitative analysis was chosen as the main approach to data interpretation (Cordeiro 2006; Llobet 2006; Corredera 2007; Escobar 2008; Escobar and Nussbaum 2008; Evnitskaya 2008; Evnitskaya and Aceros forthcoming). However, there are also several studies carried out within a quantitative paradigm, which confirm qualitative conclusions in favor of the CLIL sequence's effectiveness. Thus, Horrillo (2006) reported that students were "on-task" more than 90% of the time while accomplishing a CLIL jigsaw task. Escobar and Sánchez's (forthcoming) study should also be mentioned here. In it they analyzed learners' written pretests and posttests in terms of fluency and lexical complexity. In case of the latter the authors were especially concerned about whether or not learners acquired academic English lexical items without

¹ *Collaborative tasks assessment and learning targets achievement in "CLIL" sciences-in-foreign-language classrooms (Tasques col·laboratives i aprenentatges lingüístics i acadèmics en aules "AICLE" inclusives de ciències en llengua estrangera)*, funded by the Catalan Government (ARIE 2004-210060 and 2005-10056). The materials are available at: <http://www.clil-si.org/>

having received any previous formal instruction. Their results showed that the subjects improved considerably in both aspects of the language produced.

It should be kept in mind that in the CLIL classroom learners have to use FL to accomplish cognitively demanding tasks related to a school curriculum (Escobar 2008). It means that both complex subject-matter contents and academic language that correspond to these contents require a high level of complexity of language produced. So, it was considered interesting to analyze the complexity of learners' oral production and its possible improvement over time, thus complementing the above mentioned quantitative research already carried out within the ArtICLE project.

In the pages that follow we begin with the presentation of the theoretical background of the study. There we explain and specify the construct 'complexity', which was later used for the data interpretation, by providing a theoretical and several working definitions of this aspect of language learner production. In the same section we (a) briefly discuss the role of reliability and validity in quantitative analysis; (b) provide main characteristics of three research tools chosen for the study; and (c) describe various general analytic measures commonly used in Second Language Acquisition (SLA) research for the assessment of complexity. This is followed by the research questions. Then the data and the participants are presented and the methodology utilized in the study is explained. In section 5 we provide a detailed analysis which was carried out in two phases: data segmenting and complexity measuring. It is followed by a discussion of the results of the analysis and the conclusions. Finally the limitations of the study and issues for further research are considered.

1. THEORETICAL FRAMEWORK

Research on fluency, accuracy, and complexity in second (L2) and foreign language learners' production has a long tradition in the SLA field since it is assumed that their measures can reveal the level of learner's proficiency in target language. Their indicators are usually used for observing differences in learners' written and oral discourse over time, which permits to evaluate language development in terms of each of the above mentioned language aspects. Within this wide field we are especially interested in the assessment of progress in complexity of FL oral performances. But before analyzing our data, we consider it important to see what researchers understand by the term 'complexity'. A notion of "content validity", i.e. the validity of each theoretical construct, should be mentioned here since it is essential for both qualitative and quantitative investigation (Long 1997). It means that any concept should be clearly defined to avoid that its application to empirical data causes serious methodological

problems. Therefore researchers must be certain that what they are actually analyzing and measuring is exactly the same thing as what they claim to be analyzing and measuring.

1.1.DEFINING THE CONSTRUCT 'COMPLEXITY'

The most cited recent theoretical definition of complexity was originally proposed by Skehan (1996) and developed later by Foster and Skehan (1996) and Skehan and Foster (1999). Following Crookes (1989), in considering learner performance Skehan (1996) distinguishes complexity as a language aspect which "concerns the elaboration or ambition of the language which is produced" (p. 22). Complexity is thus understood as the capacity to use more advanced language and to encode more complex ideas (Ellis and Yuan 2004). What enables learners to progress and produce more complex language is their willingness and preparedness to take risks and restructure their interlanguage by experimenting with language (Skehan and Foster 1999). So, learners' development in complexity can be observed in progressively elaborated language and an increasing variety of patterns (Foster and Skehan 1996).

Within the construct researchers differentiate three main types of complexity: lexical, grammatical or syntactic, and semantic. The first type, which is also often referred as lexical diversity, is defined by different authors (e.g. Abrams 2003; Allen, Crago, and Pesco 2006) as the range in variety of lexical items used in a given data sample. They add that this variety is supposed to grow over time with the development of learner language.

In relation to syntactic complexity, Wolf-Quintero, Inagaki, and Kim (1998) claim that grammatically complex language involves varied and sophisticated structures. Ortega (2003), who also worked with L2 writings, defines it in a similar way. She argues that syntactic complexity is a range of forms that appear in language production and a degree of sophistication of these forms. Foster and Skehan (1996) refer to grammatical complexity as elaboration and variation of syntactic patterning. In comparison to two first authors, their theoretical definition seems to be more precise since they are the only ones who specify the type of 'structures' and 'forms' in question. However, all of them highlight the construct's importance in SLA research because of the assumption that language development implies the growth of learners' syntactic repertoire and their ability to use it appropriately in a variety of situations.

A semantic aspect of language production is related to the content of a conveyed message. Therefore analyzing this level, researchers can move from the examination of lexical variety or the formation and use of different syntactic patterns to the construction of meaning. Hence, in assessing language progress the increasing level of semantic complexity of learner speech should also be

considered. However, due to the fact that we could find no definition of this type of complexity it makes us think that its evaluation may result to be quite difficult.

As it can be noticed there are few studies which provide any formulation of the notion of complexity and they seem to do it in a wide and ambiguous way. The question of what 'complexity' really means and how it can be measured remains thus unresolved. Hence, in order to apply the construct to empirical data and establish whether there is any development in complexity of the language produced, it should be operationalized. Taking into account that Escobar and Sánchez's (forthcoming) study carried out within the ArtICLE project was on lexical complexity of learners' production, here we were interested in analyzing only syntactic and semantic complexity. Therefore, in the following section we discuss operational definitions of these two types of complexity provided by different authors.

1.2. OPERATIONAL DEFINITIONS OF COMPLEXITY

In SLA research complexity of language production always received considerable practical attention, both in relation to written and oral learner discourse. Different phenomena have been suggested to be typical for this language aspect. For syntactic complexity, subordination and level of embeddedness have been frequently regarded as one of the most important indicators (Givón 1991; Foster and Skehan 1996, Wigglesworth 1997). This explains why they are usually included in operational definitions. For example, Sotillo (2000) in her study on syntactic complexity in L2 writings defines it "as the ability to produce writing that uses subordination and embedded subordinate clauses" (p. 99). By examining the extent to which subordination is employed, it is possible to observe and assess language complexity and its increasing sophistication since the greater is degree of subordination the more complex the language produced (Ellis and Barkhuizen 2005). According to Warschauer (1996: 14), "more advanced writers or speakers of a language generally use proportionally more subordination than do beginners" who tend to produce a greater number of simple and coordinated sentences/utterances.

In relation to the provided operational definition we think it appropriate to discuss in more detail two terms, i.e. 'clause' and 'subordination'. The former is defined by Foster and Skehan (1996: 310) as "either a simple independent finite clause, or a dependent finite or non-finite clause". A finite clause is one whose verb element is finite, i.e. conjugated. The other type - non-finite clause - differs in that its verb element can be represented only by an infinitive, an *-ing* participle and *-ed* participle. With reference to subordination Quirk, Greenbaum, Leech, and Svartvik (1985) describe it as an asymmetric, hierarchical relationship which is characterized by the use of a dependent (embedded or subordinate) clause as a functional element in the structure of another clause.

In the research to date available for our revision we found several studies which investigated semantic complexity from different positions and in different contexts. They can be summarized in two main groups. The first one analyzed the relationship between changes in this language aspect and particular scaffolding practices in case of physical handicaps such as phonological and hearing impairments in children (e.g., Windsor 1999; Crowe, Norris, and Hoffman 2000; Bellon-Harn, Hoffman, and Harn 2004; Liboiron and Soto 2006) and treatment in case of language disorders such as aphasia in adults (e.g., Glosser, Wiener, and Kaplan 1988; Kiran and Thompson 2003). With this aim they evaluated subjects' utterances according to three levels of semantic complexity (labeling, description, and interpretation) which interacted with corresponding morphological forms and syntactic patterns. The second group observed how increasing semantic complexity of certain grammatical categories such as quantifiers or tenses influenced their acquisition by learners (e.g., Kaplan 1983; Juffs 1998; Bassano, Laaha, Maillochon, and Dressler 2004; Berent, Kelly, Porter, and Fonzi 2008).

In our opinion, the current 'state of the art' presents a researcher who wants to capture and assess the complexity of language in learner oral performances with two problems. The first one consists in the way the construct is defined in SLA literature since the given definitions result to be ample and vague. The elaboration of clear theoretical definitions which would be available for the research community is thus highly needed. On the other hand, a deficit of existing operational definitions of complexity as a general notion and of its more concrete types should also be considered problematic. The majority of studies we revised (Cooper 1976; Robinson 1995; Kawauchi 2005; Larsen-Freeman 2006; Michel, Kuiken, and Vedder 2007, among others) after the mere mentioning of the abstract construct go to the straightforward use of certain complexity measures, without even recognizing the huge gap that there is between the former and the latter. In case of oral data analysts one of the possible explanations can be the fact that some of researchers (e.g., Crookes 1989; Iwashita 2006; Iwashita, Brown, McNamara, and O'Hagan 2008) employ the operational definitions traditionally used in studies on L2 written production without taking into consideration the enormous amount of dissimilarities that characterize oral discourse if compared with written texts.

1.3.THE ISSUES OF RELIABILITY AND VALIDITY

Many SLA studies apply a quantitative approach to examine progress in complexity of either written or spoken learner language. The first phase of an analysis usually consists in segmenting the data into some units. The second one is a proper quantification, i.e. the count of total number of different unit components per unit (it can be the unit applied for the segmentation or any other one), the calculation of indexes, ratios, and percentages, etc. Such operations

permit to measure improvement in subjects' production. Therefore, a great number of statistical information (e.g., descriptive percentages of means and standard deviations for each measure, comparisons among the latter, distributions of categories and scores) is offered as the analysis results. These can show what is statistically significant and has important effects on the complexity of learner language and what not, thus allowing researchers to generalize beyond the studied samples (Markee 2000). Furthermore, obtained results reveal whether and to what extent their theoretically motivated hypotheses and predictions were correct and relevant.

Methodological criteria of reliability and validity are closely related to the described analytic procedures. It is clear that any study's results should be possible to repeat or replicate (Bryman 2001). Nevertheless, Seedhouse (2005) observes that many researchers "do not present their primary data in their publications and hence the reliability of major sections of their analyses is not available for scrutiny" (p. 179). Those, who want to revise authors' analytic procedures to be able to reach similar conclusions on the same material, test them against their own data or compare different data sets, find it impossible. Hence, Pallotti (2007) claims that to make the process of analysis more transparent and increase a study's reliability and replicability it is necessary that transcribed and segmented data samples as well as detailed distributional tables used for analysis be available to other researchers. Only having access to them it is possible to establish what items were excluded, how data were organized, and how figures in summary tables were derived (Polio and Gass 1997).

For the present research we reviewed thirty studies published over the last twenty years in which a quantitative analysis of L2/FL learner written or oral production had been carried out. The results showed that seven (Foster, Tonkyn, and Wigglesworth 2000; Sotillo 2000; Ellis and Barkhuizen 2005; Gilabert 2005; Kawauchi 2005; Iwashita 2006; Larsen-Freeman 2006) actually provide segmented transcripts, while the rest just offer tables with calculated measures. From the former there are only four (one for written and three for oral language) which contain quite extended excerpts and not just separate one-unit examples.² Taking into account that we are especially interested in previous research made on the assessment of learner spoken language complexity, the absence of illustrative excerpts in almost all examined studies can raise methodological questions of how their data were handled and their posterior analyses achieved. Thus, having decided to make the present study, we faced the difficult task of segmenting our data for analysis with almost no benefit of basing on or comparing with previous research experience.

² The majority of revised works can be found in Tables 1 and 2 in which we present different complexity measures these authors apply to their data. The mentioned seven studies will be examined in more detail in the next section in relation to the unit of analysis they use.

With respect to validity, it should be highlighted first that mainstream research in the field generally operates within an etic paradigm which reflects the analyst's perspective. By and large there is a tendency to employ existing theories of language teaching and learning, its acquisition and development to explain language complexity observable in learners' oral performances. According to Pike (1967), "descriptions or analyses from the etic standpoint are 'alien' in view, with criteria external to the system" (cited from Seedhouse 2005: 166). In data segmentation it is often revealed through a mechanistic use of analytic principles and procedures as a static and prescriptive set of instructions applied to a wide variety of empirical data. Other important aspect concerns generalizability, i.e. the possibility and extent to which results and conclusions obtained from a concrete case examination can be generalized and considered universally applicable.

In this study, validity is established in relation to analytic tools and their appropriateness and effectiveness for our FL non-interactive data.

1.4.THREE TOOLS FOR THE ANALYSIS OF COMPLEXITY

In revised SLA studies we could identify a wide number of units of analysis being employed.³ Hence, in a search for an effective analytic instrument for the assessment of complexity progress in learners' monologic oral production, we have selected two syntactic and one semantic unit as research tools. They are T-unit, Analysis of Speech Unit (AS-unit), and Idea-unit.

1.4.1. *T-unit*

Among the units of analysis commonly applied to L2 and FL learner data the T-unit is without a doubt the most popular one. Since the late 70s, it has been widely used in quantitative analysis of written texts produced by learners of different ages, different languages and different proficiency levels (e.g., Cooper 1976; Ho-Peng 1983; Ishikawa 1995; Sotillo 2000; Ellis and Yuan 2004; Rogers 2004; Larsen-Freeman 2006; Ishikawa 2006; Kuiken and Vedder 2007).⁴ Some researchers, when managing spoken discourse, for example, in language proficiency interviews (Young 1995), EFL teachers' performances (Lam 1995) or non-interactive narrative tasks (e.g., Crookes 1989; Robinson 1995; Yuan and Ellis 2003; Kawauchi 2005; Gilabert 2006; Iwashita 2006), also preferred T-unit for their quantitative analyses.

³ For a detailed classification of the most applied ones and their posterior discussion, the reader can refer to Foster *et al.* (2000).

⁴ Wolfe-Quintero *et al.* (1998) and Ortega (2003) make deep research syntheses on studies that employed T-unit in this field.

Suggested initially by Hunt (1965) to measure L1 schoolchildren's syntactic maturity in writing it stands for a "minimal terminable unit" that consists of an independent clause with all attached subordinate clauses. Later the author developed the definition and provided two more versions: (1) "a main clause plus all subordinate clauses and non-clausal structures attached to or embedded in it" (Hunt 1970: 4),⁵ and (2) "the shortest units into which a piece of discourse can be cut without leaving any sentence fragments as residue" (Hunt 1970: 189). Other definitions of this syntactic unit (e.g., Schneider and Connor 1990; Young and Milanovic 1992; Richards, Platt, and Platt 1996; Santos 1998) just reformulate Hunt's definition by repeating his basic criteria; though Schneider and Connor (1990) add a 'non-independent clause' which they consider a T-unit in written data if it is punctuated as a sentence. Depending on study purposes and types of data, researchers who apply the unit usually adopt either one of Hunt's definitions or one of those given by more recent authors and therefore decide what should be included or excluded from their analysis.

Due to the monologic and spoken character of our data which will be described in more detail in section 3.1., in the revised SLA research we were mainly interested in authors who applied T-unit to L2/FL learner oral production. The most similar were a few studies on non-interactive narratives. Among them we found two (Kawauchi 2005 and Iwashita 2006) which offer several utterances segmented into T-units. These were drawn from their oral data and used as examples, however absolutely decontextualized. Gilabert (2005) is the only one who besides a number of examples also gives explanations of what should be neither considered separate T-units nor included in them. It should be mentioned, though, that they are given within the instructions for calculating syntactic complexity, i.e. when it is supposed that the production has been already segmented. In the field of written language Sotillo (2000), who carried out research on advanced L2 learners' production, also provides guidelines for applying T-unit and coding written data. As an example, she offers an excerpt which contains sixteen identified T-units. Thus, from the total of eighteen revised studies which employed the tool for segmenting written or oral learner discourse only Sotillo (2000) seemed to be useful for us, though to a certain degree, since her data were written texts obtained from advanced learners.

Despite the fact that few studies were found which presented the data segmented into T-units, this was chosen as one of the units of analysis for several

⁵ By 'non-clausal structure' we understand items that contain no verbal forms, such as single-word or phrasal utterances used as initiations or responses (Pica and Doughty 1988). According to Aarts and Aarts (1986), 'embedding' is a type of syntactic relations in which one element realizes a function within another element. A clause should be considered as embedded if: (1) a finite clause is introduced by the word *that* or by *WH*-words (what, who, which, whether, where, why, etc.), the latter in case if the main clause contains the verb *to be*, and (2) a non-finite clause is introduced by the word *for*.

reasons.⁶ First, because it was based on a clause, it was easier to identify in speech than a sentence (the latter being moreover a completely written production unit). Second, an important role played the fact that it has been widely employed by researchers to assess development in both written and oral discourse. So we thought that it could give us useful information about complexity of the language produced in the individual explanatory performances as well as capture its progress, thus allowing us to evaluate the data. Above we have mentioned various definitions of the unit; in our study we worked from Hunt's second definition (Hunt 1970). We considered it both more exact and embracing as it mentioned clause embeddedness and allowed whatever non-clausal structures to be included in a T-unit. In our opinion, it was more appropriate for the one-way, non-interactive nature of the samples used in this study than the classical 1965's definition and, consequently, better corresponding to the goals of this study.

1.4.2. AS-unit

In the last twenty years a number of studies that dealt with spoken language and used the T-unit indicated that sometimes it was insufficient to carry out a full and reliable analysis of transcribed speech. Thus, for example, Tarone (1985) reported that she was unable to do it because her oral data were extremely fragmentary: in comparison to any written texts her samples contained few complete sentences but were full of hesitations and repetitions. In their attempts to find a solution for such methodological problems the researchers tried to modify the unit's definition so that it could be applicable to the elliptical nature of the spoken language (e.g., Loban 1966; Brock 1986; Chaudron 1988; Pica, Halliday, Lewis, and Morgenthaler 1989; Young 1995). The result was its elaboration into what became known as a communication unit, or C-unit. There exist various definitions which differ from author to author and in the extent to which the classical T-unit was developed.

More recently another considerable contribution to adapt this analytic tool to the complicated reality of L2 and even more of FL learners' oral production has been made by Foster *et al.* (2000). The authors carry out a broad and critical survey on numerous units of analysis used in the field of applied linguistics and SLA over the last two decades for segmenting either written or oral learner language. Their detailed examination of the actual state of question revealed "a plethora of definitions..., paucity of examples, and a worrying tendency for researchers to avoid the issue altogether by drawing a veil of silence over their methods" (p. 357).

⁶ For a discussion on the relative merits of applying T-units to non-native speaker highly interactive oral data, see Foster *et al.* (2000).

They state two main problems related to the units' definition and application. First of all, they point out that many researchers fail to provide full and explicit definitions of the chosen unit of analysis as these vary in the amount of detail. Some authors employ the same unit but use different definitions, while others just omit to give any description and merely label the unit. Moreover, as their survey shows, few research reports have examples and these in their majority are taken from unproblematic written data. Foster *et al.* (2000) thus conclude that these definitions are quite inappropriate to be applied to the complex reality of learners' speech transcripts. They argue that the absence of comprehensive and well exemplified units' definitions makes it impossible to carry out accurate and comparable analyses based on a quantitative evaluation of spoken learner language.

As a possible solution, the authors take Hunt's T-unit as a starting point and refine it to cope with the features typical of spoken data. Thus, they propose the AS-unit which they call "a unit for all reasons" (p. 354). They define it as "... a single speaker's utterance consisting of *an independent clause, or sub-clausal unit*, together with any *subordinate clause(s)* associated with either" (p. 365). However this unit of analysis is primarily syntactic, they suggest the necessity of the principled use of pauses and one of the prosodic features, more precisely intonation, to deal with 'awkward cases' that can be found in non-native speaker (NNS) data with high frequency. *An independent clause* is a clause that includes a finite verb. *A sub-clausal unit*, as Foster *et al.* (2000) indicate, can consist of: a) one or more phrases that can be elaborated into a full clause by recovering elided elements from the context; or b) a minor utterance such as "Yes" or "Thank you". *A subordinate clause* consists minimally of a finite or non-finite verb plus at least one additional clause element (subject, object, complement, or adverbial).

In regard to adverbial subordinate clauses and conditions under which they can be included in the AS-unit, the authors show with several clear examples from a wide range of oral data that those appearing in the initial or medial position should not make the researcher doubt. However, a loose linkage of adverbials in final position effectually causes problems. Therefore, Foster *et al.* (2000) establish a tight condition and include a final adverbial clause only if it is within the same tone unit as one of the preceding clause elements of the AS-unit. This linkage allows one to regard the adverbial clause as definitely a part of the plan which produced the initial main clause. As for the intonational and pause principle, in order to be sure that a subordinate clause is attached to the main clause, between them there should be neither falling or rising intonation nor a pause equal to or more than 0.5 seconds.

Despite the opinion of some SLA researchers that the tool requires a complex segmentation procedure (e.g., Iwashita 2006) various recent studies have used it and clearly showed its accessibility and applicability to empirical spoken

data. Among them, Ellis and Barkhuizen (2005) can be mentioned. They use the AS-unit in segmenting monologic oral narratives produced by university L2 learners and - together with other complexity measures - in their analysis.⁷ Tavakoli and Skehan (2005) also prefer it to the T-unit in analyzing the effects of both task structure and strategic planning time on three aspects of learner oral narrative production. As a basic syntactic unit of analysis the AS-unit was also chosen by Michel *et al.* (2007). In their study they measure the adult L2 learners' oral performances - made in either a monologic or dialogic condition - in terms of accuracy, syntactic complexity, and fluency.

Thus, the fact that the AS-unit was specially elaborated from the previous tool in order to deal with oral learner language and a comprehensive and careful definition, its explanation and ample exemplification provided by Foster *et al.* (2000) permitted us to consider this unit of analysis reliable and valid. It also influenced our decision to choose it as a second tool for segmenting our subjects' non-interactive data and measuring the progress in complexity of the language produced.

1.4.3. Idea-unit

The last analytic tool chosen for the assessment of our data is the Idea-unit, which we consider an alternative to the previous ones as it bases on semantic criteria.⁸ Since late 70s till nowadays researchers have proposed various definitions of the unit. For example, Kroll (1977) defines it as "a chunk of information which is viewed by the speaker/writer cohesively as it is given a surface form... related... to psychological reality for the encoder" (Kroll 1977, cited in Foster *et al.* 2000: 358). In our opinion, such definition results quite problematic to employ because it bases entirely on the principle of meaning which extent is sometimes very difficult to establish with certainty.

Another definition was provided by researchers who examine oral reasoning and argumentation of L1 students working in small groups in social and natural science subject-matters (e.g., Pontecorvo and Girardet 1993; Guerrera and Lajoie 1998). Pontecorvo and Girardet (1993) describe the Idea-unit as the smallest unit in which discourse can be analyzed, which is characterized by a single statement and corresponds to a linguistic clause. Hence, they combine semantic criteria with the syntactic one though without specifying what they understand under 'linguistic clause'.

⁷ A more detailed description of their study will be given with regard to the Idea-unit, the third unit of analysis chosen for the present research work.

⁸ However, several studies also define it from a syntactic (Kroll 1977; Carrell 1990) and intonational (Chafe 1980) points of view.

A more recent research carried out by Ellis and Barkhuizen (2005) suggests another definition of the unit. They define it as “a message segment consisting of a topic and comment that is separated from contiguous units syntactically and/or intonationally” (p. 154). Though their description is primarily semantic, they incorporate intonational criteria for oral production and the syntactic one for written data with the aim to identify unit boundaries. As the authors indicate, it can serve for analyzing the propositional aspect of language and its completeness, i.e. the degree to which a speaker encodes the ideas needed to convey an expected content.

Idea-unit makes reference to content construction and its complexity thus permitting the researcher to examine the progress in learner academic discourse over time. This is the main reason why we considered it highly attractive and promising for dealing with our data. As it will be discussed in detail in section 3.1., the latter consisted of oral FL learners' performances made in the CLIL classroom context and we should remember that in such learning environment subject-matter content learning and production is of the same importance as that of language. If the tool actually resulted to analyze complexity from a semantic point of view, it would be an alternative and interesting examination, since both the T-unit and the AS-unit work from syntactic criteria.

According to Ellis and Barkhuizen (2005), this unit can be used best when the elicitation task requires learners to communicate a pre-specified content as, for example, in picture-based narrative tasks. The authors also offer to make a distinction between ‘major’ and ‘minor’ Idea-units by understanding the former as the propositions essential for conveying the content of the message. The latter relate the details that embellish the message but are not the principal ones. Ellis and Barkhuizen (2005) comment that both types can be established in the data making reference to a ‘bare-bones’ summary of the story/message produced by native speakers who were asked to perform the same task. To avoid a possible methodological confusion in the present study it was decided to use the term ‘Idea-unit’ in reference to the analytic tool/unit of analysis and ‘Idea’ (that can be ‘Major’ or ‘Minor’) in relation to two types of content propositions: main and optional.

Ellis and Barkhuizen (2005) both define the Idea-unit and use it for measuring complexity in their profound analysis of fluency, accuracy and complexity of oral narratives produced by a group of Chinese university students who were L2 intermediate-level learners of English. Unfortunately, we cannot see how the tool works with such data when applied for segmenting because the authors preferred the AS-unit for this purpose.

Nevertheless, we found one research which uses their definition of the Idea-unit both for segmenting and analyzing the data. Larsen-Freeman (2006) carries out a qualitative analysis of learner language progress in FL written and oral

biographic narratives.⁹ The collected data proceed from five upper-intermediate adult learners of English of Chinese origin. It should be kept in mind that her participants, as well as those of Ellis and Barkhuizen (2005), were all adults and had a high level of proficiency in target language. It means that their production can be regarded as the trouble-free data and therefore effortlessly managed, i.e. segmented into units basing on syntactic/intonational principle. Our assumption is confirmed by the author's examples given in the study. From two oral narratives - the other three are written - only one production contains more than just one Idea-unit. These spoken data show that in most cases Idea-units correspond to complete sentences. In the written texts Larsen-Freeman (2006) applies the same segmentation rule though sometimes she joins two sentences in one unit if the second gives additional information to the idea of the first. Therefore, we can conclude that due to the facts that her participants had a high level of English and their unproblematic written and oral production contained full clauses she was able to follow Ellis and Barkhuizen's (2005) definition and segment her data into Idea-units without any visible problems.

1.5.SEGMENTATION

Those researchers who describe any process previous to the data quantification report on "segmenting" or "dividing" their data into certain units, which they call interchangeably "units of segmentation" or "units of analysis" (e.g., Young 1995; Foster *et al.* 2000; Ellis and Barkhuizen 2005; Larsen-Freeman 2006; Ishikawa 2006). Others only speak about the "coding" of their written or oral data for measuring different aspects of linguistic production, i.e. accuracy, complexity and/or fluency, and the application of a certain unit as "a basic unit of analysis" (e.g., Sotillo 2000; Gilabert 2006; Iwashita 2006; Michel *et al.* 2007). In this study we use the term "unit of analysis" both when referring to and describing the segmentation process and taking measures of complexity.

The analysis of learner language production requires a principled way of segmenting the data into units (Ellis and Barkhuizen 2005). Therefore before assessing FL learner monologic oral performances in terms of complexity, it is to decide on a unit on which to base the examination and then identify this unit in the data. By and large the segmentation of written texts is a task which offers little difficulty, since they usually contain unproblematic and complete sentences easy to deal with. Thus, the latter become the most obvious unit. However, Ishikawa (1995) who worked with very low-proficient Japanese learners of English as FL (EFL) reported that their general tendency to overpunctuate and overcoordinate in writing complicated a lot the process of data segmentation. If we turn to naturally

⁹ To observe how learners' interlanguage restructures over time and measure its development, the author also examines her written data using a quantitative approach. For this she chooses T-unit as the unit of analysis.

produced L2/FL oral discourse, the researcher encounters that the transcripts of elliptical and fragmentary learner speech cannot be so clearly cut - even if data are of a non-interactive origin - due to the absence of any evident, accessible and standard unit which could permit to handle different spoken discourse features.

1.6.MEASUREMENT

If the study's objective is to prove whether one or several chosen units of analysis are appropriate for the type of data the researcher has and potential in assessing, for example, progress in complexity, some measure, some point of reference is needed. The empirical studies we consulted show that there are two types of discourse analytic measures of complexity: ones of specific linguistic features, such as verb forms or tenses, and the others of general dimensions of oral and written production (Ellis 2005). The latter usually include the length of a unit chosen for the analysis as well as the amount of embedding, subordination, and coordination, which are reported by frequency of complexity indicators; a range of structural types and sophistication of particular structures also can be calculated, in this case by the means of ratios and indexes.

Authors	Nº of Units	Nº of Clauses	Nº of SCs	Unit Length
Cooper (1976)				X
Ellis and Barkhuizen (2005)	X		X	X
Ishikawa (1995)	X			X
Iwashita (2006)				X
Kawauchi (2005)				X
Larsen-Freeman (2006)				X
Sotillo (2000)	X	X	X	X
TOTAL:	3	1	2	7
<i>Note: Unit = production unit, i.e. T-unit, AS-unit, and Idea-unit; SC = subordinate clause</i>				

Table 1. Complexity Indicators Frequency used in the SLA research literature

Tables 1 and 2 present the most commonly used general analytic measures in terms of T-unit, AS-unit, and Idea-unit. In recent years researchers in SLA field have tended to take use of the second option which seems to be more sensitive and precise to detect and assess language development (Skehan 2003). Here we followed this mainstream tendency and made use of some general analytic measures which will be discussed in more detail in section 4.

Authors	S-Nodes/ Total Units	Clauses/ Total Units	ICs/ Total Units	ICs/ Total clauses	SCs/ Total Units	SCs/ Total Clauses
Cooper (1976)		X				
Crookes (1989)					X	
Ellis and Barkhuizen (2005)		X				
Ellis and Yuan (2004)		X				
Foster and Skehan (1996)		X				
Gilabert (2006)	X					
Ishikawa (1995)		X				
Iwashita (2006)		X	X	X	X	X
Iwashita, Brown, McNamara, and O'Hagan (2008)		X				X
Kawauchi (2005)		X				
Kuiken and Vedder (2007)		X				X
Larsen-Freeman (2006)		X				
Michel <i>et al.</i> (2007)		X				X
Robinson (1995)	X					
Robinson (2001)		X				
Sotillo (2000)						X
Tavakoli and Skehan (2005)		X				
Yuan and Ellis (2003)		X				
TOTAL:	2	14	1	1	2	5
<i>Note:</i> S-Node = sentence node; Unit = production unit, i.e. T-unit, AS-unit, and Idea-unit; SC = subordinate clause; IC = independent clause						

Table 2. Complexity Ratios used in the SLA research literature

2. OBJECTIVES AND RESEARCH QUESTIONS

Carried out within the framework of the ArtICLE research project, the original goal of this study was to examine whether - considering its double nature and any possible negative consequences for both academic and linguistic learning - the CLIL approach is actually effective and contributes to the process of FL development in an already bilingual Catalan-Spanish educational system. By comparing learners' performances in a pretest-treatment-posttest design we were especially interested in determining whether CLIL has any positive outcome on the improvement of their monologic oral competences.

We were conscious that CLIL impact on FL learning can be evaluated from different positions and that exist various dimensions and aspects of the topic. So, in this study we decided to choose just one of them and focused our interest on the analysis of complexity of the spoken language produced. As it was shown in the previous section, after reviewing the literature available on the topic we found that there was no standard analytic tool but a variety of them, each operationalizing a different definition and aspect of complexity.

Therefore, the initial research goal required some important preliminary work to be done, which consisted in evaluating the appropriateness and effectiveness of the chosen tools for the empirical data. Thus, their testing against FL learners' monologic explanatory oral production finally became the objective of the given study. According to the new goal the following research question was posed:

1. Which of the available tools is the most effective to capture the progress in complexity of the learner language when applied for the assessment of the data in our corpus?

Among the requirements that any tool chosen to measure complexity in learner production must satisfy the first one is to provide a clear-cut procedure of segmenting the data into analyzable units. It means that authors who propose or use the tools should make available a series of comprehensible and easy-to-follow instructions as well as segmented samples which would serve as illustrative examples. In the previous sections we already discussed their absence in current SLA research, this fact made us narrow down our principal question and address another more concrete one:

- 1.1. What sort of methodological issues arise when we apply each tool to our data?

Due to the fact that there are different types of complexity and different ways of measuring it, we were interested in observing how the units of analysis

selected for the given study would work with our data. Thus, there emerged our last research question:

- 1.2. What kind of information does each tool provide about complexity of the language produced?

3. THE CORPUS

3.1. DATA DESCRIPTION

Complete database comprises a large oral and written FL learner corpus which was collected throughout the implementation of a CLIL sequence on teaching Natural Sciences in a foreign language. It was carried out during the academic years 2004/2005 and 2005/2006 in one primary and seven public secondary schools in Catalonia (Spain), whose educational system is highly bilingualized in Catalan and Spanish. The sequence was implemented during English classes under the supervision of English teacher and was completely audio- and in a major part videotaped. It had a four-week pretest-treatment-posttest design and contained oral and written individual pretests and posttests, a series of jigsaw and problem solving tasks, tasks of information search in Internet, a poster preparation and a final oral presentation. The topic was Amazon rainforests and their actual problematic situation. All tasks aimed at improving learners' team-work skills, increasing their academic knowledge in Natural Sciences field, and developing social and communicative skills that would enable them not only to understand but also to speak about subject-matter contents in English when working in pairs and making formal presentations in front of their classmates.

Empirical data analyzed in the present study are audio recordings of learners' individual pretests and posttests gathered during the sequence implementation at a secondary school in Metropolitan Barcelona in 2005. They are identical and include three open-ended questions, each corresponding to one of the three principal content aspects: (1) "Interesting facts about Rainforests", (2) "Plants and animals in Rainforests", and (3) "People in Rainforests". These questions merely functioned as general instructions since their primary goal was to elicit a specific type of academic discourse carried out in FL, namely, oral monologic explanatory production. Each time before starting recording, the learners were given time to complete a written pretest/posttest which contained the same questions. These written versions, though withdrawn during the recording, served both as an assessment tool and a kind of pre-task planning which allowed them to prepare for their individual speech performances in advance. When recording the latter they also had no time limit. This encouraged

careful on-line planning, i.e. formulation and monitoring of speech plans. Many researchers who analyze oral narratives (see, for example, Foster and Skehan 1996; Mehnert 1998) report that the pre-task planning impacts positively learners' productions and results in greater complexity of their language. Yuan and Ellis (2003) demonstrate that actually both planning types have such an effect.

In the described sequence two main reasons determined this task format. Firstly, an individual test was designed in order to avoid the methodological problems that can be caused by the "interference" of the cooperative nature of interaction. Studies carried out within the Conversational Analysis framework clearly show that success or failure in any conversation depends on communicative and conversational skills of all the participants in the interaction (Van Lier 1989). How this affects testing has been demonstrated by researchers working in different paradigms such as oral language proficiency interviews, native/non-native speaker or teacher-student interactions, all of which lead to learner language assessment. In all of them an interviewer, a native speaker or a teacher usually plays the role of an expert. According to Young (1995), this tendency can be revealed in different ways such as topic initiation, interruptions and questions, answer repair or its confirmation, feedback provision, and in a general higher quantity of talk. Egbert (1998) shows how interviewers suggest to students not only different repair organizational structures, but also the forms they should use to do so. It is evident that all this influences learners' production as well as interferes in their communicative orientations and goals and, consequently, complicates the evaluation process. Since the aim was to capture and assess each learner's individual progress in content and foreign language knowledge over time, as it was said earlier it was important to avoid or at least minimize any possible effects created by the interlocutor's presence. Secondly, the students were familiar with such kind of assessment tasks since 'the recitation of the content' is a part of any classroom everyday routine. All said above conditioned both the choice of monologic performances and the task repetition before and after the treatment.

3.2. PARTICIPANTS

The subjects of the present study were two learners of English as a FL in a state secondary school in Metropolitan Barcelona (Spain). They were females with ages between 15 and 16. In this study they will be referred to by the pseudonyms Montse and Laura. Both had Catalan and Spanish languages background since they used two of them in family and school environment as their first languages (L1). In relation to the FL, it should be highlighted that though the students had benefited from tuition in English for seven and a half school years, which means from 600 to 700 hours of total formal instruction, at the moment of the data collection their level of proficiency could be approximately considered as

elementary, i.e. A1/A2, according to the Common European Framework of Reference for Languages. These results can be partially explained by the facts that in spite of such amount of hours the learners' real exposure to the FL had been very low and during the whole period of their schooling they had had little opportunity to use it outside the English classroom in either formal or informal contexts. On the other hand, as Escobar (2008) reports, even though there is "an increase in general knowledge of foreign languages throughout Catalonia in the last ten years, compulsory education is still unable to produce exit levels that guarantee successful multilingual communication amongst graduates" (p. 154).

4. METHODOLOGY

Once in possession of our subjects' oral pretests and posttests which were registered under the conditions illustrated by Picture 1, the data were transcribed using the program Transana 2.20 and the transcription conventions shown in appendix A.



Picture 1. Montse and Laura, performing the pretest/posttest

In the first phase of the analysis, which corresponded to the data segmentation, we used the tools examined in the theoretical part of the study and tested them against our empirical data. It means that the transcripts of each subject's pretest and posttest were divided into T-units, AS-units, and Idea-units. This consisted in the following procedure: each unit was put on a separate line into a corresponding table, one after the other, and sequentially numbered. To illustrate the tools' application we provided several excerpts for each one (for full segmented transcripts, see appendix B). Finally, we discussed the methodological issues which arose in the process of segmenting the learners' performances as well as each tool's effectiveness at this stage.

In the second phase we applied each tool to our data with the aim to measure complexity of the language produced. This permitted us to observe the level of complexity in each subject's pretest and posttest. Then we calculated

difference in scores between them to find out whether there was any actual progress over time. For practical reasons and to get comparable data, from the measures figured in Tables 1 and 2 for this study we chose only those which were used by more than two researchers. Therefore, first, two Frequencies which could reveal the progress in general complexity of the learners' language produced were calculated. These were: (a) the Unit Frequency, i.e. the total number of units within each learner's pretest/posttest, and (b) the Unit Length Frequency, which was the percentage of the total number of words to the total number of units in each sample. To obtain information about syntactic complexity, we calculated two Ratios: (a) the Clause Ratio, i.e. the total number of clauses divided by the total number of units, and (b) the Subordinate Clause Ratio, i.e. the proportion of subordinate clauses to the total number of clauses. The tables with the calculated elements can be found in Appendix B.

In relation to two last measures, Foster *et al.* (2000) and Iwashita *et al.* (2008) claim that Ratios being traditionally used for written discourse are not always applicable to interactive oral data since in general these contain short rather than extended samples due to the nature of spoken language. They conclude that it is possible that these measures are useful only with longer stretches of text, such as written discourse. Since our data were individual explanatory performances, we considered that they fitted this condition and could be thus measured by the means of Ratios.

Summing up, in the next section we intend to carry out a comparative study among the three units of analysis defined above in order to show the methodological implications that each of them has when being used for the segmentation of our data. To do that, we discuss their testing against the same three excerpts taken from a pretest and a posttest of one of our subjects, Montse. The second step is to examine the outcomes on complexity that each tool produces in the measuring phase.

5. ANALYSIS

5.1. T-UNIT

As it was already shown in section 1.4.1., the T-unit was initially proposed for the assessment of syntactic maturity in written L1 learner texts and is therefore based on syntactic criteria. Nevertheless, it has been commonly employed in SLA quantitative research for both written and spoken discourse of learners who belonged to different age and language proficiency groups. Having decided to apply the T-unit to the low-intermediate FL speakers' monologic oral explanatory data, we revised the studies on L2 and FL non-interactive production and found

that from eighteen only four (Sotillo 2000; Gilabert 2005; Kawauchi 2005 and Iwashita 2006) actually provided examples or/and instructions for their data segmentation into T-units. These were expected to be a reliable source for consulting in case of methodological problems with the tool which could supposedly arise due to the low English level the subjects had and an oral nature of the data.

5.1.1. Segmentation

5.1.1.1. Problem 1: Hesitation phenomena

In Table 3, in the left column we have an excerpt of Montse's transcribed pretest. Even a brief and superficial revision shows that it is very fragmentary and pausing; it contains numerous features which can often be encountered in authentic spoken data. This made us think that it would not be so easy to segment.

e: the principal rainforest are i::n South A↑merica and in ↑Africa. e: and the principal: place is in the- is the Amazon and is in South America. e: the weather is ↑wet a::nd there (.) rains a lot. e: the princi- e: there are a lot o:f kinds o:f e: animals and plants, e: for example son- son animals, there are (beautifuls), e: monkeys, e: panter a:nd- and parrots. e:m (1'') there are a lot of trees, of (centenar-) e: and the trees have lot- a lot of (.) years, they are very old. e::m: (.) the people (where) live i:n- in the rainforest (1'') <are very primitive,> a::nd they have a very differents costumes <that (.) ours (.) costumes.> (1.5'') e:: (2.5'') e: the:y- (.) e: they does- they don't (.) <wear (.) our (.) clothes, and they wear e: another clothes. the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>	3	e: the principal rainforest are i::n South A↑merica and in ↑Africa.
	4	e: and the principal: place is in the- is the Amazon and is in South America.
	5	e: the weather is ↑wet
	6	a::nd there (.) rains a lot.
	7	e: the princi- e: there are a lot o:f kinds o:f e: animals and plants,
	8	e: for example son- son animals,
	9	there are (beautifuls), e: monkeys, e: panter a:nd- and parrots.
	10	e:m (1'') there are a lot of trees, of (centenar-)
	11	e: and the trees have lot- a lot of (.) years,
	12	they are very old.
	13	e::m: (.) the people (.) (where) live i:n- in the rainforest (1'') <are very primitive,>
	14	a::nd they have a very differents costumes <that (.) ours (.) costumes.>
	15	(1.5'') e:: (2.5'') e: the:y- (.) e: they does- they don't (.) <wear (.) our (.) clothes,
	16	and they wear e: another clothes.
	17	the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>

Table 3. Excerpt 1 from pretest: non-segmented (left column) and segmented into T-units (right column)

In the right column we present the same excerpt which we segmented into T-units following Hunt's definition. In order to do this, we tried to divide the text into units which would include main clauses with all attached or embedded subordinate clauses and non-clausal structures. We see that the tool functions well here because the fragment consists of almost only main clauses which can be effortlessly separated. Nevertheless, we have marked in red a number of oral discourse features also known as hesitation phenomena. According to Skehan and Foster (1999), they are connected to moment-by-moment decisions during performance and reflect adjustments and improvements executable within the pressure of real-time communication. Due to the fact that they are not mentioned in the definition, their segmentation resulted to be problematic. Thus, it was unclear whether and - in case of positive answer - how to handle them in relation to the unit. For example, in T-units 4 and 17 we find a reformulation, in 7 a false start, in 9 and 13 a simple repetition while in 15 it is a repetition followed by a self-repaired reformulation ("the:y- (.) e: they does- they don't"), and in 11 we have a self-repair. Therefore, neither the tool's definition nor the authors who applied it specified whether these hesitation phenomena should be considered disturbing and taken out or be included into the unit.

5.1.1.2. Problem 2: Intonation and pauses

Table 4 contains another excerpt taken from the same speaker's posttest:

the principal problem of animals <u>are</u> the:- that a lot of animals are en↑dangered (.) en↓dangered. because the: cutters e: kill them to do clothes, and- (1'') and to do: something. e: (1'') an- (.) e: we have to:- we have to:- protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests. e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun, and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same of creatures.	5	the principal problem of animals <u>are</u> the:- that a lot of animals are en↑dangered (.) en↓dangered. because the: cutters e: kill them to do clothes, and- (1'') and to do: something.
	6	e: (1'') an- (.) e: we have to:- we have to: protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests.
	7	e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun,
	8	and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same o:f creatures.

Table 4. Excerpt 2 from posttest: non-segmented (left column) and segmented into T-units (right column)

While segmenting it, besides the already discussed phenomena, we are also faced with some new methodological problems. For example, we segmented a part marked in the left column into two T-units in the right column (5 and 6). According to the tool's definition which bases on the syntactic criteria, it is correct.

Both consist of a main clause and an attached adverbial subordinate clause which starts with the conjunction ‘because’. Nevertheless, we can observe a slight difference between the examined units which is only marked by several discourse features. In T-unit 5 Montse pronounces the word ‘endangered’ twice but every time with different and clearly noticeable intonation: at first with the rising one and after a very short pause with the falling one followed by a longer pause which in the transcript is marked as ‘ending’ or ‘final’ (Atkinson and Heritage 1984) by a full stop (“en↑dangered (.) en↓dangered. because”). Meanwhile, the next T-unit has neither indicators of intonation change nor pausing (“these animals because”).

Within two units, the first part of the unit 8 is a complete independent clause. Its second part - “the same of creatures” - seems to be a ‘non-clausal structure’ because it contains no verbal forms. Thus, it should be integrated into the same unit together with the preceding main clause. But it contradicts the transcript, in which between two parts we find unmarked falling intonation and a ‘final’ pause. These discourse marks let us suppose that what should be regarded as two parts of the same T-unit, for the speaker are actually two separate units.

5.1.1.3. Problem 3: Reformulated false starts and subordinate clauses

Table 5 displays the excerpt 3 which belongs to the same posttest as the previous one:

if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees. and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never ↑die and the trees (.) of Amazonia never d- never- (.) m:: disappear.	16	if <u>we</u> cut down- if the coachers cut down a <u>tree</u> the:y could- they replant, for example, two or three new trees.
	17	and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never ↑die
	18	and the trees (.) of Amazonia never d- never- (.) m:: disappear.

Table 5. Excerpt 3 from posttest: non-segmented (left column) and segmented into T-units (right column)

From its very beginning we had several doubts related to its segmentation. In the unit 16, should we consider “if we cut down-” a false start which was immediately reformulated? Being thus a first version of a subordinate clause, should we include it in the T-unit together with the reformulation and a main clause as we finally did following Hunt’s definition? If we look at the next unit, we find that she makes clear difference between two social agents (“if we: and if they did it”). Then, if taking this position, can we view the problematic part as an independent T-unit?

It seems to be easy to segment a fragment marked in the left column. Working from the tool's syntactic criteria, it can be divided into two T-units - it has two main clauses joined by a conjunction 'and'; the first one is preceded by a subordinate clause. They correspond to T-units 17 and 18 in the right column. Questions arise when we start to think whether the segmentation of the fragment was correct. Does the subordinate clause belong only to the unit 17's main clause? Taking into account that there are two coordinated main clauses with the same clause structure (Subject + Adverb + Verb), we suppose that they are joined more than by just a conjunction. The subordinate clause has the same function: it serves as a conditional both to the first and the second main clauses. But neither the unit's definition nor those few studies that provide examples of their written or oral data segmented into T-units say anything about it.

When applying this unit of analysis for segmenting any kind of data, we should remember that originally it was proposed and developed for the assessment - from a formal point of view - of syntactic development in written language. So, it is evident that it works especially well with written texts which very often - if not always - consist of full clauses, and therefore can be clearly and surely cut into units. With respect to spoken data, in particular individual oral narratives, some researchers also prefer to use it. Nevertheless, our samples taken from learners with low level of proficiency in FL show that T-unit is not the most appropriate tool for segmenting such data. It does not take into account the moments of spontaneity which occur quite often in oral language and the process of utterance/sentence construction which is easily observable in speech but erasable from a written text. The tool neither gives a satisfactory solution - nor is able to do it due to its purely grammatical grounds - to how to handle difficult cases, in which we find numerous spoken discourse features, such as unfinished words and clauses, their repetition and reformulation, intonation and pauses, etc. Thus, researchers who work with spoken data have to choose on their own whether to regard them as unit components and mark in the transcripts. Otherwise, as Robinson (1995) highlights, the grammatically defined T-unit results to reduce the amount of analyzable data¹⁰.

During the segmentation process T-unit revealed a series of methodological problems related to its 'written discourse' origins. In the next section we continue our analysis and employ the tool for measuring complexity of the subjects' monologic oral pretests and posttests. The objective is to see whether in this phase of the analysis it results to be more clearly applicable and effective for the progress assessment in this aspect of learner production.

¹⁰ However, in his analysis of spoken narrative discourse made by intermediate-level adult L2 learners of English he applies the unit as a measure of oral production because it can serve "as a point of comparison with other studies that have employed T-unit measures" (Robinson 1995: 111).

5.1.2. Principles for complexity measurement

As it was already said in the methodological part, four complexity measures were chosen for the present study: two Frequencies and two Ratios. To be able to measure this language production aspect and obtain reliable and valid results it was essential to have clear guidelines on what to regard as elements that later were to be counted for each measure. The first measure, the Unit Frequency, i.e. the total number of T-units within each learner's pretest and posttest, could be easily calculated since it based on the data segmentation carried out in the previous phase of the analysis. In respect to other measures we revised the research literature to date to see whether and how different authors who used the tool specified the procedures.

For the second Frequency, i.e. the Unit Length, which is calculated by dividing the total number of words by the total number of T-units in each sample, it was important to know whether all words should be counted or there was something to be excluded. We found very few studies that provided any explanations. Thus, Ishikawa (1995) reported that words within unfinished clauses and short, clauseless exclamations were included in the word totals. She also counted contractions (e.g., "can't", "didn't") as two words. Kawauchi (2005) only mentioned that in his research repeated words were excluded.

The same authors specified that to calculate the Ratios (e.g., the proportion of clauses to the total number of T-units and of subordinate clauses to the total number of clauses) all repeated, partly self-repaired, and abandoned clauses in the same T-unit (Kawauchi 2005) as well as short, clauseless exclamations were not counted (Ishikawa 1995). However, the latter highlighted that even if clauses lacked subjects or verbs they were taken into account.

In the given study for measuring complexity we followed the above mentioned principles and also established several additional ones in relation to the word count. Thus, wordless sounds (e.g., "e:", "e:m" or "ay"), incomplete ambiguous words (e.g., "an-" which can be interpreted either as indefinite article 'an' or conjunction 'and', "th-" as definite article 'the', adjective/conjunction 'that' or conjunction 'than'), words in L1 (Catalan and Spanish), and proper names no related to the subject-matter contents (e.g., learners' names) were excluded.

5.1.3. Measurements based on the T-unit

Having segmented the subjects' oral production into T-units, we were thus able to measure the progress in complexity of their discourse. In this section it will be shown whether and to what extent the latter was captured by each measure selected for the present study (Unit Frequency, Unit Length Frequency, Clause Ratio, and Subordinate Ratio) when these were calculated with the T-unit and what outcomes could be considered statistically significant.

In Figure 1 it can be observed that two Frequency measures reveal the learners' progress with the most clarity. This is especially obvious in case of the Unit Frequency. Its examination demonstrates that Montse got higher scores than Laura both in pretest and posttest. However, the difference - and it can be said that the progress too - is bigger in case of the latter (16 T-units vs. 10 of Montse).

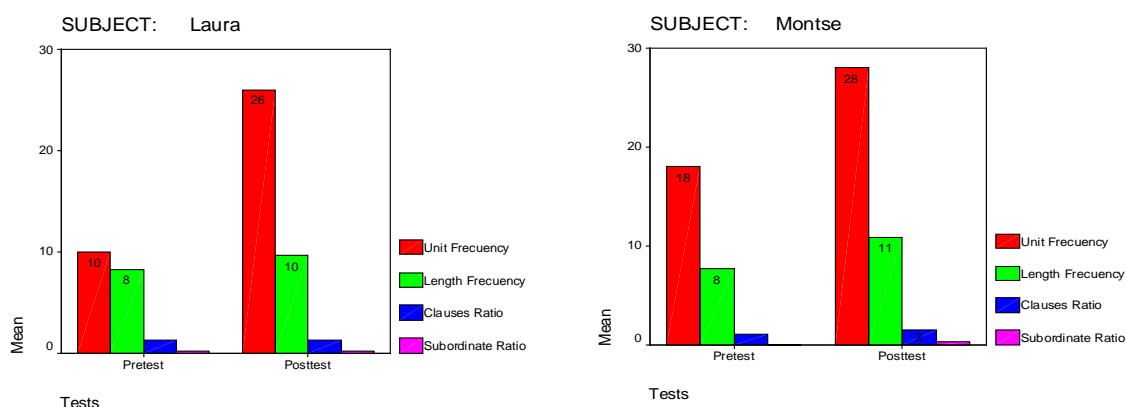


Figure 1. Complexity measures' results with the T-unit

The situation becomes opposite when we examine the Unit Length Frequency in each sample (Table 6). Before the treatment Laura had a slight advantage but she managed to add only 1.35 words per T-unit to her posttest. Meanwhile the difference achieved by Montse is of 3.15 words per T-unit, which means that her T-units exceeded those of Laura in almost two words each. So, the former produced a bigger difference in the Unit Frequency between her tests and it is clear that in this measure she made more progress than the other learner. The latter, on her side, obtained better outcomes in the Unit Length Frequency since T-units in her posttest became noticeably longer than those of Laura.

		Frequency		Ratio	
		Unit	Unit Length	Clause	Subordinate Clause
Laura	Pretest	10	8.30	1.30	0.23
	Posttest	26	9.65	1.27	0.24
	Progress	16	1.35	-0.03	0.01
Montse	Pretest	18	7.67	1.05	0.05
	Posttest	28	10.82	1.50	0.30
	Progress	10	3.15	0.45	0.25

Table 6. Results of the complexity measures with the T-unit

In respect to the subjects' scores obtained in two last measures - the Clause and Subordinate Clause Ratios - in case of Montse we can observe a greater proportion of clauses to T-units and of subordinate clauses to the total number of clauses. Nevertheless, in both of them the difference is quite low to be able to speak about any great progress (0.45 and 0.25, respectively). Laura

showed even less difference between her performances: she slightly decreased in the first Ratio (-0.03) and increased only 0.01 in the second. Actually, both in pretest and posttest neither of them achieved to produce 2 complete clauses per unit or pass the limit of 1 subordinate per clause. Summing up, the differences between either learners or their oral production acquired with the T-unit in both Ratios seem to reveal no apparent increase in complexity of the subjects' language.

Having applied the T-unit for the samples quantification according to the adopted analytic principles which were discussed in section 5.1.2., several observations can be made. First, that this research tool provided important information about general complexity of the learners' language when two Frequency measures were used. The progress was especially visible in the Unit Frequency since it clearly indicated that the posttests contained more and longer T-units than the pretests. If we turn to the Ratios, it should be kept in mind that they were supposed to measure the grade of syntactic complexity of language with the last, the Subordinate Clause Ratio, able to indicate the degree of subordination employed. However, in both Ratios the T-unit showed little increase in the language sophistication for Montse and almost no increase for Laura. This might be interpreted as little appropriateness of the tool for measuring syntactic complexity.

To complement these observations and examine whether the progress in complexity shown by the subjects after the treatment and captured by each measure was statistically significant, several tests with the program SPSS for Windows 11.5.0 (2000) were applied to the samples.¹¹ However, only the scores obtained in the Unit Length Frequency, the Clause Ratio, and the Subordinate Clause Ratio were analyzed.

To decide on the statistical procedure to be employed, first it was necessary to find out whether the learners' scores had a normal distribution. With this aim the one-sample Kolmogorov-Smirnov test¹² was applied to their scores obtained in the

¹¹ To be able to speak about statistical significance of the results obtained with the T-unit in case of only 2 subjects, each one was treated as a group of individuals who took a pretest and a posttest and each of their scores as a behavior observation of this group, which in their total constituted the observed cumulative distribution function. By doing this, it became possible to acquire N more than 2 for three measures (Unit Length Frequency, Clause Ratio, and Subordinate Clause Ratio) which allowed us to get their significance values. Taking into account that the first measure - the Unit Frequency - was a simple count of the units in each sample and not a proportion of some elements to other elements, it was excluded from the statistical procedures.

¹² The one-sample Kolmogorov-Smirnov test is used to test the null hypothesis that a sample comes from a particular distribution. It is computed from the largest difference between the observed cumulative distribution function, i.e. the empirical data, and the theoretical one, calculated from a mathematical theory. Unlike the majority of statistical testing, in this goodness-of-fit test statistically significant values below .05 mean that the data and the normal distribution do not fit.

pretest and posttest for three measures mentioned above. It revealed that only those to be used for calculating the Unit Length Frequency were within the normal distribution since their significance was of .363 in the pretest and .262 in the posttest for Laura and of .886 in the pretest and .719 in the posttest for Montse. Therefore for this measure the independent-samples *t* test¹³ was applied to all samples.

The outcomes obtained for Laura are presented in Table 8. They show that the difference in mean scores was not significant for this measure (.521).

Group Statistics					
	Tests	N	Mean	Std. Deviation	Std. Error Mean
Length frequency	Pretest	10	8.30	4.596	1.453
	Posttest	26	9.65	5.939	1.165

Table 7. Laura's independent-samples t test group statistics for the Unit Length Frequency with the T-unit

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
Length frequency	Equal variances assumed	.122	.729	-.648	34	.521	-1.35	2.089	-5.600 2.892
	Equal variances not assumed			-.727	21.136	.475	-1.35	1.863	-5.226 2.518

Table 8. Laura's independent-samples t test for the Unit Length Frequency with the T-unit

Table 10 displays that the difference between mean scores in Montse's pretest and posttest calculated by the Unit Length Frequency resulted to be clearly significant. Though being slightly higher (.071) than the standard significance value of .05, if compared to the one obtained by Laura (.521, see Table 8), it can be supposed that the progress made by the former seemed to be more linked to the CLIL treatment than that of the latter.

Group Statistics					
	Tests	N	Mean	Std. Deviation	Std. Error Mean
Length frequency	Pretest	18	7.67	4.550	1.073
	Posttest	28	10.82	6.225	1.176

Table 9. Montse's independent-samples t test group statistics for the Unit Length Frequency with the T-unit

¹³ The independent-samples *t* test calculates the significance value of the difference between two sample means which should be less than .05.

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
Length frequency	Equal variances assumed	1.554	.219	-1.853	44	.071	-3.15	1.703	-6.587 .277
	Equal variances not assumed			-1.982	43.168	.054	-3.15	1.592	-6.365 .055

Table 10. Montse's independent-samples t test for the Unit Length Frequency with the T-unit

According to the one-sample Kolmogorov-Smirnov test, in the Clause Ratio and the Subordinate Clause Ratio the distributional significance values of both Laura and Montse's scores fell below .05 (see Appendix C), meaning that they did not fit well the normal distribution. Thus, for the Ratios Mann-Whitney test¹⁴, which is a non-parametric analogy of the independent-samples *t* test, was used.

Table 12 shows that the difference in mean scores obtained for Laura was significant neither in the Clause Ratio nor in the Subordinate Clause Ratio (.793, and .963, respectively).

Ranks					Test Statistics ^b		
Tests		N	Mean Rank	Sum of Ranks		Clause ratio	Subordinate ratio
Clause ratio	Pretest	10	19.10	191.00	Mann-Whitney U	124.000	124.000
	Posttest	26	18.27	475.00	Wilcoxon W	475.000	449.000
	Total	36			Z	-.263	-.046
Subordinate ratio	Pretest	10	18.10	181.00	Asymp. Sig. (2-tailed)	.793	.963
	Posttest	25	17.96	449.00	Exact Sig. [2*(1-tailed Sig.)]	.849 ^a	.986 ^a
	Total	35					

a. Not corrected for ties.

b. Grouping Variable: Tests

Table 11. Laura's group statistics with Mann-Whitney test for Ratios with the T-unit

Table 12. Laura's test statistics with Mann-Whitney test for Ratios with the T-unit

In case of Montse, Mann-Whitney test (Table 14) displays that the difference in her mean scores in both Ratios is highly significant (.012 and .026, respectively). This fact allows us to make two following assumptions: (a) the T-unit showed that this learner also progressed in syntactic complexity and (b) the tool indicated that there was a high probability that it could be attributed the CLIL treatment and not to chance.

¹⁴ Mann-Whitney test establishes the same significance level as the independent-samples *t* test which is equal to .05.

Ranks				
	Tests	N	Mean Rank	Sum of Ranks
Clause ratio	Pretest	18	18.72	337.00
	Posttest	28	26.57	744.00
	Total	46		
Subordinate ratio	Pretest	17	18.82	320.00
	Posttest	28	25.54	715.00
	Total	45		

Table 13. Montse's ranks with Mann-Whitney test for Ratios with the T-unit

Test Statistics ^a		
	Clause ratio	Subordinate ratio
Mann-Whitney U	166.000	167.000
Wilcoxon W	337.000	320.000
Z	-2.522	-2.219
Asymp. Sig. (2-tailed)	.012	.026

a. Grouping Variable: Tests

Table 14. Montse's test statistics with Mann-Whitney test for Ratios with the T-unit

Summing up, it should be highlighted that the analysis of the statistical significance of the results obtained by measuring complexity only partially proved our observations made above on the T-unit's effectiveness. Thus, on one hand, in relation to the Unit Length Frequency none of the subjects reached to have significance values though Montse's outcomes could be considered almost significant. On the other hand, despite our previous assumption that the T-unit was not the most appropriate and effective tool for measuring syntactic complexity since mean scores obtained for both subjects were too low, the statistical tests carried out for two Ratios revealed that there was a highly significant difference between Montse's pretest and posttest while in case of Laura her difference seemed to be insignificant.

5.2.AS-UNIT

As it was described in detail in section 1.4.2., the AS-unit was proposed by Foster *et al.* (2000) as a possible solution to the lack of any obvious and standard tool for the analysis of spoken data in SLA research. It was elaborated from the T-unit to deal with fragmentary and elliptical nature of oral discourse. Though the main criteria of this unit of analysis are also syntactic, they are complemented by pausing and intonational principles. Taking all the above said into consideration and having the authors' guidelines on how the oral data should be segmented, we expected that the AS-unit would result to be better applicable for our data than the previous tool.

In the next section we applied it to the same three excerpts in order to investigate the following: (a) whether this syntactic unit of analysis can give positive answers to the questions which arose after employing the T-unit and (b) whether it causes other methodological problems when handling our empirical data.

5.2.1. Segmentation

5.2.1.1. Problem 1: Hesitation phenomena

Table 15 displays the excerpt 1 segmented into AS-units:

e: the principal rainforest are i::n South A↑merica and in ↑Africa. e: and the principal: place is in the- is the Amazon and is in South America. e: the weather is <u>wet</u> a::nd there (.) rains a lot. e: the princi- e: there are a lot o:f kinds o:f: e: animals and plants, e: for example son- son animals, there are (beautifuls), e: monkeys, e: panthers a:nd- and parrots. e:m (1'') there are a lot of trees, of (centenar-) e: and the trees have lot- a lot of (.) years, they are very old. e::m: (.) the people (where) live i:n- in the <u>rainforest</u> (1'') <are very <u>primitive</u> ,> a::nd they have a very differents costumes <that (.) ours (.) costumes.> (1.5'') e:: (2.5'') e: the:y- (.) e: they does- they don't (.) <wear (.) our (.) clothes, and they wear e: another clothes. the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>	3	e: the principal rainforest are i::n South A↑merica and in ↑Africa.
	4	e: and the principal: place {is in the-} is the Amazon // and is in South America.
	5	e: the weather is ↑wet
	6	a::nd there (.) rains a lot.
	7	e: {the princi-} e: there are a lot o:f kinds o:f: e: animals and plants,
	8	e: for example {son-} son animals,
	9	there are (beautifuls), e: monkeys, e: panthers {a:nd-} and parrots.
	10	e:m (1'') there are a lot of trees, {of (centenar-)}
	11	e: and the trees have {lot-} a lot of (.) years,
	12	they are very old.
	13	e::m: (.) the people // (where) live {i:n-} in the <u>rainforest</u> (1'') <are very <u>primitive</u> ,>
	14	a::nd they have a very differents costumes <that (.) ours (.) costumes.> (1.5'')
	15	e:: (2.5'') e: {the:y- (.) e: they does-} they don't (.) <wear (.) our (.) clothes,
	16	and they wear e: another clothes.
	17	{the:y-} the:y put earrings i:n the: noses, mouth and in a lot of parts {of the-} of their body.>
<u>Keys, according to Foster et al. (2000):</u> { } dysfluency features (false starts, functionless repetitions, reformulations, and self-repairs) // clause boundary within an AS-unit		

Table 15. Excerpt 1 from pretest: non-segmented (left column) and segmented into AS-units (right column)

Regarding the first difficulty we faced in applying the T-unit, i.e. the absence of any mentioning of discourse phenomena so frequent in spoken language and of how to handle them, Foster *et al.* (2000) work it out. According to their detailed and abundantly exemplified explanations, these should be included into the unit and marked as 'dysfluency features' (Foster *et al.* 2000: 368) in the transcript (all versions except for the final one). In the right column of Table 15, among others, we have: "{is in the-}" (unit 4), "{the princi-}" (unit 7) and "{the:y- (.) e: they does-}"

(unit 15) for a reformulation, a false start, and a repetition respectively. Thus, it is easily observable that the tool is sensitive to their presence. All false starts, repetitions, reformulations, and self-repairs which were beyond the T-unit's applicability are taken into consideration here. We can see that AS-unit successfully resolves the T-unit's methodological problems related to hesitation phenomena.

5.2.1.2. Problem 2: Intonation and pauses

In Table 16 we segmented the excerpt 2 into AS-units:

the principal problem of animals <u>are</u> the:- that a lot of animals are en↑dangered (.) en↓dangered.	6	the principal problem of animals <u>are</u> {the:-} // that a lot of animals are {en↑dangered} (.) en↓dangered.
because the: cutters e: kill them to do clothes, and- (1'') and to do: something. e: (1'') an- (.) e: we have to:- we have to:- protect these- the:- these animals	7	because the: cutters e: kill them // to do clothes, // {and-} (1'') and to do: something.
because e: some animals are:- only live <u>there</u> in rainforests. e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun, and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same of creatures.	8	e: (1'') {an- (.) e: we have to:-} we have to: protect {these- the:-} these animals // because e: some animals {are:-} only live <u>there</u> in rainforests.
	9	e:: (2.5'') {we h-} e: we have to create {r-} natural reserves a:nd (.) don't kill animals for fun,
	10	and the: indigenous only kill {for-} for <u>eat</u> not for fun.
	11	e: the same of creatures.
Keys, according to Foster <i>et al.</i> (2000): { } dysfluency features (false starts, functionless repetitions, reformulations, and self-repairs) // clause boundary within an AS-unit		

Table 16. Excerpt 2 from posttest: non-segmented (left column) and segmented into AS-units (right column)

The same marked fragment which in Table 4 was divided into two T-units here consists of three AS-units. Why? In their study Foster *et al.* (2000) show how such 'awkward cases' which occur quite frequently in language learner spoken data can be solved by using the 'intonation and pauses' principle. When we encounter adverbial subordinate clauses in final position we should include them only if they are pronounced with the same intonation as at least one of the elements of the prior clause. This is exactly what we have in the unit 8: no discourse indicators of intonation change between "these animals" and "because" is observed.

On the other hand, the authors highlight a great utility of the principle for the identification of unit boundaries. It is especially important in case of 'because'

clauses due to that fact that their relation with main clauses can result to be uncertain. The speakers often start their utterances with ‘because’ using it as a short form for “I say this because...” or “It is because...”. To emphasize it, they usually mark the boundary between the clauses prosodically with a ‘final’ intonation and with a significant pause. So, returning to our excerpt, let’s see what happens with the foregoing part. Following the authors’ rule, we obtain two independent AS-units since the main clause is separated from the subordinate one by marked falling intonation and a pause greater than 0.5 seconds.

At the end of the excerpt a similar situation can be observed. When we segmented it into T-units we included a fragmentary utterance “e: the same of creatures” in the previous unit. But AS-unit gives us very clear instructions how to segment the problematic part: by employing the above mentioned principle. Therefore, we consider it an independent AS-unit even though it is incomplete. It is evident that the speaker separates it prosodically from the preceding unit and by a pause marks it as a new start.

5.2.1.3. Problem 3: Reformulated false starts and subordinate clauses

The excerpt 3 segmented into AS-units can be found in the following table:

if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees.	18	{if <u>we cut down-</u> } if the coachers cut down a <u>tree</u> // {they could-} they replant, for example, two or three new trees.
and <u>then</u> e: if <u>we:</u> and if <u>they</u> did it (.) the:- the Amazonia never↑die and the trees (.) of Amazonia never d-never- (.) m:: disappear.	19	and <u>then</u> e: if <u>we:</u> and if <u>they</u> did it (.) // {the:-} the Amazonia never↑die // and the trees (.) of Amazonia {never d-} never- (.) m:: disappear.
<u>Keys, according to Foster et al. (2000):</u> { } dysfluency features (false starts, functionless repetitions, reformulations, and self-repairs) // clause boundary within an AS-unit		

Table 17. Excerpt 3 from posttest: non-segmented (left column) and segmented into AS-units (right column)

In comparison to the same excerpt divided into T-units (Table 5), in which we had a series of methodological doubts, here we successively applied Foster et al.’s principles one by one. Thus, a false start “if we cut down-” in the unit 18 was regarded as a part of the AS-unit together with its reformulation and a main clause but marked as dysfluency features.

If we turn to a fragment marked in the left column of the excerpt, we should remember that working with the first tool it gave rise to some questions. Now, basing on the information provided by Foster et al. (2000) we can suppose that the

conditional clause (“if we; and if they did it”) serves two coordinated main clauses. And the transcript confirms this supposition. Though we find rising intonation between the main clauses, there is no pause at all. The fragment does not contain a complete set of discourse markers which would permit us to regard the clauses as independent AS-units. On the contrary, the absence of even the shortest pause indicates that the speaker intended the fragment as a whole. Therefore, it should be considered just one AS-unit (19 in the right column).

At first sight, we can say that in the segmentation phase this tool resulted to be applicable and effective to our corpus, thus showing that it is actually more sensitive to the spoken language than T-unit. It successfully worked out the methodological problems which the latter had raised. It is evident and the excerpts from Tables 15-17 showed it with clarity that Foster *et al.* (2000) significantly developed Hunt’s unit to make it appropriate for a complex spoken language reality. They explained and exemplified all syntactic components of the AS-unit as well as specified and clarified the conditions of their inclusion in the unit. They incorporated intonation and pausing as additional criteria to their mainly syntactic definition. By this the authors not only achieved to improve T-unit’s completely grammatical character but also showed that both are highly useful for the establishment of unit boundaries in difficult cases which so often take place in oral data. Nevertheless, it should be emphasized that AS-unit still works within the formalist syntactic paradigm though to a less degree than the previous tool.

Furthermore, the way the tool deals with hesitation phenomena makes us think that it can lead to serious methodological consequences. We suppose that marking oral discourse features as dysfluency can mean that at the moment of measuring complexity they will be excluded and left unanalyzed. Thus, it can cause two interrelated problems. The first one consists, in our opinion, in that the unit of analysis elaborated precisely to deal with the reality of messy and fragmentary L2/FL learner spoken discourse suddenly converts authentic oral data into adapted and ‘cleaned’ samples. This, in turn, can result that we will lose some actual linguistic material that can provide valuable and valid information about complexity and its development in learner language as well as allow observing the sophisticated process of utterance construction.

5.2.2. Principles for complexity measurement

The first measure for the AS-unit was calculated in the same way as it was done for the T-unit, i.e. the total number of units in each subject’s production was counted. In order to measure the AS-unit length we followed Foster *et al.*’s (2000) guidelines. Thus, all false starts, functionless repetitions, reformulations, and self-repairs, which were previously marked as dysfluency features in the segmented transcripts, were excluded from the total word count. We also applied the additional principles which were adopted for the T-unit. Therefore wordless

sounds, words in L1, and proper names which had no relation to the subject-matter contents were excluded.

According to the authors' indications, at the clause level two rules were to be applied for the data quantification. First, dysfluency features were also to be excluded and, second, subordinate clauses which consisted of a finite/non-finite verb and at least one additional clause element were to be counted. So, taking into consideration these rules, the total numbers of clauses and of subordinate clauses in the samples were summed, their proportion to the total number of AS-units and the clauses, respectively, were calculated and the Ratios were finally obtained.

5.2.3. Measurements based on the AS-unit

Having segmented the same samples into AS-units, we then measured the progress in complexity of the subjects' oral language following the procedures which were employed for the T-unit. Therefore, at first two Frequencies and two Ratios were taken and then the statistical significance for three of them (Unit Length Frequency, Clause Ratio, and Subordinate Clause Ratio) was computed with the SPSS for Windows 11.5.0 (2000).

We start our interpretation of the obtained results with the Figure 2. It clearly demonstrates that mean scores taken with the second analytic tool were the highest for the Unit Frequency and the Unit Length Frequency. In relation to the former, Laura achieved to make a bigger 'jump' in her outcome in comparison to that of Montse (14 vs. 11, respectively).

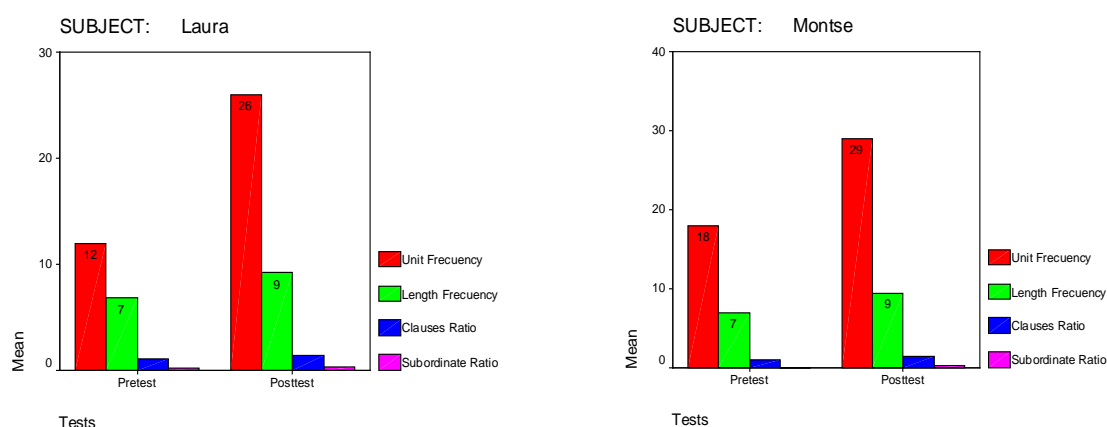


Figure 2. Complexity measures' results with the AS-unit

If we compare the results obtained with the AS-unit (Table 18) and the T-unit (Table 6), it can be noticed a slight increase in the Unit Frequency in Laura's pretest and Montse's posttest. However, the latter continues to have an advantage over the former in both performances since she achieves to produce 6 units more in the first and 3 more in the second than Laura. One of interesting effects of the

AS-unit over the outcomes is that though in the Unit Frequency it is able to distinguish individual progress in complexity it seems to decrease the difference between the learners'. In Table 18 it can be seen that here Laura gets ahead of Montse with only 3 units while in the T-unit she had 6 (Table 6). Thus, in reference to the first measure it can be supposed that an increase in the AS-unit's preciseness in the data segmentation (in comparison to that of the T-unit) resulted in the tool's tendency to diminish the difference between the subjects' progress in complexity of their discourse.

		Frequency		Ratio	
		Unit	Unit Length	Clause	Subordinate Clause
Laura	Pretest	12	6.83	1.08	0.23
	Posttest	26	9.19	1.38	0.30
	Progress	14	2.36	0.30	0.07
Montse	Pretest	18	7	1	0.05
	Posttest	29	9.48	1.41	0.32
	Progress	11	2.48	0.41	0.27

Table 18. Results of the complexity measures with the AS-unit

The tool's precision also impacted the Unit Length Frequency of both learners' because all false starts, repetitions, reformulations, and self-repairs which were marked during the segmentation were finally excluded from the word count. Even a superficial revision revealed that there was a general decrease in scores obtained by both Laura and Montse, i.e. there were fewer words per each AS-unit. Montse was no more disadvantaged in her pretest in comparison to Laura but rather exceeded her in 0.17 words per AS-unit. However, her advantage over the other learner was so slight that it could be considered that both started the CLIL treatment producing almost the same degree of complexity. It repeated to happen in their scores obtained after the treatment since their posttests' length resulted to be very similar (9.48 for Montse and 9.19 for Laura, with a difference of only 0.29 words per AS-unit). It also occurred with the progress demonstrated by both subjects because Montse achieved to get 2.48 points and Laura 2.36. So, it looked like that when applying the AS-unit both of them showed the same progress in general complexity since their production level before and after the treatment turned out to be almost equal. Thus, the results obtained by two Frequencies seemed to indicate that this unit of analysis actually reduced any difference between the learners' scores revealed by the T-unit.

In respect to the subjects' scores obtained in the Clause and Subordinate Clause Ratios with the AS-unit, we could observe that in case of Montse the situation repeated. She got again a greater percentage in both Ratios. Still the progress scores did not seem to be high enough (0.41 and 0.27, respectively) to indicate any notable increase in language sophistication between her pretest and posttest. If compared to the T-unit, Laura's outcomes in both Ratios turned out to

be considerably higher, especially in the Clause Ratio having increased from -0.03 to 0.30. However, the learners' progress did not result in producing either 2 clauses per AS-unit or 1 subordinate per clause.

On the other hand, we already had a similar situation with the T-unit when we interpreted low difference between the scores in the Ratios as indicators of little progress in complexity of the language produced. Meanwhile the posterior statistical analysis of the results displayed that precisely in the Ratios one of the subjects, Montse, had significance values which affirmed that she improved remarkably in her posttest. So, in relation to the AS-unit, it could be supposed that it was probably a similar case: what was interpreted as almost invisible or unclear difference could actually be important indicator of the learners' progress in complexity. To affirm or deny the above said, it was necessary to carry out the same statistical procedures which were employed for the first analytic tool.

As it resulted for the T-unit, when Kolmogorov-Smirnov test was applied to the samples segmented into AS-unit, it showed that from three measures the only one which was distributed normally was the Unit Length Frequency. The subjects scores' difference in respect to the normal distribution had significance values of .631 in the pretest and .220 in the posttest for Laura and almost equal to 1.0 for Montse. Thus, in order to find out whether the progress obtained by each learner in this measure was statistically significant, the independent-samples *t* test was used.

Table 20 displays the difference between Laura's mean scores in the Unit Length Frequency. It should be emphasized that even though this value resulted to be insignificant (.196), it is still much closer to 0.05 limit than the one obtained with the T-unit (.521, see Table 8).

Group Statistics					
	Tests	N	Mean	Std. Deviation	Std. Error Mean
Length frequency	Pretest	12	6.83	3.904	1.127
	Posttest	26	9.19	5.579	1.094

Table 19. Laura's independent-samples t test group statistics for the Unit Length Frequency with the AS-unit

Independent Samples Test									
Levene's Test for Equality of Variances				t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Length frequency	Equal variances assumed	1.045	.313	-1.319	36	.196	-2.36	1.789	-5.987 1.269
	Equal variances not assumed			-1.502	29.840	.144	-2.36	1.571	-5.568 .850

Table 20. Laura's independent-samples t test for the Unit Length Frequency with the AS-unit

In case of Montse, the application of the independent-samples *t* test revealed that the difference in mean scores between her pretest and posttest was also insignificant (Table 22). But as it was already commented in relation to the T-unit, her results could be considered almost significant (.076) since they were situated very close to .05 significance value.

Group Statistics					
	Tests	N	Mean	Std. Deviation	Std. Error Mean
Length frequency	Pretest	18	7.00	3.926	.925
	Posttest	29	9.48	4.904	.911

Table 21. Montse's independent-samples *t* test group statistics for the Unit Length Frequency with the AS-unit

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower Upper
Length frequency	Equal variances assumed	1.255	.269	-1.815	45	.076	-2.48	1.368	-5.238 .272
	Equal variances not assumed			-1.912	41.970	.063	-2.48	1.298	-5.103 .137

Table 22. Montse's independent-samples *t* test for the Unit Length Frequency with the AS-unit

Kolmogorov-Smirnov test showed that for calculating the Clause Ratio Laura's scores in the pretest were within the normal distribution (.232) while those in the posttest were not (.002). Thus, it was impossible to apply the independent-samples *t* test either to them or to her pretest/posttest scores for the Subordinate Clause Ratio, the latter having the significance values of .047 and 0.01 in the pretest and posttest, respectively. So, we had to calculate the differences for both Ratios with the use of Mann-Whitney test. It was also applied to Montse's scores for both Ratios since the former did not fit the normal distribution (see Appendix C).

The differences obtained for Laura (Table 24) for both Clause Ratio and Subordinate Clause Ratio did not result to be statistically significant, being .272 and .645, respectively. Still these outcomes were notably higher than those obtained with the T-unit (see Table 12). Montse achieved to get again significance values which are displayed in Table 26. Her differences were of .019 for one Ratio and .016 for the other.

Ranks				
	Tests	N	Mean Rank	Sum of Ranks
Clause ratio	Pretest	12	16.96	203.50
	Posttest	26	20.67	537.50
	Total	38		
Subordinate ratio	Pretest	10	16.95	169.50
	Posttest	25	18.42	460.50
	Total	35		

Table 23. Laura's group statistics with Mann-Whitney test for Ratios with the AS-unit

Test Statistics ^b		
	Clause ratio	Subordinate ratio
Mann-Whitney U	125.500	114.500
Wilcoxon W	203.500	169.500
Z	-1.099	-.460
Asymp. Sig. (2-tailed)	.272	.645
Exact Sig. [2*(1-tailed Sig.)]	.343 ^a	.706 ^a

a. Not corrected for ties.
b. Grouping Variable: Tests

Table 24. Laura's test statistics with Mann-Whitney test for Ratios with the AS-unit

Ranks				
	Tests	N	Mean Rank	Sum of Ranks
Clause ratio	Pretest	18	19.22	346.00
	Posttest	29	26.97	782.00
	Total	47		
Subordinate ratio	Pretest	17	18.32	311.50
	Posttest	28	25.84	723.50
	Total	45		

Table 25. Montse's ranks with Mann-Whitney test for Ratios with the AS-unit

Test Statistics ^a		
	Clause ratio	Subordinate ratio
Mann-Whitney U	175.000	158.500
Wilcoxon W	346.000	311.500
Z	-2.345	-2.413
Asymp. Sig. (2-tailed)	.019	.016

a. Grouping Variable: Tests

Table 26. Montse's test statistics with Mann-Whitney test for Ratios with the AS-unit

Summing up, having calculated the statistical values of three measures' outcomes taken with the second research tool, it was found that the progress in complexity in the Unit Length Frequency was insignificant for both learners. Still the fact that for Laura the difference in mean scores in this measure resulted to be remarkably much closer to the significance value of .05 with the AS-unit than with the T-unit should be considered important and speaking in favor of the former. In respect to our first interpretation that the AS-unit seemed to diminish considerably the difference between the learners, the statistical analysis showed that actually this was not the case since Montse's difference in mean scores almost achieved to become significant.

When we turn to the Ratios, the statistical analysis revealed that in relation to these two measures the AS-unit behaved in the same way as the T-unit: what initially was considered low meaningful turned out to be statistically significant in case of Montse. Still we could observe that in both Ratios her progress scores calculated with the AS-unit varied little from those made with the T-unit (see Tables 6 and 18). Laura's situation is different: according to the second analytic tool, her Ratios' scores were still too low to become statistically insignificant. Still in the Clause Ratio it can be clearly seen that when the AS-unit was applied for measuring complexity this learner achieved to produce 0.33 clauses more per unit

than with the T-unit. Such a notable progress in difference in her mean scores is even more obvious in the outcomes on statistical significance. These were much closer to .05 than in the first analytic tool (compare, for example, .272 in the Clause Ratio and .645 in the Subordinate Ratio with the AS-unit and .793 and .963, respectively, with the T-unit).

All the above said allows us to suppose that the AS-unit is not only better and easier applicable for measuring complexity in our data due to the explicit guidelines provided by the authors but also more operative and precise in the very process of measuring: it seems to be able to measure even little progress in language sophistication made by the learners in a more effective way than the previous unit of analysis. It should be noted that this especially concerns syntactic complexity of the language produced since the tool seems to result highly sensitive in measuring the degree of subordination in the subjects' performances.

5.3. IDEA-UNIT

As it was said in section 1.4.3., Idea-unit was chosen for the present study as an alternative tool to two previous ones since it was based on semantic criteria and thus seemed to be appropriate and effective for the analysis of the propositional aspect of language. For better managing of learner oral data it also incorporated intonational principle. This analytic tool was designed to work especially well with picture-based non-interactive narratives and though we found only Larsen-Freeman (2006) to apply it for segmenting FL learner monologic spoken discourse, it resulted to be highly appropriate in dealing with such data. So, in this study it was considered possible to test it against individual oral explanatory production and then compare it with two previous units of analysis.

5.3.1. Segmentation

5.3.1.1. Problem 1: Hesitation phenomena

Table 27 reproduces the excerpt 1: non-segmented in the left column and segmented into Idea-units in the right one.

empiezo ya? e: (.) I'm going to talk to the <u>rain</u> forest. e: the principal rainforest are i::n South A↑merica and in ↑Africa. e: and the principal: place is in the- is the Amazon and is in South America. e: the weather is ↑ <u>wet</u> a::nd there (.) rains a lot. e: the princi- e: there are a lot o:f kinds o:f e: animals and plants, e: for example son- son animals, there are	4	e: and the principal: place is in the- is the Amazon and is in South America.
	5	e: the weather i\$ <u>wet</u> a::nd there (.) rains a lot.
	6	e: the princi- e: there are a lot o:f kinds o:f e: animals and plants,
	7	e: for example son- son animals, there are (beautifuls), e: monkeys, e: panthers a:nd- and parrots.

(beautifuls), e: monkeys, e: panthers a:nd- and parrots. e:m (1'') there are a lot of trees, of (centenar-) e: and the trees have lot- a lot of (.) years, they are very old. e::m: (.) the people (where) live i:n- in the <u>rain</u> forest (1'') <are very <u>primitive</u> ,> a::nd they have a very differents costumes <that (.) ours (.) costumes.> (1.5'') e:: (2.5'') e: the:y- (.) e: they does- they don't (.) <wear (.) our (.) clothes, and they wear e: another clothes. the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>	8	e:m (1'') there are a lot of trees, of (centenar-) e: and the trees have lot- a lot of (.) years, they are very old.
	9	e::m: (.) the people (where) live i:n- in the <u>rain</u> forest (1'') <are very <u>primitive</u> ,> a::nd they have a very differents costumes <that (.) ours (.) costumes.> (1.5'')
	10	e:: (2.5) e: the:y (.) e: they does- they don't (.) <wear (.) our (.) clothes, and they wear e: another clothes.
	11	the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>

Table 27. Excerpt 1 from pretest: non-segmented (left column) and segmented into Idea-units (right column)

With respect to the first problem - hesitation phenomena - it can seem that we have here the same situation as we had with the T-unit. The definition does not mention the phenomena and consequently gives no solution to how to handle them. But actually, due to the unit's semantic grounds we discover that such oral discourse features should not be regarded as problematic. On the contrary, they form part of 'a message segment'. In our opinion, they are one of the best indicators we can have of the process of content construction. Repetitions and reformulations, self-repairs and false starts, i.e. everything that Foster *et al.* (2000) call 'dysfluency features' and rule out of the analysis, openly and constantly mark step by step a slow, prolonged and never-ending route which any learner (and even more in case of L2/FL one) takes in building their discourse and which is so evident in spoken language.

Thus, in Idea-unit 4 the reformulation reflects a change in the speaker's strategy: instead of telling directly where the object is located ("place is in the-") she at first introduces it ("is the Amazon") to site it after at the end of the same unit ("and is in South America") and give more characteristics in the next one (unit 5). We can suppose that something similar occurs in the unit 6 where we find a false start. An utterance was begun with some idea but suddenly sharply cut off; after a short filled pause a new topic was initiated.

In the unit 10 a series of hesitation phenomena creates an interesting situation. Here we have a paused repetition "the:y (.) e: they does" which the speaker immediately repairs. She changes the auxiliary from the 3rd singular to the 3rd plural making it agree with the subject. But at the same time she reformulates it, thus transforming the utterance into negative ("they does- they don't"). We think that these discourse features clearly indicate a search for grammatical accuracy and, what is more important, complex meaning construction.

All said above confirms our assumption that hesitation phenomena should be included in the unit and analyzed. As we could see, they allow observing the dynamics of speech building, i.e. how the speaker encodes the ideas needed to convey a certain propositional content and adjusts these to his/her pragmatic objectives.

5.3.1.2. *Problem 2: Intonation and pauses*

In Table 28 we tried to divide the excerpt 2 into Idea-units:

the principal problem of animals <u>are</u> the:- that a lot of animals are en↑dangered (.) en↓dangered. because the: cutters e: kill them to do clothes, and- (1'') and to do: something. e: (1'')	5	the principal problem of animals <u>are</u> the:- that a lot of animals are en dangered (.) en↓dangered. because the: cutters e: kill them to do clothes, and- (1'') and to do: something.
and- (.) e: we have to:- we have to: protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests. e:: (2.5'') we h- e:	6	e: (1'') (an-) (.) e: we have to:- we have to: protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests.
we have to create r- natural reserves a:nd (.) don't kill animals for fun, and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same of creatures.	7	e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun, and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same of creatures.

Table 28. Excerpt 2 from posttest: non-segmented (left column) and segmented into Idea-units (right column)

At first sight, the task of unit identification seems to be evident and not at all complicated. According to Ellis and Barkhuizen's (2005) definition, we should just cut the fragment into message segments which consist of a topic and comment. It is also supposed that in case of oral data the boundaries are marked intonationally. Therefore, we segmented the problematic part from the left column into two Idea-units (units 5 and 6). Each of them has a main clause in which a topic is expressed and an attached subordinate clause which functions as a comment. Though in Idea-unit 5 there is a 'final' intonation and a pause between the main clause and the adverbial, it is obvious that the latter forms part of a content message conveyed in the former. Therefore both should come together. In case of the unit 6 we have neither intonation change no pauses which could justify the segmentation into more units.

However, in the next Idea-unit it becomes clear that the extent of 'a topic and comment' is not so easily established. Even if we follow the stated intonation principle, it is not apparent how to deal with the verbless structure "the same of creatures". Should it just be regarded as a comment? Or should we consider it a new idea and thus mark as a separate unit? Neither tool's definition nor Larsen-

Freeman, the only author found to use Ellis and Barkhuizen's (2005) unit of analysis for the data, mentions such case.

5.3.1.3. *Problem 3: Reformulated false starts and subordinate clauses*

The last excerpt segmented into Idea-units is presented in Table 29:

and it's very important that <u>we</u> replant the:- these trees. if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees. and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never↑die and the trees (.) of Amazonia never d- never- (.) m:: disappear.	11	and it's very important that <u>we</u> replant the:- these trees. if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees.
	12	and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never↑die and the trees (.) of Amazonia never d- never- (.) m:: disappear.

Table 29. Excerpt 3 from posttest: non-segmented (left column) and segmented into Idea-units (right column)

Here we actually can easily resolve both difficulties we had with T-unit. The first one - reformulated false starts - is similar to the cases we have already discussed in relation to the excerpt 1 (see Table 27). In Idea-unit 11 it indicates a change in the speaker's pragmatic position and reveals the process of meaning construction. Referring to the second one - subordinate clauses - we simply cannot segment the utterance in the unit 12 into two units. It is evident that the conditional and two main clauses constitute one single idea.

However, here we again encounter the problem of unit limits. What should be considered a 'message segment'? Till what point a fragment can be regarded as one topic? It is clear that inside the excerpt there are two big topics (anti-deforestation policy, unit 11, and Amazon's future, unit 12). But it is possible that both of them or at least the first one, in turn, consist of smaller and more concrete ideas. Thus, another essential question can be raised. What should be considered the smallest idea? An utterance? The definition which relies on semantic criteria and employs some prosodic features provides no satisfactory answer. Perhaps it is necessary and useful to have some additional criteria, for example, syntactic, to help to establish unit boundaries. In this case, should it be a clause? But only a main one or together with any attached subordinate clauses?

So, having segmented the speech samples into Idea-units we should admit that its definition is quite wide and incomplete. The lack of complementary indicators besides semantic criteria and intonation principle leaves such an important methodological decision as unit limits on behalf of the researcher. We can see that when applied to monologic oral data collected from low-level FL

learners, the unit fails to be so explicit and exact as it is shown in Larsen-Freeman (2006).

On the other hand and as it was already mentioned in the theoretical part, in comparison to two previous units this one indeed presented an alternative position for the analysis of the progress in complexity of the language produced. Due to the fact that it referred to the content construction and learner's pragmatic objectives, we decided to work out the tool's definition in order to improve its application to our empirical data. In section 5.2.1. we could observe that in the segmentation phase the AS-unit which was elaborated from the T-unit resulted to be more effective. So, to precise the Idea-unit boundaries it was determined to employ those methodological principles proposed by Foster *et al.* (2000) which seemed to be the most promising and appropriate for the last tool.

5.3.2. *Re-segmentation*

First of all, to complement the intonation principle we suggested that 'a message segment' should be separated from the next unit by: (1) falling intonation and (2) a pause equal to or more than 0.5 seconds. In this case intonation and pausing would serve as discourse indicators of a 'natural' ending and permit us to follow the speakers' pragmatic objectives. Basing on this principle and taking into account Ellis and Barkhuizen's (2005) distinction between the essential propositions which corresponded to Mayor Ideas and additional details corresponding to Minor Ideas, we considered important to specify that one Idea-unit could contain more than just one Idea. We supposed therefore that sometimes within the boundaries of the same Idea-unit a Mayor Idea and one or several dependent Ideas could be found. By this assumption we tried to standardize the tool and make some kind of analogy with clausal definitions of the T-unit and the AS-unit which would allow their posterior comparison.

Another decision was taken on problematic cases such as incomplete or ambiguous Ideas. If after being segmented as a separate Idea-unit according to the 'intonation and pause' principle, any Idea became incomprehensible it should have been included into the previous unit to which it was related. In case of self-repaired Ideas, only elaborated into a minimally understandable utterance were to be considered an Idea-unit. Furthermore, all previous self-repaired versions of the Idea together with the comprehensible one were to form just one Idea-unit. The same rule was to be applied to repeated and reformulated Ideas regardless of whether they were mayor or minor.

To observe how the refined tool worked with our data and whether it gave any positive methodological results, we applied it according to the rules described above and re-segmented the subjects' oral performances into Idea-units. Here we

present the same three excerpts segmented into Idea-units according to Ellis and Barkhuizen (2005) and the specifications proposed in this study.

5.3.2.1. Excerpt 1

Table 30 presents two segmentations of the excerpt 1 which, as it was already commented, was taken from Montse's pretest.

4	e: and the principal: place is in the- is the Amazon and is in South America.	4	e: and the principal: place is in the- is the Amazon and is in South America.
5	e: the weather is ↑ <u>wet</u> a::nd there (.) rains a lot.	5	e: the weather is ↑ <u>wet</u> a::nd there (.) rains a lot.
6	e: the princi- e: there are a lot o:f kinds o:f e: animals and plants,	6	e: the princi- e: there are a lot o:f kinds o:f e: animals and plants, e:
7	e: for example son- son animals, there are (beautifuls), e: monkeys, e: panter a:nd- and parrots.		for example son- son animals, there are (beautifuls), e: monkeys, e: panter a:nd- and parrots.
8	e:m (1'') there are a lot of trees, of (centenar-) e: and the trees have lot- a lot of (.) years, they are very old.	7	e:m (1'') there are a lot of trees, of (centenar-) e: and the trees have lot- a lot of (.) years, they are very old.
9	e::m: (.) the people (where) live i:n- in the <u>rainforest</u> (1'') <are very <u>primitive</u> ,> a::nd they have a very different costumes <that (.) ours (.) costumes.> (1.5'')	8	e::m: (.) the people (where) live i:n- in the <u>rainforest</u> (1'') <are very <u>primitive</u> ,> a::nd they have a very different costumes <that (.) ours (.) costumes.> (1.5'')
10	e:: (2.5'') e: the:y- (.) e: they does- they don't (.) <wear (.) our (.) clothes, and they wear e: another clothes.	9	e:: (2.5'') e: the:y (.) e: they does- they don't (.) <wear (.) our (.) clothes, and they wear e: another clothes.
11	the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>	10	the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>

Table 30. Segmentation into Idea-units according to Ellis and Barkhuizen (2005) (left column) and the proposed specifications (right column)

It can be seen that the version segmented according to our proposal contains less Idea-units. In the marked fragment the unit boundary that served for the first segmentation actually shows no ending since there is only a very short pause and no falling intonation. This indicates that the speaker has not finished yet and is going to continue the started Idea. Therefore, according to the new adopted principle, what was initially divided into 2 Idea-units (5 and 6 in the left column) now consists of only one unit (6 in the right column).

5.3.2.2. Excerpt 2

Table 31 displays two segmentations of the excerpt 2:

5	the principal problem of animals <u>are</u> the:- that a lot of animals are en↑dangered (.) en↓dangered. because the: cutters e: kill them to do clothes, and- (1'') and to do: something.	4	the principal problem of animals <u>are</u> the:- that a lot of animals are en↑dangered (.) en↓dangered.
		5	because the: cutters e: kill them to do clothes, and- (1'') and to do: something.
6	e: (1'') (an-) (.) e: we have to:- we have to: protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests.	6	e: (1'') (an-) (.) e: we have to:- we have to: protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests.
7	e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun, and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same of creatures.	7	e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun, and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same of creatures.

Table 31. Segmentation into Idea-units according to Ellis and Barkhuizen (2005) (left column) and the proposed specifications (right column)

Here the opposite situation can be observed. Applying the same principle we obtain two separate Idea-units instead of one which we got having worked according to Ellis and Barkhuizen (2005). In this case, the unit boundary is very clearly marked by the change in intonation: at first rising and then falling, which is followed by a pause more than 0.5 seconds. The utterance which was handled as problematic when we employed the T-unit ("the same of creatures") here was regarded as a new minor Idea but included in the previous Idea-unit. It was considered that it could result ambiguous if taken from its context and segmented as a new unit.

5.3.2.3. Excerpt 3

In Table 32 two segmentations of the last excerpt can be examined:

11	and it's very important that <u>we</u> replant the:- these trees. if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees.	11	and it's very important that <u>we</u> replant the:- these trees.
		12	if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees.
12	and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never↑die and the trees (.) of Amazonia never d- never- (.) m:: disappear.	13	and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never↑die and the trees (.) of Amazonia never d- never- (.) m:: disappear.

Table 32. Segmentation into Idea-units according to Ellis and Barkhuizen (2005) (left column) and the proposed specifications (right column)

For this excerpt the same procedure was employed which produced two Idea-units separated by an unmarked intonation and a significant pause. It seems that having applied the Idea-unit with the proposed specifications it started to deal with our data in a more effective way. We recognized that the second phase of the analysis which consisted in measuring complexity progress in learner oral production depended on the preciseness of the segmentation. Thus, we thought that after having re-segmented we would be able to carry out more valid quantifications.

5.3.3. Principles for complexity measurement

For the last tool, the total number of Idea-units produced in each production was counted. To determine conditions for elements inclusion/exclusion for the second measure (Unit Length Frequency) two facts were taken into account: first, that Ellis and Barkhuizen (2005) did not calculate it and, second, the previous discussion on the exclusion of dysfluency features in the AS-unit. Thus, the principles elaborated for the T-unit were chosen. In respect to the Ratios, it was impossible to calculate the proportions of clauses and subordinates for the Idea-unit since these were syntactic elements and the tool was supposed to measure semantic complexity. It was finally decided to apply the Ratio paradigm to the tool's basic elements, i.e. Mayor and Minor Ideas, and calculate the percentage of the total number of Ideas to the total number of Idea-units and of Minor Ideas to the total number of Ideas. In counting Ideas, repetitions and non-understandable self-repairs were excluded.

5.3.4. Measurements based on the Idea-unit

For the last analytic tool we followed the same procedure adopted in relation to the previous ones. After having segmented our monologic oral explanatory data into Idea-units we first calculated four complexity measures and then computed statistical significance values for three of them (Unit Length Frequency, Clause Ratio, and Subordinate Clause Ratio).

According to Figure 3, two first measures again provide the most visible results since they allow observing the progress more clearly than two other ones. Thus, the first measure - the Unit Frequency - revealed that in all three categories, i.e. pretest, posttest and progress scores, Montse had a higher degree of complexity of the language than Laura. Before the treatment she achieved to produce 11 units while Laura only 7, her post-treatment score was also much higher and thus her progress was more obvious (her 9 units vs. Laura's 5). So, it can be observed that in this measure the last analytic tool also showed that one of the subjects improved more in complexity of her oral discourse. Thus, it provided

the results similar to those obtained by two previous tools even though here this learner was Montse and not Laura.

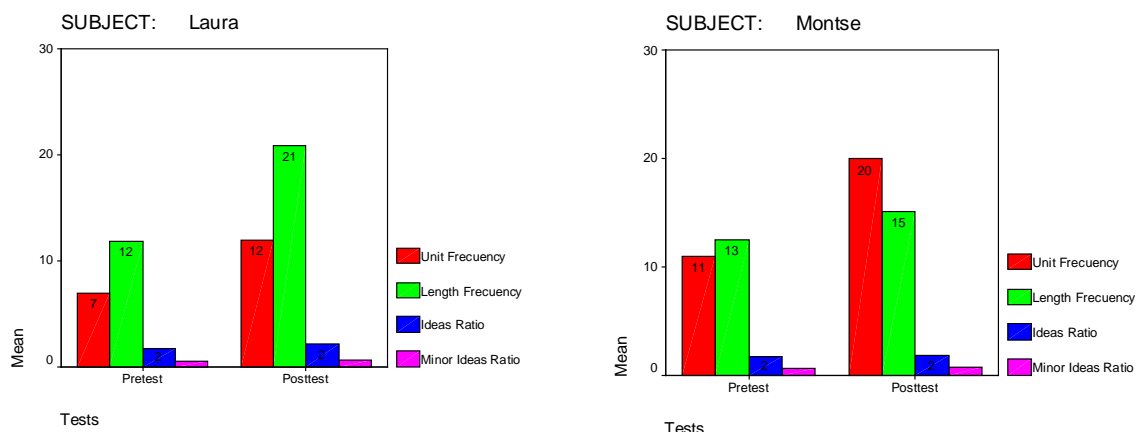


Figure 3. Complexity measures' results with the Idea-unit

As it can be seen the scores taken with our last research tool and presented in Table 33 differ considerably from those acquired with the T-unit or AS-unit. The fact that the basic criteria of the former were semantic while the latter based on the syntactic ones gave distinct character or quality to Idea-units. The segmentation principles employed for this unit of analysis resulted in fewer units which contained a bigger number of words since units represented whole ideas and not mere utterances. Thus, in the Unit Length Frequency the scores were notably higher than in case of the previous tools. If compared between the subjects, the Idea-unit not only showed that Laura progressed remarkably more (9.05 words per Idea-unit vs. 2.61 of Montse) but also that the difference between the learners' progress scores was much higher than in either T-unit or AS-unit, even though in these two cases it was Montse who always gained.

In terms of complexity two Frequencies' results can be interpreted in the following way: though Montse produced more ideas in her posttest (20 vs. 12 of Laura) on average they extended less than 3 words per unit. Laura, on her side, had fewer ideas but these resulted to be considerable much longer since in her posttest each on average contained 9 words more. Thus, the Idea-unit seems to demonstrate a greater degree of complexity after the CLIL treatment in both measures and for both learners.

		Frequency		Ratio	
		Unit	Unit Length	Ideas	Minor Ideas
Laura	Pretest	7	11.86	1.71	0.58
	Posttest	12	20.91	2.16	0.69
	Progress	5	9.05	0.45	0.11

Montse	Pretest	11	12.54	1.73	0.63
	Posttest	20	15.15	1.80	0.78
	Progress	9	2.61	0.07	0.15

Table 33. Results of the complexity measures with the Idea-unit

In respect to the Clause and Subordinate Clause Ratios it should be kept in mind that in order to calculate them for this research tool we were obliged to propose some adaptations. Thus, we applied the analytic procedures used in the T-unit and the AS-unit for making two Ratios to Major and Minor Ideas; consequently the proportion of the total number of Ideas to the total number of Idea-units as well as of the Minor Ideas to the total number of Ideas was calculated. The first measure revealed almost the same scores in pretest for both subjects and some advantage for Laura in the posttest which still gave a quite notable difference and especially if compared to that of Montse (0.45 vs. 0.07). The second Ratio showed both very similar scores in all three categories: learners' pretests, posttests, and progress made, and a very low difference between the tests for both subjects.

It can be summed up, that as it was the case of the previous units of analysis chosen for the present study the one examined in this section also provided the most visible results in two Frequencies which displayed a considerable increase in complexity of the language produced by both subjects. The Ideas and Minor Ideas Ratios gave little difference in scores both between each learner's tests and each one's progress.

As it was already done in relation to the T-unit and the AS-unit, after quantifying our data a series of the statistical procedures were applied. In order to compute the significance values, first it was necessary to find out whether the scores in each subject's pretest and posttest were distributed normally. Kolmogorov-Smirnov test demonstrated that both learners' scores were within the normal distribution in the Unit Length Frequency, the Ideas Ratio, and the Minor Ideas Ratio (see Appendix C). Thus, for all three measures the independent-samples *t* test was employed to calculate the significance values.

As it is shown in Table 35, for Laura, only the Unit Length Frequency registered significant difference between her scores in the pretest and posttest, being of .46. And both Ratios demonstrated that her progress was statistically insignificant.

Group Statistics					
	Test	N	Mean	Std. Deviation	Std. Error Mean
Length frequency	Pretest	7	11.86	4.741	1.792
	Posttest	12	20.92	10.414	3.006
Idea ratio	Pretest	7	1.71	.756	.286
	Posttest	12	2.17	1.030	.297
Minor idea ratio	Pretest	7	.6190	.39340	.14869
	Posttest	12	.6875	.38620	.11149

Table 34. Laura's independent-samples t test group statistics for three measures with the Idea-unit

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Length frequency	Equal variances assumed	5.355	.033	-2.155	17	.046	-9.06	4.203	-17.927	-.192
	Equal variances not assumed			-2.589	16.408	.020	-9.06	3.500	-16.464	-1.655
Idea ratio	Equal variances assumed	.249	.624	-1.009	17	.327	-.45	.448	-1.398	.493
	Equal variances not assumed			-1.097	15.875	.289	-.45	.412	-1.327	.422
Minor idea ratio	Equal variances assumed	.002	.967	-.370	17	.716	-.0685	.18489	-.45853	.32163
	Equal variances not assumed			-.368	12.489	.719	-.0685	.18584	-.47162	.33471

Table 35. Laura's independent-samples t test for three measures with the Idea-unit

For Montse the statistical analysis revealed significance values in no measure (Table 37) since none reached to be equal or less than .05.

Group Statistics					
	Test	N	Mean	Std. Deviation	Std. Error Mean
Length frequency	Pretest	11	12.55	7.488	2.258
	Posttest	20	15.15	6.548	1.464
Idea ratio	Pretest	11	1.73	.786	.237
	Posttest	20	1.80	.894	.200
Minor idea ratio	Pretest	11	.5455	.47779	.14406
	Posttest	20	.7250	.37958	.08488

Table 36. Montse's independent-samples t test group statistics for three measures with the Idea-unit

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
									Lower Upper
Length frequency	Equal variances assumed	.429	.518	-1.008	29	.322	-2.60	2.585	-7.892 2.682
	Equal variances not assumed			-.968	18.460	.346	-2.60	2.691	-8.248 3.039
Idea ratio	Equal variances assumed	.115	.737	-.226	29	.823	-.07	.322	-.732 .586
	Equal variances not assumed			-.234	23.133	.817	-.07	.310	-.714 .569
Minor idea ratio	Equal variances assumed	3.007	.094	-1.150	29	.260	-.1795	.15618	-.49898 .13989
	Equal variances not assumed			-1.074	17.065	.298	-.1795	.16720	-.53221 .17312

Table 37. Montse's independent-samples t test for three measures with the Idea-unit

So, having revised the statistical results of this tool's application to our data, it can be resumed that they proved our interpretation. From three examined measures it gave the significance value only in the Unit Length Frequency and only for Laura which corresponded to her high progress in this measure. Neither for her nor for Montse the Ratios turned out to be significant. These facts can indicate that for measuring progress in semantic complexity of the language produced the Idea-unit seems to be little effective even though in assessing general complexity it gave some positive results.

6. DISCUSSION and CONCLUSIONS

In the present study we employed three research tools, two syntactic and one semantic, in order to segment our data and measure its complexity. Our principal objective was to find out whether these tools allow us to capture and assess the progress in complexity of learners' spoken production and which one is the most effective. First of all, we were interested in examining whether the chosen tools could be easily applied for the division of monologic oral performances into units. We had foreseen that the fact that our subjects had a quite low level of target language could raise some problematic methodological issues. Second, by measuring both subjects' pretest and posttest we wanted to find out whether the tools gave important outcome on complexity and what information about this aspect of language each one provided.

6.1.SEGMENTATION

Having applied the first analytic tool, the T-unit, to the FL learner monologic production we were faced with three serious methodological problems. The analysis revealed that all of them were mainly caused by two main characteristics of our data: its oral origin and learners' low-proficiency level of the target language.

In concrete they were related to (a) hesitation phenomena, (b) intonation and pauses, and (c) reformulated false starts and subordinate clauses. The segmentation process showed that the tool resulted little appropriate for dealing with our data. In our opinion, this owes to the proper nature of the T-unit since it was initially proposed for the formal assessment of written syntactic maturity in L1. Thus, its definition gave no solution for the above mentioned spoken discourse features. It also resulted impossible to base on previous SLA research experience since almost all consulted studies provided neither guidelines on the tool's employment nor segmented samples.

In relation to the second unit of analysis, it should be emphasized that Foster *et al.*'s (2000) detailed commentaries and examples resulted to be a highly useful complement to their definition and a comprehensible guide on how to segment language learner spoken data. The analysis demonstrated that this research tool achieved to overcome many methodological shortcomings of the previous one and resolve the problems arisen by the use of the latter. Though some SLA researchers (e.g., Iwashita 2006) considered the tool's application too complex and preferred the traditional T-unit, the present study showed that seemingly complex and scrupulous segmentation procedures actually helped to handle our oral data more easily and allowed us to succeed in the first phase of the analysis.

The only hypothetically problematic methodological consequence of this segmentation methodology was considered the fact that whatever dysfluency feature was to be marked in the transcripts. It was supposed that in the measuring phase it meant their exclusion from the quantification. This, in our opinion, would lead to that the unit of analysis which was elaborated to deal with the complex reality of L2 and FL learner spoken language would leave to segment authentic data. This could lead to the loss of some parts of linguistic material probably valuable for the assessment of complexity progress in the language produced. Except for this hypothetical problem related to the measuring of complexity, whose results will be discussed in more detail in the next section, it can be concluded that the AS-unit turned out to be not only more appropriate and better applicable to the spoken language but also more sensitive to the peculiarities of the latter than the T-unit.

The last research tool which was regarded as alternative since it based on other primary criteria than the previous ones initially seemed interesting and promising for the data collected in a CLIL classroom because it claimed to be capable to analyze content complexity of learner spoken production thus permitting us to assess the progress in their academic discourse over time. Its application to our monologic oral explanatory data according to Ellis and Barkhuizen's (2005) definition showed that on one hand the Idea-unit successfully handled problematic cases related to spoken language features such as hesitation

phenomena, intonation or pausing due to its interest in the propositional rather than formal aspect of the language produced. On the other hand, its definition which was supposed to serve for segmenting our data into concrete propositions called in this study 'Ideas' resulted to be imprecise since it was unclear what constituted the unit elements and where its boundaries lied. Hence, concerned with the validity of the complexity measures to be carried out basing on such segmentation, it was decided to refine the tool's definition and specify the Idea-unit limits. With this aim several methodological principles of the AS-unit which were considered the most appropriate for the investigated tool were employed. Thus, the rule of a falling intonation and a 0.5 second pause as indicators of a 'natural' ending was introduced. It was also mentioned that sometimes by following this rule several Ideas, both Mayor and Minor, could be included within the same Idea-unit.

An important decision was taken in reference to the segmentation of incomplete, ambiguous and self-repaired Ideas. Only those which could be comprehended individually were to be regarded as separate Idea-units. Once elaborated the analytic procedures, we re-segmented our data in order to observe whether this time the tool would result to be more methodologically effective. The comparison between two segmentations demonstrated that the proposed specifications allowed to the Idea-unit to handle the data in a more careful and exact way.

Having discussed individually each research tool's appropriateness for segmenting our FL learner monologic oral production, a series of conclusions can be derived from this phase of the analysis. First, in relation to the T-unit, it should be highlighted that it arose several serious methodological issues which it was unable to resolve. Thus, it should be admitted that this tool resulted to be little appropriate for dealing with our data. Turning to the next unit of analysis, we could observe its preciseness in segmentation procedures and sensitivity to the typical features of spoken discourse which seemed to lack in the previous tool. Despite apparently complex application procedure it turned out to work very well with our data and produced clearly and systematically segmented samples. The last tool chosen for the present study had to be tested twice against the data since first segmentation seemed to us ambiguous and invalid for the posterior quantification due to its definition's impreciseness in respect to the unit boundaries. Taking into account possibly important outcomes of this semantic tool in measuring and assessing the progress in content complexity of the language produced in the CLIL classroom, it was considered necessary to improve and specify the segmentation procedure. Having re-segmented the data, it could be observed that the Idea-unit answered positively to the treatment and started to function more accurately and careful. However, the analysis of each tool's application to our data showed that the AS-unit resulted to be the most appropriate and effective one.

6.2.MEASUREMENT

After the division of our oral data into T-units, AS-units, and Idea-units, the segmented samples were quantified by applying two Frequency and two Ratio measures for each tool. As it was described in section 5.1.3., the T-unit revealed that Laura progressed more in producing T-units while Montse improved more in the Unit Length Frequency. In the Ratios, however, the difference between mean scores seemed to be too low to be able to affirm anything about the progress in complexity of the language produced. Still, the posterior statistical analysis indicated that exactly in these two measures there were statistically significant changes. In the Unit Length Frequency the significance was less conclusive since only Montse achieved to have almost statistically significant scores. Nevertheless, her progress is especially remarkable when being compared with Laura's significance values in this measure.

So, in relation to the first examined research tool, the conclusion can be made that the data segmented into T-units allowed us to employ several measures which could show the extent to which the subjects took the advantage of the CLIL treatment in order to improve complexity of their spoken discourse. Thus, the Clause Ratio and the Subordinate Ratio helped us to discriminate between the learner who progressed more due to the treatment and the one who did not. The Unit Length Frequency also seemed to be useful though its results in the analyzed cases were not so obvious. The last one employed in the present study, the Unit Frequency, permitted an easy observation of the learners' progress but at the same time provided outcomes which contradicted to those obtained with the other three measures. To investigate whether it happened because this measure displayed a distinct type of the progress and make any definitive conclusions, the analysis of a larger corpus is recommended.

Among four measures taken with the AS-unit, it was found that at the first sight the Unit Frequency seemed to capture the progress for both Laura and Montse more clearly than the others. Still, it demonstrated the outcomes which differed from the ones acquired with the rest of the measures since it suggested that it was Laura who progressed more after the CLIL teaching sequence. Nevertheless, the difference in the progress in complexity of oral language made by the learners resulted to be less with this tool than with the T-unit due to the increased preciseness of the former which thus tended to diminish any difference between the subjects' outcomes.

If compare three other measures taken with the AS-unit to the calculated with the previous tool, these seemed to be less effective in showing the differences between the learners. Actually, the outcomes in the Unit Length Frequency, the Clause Ratio, and the Subordinate Ratio resulted to be almost the same for Laura and Montse. Still, as it occurred with the T-unit, the statistical computation showed that only Montse's differences in two Ratios achieved to have

significance values less than .05. Thus, it can be suggested that her progress in complexity could be due to the CLIL teaching sequence and not to chance. In relation to the Unit Length, neither Laura's nor Montse's difference between the pretest and posttest reached to become significant however that of the latter could be again considered notable.

It seems that both analytic tools resulted to be useful not only in identifying the progress in complexity of the produced language attributable to the treatment but also in distinguishing between those who achieved this progress and those who did not. Such similarity between two units of analysis can suppose difficulties in making choice between them for the application in our future research. However, later several reasons in favor of one of them will be provided.

When we turn to the Idea-unit, the analysis of the quantifications made with this tool showed that the data segmentation resulted in producing fewer Idea-units which however were characterized by a bigger length in comparison to the already examined T-unit and AS-unit. Taken measures displayed that it was Montse who progressed more in the Unit Frequency while Laura achieved to do it in the Unit Length Frequency. Nevertheless, according to the statistical analysis, only Laura's progress resulted to be significant in this Frequency. In the Ideas and Minor Ideas Ratios none of the subjects reached to have significance values less than .05. It should be highlighted that in the present study they were proposed and used as *ad hoc* substitutes for the Clause Ratio and the Subordinate Clause Ratio in reference to the Idea-unit but turned out to function in a different way than the clause-based Ratios. Though the outcomes obtained with the Idea-unit revealed that this tool was completely different from the previous ones, it demonstrated its inappropriateness and low effectiveness in almost all measures since only in one it showed significant results attributable to the treatment. This apparent lack of effectiveness in capturing significant changes in complexity of the learners' oral performances might influence negatively our decision to employ this analytic tool in future research.

The similarities found between the outcomes calculated with the T-unit and the AS-unit proved that both belonged to the same category of units of analysis which were elaborated to measure - among other language phenomena - syntactic complexity. It should be noted that by the means of the Clause Ratio and the Subordinate Ratio both tools showed significant results which evidenced their effectiveness in measuring the degree of syntactic complexity employed by the subjects. This allowed us to consider these two units of analysis and the applied clause-based Ratios as particularly useful tools for future studies on the improvement in syntactic complexity of FL learner monologic oral explanatory production.

In relation to general complexity, it should be mentioned that the Frequencies demonstrated less effectiveness in assessing the learners' progress.

Regardless of whether our data were segmented into T-units or AS-units, the Unit Frequency provided the results which disagreed with those obtained with other measures. And the progress captured by the Unit Length Frequency never reached to become statistically significant. However, the fact that the outcomes shown by the latter were always notable and that it resulted impossible to compute the statistical significance of the former with the data available for the present study indicates that both Frequencies should nevertheless be taken into account in future research.

Summing up, the analysis carried out on the Frequencies and the Ratios showed that both the T-unit and the AS-unit could be considered appropriate analytic tools for our research goals. Yet, two reasons should be pointed out which speak in favor of the AS-unit. First concerns measuring. Thus, this tool revealed a slightly better progress in complexity in three measures for Laura (if compared to the one obtained by this learner with the T-unit) and the significance values closer to .05. It can be interpreted as a higher degree of preciseness and sensitivity of this analytic tool to the effects of the CLIL teaching sequence on the subjects (even in case of the above mentioned learner who neither in the T-unit nor in the AS-unit achieved to have statistically significant results). A possible explanation to it can be the assumption that having been more thorough in the data segmentation it was thus able to reach better outcomes in measures. The second reason which favors the AS-unit and makes us tend toward this tool is precisely its accurate and transparent segmentation principles as well as its sensitivity to the typical oral discourse features.

So, from the analysis of three research tools chosen for the present study it can be concluded that the AS-unit resulted to have several serious advantages over the T-unit and the Idea-unit: (a) it was able to resolve the methodological issues in segmentation arisen by the T-unit, (b) it turned out to be better applicable and more appropriate for dividing our data into units due to its clear definition and detailed author's guidelines on the segmentation, and (c) in taking complexity measures it revealed higher exactness and sensitivity to even small changes in learners' monologic oral production.

6.3.LIMITATIONS OF THE STUDY AND ISSUES FOR FUTURE RESEARCH

We consider important to point out that all affirmations made in relation to the application and outcomes of the units of analysis chosen for the present study in order to assess the progress in complexity shown by Laura and Montse after the implementation of the CLIL teaching sequence are limited to these two cases. Thus, to make any generalizations over the appropriateness and effectiveness of the analytic tools an examination of a bigger set of samples is recommended. Therefore one of the possible issues for developing in future research could be the

segmentation, quantification and comparison of pretests and posttests of all learners who participated in this CLIL treatment.

Another considerable issue related to the previous one which resulted impossible to carry out here due to time and space limits could be the employment of other measures of complexity. It could clarify possible doubts on whether it was a certain unit of analysis or a measure that turned out to be ineffective since those used in the present study were chosen only basing on the principle of their popularity in the SLA research literature.

Finally, it should be added that though in the previous section it was concluded that the Idea-unit seemed to result little appropriate for our study, it does not mean that it should be completely rejected. Before that it is necessary: (a) to examine the possibility of applying its segmentation principles - which gave notable results in the Unit Frequency - as a tool for measuring progress in the production of academic contents learnt under the CLIL treatment and (b) to revise whether the Idea Ratio and the Minor Idea Ratio as proposed in the present study can actually function as indicators of semantic complexity.

Furthermore, as it was already discussed in section 5.2., the AS-unit clearly demonstrated that it worked within the same formalist syntactic paradigm as the T-unit, though to a less degree. It was also shown that it actually excluded all discourse features from the quantification thus, in our opinion, converting the authentic oral data into 'cleaned' samples. This makes us suppose that though having gained in precision we lost some important linguistic material that could provide valuable information about complexity development in learner language. But besides, as it was discussed in the Idea-unit segmentation, they function as discourse markers that can reveal the sophisticated process of utterance construction. To prevent the loss of such important information, the Idea-unit could be employed as a useful complement for capturing and understanding such phenomena. Hence, the application of qualitative tools for the data analysis and especially of those proper to the Conversation Analysis could help us to exploit the possibilities of this unit of analysis.

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APPENDIX A: TRANSCRIPTION CONVENTIONS

Transcription conventions were abridged and adapted from Atkinson and Heritage (1984, pp. ix-xvi):

.	Descending tone sequence and a pause equal to or more than 0.5 sec. which indicate a 'natural' ending
,	Tone sequence with a comma-like pause
(.)	The shortest hearable pause, less than 0.2 sec.
(2")	Exactly timed pause in seconds
>fast< <slow>	The talk produced is noticeably quicker or slower than the surrounding talk
(word)	The transcriber's guess at an unclear part
<u>under</u>	Emphasis
↑word	A rising intonation shift
↓word	A falling intonation shift
lo::ng	The stretching of a sound or letter
cu-	A sharp cut-off of a prior word or sound
+spi:k+	Approximate phonetic transcription

APPENDIX B: SEGMENTED TRANSCRIPTS

SUBJECT 1: LAURA

No	T-unit: pretest	Words	Cs	SCs
1	hello, my name is Laura,	4	1	0
2	e:m I think tha:t (1'') e: (1'') tha:t rainforest are very big around the world (.) i::n (1'') South America, concretely i:n- (1) in Brazil.	16	2	1
3	there are a very big (.)	5	1	0
4	his name is Amaz↑onas (2'')	4	1	0
5	and there is (.) e: very different types of animals, e:m (4'') monkeys, +taicans+, snakes, and different type of fish. (4'')	16	1	0
6	there are (.) e:m (.) <different and big trees.> (4'')	6	1	0
7	e: (3'') the:: people who live there (.) e:m (1'') makes little houses with differe:nts (2'') +matherials+	11	2	1
8	m: I think that they live good (2'')	6	2	1
9	but (.) they need a little h↑elp (2'')	6	1	0
10	the:y (.) have eat and drink with the rivers (5'') and- (5'')	9	1	0
TOTAL:		83	13	3

Note: C = clause; SC = subordinate clause

No	T-unit: posttest	Words	Cs	SCs
1	my name is Laura,	3	1	0
2	I want to:: (.) talk about the: (.) rainforests.	7	2	1
3	the rainforests are very dense and warm- (1.5'') e: forest,	8	1	0
4	e: they are recognized around the Equator (.) the Equator ↑world and- (2'')	8	1	0
5	and th- the biggest- the rainforests ar:e (.) in South America,	9	1	0
6	its name is Amazonias.	4	1	0
7	<they: have a:> >big biodiversity (.)	5	1	0
8	that is a variety of plants and animals who they live in the:- this place.<	15	2	1
9	they have more ten thousand of plants (.)	7	1	0
10	for they- there are indigenous people who use for make medicines and another things (.)	14	2	1
11	and more animals (.) for example monkeys, mammals, e: fishes (1.5'') and another types. (5'')	11	1	0
12	e: the- the plants of the: rainforests also they make the:- of th- the more of the part of the oxygen of the world and rains of the: whole of world.	28	1	0
13	e:: (the indigenous-) also the indigenous people (.) ar::e poor pe- poor people (.)	10	1	0

14	+but+ (.) also (.) I think that for they (.) are very rich because they ca:n- (1.5'') e: (3'')	13	2	1
15	e: we think that they ar::e- e: are- (.)	5	1	0
16	>(indígenes són:: (.) tampoco.)<	0	0	0
17	the facility of are (.) with harmony with the nature.	9	1	0
18	and hunt only the animals they have and e:at	9	2	1
19	or: they can use all +tips+ o:f (.) plants	8	1	0
20	and they: (.) know them.	4	1	0
21	a:n:d +but+ the foreign people who go them (.) >ay< (.) there (.) e:: cuts the: plants and make that the animals and the people can ↑die,	22	3	2
22	also the foreign people instead of pa(ss) illness to the: (.) Yanomami for example.	13	1	0
23	and they are:- are inimmune of this- this- (.) this illness (1'')	7	1	0
24	and they can cure them e: because they are- (5.5'')	8	1	0
25	a:nd with this problem I recommendate tha:t more of the rich countries e: make e: m: campaigns of vacunations,	16	2	1
26	or they control more the +destru on+ and deforestation, (3'')	8	1	0
TOTAL:		251	33	8
<i>Note: C = clause; SC = subordinate clause</i>				

Nº	AS-unit: pretest	Words	Cs	SCs
1	hello,	1	0	0
2	my name is Laura,	3	1	0
3	e:m I think // {tha:t} (1'') e: (1'') tha::t rainforest are very big around the world (.) i::n (1'') South <u>America</u> , concretely {i:n-} (1'') in Brazil.	16	2	1
4	there are a very big (.)	5	1	0
5	his name is Amaz↑o <u>n</u> as (2'')	4	1	0
6	and there is (.) e: very different types of animals, e:m (4'')	8	1	0
7	monkeys, +taicans+, snakes, and different type of fish. (4'')	8	0	0
8	there are (.) e:m (.) <different and big trees.> (4'')	6	1	0
9	e: (3'') the:: people // who live there (.) e:m (1'') makes little houses with differe:nts (2'') +ma <u>th</u> erials+ (2'')	11	2	1
10	m: I think // that they live <u>good</u>	6	2	1
11	but (.) they need a little h↑elp (2'')	6	1	0
12	the:y (.) have eat and drink with the <u>r</u> ivers (5'') {and-} (5'')	8	1	0
TOTAL:		82	13	3
<i>Note: C = clause; SC = subordinate clause</i>				

No	AS-unit: posttest	Words	Cs	SCs
1	my name is Laura,	3	1	0
2	I want // to:: (.) talk about the: (.) rainforests.	7	2	1
3	the rainforests are very dense and warm- (1.5'') e: <u>forest</u> ,	8	1	0
4	e: they are recognized around {the Equator} (.) the Equator ↑world {and-} (2'')	7	1	0
5	and {th- the biggest-} the rainforests ar:e (.) in South America,	7	1	0
6	its name is Amazonas.	4	1	0
7	<they: have a:> >big <u>biodiversity</u> (.)	5	1	0
8	that is a variety of plants and animals // who they live in {the-} this place.<	14	2	1
9	they have more ten thousand of <u>plants</u> (.)	7	1	0
10	{for they-} there are indigenous people // who use for make <u>medicines</u> and another <u>things</u> (.)	12	2	1
11	and more animals (.) for example monkeys, mammals, e: fishes (1.5'') and another types. (5'')	11	1	0
12	e: {the-} the plants of the: rainforests also they make {the:- of th-} the more of the part of the <u>oxygen</u> of the ↑world and rains of the: whole of world.	26	1	0
13	e:: {(the indigenous-)} also the indigenous <u>people</u> (.) ar::e {poor pe-} poor people (.)	7	1	0
14	+but+ (.) <u>also</u> (.) I think // that for <u>they</u> (.) are very rich // because they ca:n- (1.5'') e: (3'')	13	3	2
15	e: we think // that they {ar::e-} e: are- (.)	5	2	1
16	>(indígenes son:: (.) tampoco.)<	0	0	0
17	the facility of are (.) with harmony with the <u>nature</u> .	9	1	0
18	and hunt only the animals // they have and e:at	9	2	1
19	or: they can use all +tips+ o:f plants	8	1	0
20	and they: (.) know them.	4	1	0
21	a:n:d +but+ the foreign people // who go {them (.) >ay< (.)} <u>there</u> (.) e:: cuts the: <u>plants</u> and make // that the animals and the people can ↑ <u>die</u> ,	21	3	2
22	also the foreign people instead of pa(ss) illness to the: (.) Yanomami for example.	13	1	0
23	and they {are:-} are in <u>immune</u> of {this- this-} (.) this illness (1'')	7	1	0
24	and they can <u>cure</u> them e: // because they are- (5.5'')	8	2	1
25	a:nd with this problem I recommendate // tha:t more of the rich <u>countries</u> e: make e: m: campaigns of <u>vacunations</u> ,	16	2	1
26	or they control more the +destrukfon+ and deforestation, (3'')	8	1	0
	TOTAL:	239	36	11
Note: C = clause; SC = subordinate clause				

No	Idea-unit: pretest	Words	May	Min
1	[hello, my name is Laura,] e:m [I think tha:t (1'') e: (1'') tha::t rainforest are very big around the world] (.) [<i>i::n (1'') South <u>America</u>, concretely i:n- (1'') in Brazil.</i>]	20	2	1
2	[<i>there are a very big (.) his name is Amaz[↑]onas</i>] (2'')	9	0	1
3	and [there is (.) e: very different types of animals,] e:m (4'') [<i>monkeys, +taicans+, snakes, and different type of fish.</i>] (4'')	16	1	1
4	[there are (.) e:m (.) <different and big trees.>] (4'')	6	1	0
5	e: (3'') [the:: people who live there] (.) e:m (1'') [<i>makes little houses with differe:nts (2'') +ma<u>ther</u>ials+] (2'')</i>]	11	1	1
6	m: [<i>I think that they live <u>good</u></i>] but (.) [<i>they need a little h[↑]elp</i>] (2'')	12	0	2
7	[<i>the:y (.) have eat and drink with the <u>rivers</u></i>] (5'') and- (5'')	9	0	1
TOTAL:		83	5	7
<p>Note: May = Mayor Idea; Min = Minor Idea</p> <p>In bold type = Mayor Ideas; in <i>italics</i> = Minor Ideas</p> <p>[] = Idea's boundaries</p>				

No	Idea-unit: posttest	Words	May	Min
1	[my name is Laura,] [<i>I want to:: (.) talk about the: (.) rainforests.</i>]	10	1	1
2	[the rainforests are very dense and warm-] (1.5'')	7	1	0
3	e: <u>forest</u> , e: [<i>they are recognized around the Equator</i>] (.) the Equator [↑] world and- (2'')	9	0	1
4	and th- [<i>the biggest- the rainforests ar:e (.) in South America,</i>] [<i>its name is Amazonias.</i>]	13	0	2
5	[<they: have a:> > <u>big biodiversity</u>] (.) [<i>that is a variety of plants and animals who they live in the- this place.<</i>]	20	0	2
6	[they have more ten thousand of <u>plants</u>] (.) for they- [<i>there are indigenous people who use for make <u>medicines</u> and another <u>things</u></i>] (.) [and more animals] (.) [<i>for example monkeys, mammals, e: fishes (1.5'') and another types.</i>] (5'')	32	2	2
7	e: the- [<i>the plants of the: rainforests also they make the:- of th- the more of the part of the oxygen of the[↑]world and rains of the: whole of world.</i>]	28	0	1
8	e:: [(the indigenous-) also the indigenous <u>people</u>] (.) [<i>ar::e poor pe- poor people</i>] (.) +but+ (.) <u>also</u> (.) [<i>I think that for <u>they</u> (.) are very rich</i>] because (.) they ca:n- (1.5'') e: (3'') e: we think that they ar::e- e: are- (.) >(indígenes son:: (.) tampoc.)< [<i>the facility of are (.) with harmony with the <u>nature</u>.</i>]	37	1	3
9	[<i>and hunt only the animals they have and e:af</i>] or: [<i>they can use all +tips+ o:f plants</i>] and [<i>they: (.) know them.</i>]	21	0	3

10	a:n:d +but+ [the foreign people who go <u>them</u> (.) >ay< (.) <u>there</u> (.) e:: cuts the: <u>plants</u> and make that the animals and the people can <u>die</u> ,] also [<i>the foreign people instead of pa(ss) illness to the: (.) Yanomami for example.</i>]	35	1	1
11	and [<i>they are:- are inimmune of this- this- (.) this illness</i>] (1'') and [<i>they can cure them</i>] e: because they are- (5.5'')	15	0	2
12	a:nd with this problem [I recommendate tha:t more of the rich <u>countries</u> e: make e: m: campaigns of <u>vacunations</u> ,] or [they control more the +destrukfon+ and deforestation,] (3'')	24	2	0
TOTAL:		251	8	18
<p>Note: May = Mayor Idea; Min = Minor Idea In bold type = Mayor Ideas; in <i>italics</i> = Minor Ideas [] = Idea's boundaries</p>				

SUBJECT 2: MONTSE

Nº	T-unit: pretest	Words	Cs	SCs
1	empiezo ya?	0	0	0
2	e: (.) I'm going to talk to the <u>rain</u> forest.	8	1	0
3	e: the principal rainforest are i::n South↑America and in ↑Africa.	10	1	0
4	e: and the principal: place is in the- is the Amazon and is in South America.	15	1	0
5	e: the weather is ↑ <u>wet</u>	4	1	0
6	a::nd there (.) rains a lot.	5	1	0
7	e: the princi- e: there are a lot o:f kinds o:f e: animals and plants,	12	1	0
8	e: for example son- son animals,	3	1	0
9	there are (beautifuls), e: monkeys, e: panthers a:nd- and parrots.	7	1	0
10	e:m (1'') there are a lot of trees, of (centenar-)	8	1	0
11	e: and the trees have lot- a lot of (.) years,	9	1	0
12	they are very old.	4	1	0
13	e::m: (.) the people (.) (where) live i:n- in the <u>rain</u> forest (1'') <are very <u>primitive</u> ,>	10	2	1
14	a::nd they have a very different costumes <that (.) ours (.) costumes.> (1.5'')	10	1	0
15	e:: (2.5'') e: the:y- (.) e: they does- they don't (.) <wear (.) our (.) clothes,	8	1	0
16	and they wear e: another clothes.	5	1	0
17	the:y- the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.>	18	1	0
18	(1.5'') e: (2'') I finish.	2	1	0
TOTAL:		138	18	1
<i>Note: C = clause; SC = subordinate clause</i>				

Nº	T-unit: posttest	Words	Cs	SCs
1	hello, my name is Montse Vallés	4	1	0
2	e: e:m and I'm going to speak- to speak about rainforests.	8	1	0
3	e: rainforests are situated principal- principally in South A↑merica and Africa.	10	1	0
4	e: the weather o:f the rainforest is warm and wet.	9	1	0
5	the principal problem of animals <u>are</u> the:- that a lot of animals are e: endangered (.) en↓dangered. because the: cutters e: kill them to do clothes, and- (1'') and to do: something.	26	5	4
6	e: (1'') an- (.) e: we have to:- we have to: protect these- the:- these animals because e: some animals are:- only live <u>there</u> in rainforests.	16	2	1

7	e:: (2.5'') we h- e: we have to create r- natural reserves a:nd (.) don't kill animals for fun,	13	1	0
8	and the: indigenous only kill for- for <u>eat</u> not for fun. e: the same o:f creatures.	14	1	0
9	the principle problem of the <u>plants</u> is that th- that the:- (.) the peop- the occigen- the <occidently> people, e: cut down the forest trees a:nd don't plant any <u>trees</u> .	26	2	1
10	and it- and the <u>trees</u> of the Amazonia are the:- are the trees tha:t (.) >a:re the most (hard).	16	2	1
11	there are very trees.	4	1	0
12	there are a lot of trees.<	6	1	0
13	a::nd (.) if we cut <u>down</u> e: they didn't to breathe, <can't do <u>oxygen</u> >	14	3	1
14	and without the <u>oxygen</u> the people die.	7	1	0
15	and it's very important that <u>we</u> replant the:- these trees.	11	2	1
16	if <u>we</u> cut down- if the coachers cut down a <u>tree</u> the:y could- they replant, for example, two or three new trees.	22	2	1
17	and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) the:- the Amazonia never ↑die	13	2	1
18	and the trees (.) of Amazonia never d- never- (.) m:: disappear.	7	1	0
19	e: the people o:f- wh- who live in rainforests a:re Yanomami.	9	2	1
20	e: these people is very primitive	5	1	0
21	a:nd (.) they haven't got tech↑nology like <u>we</u> - like <u>us</u> .	10	1	0
22	e:m (.) they wear <u>piercing</u>	3	1	0
23	and they have other religion	5	1	0
24	and they can't speak like <u>us</u> .	7	1	0
25	e: lots of- lots of closh- coachers when go to: Amāzonía or rainforest e: contage the indigenous (.) e: like e: flowers.	15	2	1
26	a:n:d- a::n::d- po:r- po:r- not much (.) not mu(h)ch e: <u>money</u> (.) e: they have to:- to cut down the trees.	11	1	0
27	and- (.) and theñ- then can't (can't) survive in the Amazonia.	8	1	0
28	↑and (.) that's all.	4	1	0
TOTAL:		303	42	13
Note: C = clause; SC = subordinate clause				

No	AS-unit: pretest	Words	Cs	SCs
1	empiezo ya?	0	0	0
2	e: (.) I'm going to talk to the <u>rainforest</u> .	8	1	0
3	e: the principal rainforest are i::n South↑America and in ↑Africa.	10	1	0
4	e: and the principal: place {is in the-} is the Amazon and is in South America.	12	1	0

5	e: the weather is ↑ <u>wet</u>	4	1	0
6	a::nd there (.) rains a lot.	5	1	0
7	e: {the princi-} e: there are a lot o:f kinds o:f e: animals and plants,	10	1	0
8	e: for example {son-} son animals,	3	1	0
9	there are (beautifuls), e: monkeys, e: panthers {a:nd-} and parrots.	7	1	0
10	e:m (1'') there are a lot of trees, {of (centenar-)}	6	1	0
11	e: and the trees have {lot-} a lot of (.) years,	8	1	0
12	they are very old.	4	1	0
13	e::m: (.) the people // (where) live {i:n-} in the <u>rainforest</u> (1'') <are very <u>primitive</u> ,>	10	2	1
14	a::nd they have a very different costumes <that (.) ours (.) costumes.> (1.5'')	10	1	0
15	e:: (2.5'') e: {the:y- (.) e: they does-} they don't (.) <wear (.) our (.) clothes,	6	1	0
16	and they wear e: another clothes.	5	1	0
17	{the:y-} the:y put earrings i:n the: noses, mouth and in a lot of parts {of the-} of their body.> (1.5'')	16	1	0
18	e: (2'') I finish.	2	1	0
TOTAL:		126	18	1
<i>Note: C = clause; SC = subordinate clause</i>				

No	AS-unit: posttest	Words	Cs	SCs
1	hello,	1	0	0
2	my name is Montse Vallés	3	1	0
3	e: e:m and I'm going {to speak-} to speak about rainforests.	8	1	0
4	e: rainforests are situated {principal-} principally in South A↑ <u>m</u> erica and Africa.	9	1	0
5	e: the weather o:f the rainforest is warm and wet.	9	1	0
6	the principal problem of animals <u>are</u> {the:-} // that a lot of animals are {en↑dangered} (.) en↓dangered.	13	2	1
7	because the: cutters e: kill them // to do clothes, // {and-} (1'') and to do: something.	12	3	3
8	e: (1'') {(an-) (.) e: we have to:-} we have to: protect {these- the:-} these animals // because e: some animals {are:-} only live <u>there</u> in rainforests.	14	2	1
9	e:: (2.5'') {we h-} e: we have to create {r-} natural reserves a:nd (.) don't kill animals for fun,	13	1	0
10	and the: indigenous only kill {for-} for <u>eat</u> not for fun.	10	1	0
11	e: the same of creatures.	4	1	0
12	the principle problem of the <u>plants</u> is // {that th- that the:- (.) the peop- the occigen-} the <occidently> people, e: cut down the forest trees a:nd don't plant any <u>trees</u> .	20	2	1

13	{and it-} and the <u>trees</u> of the Amazonia {are the:-} are the trees // tha:t (.) >a:re the most (hard).	14	2	1
14	{there are very trees.} there are a lot of trees.<	6	1	0
15	a::nd (.) if we cut <u>down</u> // e: they didn't to breathe, // <can't do <u>oxy</u> gen>	14	2	1
16	and without the <u>oxy</u> gen the people die.	7	1	0
17	and it's very important // that <u>we</u> replant {the:-} these trees.	10	2	1
18	{if <u>we</u> cut down-} if the coachers cut down a <u>tree</u> // {they could-} they replant, for example, two or three new trees.	16	2	1
19	and <u>then</u> e: if <u>we</u> : and if <u>they</u> did it (.) // {the:-} the Amazonia never↑die // and the trees (.) of Amazonia {never d-} never- (.) m:: disappear.	20	3	1
20	e: the people {o:f- wh-} who live in rainforests a:re Yanomami.	8	2	1
21	e: these people is very primitive	5	1	0
22	a:nd (.) they haven't got tech↑nology {like <u>we</u> -} like <u>us</u> .	8	1	0
23	e:m (.) they wear <u>pier</u> cing	3	1	0
24	and they have other religion	5	1	0
25	and they can't speak like <u>us</u> .	7	1	0
26	e: {lots of-} lots of {closh-} coachers when go to: Ama↑zonía or rainforest e: contage the indigenous (.) e: like e: flowers.	14	2	1
27	{a:n:d-} a::n::d- {po:r-} po:r- {not much} (.) not mu(h)ch e: <u>money</u> (.) e: they have {to:-} to cut down the trees.	11	1	0
28	{and-} (.) and {theñ-} then {can't} (can't) survive in the Amazonia.	7	1	0
29	↑and (.) that's all.	4	1	0
TOTAL:		275	41	13

Note: C = clause; SC = subordinate clause

No	Idea-unit: pretest	Words	May	Min
1	[empiezo ya?]	0	1	0
2	e: (.) [I'm going to talk to the <u>rain</u> forest.]	8	1	0
3	e: [the principal rainforest are i::n South America and in ↑Africa.]	10	1	0
4	e: and [the principal: place is in the- is the Amazon] and [is in South America.]	15	0	2
5	e: [the weather is ↑ <u>wet</u>] a::nd [there (.) rains a lot.]	9	0	2
6	e: the princi- e: [there are a lot o:f kinds o:f: e: animals] and [plants,] e: [for example son- son animals, there are (beautifuls), e: monkeys, e: panthers a:nd- and parrots.]	22	2	1
7	e:m (..) [there are a lot of trees,] of (centenar-) e: and [the trees have lot- a lot of (.) years, they are very old.]	21	0	2
8	e::m: (.) [the people (where) live i:n- in the <u>rain</u> forest]	20	1	2

	(.) [<i><are very <u>primitive</u>,></i>] a::nd [<i>they have a very different costumes <that (.) ours (.) costumes.></i>]			
9	(1.5'') e:: (2.5'') e: [<i>the:y (.) e: they does- they don't (.) <wear (.) our (.) clothes,></i>] and [<i>they wear e: another clothes.</i>]	13	0	2
10	the:y- [<i>the:y put earrings i:n the: noses, mouth and in a lot of parts of the- of their body.></i>]	18	0	1
11	(1.5'') e: (2'') [I finish.]	2	1	0
	TOTAL:	138	7	12
<p>Note: May = Mayor Idea; Min = Minor Idea In bold type = Mayor Ideas; in <i>italics</i> = Minor Ideas [] = Idea's boundaries</p>				

No	Idea-unit: posttest	Words	May	Min
1	[hello, my name is Montse Vallés] e: e:m and [<i>I'm going to speak- to speak about rainforests.</i>]	12	1	1
2	e: [rainforests are situated principal- principally in South A↑merica and Africa.]	10	1	0
3	e: [<i>the weather o:f the rainforest is warm and wet.</i>]	9	0	1
4	[the principal problem of animals are] the:- that [<i>a lot of animals are en↑dangered</i>] (.) en↓dangered.	14	1	1
5	because [<i>the: cutters e: kill them to do clothes, and- (1.0) and to do: something.</i>]	12	0	1
6	e: (1'') (an-) (.) e: we have to:- [we have to: protect these- the:- these animals] because e: [<i>some animals are:- only live <u>there</u> in rainforests.</i>]	16	1	1
7	e:: (2.5'') we h- e: [<i>we have to create r- natural reserves</i>] a:nd (.) [<i>don't kill animals for fun,</i>] and the: [<i>indigenous only kill for- for <u>eat</u> not for fun.</i>] e: [<i>the same of creatures.</i>]	27	0	4
8	[<i>the principle problem of the <u>plants</u> is</i>] that th- that the:- (.) the peop- the occigen- [<i>the <occidently> people, e: cut down the forest trees</i>] a:nd [<i>don't plant any <u>trees</u>.</i>]	26	0	3
9	and it- and the <u>trees</u> of the Amazonia are the:- are the trees tha:t (.) >a:re the most (hard). there are very trees. [there are a lot of trees.]	26	1	0
10	< a::nd (.) [<i>if we cut <u>down</u> e: they didn't to breathe,</i>] [<i><can't do <u>oxygen</u>></i>] and [<i>without the <u>oxygen</u> the people die.</i>]	21	0	3
11	and [<i>it's very important that <u>we</u> replant the:- these trees.</i>]	11	0	1
12	[<i>if <u>we</u> cut down- if the coachers cut down a <u>tree</u> they could- they replant, for example, two or three new trees.</i>]	22	0	1
13	and <u>then</u> e: [<i>if <u>we</u>: and if <u>they</u> did it (.) the:- the Amazonia never ↑die</i>] and [<i>the trees (.) of Amazonia never d- never- (.) m:: disappear.</i>]	20	0	2
14	e: [the people o:f- wh- who live in rainforests] [a:re	9	1	1

	Yanomami.]			
15	e: [<i>these people is very primitive</i>] a:nd (.) [<i>they haven't got tech↑nology like <u>we</u>- like <u>us</u>.</i>]	15	0	2
16	e:m (.) [<i>they wear <u>piercing</u></i>] and [<i>they have other religion</i>] and [<i>they can't speak like <u>us</u>.</i>]	15	0	3
17	e: lots of- [lots of closh- coachers when go to: Ama↑zonia or rainforest] e: [<i>contage the indigenous (.) e: like e: flowers.</i>]	15	1	1
18	a:n:d- a::n::d- po:r- [<i>po:r- not much (.) not mu(h)ch e: <u>money</u> (.) e: they have to:- to cut down the trees.</i>]	11	0	1
19	and- (.) and theñ- [<i>then can't (can't) survive in the Amazonia.</i>]	8	0	1
20	↑and (.) [that's all.]	4	1	0
	TOTAL:	303	8	28
<p>Note: May = Mayor Idea; Min = Minor Idea In bold type = Mayor Ideas; in <i>italics</i> = Minor Ideas [] = Idea's boundaries</p>				

APPENDIX C: DESCRIPTIVE STATISTICS BY KOLMOGOROV-SMIRNOV TEST

SUBJECT 1: LAURA

T-unit: Descriptive Statistics

Tests	N	Mean	Std. Deviation	Minimum	Maximum
Pretest					
Length frequency	10	8.30	4.596	4	16
Clause ratio	10	1.30	.483	1	2
Subordinate ratio	10	.1500	.24152	.00	.50
Posttest					
Length frequency	26	9.65	5.939	0	28
Clause ratio	26	1.27	.604	0	3
Subordinate ratio	25	.1467	.24210	.00	.67

T-unit: One-Sample Kolmogorov-Smirnov Test

Tests	Length frequency	Clause ratio	Subordinate ratio
Pretest			
N	10	10	10
Normal Parameters ^{a,b}			
Mean	8.30	1.30	.1500
Std. Deviation	4.596	.483	.24152
Most Extreme Differences			
Absolute	.292	.433	.433
Positive	.292	.433	.433
Negative	-.175	-.267	-.267
Kolmogorov-Smirnov Z	.922	1.368	1.368
Asymp. Sig. (2-tailed)	.363	.047	.047
Posttest			
N	26	26	25
Normal Parameters ^{a,b}			
Mean	9.65	1.27	.1467
Std. Deviation	5.939	.604	.24210
Most Extreme Differences			
Absolute	.198	.403	.448
Positive	.198	.403	.448
Negative	-.097	-.289	-.272
Kolmogorov-Smirnov Z	1.008	2.055	2.238
Asymp. Sig. (2-tailed)	.262	.000	.000

a. Test distribution is Normal.

b. Calculated from data.

AS-unit: Descriptive Statistics

Tests	N	Mean	Std. Deviation	Minimum	Maximum
Pretest					
Length frequency	12	6.83	3.904	1	16
Clause ratio	12	1.08	.669	0	2
Subordinate ratio	12	.25	.452	0	1
Posttest					
Length frequency	26	9.19	5.579	0	26
Clause ratio	26	1.38	.697	0	3
Subordinate ratio	26	.42	.643	0	2

AS-Unit: One-Sample Kolmogorov-Smirnov Test

Tests			Length frequency	Clause ratio	Subordinate ratio
Pretest	N		12	12	12
	Normal Parameters ^{a,b}	Mean	6.83	1.08	.25
		Std. Deviation	3.904	.669	.452
	Most Extreme Differences	Absolute	.216	.300	.460
		Positive	.216	.300	.460
		Negative	-.082	-.284	-.290
	Kolmogorov-Smirnov Z		.748	1.038	1.593
	Asymp. Sig. (2-tailed)		.631	.232	.013
Posttest	N		26	26	26
	Normal Parameters ^{a,b}	Mean	9.19	1.38	.42
		Std. Deviation	5.579	.697	.643
	Most Extreme Differences	Absolute	.206	.363	.398
		Positive	.206	.363	.398
		Negative	-.116	-.252	-.255
	Kolmogorov-Smirnov Z		1.051	1.852	2.032
	Asymp. Sig. (2-tailed)		.220	.002	.001

a. Test distribution is Normal.

b. Calculated from data.

Idea-unit: Descriptive Statistics

Test		N	Mean	Std. Deviation	Minimum	Maximum
Pretest	Length frequency	7	11.86	4.741	6	20
	Idea ratio	7	1.71	.756	1	3
	Minor idea ratio	7	.6190	.39340	.00	1.00
Posttest	Length frequency	12	20.92	10.414	7	37
	Idea ratio	12	2.17	1.030	1	4
	Minor idea ratio	12	.6875	.38620	.00	1.00

Idea-unit: One-Sample Kolmogorov-Smirnov Test

Test			Length frequency	Idea ratio	Minor idea ratio
Pretest	N		7	7	7
	Normal Parameters ^{a,b}	Mean	11.86	1.71	.6190
		Std. Deviation	4.741	.756	.39340
	Most Extreme Differences	Absolute	.202	.256	.262
		Positive	.202	.256	.190
		Negative	-.131	-.219	-.262
	Kolmogorov-Smirnov Z		.535	.678	.694
	Asymp. Sig. (2-tailed)		.937	.748	.722
Posttest	N		12	12	12
	Normal Parameters ^{a,b}	Mean	20.92	2.17	.6875
		Std. Deviation	10.414	1.030	.38620
	Most Extreme Differences	Absolute	.132	.314	.291
		Positive	.132	.314	.209
		Negative	-.106	-.186	-.291
	Kolmogorov-Smirnov Z		.456	1.089	1.007
	Asymp. Sig. (2-tailed)		.985	.187	.262

a. Test distribution is Normal.

b. Calculated from data.

SUBJECT 2: MONTSE

T-unit: Descriptive Statistics

Tests		N	Mean	Std. Deviation	Minimum	Maximum
Pretest	Length frequency	18	7.67	4.550	0	18
	Clause ratio	18	1.00	.343	0	2
	Subordinate ratio	17	.0294	.12127	.00	.50
Posttest	Length frequency	28	10.82	6.225	3	26
	Clause ratio	28	1.50	.882	1	5
	Subordinate ratio	28	.1833	.25892	.00	.80

T-Unit: One-Sample Kolmogorov-Smirnov Test

Tests			Length frequency	Clause ratio	Subordinate ratio
Pretest	N		18	18	17
	Normal Parameters ^{a, b}	Mean	7.67	1.00	.0294
		Std. Deviation	4.550	.343	.12127
	Most Extreme Differences	Absolute	.137	.444	.537
		Positive	.137	.444	.537
		Negative	-.085	-.444	-.404
	Kolmogorov-Smirnov Z		.583	1.886	2.214
	Asymp. Sig. (2-tailed)		.886	.002	.000
Posttest	N		28	28	28
	Normal Parameters ^{a, b}	Mean	10.82	1.50	.1833
		Std. Deviation	6.225	.882	.25892
	Most Extreme Differences	Absolute	.131	.357	.403
		Positive	.131	.357	.403
		Negative	-.104	-.285	-.239
	Kolmogorov-Smirnov Z		.695	1.892	2.135
	Asymp. Sig. (2-tailed)		.719	.002	.000

a. Test distribution is Normal.

b. Calculated from data.

AS-unit: Descriptive Statistics

Tests		N	Mean	Std. Deviation	Minimum	Maximum
Pretest	Length frequency	18	7.00	3.926	0	16
	Clause ratio	18	1.00	.343	0	2
	Subordinate ratio	18	.06	.236	0	1
Posttest	Length frequency	29	9.48	4.904	1	20
	Clause ratio	29	1.41	.682	0	3
	Subordinate ratio	29	.45	.686	0	3

AS-unit: One-Sample Kolmogorov-Smirnov Test

Tests			Length frequency	Clause ratio	Subordinate ratio
Pretest	N		18	18	18
	Normal Parameters ^{a,b}	Mean	7.00	1.00	.06
		Std. Deviation	3.926	.343	.236
	Most Extreme Differences	Absolute	.111	.444	.538
		Positive	.111	.444	.538
		Negative	-.111	-.444	-.407
	Kolmogorov-Smirnov Z		.472	1.886	2.281
	Asymp. Sig. (2-tailed)		.979	.002	.000
Posttest	N		29	29	29
	Normal Parameters ^{a,b}	Mean	9.48	1.41	.45
		Std. Deviation	4.904	.682	.686
	Most Extreme Differences	Absolute	.102	.349	.364
		Positive	.102	.349	.364
		Negative	-.074	-.238	-.257
	Kolmogorov-Smirnov Z		.547	1.877	1.960
	Asymp. Sig. (2-tailed)		.926	.002	.001

a. Test distribution is Normal.

b. Calculated from data.

Idea-unit: Descriptive Statistics

Test		N	Mean	Std. Deviation	Minimum	Maximum
Pretest	Length frequency	11	12.55	7.488	0	22
	Idea ratio	11	1.73	.786	1	3
	Minor idea ratio	11	.5455	.47779	.00	1.00
Posttest	Length frequency	20	15.15	6.548	4	27
	Idea ratio	20	1.80	.894	1	4
	Minor idea ratio	20	.7250	.37958	.00	1.00

Idea-unit: One-Sample Kolmogorov-Smirnov Test

Test			Length frequency	Idea ratio	Minor idea ratio
Pretest	N		11	11	11
	Normal Parameters ^{a,b}	Mean	12.55	1.73	.5455
		Std. Deviation	7.488	.786	.47779
	Most Extreme Differences	Absolute	.130	.277	.284
		Positive	.103	.277	.237
		Negative	-.130	-.181	-.284
	Kolmogorov-Smirnov Z		.433	.919	.941
	Asymp. Sig. (2-tailed)		.992	.367	.338
Posttest	N		20	20	20
	Normal Parameters ^{a,b}	Mean	15.15	1.80	.7250
		Std. Deviation	6.548	.894	.37958
	Most Extreme Differences	Absolute	.159	.264	.366
		Positive	.159	.264	.234
		Negative	-.101	-.186	-.366
	Kolmogorov-Smirnov Z		.712	1.183	1.635
	Asymp. Sig. (2-tailed)		.692	.122	.101

a. Test distribution is Normal.

b. Calculated from data.