Students' errors in L1 grammar from the perspective of formal linguistics

ABSTRACT

This paper digs into the role that knowledge about formal linguistics can play in teacher education. In order to do so, the paper focuses in the errors and misconceptions made by secondary students when confronted with instruction of explicit grammar. Errors are measured with respect to a formal theory of grammar. The rationale for developing this research is that certain aspects of formal theories, such as constituency, recursion, dependency, and compositionality function not only are the building blocks of the utterances but are also on the base of speech processing. If this is the case, having acquired them correctly might be helpful for enhancing literacy, since the very same notions are on the base of both the construction and the understanding of any text. In the second place, the issue of how the absence of such knowledge models the perspective from which students' errors are evaluated by the teachers is equally addressed. Errors are described following the theories for analyzing errors in mathematics. A side effect of this approach is that the parallelism between errors made in learning mathematics and in learning the grammatical concepts just mentioned allows to broaden the perspective from which the latter is approached.

Key words: formal grammar, L1 grammar, errors, linearity, functional grammar, literacy

1. Introduction

Analyzing both Primary and Secondary students' errors has a long tradition in Mathematics, which goes back at least to the beginning of the Twenty Century (see Radatz, 1980, and Swan, 2001: 151, who refers to a 'growing fascination' for this area in the eighties).[1] Likewise, errors made by second language learners have been considered to play a significant role in the process of acquiring it since Corder's 1967 seminal paper. Consequently, the study of errors in the L2 domain has its own research field, dedicated to describe their types, to find out their causes, and, finally, to debate about their treatment. This situation radically differs from how the study of pupils' errors in grammar courses at school is approached.[2]

To my knowledge, analyzing errors in grammar is almost exclusively concerned with errors (grammatical or not) made in writing, and this is regardless of the theoretical assumptions from which they are dealt with (see some critical reviews in Dunn & Lindblom 2005, Lobeck, 2005, Wheeler, 2010 and Crovitz, 2012). A nice evidence that this is the case, is the fact that grammatical errors are listed on a par with orthographical ones (a good example is, for Spanish, Mondragón Mullor, 2013: 362-363, but also Encabo y López Valero 2016) as if they were qualitatively equivalent: just errors made when writing a text.[3] This situation is not unexpected if for a vast majority of both educators and teachers grammar is conceived of as a communicative device subordinated to developing writing skills and which revolves around the notion of linguistic awareness.[4] However, as Myhill (2000: 151) observes, "too much professional energy has been attributed to the debate about whether grammar should be taught or not, whilst insufficient research resource has been allocate [sic] to investigating how pupils learn". In her paper, Myhill analyses some of the misconceptions and difficulties that students must face when learning the L1 grammar. These errors are different from the errors typical of the acquisition period and are not of interest to the current survey. In this paper we

concentrate too on errors, but from within a different starting point as well as aim. Specifically, we assume the theoretical frameworks used for analyzing and categorizing errors made by students learning Mathematics at school. These frameworks not only will allow us to classify student's difficulties and obstacles but also will allow us to broaden the perspective from which the process of learning grammar at school is seen, to the extent of considering it as similar to other learning processes. This consequence is not secondary at all, since, as Myhill (2000: 153) implicitly asserts, the fact that in the study of language the object and the medium used to study it are the same enable us to expect an obstacle to exist that is absent from other disciplines, with the consequences that follow from this. The present paper has the twofold aim of describing the students' errors and misconceptions with respect to a formal theory of grammar and of studying the consequences of how the absence of such knowledge models the perspective from which students' errors are addressed on the part of both prospective and current teachers.

The discussion is organized as follows. Section 2 briefly reviews the problem of what kind of grammar should be taught and offers arguments in favor of promoting formal oriented approaches against discourse, or function in general, based approaches. Section 3 contains the theoretical framework for analyzing errors that will be used. Section 4 describes and classifies errors and misconceptions of grammar students according to the theoretical background presented in the preceding sections and presents the consequences that follow for the different educational proposals. Section 5 offers the conclusion and future lines of research.

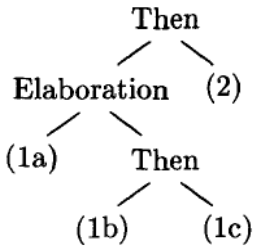
2. Formal vs. Function oriented L1 grammars

The discussion around what grammar should be taught at school, if any, is a long standing one (see for some references van Rijt, de Swart & Coppen, 2018: 2-4). In this section weare going to very briefly review some of the advantages which have been put forward in favor of teaching grammar and doing it within a formally oriented framework. This introduction is needed insofar as the errors and misconceptions are analyzed as difficulties and deviations in acquiring the concepts presented here.

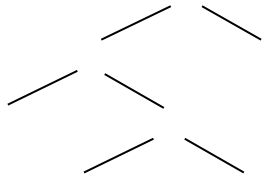
Firstly, studying both grammar in particular (see Larson 2010), or linguistics, in general (see Hudson, 2004, and Honda & O'Neil 2017, and references therein), is worth valuable not only *per se* (see recently van Rijt *et al.*, 2018: 2, and Wijnands, van Rijt & Coppen, 2021:2, and references therein, and independently Boroditsky, 2019 and Hines & Stern, 2019, whose contribution is not by accident titled *More than a tool for communication*) but also because, as these authors put it, both disciplines constitute an exceptional instrument for introducing students 'to the principles of scientific research and scientific thought', such as 'the articulation of hypotheses, principles, data, and reasoning into a coherent, convincing whole' (Larson 2010: xviii). Needless to say, the attainment of the afore mentioned benefits heavily relies upon the methodology and the grammatical theory adopted, as Van Rijt, de Swart, Wijnands & Coppen (2019) had shown. Leaving aside the fact that certain approaches and certain models of grammar contribute to develop scientific reasoning the truth is that some concepts of formally oriented approaches are to be favored in school since they may positively influence literacy development (see also van Rijt & Coppen, 2017, Van Rijt *et al.* 2018 and Bosque & Gallego 2018[5]). For the purposes of the present research, we are particularly concerned with the following four: compositionality, constituency, recursion, and (long distance) dependency. Dependency (and hierarchy) automatically follows from constituency and

recursion. They are all structure-related and, as such, come into play for building up a sentence, and also a text.[6] I show in (1) and (2) the parallelism between the two domains:

(1) Discourse structure (Hobbs 1990: 84)



(2) Syntactic structure for *Writing creative texts without effort*



[[writing [creative texts]] without effort]

In fact, this parallelism relates to a structural property: in both cases constituency and recursion are the outcome of a segmentation operation, unavoidable for processing the sentence. So, eventually, these concepts, when appropriately taught, are needed because they are expected to strengthen comprehension related skills. In any case, the three concepts of compositionality, constituency and recursion appear in Van Rijt & Coppen (2017) and Van Rijt *et al.* (2018) list of concepts that should be included according to the experts in the grammar curriculum in schools (see also, for Spanish, the *Glosario de términos gramaticales*, RAE-ASALE, 2018, and Bosque & Gallego 2021). The authors present them as if they were a list of unrelated and grammar theories neutral terms. However, it is difficult to ignore that these notions presuppose an idea of language and grammar specific to formal frameworks, and specially, to generativism. This is ultimately the reason why, as Van Rijt *et al.* (2018:16-17) conclude, the advances in modern linguistics concomitant to these and other concepts 'only marginally find their way into grammar education'.[7] As expected, the pedagogical proposals for which language is considered solely as a communicative device and studying grammar is restricted to consider its 'use in complex discourse units' (Milian 2014: 53 and references therein) are not an exception. Hardly, if any, of the concepts listed in Van Rijt *et al.* (2018) will appear in the literature on L1 grammar education that explicitly assumes a functional approach along the lines just described.

3. Theoretical framework. Students' errors in Mathematics

There are mainly two reasons for recurring to a theoretical framework that belongs to an area apparently so distant from L1 grammar such as Mathematics. Firstly, as it has already been noted, the analysis of Primary and Secondary students' errors in Mathematics is a very well stablished discipline. The literature is very extensive and both the cases and the causes are widely studied. Secondly, in the current literature on L1 grammar, on the one hand, errors are mainly analyzed as difficulties for explaining the use of a given unit in a given context. On the other hand, regardless of the fact that it is accepted the already most

widespread analysis according to which errors in fact reveal the existence of an obstacle that hinders the mastery of any discipline (see Fontich & García-Folgado 2018: 19, and references therein), the theoretical framework with respect to which the error is evaluated is an L1 grammar in some cases highly stipulative and rigid, and in any case, both very distant from the theoretical advances achieved in modern linguistics (see Van Rijt *et al*., 2018, 2020 and Van Rijt *et al*., 2019), and discourse oriented. See also Section 2 above. A third reason is that if errors and misconceptions across disciplines are ultimately very close to each other in nature, then it is also possible to ignore the idiosyncrasy of language and confront its study in school along the lines established for other disciplines.

To begin with, it is obvious that errors due to lack of concentration, careless or hasty reasoning or any other temporal situation are not of interest.[8] Researchers, on the contrary, are concerned with errors that are the result of a misconception. Or to put it the other way around, errors from this perspective are 'symptoms of misconceptions students possess' (Luneta, 2015) and point, hence, towards 'a deeper misunderstanding' on the part of the student (Swan, 2001: 147). Errors (or the misconceptions they emanate from) are significant because they are independent of good or bad teaching. As Swan 2001: 150 observes, 'the same mathematical mistakes occur all over the world, whatever curriculum is being followed and whatever pedagogical strategies seem to be adopted', which allows to speculate that misconceptions are related with more general cognitive processes (Radatz 1979, Davis 1984 cited in Rico 1995). As such, errors are regular, systematic and persistent. In general terms, different causes have been identified that explain the rationale of these misconceptions, and consequently, of the errors. For the purposes of the present research I follow a by now well know distinction between procedural related errors and content related errors (Sáenz, 2009: 126, Luneta, 2015, and Rijt *et al*., 2021). As regards the former, errors might be due to the application of irrelevant or inadequate rules or strategies. Rules and strategies might also be overapplied: it is quite frequent that this kind of errors 'stems from experiences in successfully applying comparable rules or strategies in other content areas' in which they work successfully (Radatz, 1979: 168), but which turn out to be of no use when solving problems from a different area.[9] And it might also be the case that these rules and strategies are simply made up by the student. In the second place, content errors are errors due to a "deficient mastery of prerequisite skills, facts and concepts' (Radatz, 1979: 166), which tampers and even prevents the acquisition of new knowledge. Learning new concepts requires to confront, first, and afterwards to overcome underlying misconceptions.[10] In addition to these two general classes, there exists a highly detailed description of students' errors for almost every domain within the discipline (arithmetic, algebra, geometry, functions, variables, fractions…). I will dwell on some of them when reviewing students' errors in L1 grammar.

This outline of the central assumptions will prove extremely useful for both understanding and classifying errors made by students when learning grammar at school.

3. Students' errors and misconceptions in L1 Grammar

3.1. Methodology

The data collected are students' own answers to course exercises along a period of four years, so it is not properly a quantitative study but a qualitative one. Exercises were of two classes, and were independent of each other. A group of them was oriented to elucidate students' declarative or conceptual knowledge. These exercises, taken mainly from Bosque (1994), consist of a grammatical problem and several possible rationalized

answers, among which the student has to choose the correct one. The exercises are intended for high school and first undergraduate courses and presuppose acquaintance only with traditional grammar concepts and units. The second group of exercises raised writing issues mainly at the sentence level to be solved by applying grammatical concepts (procedural knowledge), such as formal agreement (as in Corbett, 1979) or semi-lexical verbs. All these concepts had been extensively explained in class at a very descriptive level. In both cases students were asked for an explanation of their decisions, and are these answers that are analyzed here.

The exercises were aimed at two different groups of approximately forty students each during three academic courses (2015-2016, 2016-2017, 2017-2018): first-year university students of Spanish Language and Literature and pre-service teachers, both students in a medium-size town Spanish university. As regards the results, I consider that they extend to secondary education since the participants had not received any instruction in formal grammar, which in this University takes place in the second year and which, in any case, does not differ very much from the L1 grammar curriculum nor does it extend for more than three ETCS (see Van Rijt *et al*., 2021: 85 for a similar reasoning). It should be noted that in the Spanish curriculum L1 grammar education lasts until the last year of Secondary School, so it is this conceptual and procedural knowledge that these exercises reflect and the one that is being evaluated in this contribution.

3.2 Results

The fact that the same mistake was repeated student after student and year after year reveals that we are dealing with errors: they were regular, persistent, and systematic. A potential drawback of the conclusions that I present here is that they are not supported by a quantitative analysis. However, the regularity and persistence of the errors, on the one hand, and the parallelism with the domain of the Mathematics, on the other, compensate this undeniable shortcoming. Nevertheless, in order to avoid on the reader, the impression that it is just a couple of single reactions, we have asked 42 students in the fourth year or in the pre-service teacher courses to say whether they agree or not with the answers here described. The results confirm that it is not a single reaction. As it will be shown, errors might be due to the correct application of an incorrect procedure, they may follow directly from misconceptions of fundamental aspects of grammar or, finally, from the use of imperfect procedures and inadequate conceptions at the same time. Strikingly enough, students didn't detect errors even when they clash head-on with the meaning of the sequence examined. This trait has been interpreted in Mathematics as evidence that the students who make the error do not master the meaning of the symbols and concepts with which they are working or do so very imperfectly. In grammar, it is traditionally understood that the student works in a mechanical and unreflective way (see van Rijt *et al.* 2019, who talk about rules of thumb, and Wijnand & *et al*. 2021, and, for Spa., Izquierdo 2013, Bosque & Gallego, 2016, 2018, Bosque, 2018, and Bravo, 2018, among others).

According to the description presented in section 2, we have grouped errors into the two classes shown in Table 1:

MISCONCEPTIONS RELATED TO THE APPLICATION OF A RULE (PROCEDURAL KNOWLEDGE)	MISCONCEPTIONS RELATED TO CONCEPTUAL KNOWLEDGE
Based on imperfect prior knowledge	Linear conception of the structure
Due to overapplication or to lack of discrimination	Reality-mediated approach to grammar
Magical thinking	Strongly prescriptivism biased reasoning

Table 1. Classes of errors in L1 grammar

In Section 3.3 I discuss each of the classes and offer relevant examples.

3.3 Discussion

As regards the first class, MISCONCEPTIONS RELATED TO THE APPLICATION OF A RULE, errors are due to an imperfect prior knowledge or to the overapplication or misapplication of a rule, as shown in (3):

(3) Se **le** consideraba el mejor (Bosque 1994, ex. (53))
Se.IMPERSONAL him.3SG.DO considered.PTCP the best
'He was considered the best'
PROBLEM: Which is *le's* function in (3)?[11]
ANSWER REQUIRED: Direct Object (DO)
STUDENTS' ANSWER: *le* can only function as an indirect object (IO) because *le* is an IO pronoun.

Spanish pronoun *le* ('him') is primarily an indirect object pronoun, as in *Le dije*, lit. him told 'I told him'. The student, hence, is right in assuming that there exists a principle in grammar according to which the function is given by the form. So this is an example of a correct application of a rule, but the result is bad because it is based on imperfect prior knowledge, in that case, that in Spa. impersonal sentences formed with clitic *se* and marked direct objects, that is, DO with the preposition *a* 'to', the corresponding pronoun for a masculine direct object is *le* 'him.IO', and not *lo* 'him.DO'. Hence, the personal version of (3) is ***Lo** consideraban el mejor*, lit lo considered the best 'They considered him the best'. ~ In addition to this, the rule is blindly applied: if this condition obtains (there is a *le*), then the rule is applied, no matter that the solution runs against the meaning, that is, an IO with a transitive bivalent verb. Errors due to the misapplication of a rule are very frequent: In fact, 32 out of 42 students of the post-test considered that the answer was right. Nevertheless, but I want to emphasize the fact that in this kind of error, the knowledge base from which the student reasons is correct, only the application of the rule fails. Rosnick & Clement (1979) showed for Mathematics that students learn without understanding. This means that although superficially students apparently perform well, that is, they pass the exams, and even have success, in fact "misconceptions remain unchanged" (Rosnick & Clement, 1979: 3). This situation is due to the practice of tutoring of strategies -shortcuts, rules of thumb, which in turn are mechanically applied by the students, leading them this way to the wrong answer.[12]

This type of error is also an excellent example of what has been defined as inertia or epistemological obstacles: previously acquired knowledge against which it is necessary to advance, which also explains why they are difficult to overcome. This internal reorganization without which learning does not take place also explains the manifest

rejection that correct answers generate among students, since, in fact, there are many who are extremely reluctant to accept that *le* can function as a DO. The observation made for mathematics (see Section 2) that the more effective a prior learning has proved to be in its domain of validity, or the more internalized its learning is, the greater the student's opposition to freeing himself from it, is also true in L1 grammar and helps to understand this resistance. It goes without saying that in mnemonic and routine-based pedagogical procedures, this unwillingness is all the more to be expected (see also below the discussion about example (8)).

The third class of errors in this group is due to what we have called after Piaget's term 'magic thinking': students create their own theories and rules, which, resembling true theories, lead them to conclude that the problem under question is solved. This error is also very frequent in mathematics (Rosnick and Clement, 1979, García Suárez, 2010: 64, Russell *et al.*, 2009: 416). (4) contains an example of a made-up rule:

(4) Los temas de los que *se* *hablaron* durante la reunión
the topics of the.M.PL that se.CL.IMPERSONAL talk.3PL.PST.PFV during the reunion
'The topics that were discussed during the meeting'.
ANSWER REQUIRED: Being an impersonal clause, a singular is expected in the verb, hence, *habló*. The plural reveals that the structure is reanalyzed as a passive.
STUDENT'S A ANSWER: The sentence is impersonal **so the verb must be conjugated** in the present perfect (*have talked*).

There isn't any grammatical rule for Spa. similar to the one in (4), however, is the appearance of having applied a grammatical rule that allows the student to conclude that the problem of the unexpected plural on the verb is solved. A variant of this situation obtains when, in the presence of an obstacle or inconvenience, the student modifies the input data, so that the resulting adaptation allows to continue with the resolution of the problem. This is shown in (5), for the same sequence:

(5) STUDENT'S B ANSWER: Pseudo-partitive constructions prefer singular agreement.

In (5) the student completely modifies the segmentation so that the sequence *los temas de los que*, which is not even a constituent, becomes a pseudo-partitive NP. In the post-test 19 students out of 42 found this answer correct.[13]

As regards the second group, MISCONCEPTIONS RELATED TO CONCEPTUAL KNOWLEDGE, errors stem from the deeper misunderstanding of core aspects relative to grammar or language -and not of particular aspects that can be reflected in a rule. Specifically, errors are due to the following three misconceptions:

A. Language is linear;
B. Language is identified with the object it refers to;
C. Grammar is equated with prescriptivism.

Misconception C. refers to the wide-express tendency to equate teaching grammar with teaching what is "right and wrong in language" (Wijnands & *et al.*, 2021: 4). Since this situation has already been extensively criticized we are not going to say anything about it (see Saussure, 1916, Jespersen, 1933, Hazen 2005, Lobeck, 2005, Myhill 2010:116, Wheeler, 2010, Hudson, 2007, Wijnands & *et al.*, 2021, and references therein, among many others). A. and B. have received, as far as I know, less attention so I will explain them and offer some relevant examples.

A. Language is linear

Language is conceived linearly, as a sequence of juxtaposed units. From this follows, among other consequences, that the notions of structure, constituency, recursion or long-distance dependency are not handled. This misconception comes out mainly as two errors. On the one hand, it is found whenever the student fails to see that two subsequent units do not need to belong to the same constituent; on the other, it surfaces as an overgeneralization of rules that uses the position of a unit as a defining property. (6) is an example of the former:

(6) Esta ciudad ha perdido niveles de *crecimiento y de prosperidad* que
this city has lost levels of growth and of prosperity that
se **tardarán** mucho en recuperar. [Google]
se.CL.IMPERSONAL take.3PL.FUT very in recover
'This city has lost levels of growth and prosperity that will take a long time to recover'.
PROBLEM: What is wrong with this sentence?
ANSWER REQUIRED: *Tardar* ('to take long time') is a lexical verb, so a singular (*tardará*) is expected. The plural shows that *tardar* is being reanalized as a single predicate with its complement, which is the one that triggers the agreement. This a very common tendency in Spanish among certain lexical verbs, such as *lograr* 'manage'.
STUDENTS' ANSWER: This sentence is correct because *crecimiento* y *prosperidad* ('growth and prosperity') are the subjects.

In the post-test, 12 out of 42 students found that this answer was correct. The incorrect answer is the outcome of the student's failure to see at least the following three structure related features. Firstly, that there are at least three structural boundaries separating *crecimiento y prosperidad* ('growth and prosperity') from the relative clause, which is a different constituent itself. Secondly, that the constituent is the whole NP *niveles de crecimiento y prosperidad* ('levels of growth and prosperity'), and not only *crecimiento y prosperidad* ('growth and prosperity'). Thirdly, and as a consequence of the two prior statements, that there is no direct relationship between *crecimiento y prosperidad* and the relative clause despite the fact that they surface as contiguous elements. In effect, *crecimiento y prosperidad*, being the complement of a preposition, which in turn is the complement of the head of the NP *niveles*, is the most embedded constituent. As a consequence, *tardar* is not structurally accessible to it (i.e., to *crecimiento y prosperidad*). Schematically, hence, the reasoning of the student seems to correspond to (7b) instead of to (7c) - irrelevant details have been simplified or omitted and dependency relationships are shown with the arrows. Note, however, that we are not claiming that the student assigns this structure, since my contention is that this notion has not been acquired. I offer the segmentations that follow from the students' answers in order to make the explanation clearer:

(7) a. N + *de* + N + *y* + N + V
b. [N + *de* +][[N + *y* + N] + V]
c. [[N + *de* + [N + *y* + N]] [$_{\text{RelatP}}$ V]

The answer in (8) is also quite frequent:

(8) STUDENTS' B ANSWER: The subject is *niveles* ('levels')

(8) is a version of the reasoning shown in (6). In (8) the complement is separated from its head, which shows that the notions of dependency and constituency have not been acquired. It should be noted that this problem is not restricted to students. The very same mistake can be found in the official exam that students have to pass before entering the university, the EBAU. Year after year one of the grammar problems consists of identifying the function of a certain sequence with the form Det + N, regardless of whether it has a complement or not. Hence, students are asked to identify in the clause in (9) the function of the two underlined NPs, *los vecinos* 'the neighbours' and *el problema* 'the problem'. Observe that, although superficially are equivalent, only the former is a constituent:

(9) Aunque *los vecinos* hagan la reforma del sótano, no solucionarán
although the neighbors do the renovation of-the basement not solve
el problema del agua. [EBAU, July 2020, Murcia, exercise 2.2][14]
the problem of-the water
'Even if the neighbors do the basement renovation, they won't solve the water problem'

And there is still another surface effect of the existence of a linear reasoning: the position of the constituents is interpreted as relative. Thus, the subject of the clause is any NP that immediately precedes the verb (see also Fontich & García Delgado 2018: 19 for other documented examples for Spa.).

In general, it is very common among Spanish students to blur the limits between the relative clause and its antecedent, regardless of the structural complexity at stake. And the reason why there are no boundaries is because there are no constituents, only words placed one next to the other. It is this situation that ultimately reveals the errors observed. As it is to be expected, we are faced with real obstacles, because the student is reluctant to abandon this type of linear reasoning consequence of a deficient acquisition of the concept of syntactic structure. The two reactions from pre-service teachers presented in (10) show that this kind of errors are in fact due to persistent misconceptions. In both cases not only the student fails to see the correct analysis but she also is decidedly reluctant to accept it, so *esas películas* 'that films' is analyzed as the DO of *see*: [15]

(10) Esas películas que no se cansa uno de ver. (Bosque, 1994, ex. (27))
'That films that you never get tired to see'.
STUDENT A'S ANSWER: **Para mí**, el OD sería la frase nominal *esas películas*.
'For me, the DO is the NP *esas películas* 'that films''.
STUDENT B'S ANSWER: **No entiendo** que *esas películas* no sea el OD.
'I don't agree with *esas películas* not being the DO'.

Interestingly enough, the students' interviewed by Rosnick and Clement's (1979: 7, 15) reacted exactly along the same lines "...*I don' t think* of it that way. *I think* there's…", "…That's weird. I can't think of it that way", included the claim that the interviewer was "shaking all her foundations".

The linear reasoning is also present in Mathematics. Thus, quite a frequent error is to resolve the equation 2x-x=2. As in the cases just seen, the student ignores that 2x is a product, and not just two subsequent numbers. Similarly, students very often "omit the parenthesis and act as if it were not there" (Ruano, Socas & Palarea, 2008: 66-67).

Rosnick and Clement (1979: 23) claim that the difficulties that students run in to for viewing variables as standing for number stem from the fact that "this last conception is a fairly abstract one and, for that reason, a very difficult one to teach". Finally, I understand that this linear reasoning explains the errors made when translating a given problem into mathematical symbolic language. In particular, Abrate, Pochulu & Vargas (2006: 37) note that the problem "If x denotes the age of Mary and y the age of John, and Mary has twice the age of John" is translated into symbolic language as $2x = y$, instead of as the correct $2y = x$. These authors adduce this type of error as an example of a "lack of semantic understanding of mathematical language". This interpretation can be countered by the objection that the students handle the symbols and multiplication correctly, since the mathematical relation *twice* (2x) is correctly expressed. Their error lies in establishing a purely linear relationship, so that they have automatically identified the first variable (x) with the first number (Mary's age). Schematically:

(11) PROBLEM: For what x= Mary's age and y = John's age, Mary has twice John's age.
a. ANSWER REQUIRED: $2y=x$
b. STUDENTS' ANSWER: $2x=y$

The reasoning does not vary from the one we have seen the students apply to solve the problems of linguistic analysis. I conclude this section with one more example, somewhat different but which nevertheless permits an interpretation along the same line:

(12) a. El precio dependerá de *cuantos* estemos.
'The price will depend on all of the assistants'
b. El precio dependerá de *cuántos* estemos.
'The price will depend on the number of the assistants'
C. ANSWER REQUIRED: The category of the complement of *depender* 'to depend' varies.
STUDENTS' ANSWER: If *cuantos* 'all of' is written without the accent…

The student's answer reveals that she is reducing a structural difference, that between a relative *cuantos* and an interrogative *cuántos*, to a simply superficial aspect, so that if the graphic accent disappears, the difference between the two constructions vanishes with it. Once more, it is possible to find a similar situation in Mathematics. Quite a few secondary school students of algebra seem to have forgotten - or plainly not learnt - that a graph is a representation for a function. Instead, the graph is treated as a picture, as the visual image of the curve generated. This way it loses its symbolic value of being the representation of a function (see Socas Robayna, 1995, Russell *et al.*, 2009: 417-18). As far as I see it, it could be affirmed that, in the same way, for the student, the property of being an interrogative sentence is reduced as to whether it bears a graphic accent or not, completely ignoring the fact that it is the translation of a formal property, or the square brackets are the translation of the proper segmentation of the sequence under study. In this regard, Socas Robayna (1995) raises the question of whether it is not the teaching procedure itself that is at the root of this problem because 'too often the curve that represents it [the function] is considered as an object of study in itself, and not as a mode of representation of a law of variation'. The parallelism could not be more accurate. Eventually, all these misconceptions seem to point towards the student's difficulty with abstract reasoning (also Rosnick and Clement, 1979).

Hence, to conclude the discussion relative to linearity, the hypotheses I want to defend are given in (13):

(13) a. The concept of structure, as well as all the concepts derived (see Section 2) from it, is not available for Secondary students.

b. This absence might negatively affect the development of literacy, since the student proceeds in a linear, monotonic way. To put it the other way around, teaching a student the concept of structure might be helpful for improving his or her writing in terms of making structural and long dependencies relations accessible for him.

B. Language is identified with the object it refers to.

Grammar is not understood as a formal system (Saussure 1916), but is accessed through the denotation of the expressions. The clearest and best known example of this situation is the tendency to identify the subject of the sentence with the referent of the NP that performs the action of subject - and which undoubtedly has part of its justification in the widely criticized semantic approach adopted in school grammar, according to which the subject is the person, thing, etc. that carries out the action denoted by the verb. But this is not the only case. There are other examples, equally interesting and revealing:

(14) a. Los números *unos* de-l tenis que han pisado tierras chilenas. [Google]
the number ones of-the tennis that have stepped lands Chilean
'The best tennis player that have visited Chile'

b. …los *cabezarrapadas*, se disputan... [Google]
the headshaved.M.PL se.CL.IO dispute
'Skinheads dispute among them…'

c. *Las economías europeas* muestran **todas** signos *iguales* de preocupantes. [Google]
'The European Economies show all symptoms equally worrying'

The plurals in *unos* lit. ones (14a) and *iguales* lit. alikes (14c) are instances of formal agreement, although are not prescriptively correct. (14b) is a compound, which explains that only allows one plural, and not two as in *cabezas rapadas* lit. heads shaved. When faced with the plurals in (12), the students' reaction is very often to reject them on the grounds that 'There can only be one number one', 'We have just one head', 'There is only one European economy', so the way reality is configured, so will be the grammar. This type of reasoning even leads the student to reject grammatically correct forms, as in (14b). In mathematics it has also been observed that there is a tendency to particularize. Namely, students fail to understand the role of letters in equations as variables and tend, on the contrary, to interpret them as 'labels referring to concrete objects' (Russell *et al*., 2009: 416-17, and references). This difficulty for abstracting away from reality and focusing on the form could be identified with the difficulty for abstraction also in linguistics.

In this Section we have delineated common conceptual and procedural errors in L1 grammar. In order to do so, we have classified them accordingly as to whether they were due to the misapplication of a rule or an incorrect generalization, due to misconceptions related with conceptual knowledge or, finally, misconceptions related with procedural knowledge.

3.4 Further implications

Hartwell (1985: 108) argues that every pedagogical procedure should answer the question of what theory of language it presupposes, and what it predicts about the value of formal grammar instruction. He defends the view that "This question – 'what does our theory of language predict? - seems a much more powerful question than 'what does educational research tell us?'". A theory of grammar as the one outlined in Section 2 predicts the errors studied in this paper, and specifically the errors that stem from misconceptions related to central concepts of grammar and language. Continuing with Hartwell's reasoning, it is not clear at all to me that pedagogical approaches centered in the development of communicative skills and, consequently, in language as a communicative device are able both to predict and to handle these errors. In fact, a grammar in use methodology might turn out to strengthen some of the errors seen here, and specifically, errors due to the failure of separating language of the reality it refers to. Observe, in effect, that this is precisely the main objective of this approach: to focus on the meaning conveyed. Instead, recurring to the notion of structure and related concepts will help teachers both to understand the logic behind the errors and to give an adequate feedback on writing (Adger *et.al*., 2003, among many others). Finally, the current research, on the one hand, echoes Myhill's 2000 complaint as regards the need for improving our understanding of the obstacles that students find when learning grammar in school. As we have shown, when moving on to a less context-dependent level of abstraction, these problems seem to be very similar to the problems encountered in other disciplines, and specially in mathematics. On the other hand, it covers the epistemological space left by van Rijt *et al*. 2019 in the sense that these authors, for example, identify some of the errors (excess of prescriptivism, procedural knowledge consisting solely in the application of rules of thumb) but do not relate them to the misconceptions that are on their basis.

4. Conclusion

The present study had a twofold objective. Firstly, it aimed at describing the students' errors and misconceptions when learning grammar with respect to a formal theory of grammar. The rationale for developing this research is that certain aspects of formal theories, such as constituency, recursion, dependency and compositionality function as the building blocks of utterances. If this is the case, having acquired them correctly might be helpful for enhancing literacy, since the very same notions are on the base of constructing texts. Secondly, it analyzes the consequences of how the absence of such knowledge models the perspective from which students' errors are addressed. Errors were described following the theories for analysis of errors in mathematics. A side effect of this approach is that the parallelism between errors made in learning mathematics and in learning the grammatical concepts just mentioned allows to broaden the perspective from which the teaching of grammar is approached.

Errors were grouped into two major groups, namely, i. errors relative to the procedural knowledge, and ii. errors due to misconceptions about core concepts relative to grammar and language in general. Errors in group i. include the misapplication of a rule, an incorrect generalization, and made-up rules. Errors in group ii. reveal, firstly, an insufficient mastery of the general architecture of language. Students have a linear conception of structure, i.e., they lack the central notions of constituency, recursion, and long-distance dependency, among others, at an operative level. Secondly, that students' approach to grammar takes place largely on the basis of the reality to which it refers, and not by itself as a formal system. Misconceptions due to a strong prescriptivist orientation in L1 grammar belong also to this group. Another interesting fact that has come out is that students do not detect the mistakes even though they clash head-on with the meaning

of the sequence examined. The picture that emerges from these data is that grammatical analysis in school is not oriented towards understanding the meaning of the sequences examined. If this is the case, we might have pin down one of the causes for the profound division between studying grammar and enhancing literacy. From the previous discussion, it follows also that one way of overcoming this undesirable consequence is by introducing the concepts of constituency, recursion, segmentation and, consequently, compositionality, into the L1 grammar. All these concepts are on the base of our understanding of utterances.

Finally, we are are aware that the above conclusions need to be supported by quantitative research. We believe, in any case, that this work can contribute to pointing out some of the lines and questions that should be addressed in future research.

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[1] The terms *error* and *misconception* are not synonyms and they both appear in the literature, as in Wijaya *et al*. 2014 as an example of the former or in Russell *et al.* 2009, for the latter. In this research I will use *error* as the general, neutral term. The difference between the two concepts is explained in Section 3.

[2] Following a growing practice, I will also refer to grammar at school as L1 grammar, a concept completely different from acquisition of the L1. See below in the main text.

[3] A reviewer correctly points out to me that discussing about the nature of mistakes both in linguistics and in didactics is quite a prominent topic in the German tradition. This is true not only of the German tradition but also of both the Spanish and the English one (see fn. 4). However, as it will be seen, the errors targeted in the present research are quite different from the errors that these traditions normally deal with, both in their nature and in the central role they play.

[4] This is at least the picture that emerges from the special monograph on the topic of L1 grammar in school edited by Fontich, van Rijt and Gauvin 2020 and references cited therein. On the interdependence between teaching explicit grammar and improving writing see below Section 2.

[5] One of the reviewers comments upon the somewhat apparent narrow scope of the article, since it seems to ignore the variations between different linguistic societies and their pedagogical traditions. Spain has a strong tradition in L1 grammar, decreasing, that's true, but still stronger than the Anglo-American one, and very similar to the French, to cite another Romance language. Most of the findings and results analysed in van Rijt and colleagues' papers are fully applicable to Spain. This, and the fact that they were written in Eng. explains the unbalanced distribution of the references. In any case, even within the Anglo-American world, Myhill (2000) asks for investigating how students learn L1 grammar.

[6] Despite Andrew's (2010) conclusion about the absence of influence of teaching sentence-level grammar for enhancing writing (see also del Tesso 1988, for Spanish), it is undeniable that there exist many text level phenomena that can be replicated at the sentence level, such as deixis, reference, coreference and pronouns

bounding or sequences of tenses, apart from the ones mentioned in the main text (see also Leonetti 2018). If this is the case, then, what should be changed is the model of grammar that is taught.

[7] But see Struckmeier (2020) for a slightly different conclusion.

[8] I am following Radatz (1979, 1980), Swan (2001), Russell *et al*. (2009), and Luneta (2015), and references therein, among many others.

[9] According to Hiebert and Carpenter (1992), in Russell *et al* (2009: 147), 'students rely on strategies developed through their experience with similar material' when they have to solve new problems but haven't been able to link the new knowledge 'to previous knowledge for which the brain has established cognitive networks'.

[10] This theory goes back to the notion of *epistemological obstacle* due to the French philosopher Gaston Bachelard, explained in his book *Le nouvel sprit scientiphique*, from 1934.

[11] I offer here a short version of the question.

[12] Strategies are taught for different reasons. See Swan (2001), Luneta (2015: 16), and van Rijt *et al*. (2019).

[13] Here's another made-up rule, this time from the post-test: "The verb has to agree with *los temas* 'the topics' because it is a patient subject (it undergoes the action)".

[14]Accessible in https://www.um.es/web/vic-estudios/contenido/acceso/pau/ebau-materias-coordinadores/lengua-castellana-y-literatura-ii/examenes-anteriores

[15] The exercise contained several statements, some wrong, some right, about the category or the function of the components of this NP, one of which was precisely 'The DO of *ver* 'to see' is *esas películas* 'that films', which is wrong.