TO WHAT EXTENT DOES GRAMMAR KNOWLEDGE ACCOUNT FOR COMPETENCE IN FL READING COMPREHENSION IN UNIVERSITY STUDENTS?

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ABSTRACT. *This study investigates the extent to which linguistic processes account for competence in reading comprehension in university students. The research questions addressed are how far grammar knowledge accounts for FL reading comprehension in university students and whether there are significant differences between reading comprehension performance and grammar knowledge performance; whether the type question accounts for any difference in the students' marks and if text topic influences the readers' performance. Although significant statistical correlation between the two variables was found, outcomes show that reading comprehension ability cannot substantially be determined by grammar knowledge at the level tested. The students' performance was worse in grammar tests than in reading comprehension. Some question types prove to be better predictors of overall scoring and achieve significantly higher marks than others. The text topic did not make any difference to the readers' performance.*

KEYWORDS: *EFL, reading comprehension, grammar knowledge, question types, regression analysis, correlation, quantitative analysis.*

RESUMEN. *Este estudio indaga en la incidencia que los procesos lingüísticos pueden tener en la competencia lectora de alumnos universitarios. Fundamentalmente nos preguntamos en qué medida la comprensión lectora en una lengua extranjera depende del conocimiento gramatical y si hay diferencias significativas entre los resultados de las dos pruebas; si existe correlación entre los tipos de preguntas de las pruebas y cómo éstas influyen en la calificación global así cómo si los diferentes temas de los textos afectan significativamente la comprensión de los mismos. Los datos obtenidos indican que, aunque hay una correlación estadísticamente significativa, la competencia lectora no está determinada sustancialmente por el conocimiento gramatical de los sujetos. Los resultados en las pruebas de gramática son peores que en las de comprensión lectora. Aunque no existe correlación entre los tipos de preguntas, sin embargo, algunos no solamente predicen mejor los resultados que otros, sino que consiguen puntuaciones más altas. Finalmente, la diferente temática de los textos no inciden significativamente en los resultados.*

PALABRAS CLAVE: *Inglés como lengua extranjera, comprensión lectora, conocimiento gramatical, tipos de preguntas, análisis de regresión, correlación, análisis cuantitativo.*

1. Introduction

Numerous research studies have been conducted to examine the reading process in second language students. Many of these studies focus on readers' competence and strategies, generally dealing with beginning and intermediate school students. Less common, however, have been empirical studies into the role of linguistic knowledge assisting L2 reading comprehension and even less in an academic context. Bernhardt (1991) claims that this lack of data is surprising since syntactic structure instruction and practice take up a large amount of classroom time and teaching materials consist of readings that are principally developed taking into account syntactic complexity.

In general terms, reading comprehension can be defined, in its most obvious sense, as the ability to understand information in a text and interpret it appropriately. Grabe and Stoller (2002: 17) explain the reading process in the following terms: "To offer a more accurate picture of reading comprehension, we define it according to a set of necessary processes. No one process defines reading comprehension by itself, but together they provide a fairly accurate account of the processes required for fluent reading". They then list ten processes involved in fluent reading comprehension[1]. Our present interest lies in the last but not the least important aspect of the list, that of reading comprehension as a linguistic process, which has often been dismissed in favour of the great emphasis that has particularly been placed on reading comprehension as a reasoning process. Unlike L1 readers who normally have some tacit grammatical knowledge of their language, L2 students need explicit learning of grammar to help them in reading comprehension.

The role of language structure in second language reading comprehension has often been supported by many researchers (see Alderson 1984, 1993, 2000; Devine 1988; Eskey 1988; Swaffar, Arens and Byrnes 1991 among others). Adams (1980) comments on the difficulty that L2 readers have in realizing that they cannot correctly recognize a syntactic structure while they generally know that they cannot recognize a word. Bernhardt (1991) points to the use of the Gricean principle of cooperation by second language readers, especially literate adults who make any syntactic structure they may have at their disposal work for them in order to extract the message conveyed in the written texts. This view is sustained by Grabe (1991: 280) who affirms that "fluent readers need a sound knowledge of language structure and a large recognition of vocabulary". Therefore, agreeing with Bernhardt's (1991) assumption that reading development and reading proficiency exist and, consequently, learners progress through a series of stages and competencies, we set out our hypothesis that *the stronger control over syntactic structures is, the greater reading improvement will be*.

2. Background

In contemporary research literature reading is considered to be essentially divided into two components: decoding (word recognition) and comprehension. The latter is

often described as consisting of *parsing sentences, understanding sentences in discourse, building a discourse structure*, and then integrating this understanding with what one already knows. (Alderson 2000).

A plethora of attempts have been made to examine and understand the reading comprehension process resulting in the so-called *models of reading*, which can be categorised into three general types: bottom-up, top-down and interactive. These models are metaphorical representations which, although they can serve useful purposes, cannot thoroughly explain more recent research advances[2]. Interactive models of reading are considered to be the result of bottom-up and top-down useful ideas and perspectives appropriately combined; an interaction between the reader and the text. However, according to Grabe and Stroller (2002: 33): "More accurate ways to understand reading comprehension require 'modified interactive models' that highlight the number of processes, particularly automatic processes, being carried out primarily in a bottom-up manner with little inference from other processing levels or knowledge resources". In spite of certain pitfalls, this hybrid of both models working in harmony can serve to interpret general reading comprehension processes (for additional bibliography on theoretical models of the reading process see Gascoigne 2005).

Another major issue of interest for our research is based on the *Language Threshold Hypothesis*. Grabe and Stoller (2002) state that language knowledge is more important than L1 reading abilities up to some point at which the learner has enough knowledge to read reasonably fluently (see Alderson 1984; Clarke 1987; Devine 1988; Ridgway 1997; Bernhardt and Kamil 1995; Bernhardt 2000).

Evidence for this threshold hypothesis can be found in a study of metacognition and the language threshold (Schhoonen, Hulstijn and Bossers 1998). It showed that language-specific knowledge cannot remain below a certain threshold level and that the lack of this knowledge cannot be compensated for by knowledge of reading strategies, reading goals and text characteristics. Alderson (2000: 38-9) stresses that "it is clear that this linguistic threshold is not absolute but must vary by task: the more demanding the task, the higher the linguistic threshold".

Kobayashi (2002: 210) reports on the apparent contradiction in his research findings in that "learners of lower language proficiency did not benefit from clear text structure". He lays the blame at the learners' low level of language proficiency, arguing that a certain proficiency level is needed on which to base their overall understanding of the text which, in turn, may confirm a concept of linguistic threshold.

How much knowledge can be considered as sufficient is the key argument claimed by some critics since the necessary amount of linguistic knowledge (*threshold*) cannot be determined. Once again, all the factors involved in reading a text successfully have to be envisaged with respect to which the amount of linguistic knowledge required will vary. These factors at a number of different levels are related to the reader, the text, and factors involved in the reading activity. Reader level factors include reading and accuracy speed, vocabulary, and background knowledge. Text level factors include the

discourse structure, clarity, and *syntactic complexity*. Other factors such as motivation are also associated with the activity of reading (Lesaux, Lipka and Siegel 2006).

Taking for granted that reading comprehension consists of many and complex abilities that are activated as we read and that they keenly interweave to accomplish their final goal, we assume, following Grabe and Stoller (2002), two main types of processes: the lower-level process and the higher-level process, neither of them being in any way easier than the other. Thus, our research focus would be placed on the lower-level process, which, in turn, is unfolded in four layers: lexical access*, syntactic parsing,* semantic proposition formation and working memory activation, syntactic parsing being the objective to be studied. *Syntactic parsing* can be defined as *the ability to take in and store words together so that basic grammatical information can be extracted to support clause-level meaning*. Therefore, readers are to be able to recognise the syntactic relations among the words to find how they are supposed to be understood in each context. This process needs to be done rapidly and without paying much attention, in other words, become automatic. However, FL students not only require overt knowledge of target language grammar but a great amount of hours of reading as well to be capable of using the former automatically to help them in reading.

This same concept can also be referred to as *syntactic awareness*, being an understanding of the grammatical structure of the language, specifically within sentences, which also allows readers to foresee the words that will come next. In this way, syntactic awareness assists readers in accomplishing their reading comprehension tasks effectively (Tunner and Hoover 1992). Sharing this view, Koda (2005: 253) has recently pointed to the fact that the former view of reading, which defended that the necessary skills for reading competence are universal across languages, "apparently, has now led to the widely held belief that all difficulties L2 readers experience are attributable *to inadequate linguistic knowledge*".

Nevertheless, this is not universally accepted, and voices arguing that L2 readers do not need grammar knowledge for effective reading have also been heard (Urquhart and Weir 1998; Alderson 2000). Recent studies have reported on the relationship between grammatical knowledge and L2 reading comprehension showing *contradictory findings* with respect to a *predictive relationship*. Bernhardt (2000) reviewed adolescent and adult second-language literacy studies and one of the conclusions that she reached was that second language readers' text comprehension could not always be predicted by the syntactic complexity of the text.

Gascoigne (2005) inquires precisely into this subject although taking a different perspective. Her hypothesis is based on the assumption that since less successful readers pay direct attention to the words and structures of a reading passage (bottom-up or local strategies) while more successful readers focus on global meaning and background knowledge (global or top-down strategies), the former should perform well, if not better than the latter, on form-focused discrete-point grammar activities. The investigation was conducted with beginning students of French. Her findings showed that there was no significant difference detected between performance on the reading tasks and the

grammar tasks, failing to show any type of negative correlation between them and predict the learners' overall performance level.

Lesaux, Lipka and Siegel (2006) investigated the influence of cognitive and linguistic skills on the reading comprehension performance of a group of learners from diverse linguistic backgrounds. The study also compared the reading comprehension performance of grade 4 children with little or no experience with English (ESL) to that of a group of native English speakers. The results indicated that within the Good Comprehenders (GC) and Poor Comprehenders (PC) groups there were no differences between the ESL and L1 children on measures of reading and phonological processing. Further, within the GC and PC groups, on measures of syntactic awareness and verbal working memory, the ESL speakers performed at significantly lower levels than the L1 speakers. Consequently, in this case, a predictive relationship between syntactic awareness and reading processing could not be established. This, in turn, is backed up by Kobayashi (2002) who considers that surface level features, such as syntactic or lexical elements, are of secondary importance although they can affect reading ability. Shiotsu and Weir (2007: 99) also confirm "the relative contribution of knowledge of syntax and knowledge of vocabulary to L2 reading in two pilot studies in different contexts".

So far, the extent to which grammar knowledge is required by good L2 readers remains uncertain in the current research. Nevertheless, we believe that it is likely to depend on the particular reading demands.

On the other hand, alongside the controversial predictive relationship between reading competence and grammar knowledge, question types have also been considered in our study, since it is another aspect highly influential in assessing students' performance and, therefore, deserves particular attention. Numerous authors converge in the significance of assessment designs to "anticipate and provide for possible liabilities" (Koda 2005: 252) from different perspectives. Among others, Bachman (1990: 113) acknowledges the importance of the test methods:

> Given what is known about the role of contextual features in language use in general, it is not surprising to find that aspects of the test method, which provide much of the context of language tests, affect performance on language tests. Numerous research studies (for example, Clifford 1978, 1981; Brütsch 1979; Bachman and Palmer 1981, 1982; Shohamy 1983, 1984) have demonstrated that the methods we use to measure language ability influence performance on language tests.

Test methods and test *method facets*, in Bachman's terms, are considered to be essential aspects of the validity and reliability of test scores, as he (1990: 156) points out: "If we are to understand the ways in which test methods influence test performance, therefore, it is necessary to examine the various dimensions, or facets, of test methods".

Weir (1993: xi) also upholds that close attention should be "paid to establishing what can be tested through each format and its positive and negative attributes, particularly in regard to the operations involved in carrying out the tasks and the

conditions under which these activities are performed". He provides a detailed variety of testing techniques focused on each of the language skill areas together with a whole array of exercises on test formats aiming to enhance their advantages and disadvantages concerning the testing purpose sought.

Findings reported by several research studies have confirmed that different test formats measure different aspects of language ability (Graesser, Hoffman and Clark 1980; Reder and Anderson 1980; Shohamy and Inbar 1991; Kobayashi 2002 among others). Concerning our more specific scope, that is, the formats available for testing reading comprehension, Koda (2005: 236) stresses that "Further confirming the complexity of the construct of reading comprehension, there are diverse ways of conceptualizing how it can be best measured. Test users, consequently, must respect the basic assumptions underlying alternative assessment techniques". In order to elicit the assets and liabilities of techniques in measuring reading comprehension, the author discusses a selection of procedures for formal and informal assessment.

Awareness of the controversial findings yielded so far by research on the predictive relationship between reading ability and grammar knowledge has not been an obstacle to our undertaking this study. Similarly, we acknowledge, as noted earlier, that a comprehensive reading view should take into account the complex nature of reading and all the factors that are involved in the reading process. However, this study restrictively investigates the extent to which linguistic processes account for reading comprehension in university students. That is, how far grammar knowledge may help learners to become successful advanced readers in an academic context.

3. HYPOTHESIS AND RESEARCH QUESTIONS

Based on the premise that language proficiency is an essential foundation of FL reading abilities and that grammar knowledge is likely to reinforce and support more advanced reading to a greater or lesser extent, we aim to investigate the extent to which grammar knowledge accounts for reading comprehension in university students and whether the question types and text topics have any effects on the test results.

The previous studies on these topics provided a sufficient basis for the following hypotheses:

Hypothesis1: The stronger control over syntactic structures is, the greater reading improvement will be.
Hypothesis 2: Testing techniques do influence students' performance.
Hypothesis 3: Text topic does not influence the readers' performance.

Therefore, the following research questions were addressed:

1. How far does grammar knowledge account for competence in FL reading comprehension in university students?

2. Are there significant differences between reading comprehension performance and grammar knowledge performance?
3. How can the relationship between total reading scoring and the three question types be described?
4. Is there any correlation among the question types?
5. To what extent does question type account for differences in the students' performance?
6. Does text topic influence the readers' performance?

4. METHOD

4.1. *Setting and participants*

This study was conducted with 186 Spanish university students.The majority being 19-20 years of age and enrolled in the second year of their English Philology studies. They were attending a sixteen-week English reading course. Reading comprehension and grammar were both goals of the course. A compulsory textbook[3] was used in class, designed taking into account these students' specific purposes. The data were collected from two academic years 2007 and 2008 for the purpose of comparing and confirming results. The first group was made up of ninety-one students and the second one of ninety-five.

4.2. *Measurement instruments*

The instruments employed in this study to measure students' abilities consisted of two major sets of tests, one focused on reading comprehension and another on grammar knowledge. Therefore, grammar knowledge was not tested directly in the reading passages but in different tests administered for this purpose, which is a point worth taking into account since most research into the predictive relationship between grammar knowledge and reading comprehension has focused almost exclusively on the linguistic complexity within the same reading texts used for testing.

4.2.1. Reading comprehension tests

To assess reading comprehension, a reading exam was administered by the classroom teachers at the end of the semester. The 2007 exam consisted of two different reading passages A and B for each half of the students and a third passage C which was common to all of them. The authentic target language passages were approximately 600 words in length for A, 700 words for B and 450 for C. In the 2008 exam, only two different texts A and B were provided to each half of the students, each being of about 850 words. All of them dealt with different topics extracted from current magazines with the potential to influence the students' reading process.

In the 2007 version, the A and B reading comprehension tests each included eighteen multiple-choice comprehension questions, five identifying referent questions and two short semantic explanation questions. Reading comprehension passage C was followed by five multiple-choice comprehension questions. In the 2008 version, there were two reading comprehension passages including fourteen multiple-choice comprehension questions, three short semantic explanation questions and three identifying referent questions for each of them.

One point was given per question regardless the test item since all of them were viewed as equally important in the reading comprehension achievement.

The question types used are conventional. For the comprehension reading test, three question types were chosen: multiple-choice questions, identifying referent questions and short semantic explanations. The multiple-choice questions aim to measure the text-taker's ability to read English texts for main ideas, details and inferences. For example:

1. *She woks as*
   a) a housework   b) a journalist   c) she does not tell us

2. *"I might reduce my shoe size" (line 70-1) means here:*
   a) she might buy some shoes one size smaller
   b) she might wear have a smaller negative impact on the environment
   c) she might have a smaller negative impact on the environment

Identifying referent questions ask learners to identify the noun to which a pronoun or other expression refers. For example:

What or who do the following refer to?
"she" in line 39 ——————————
"that" in line 46 ——————————

Short semantic explanations ask learners to identify the meaning of a word or phrase as used in the text. For example:

Explain the meaning of "murdered tree" (line 14)

Therefore, the reading comprehension questions mainly focused on text meaning rather than structure though there were some questions aimed at recognizing text structure signalling devices such as pronouns and also nouns and phrases. Nevertheless, identifying referent is also, undoubtedly, a very important reading sub-skill worth being elicited in testing reading.

With respect to the controversy concerning the questionable validity of the multiple-choice technique argued by some researchers (Nevo 1989; Katz, Lautenschlager, Blackkburn and Harris 1990; Weir 1993; Freedle and Kostin 1999; Kobayashi 2002; Trites

and McGroarty 2005 among others) in the sense that the test takers can guess the right answer without fully understanding the reading passage, we consider that, although this criticism may be partially true, the cause may also be a hasty choice of the distracters in many cases. We believe that almost every test format may have some drawbacks if it is not carefully designed, not to mention the likely interference of the writing ability when answering other types of formats, such as open-ended questions or summary writing, which may prevent the testees demonstrating their real reading understanding and the difficulty in obtaining reliable scoring (see Hughes 1994). Besides, this is a technique frequently used in the current research (see Phakiti 2007).

Finally, regarding the reliability of marking, even though the questions were quite objective, an agreement was reached by the two teachers of the course on the scoring for each aspect assessed, and eventually the tests were scored and double-checked.

4.2.2. Grammar tests

To assess grammar knowledge, two grammar tests were administered at two points in time: one at the middle of the semester and the other at the end in both academic years. Each exam consists of 30 form-focused items, 0.5 point was given to each item since all of them were considered to be equally important with respect grammar knowledge. Grammar questions were presented in three formats: Twelve grammar correction questions where students need first to indicate which sentences are correct or incorrect in terms of their grammatical structure and then to provide the correct form for the incorrect ones[4]. Twelve substitution questions where students need to provide a suitable prepositional/phrasal verb that means the same as the verb in brackets using the particles provided, these being up, off, on, out, in, away, over, down. Six completion questions where students have to complete the sentences with the correct form of the verb in brackets, the verbal forms being infinitives, gerunds and modal verbs. In fact, the grammar content, though at an advanced level, was restricted to the grammar aspects reviewed in the textbook. For the purposes of this study, we analyzed the data of the two tests together for each academic year.

Furthermore, it is interesting to note the different language skills required by the reading comprehension and the grammar tests. The former are receptive in nature since the students only have to make the connections in the text and understand the meaning of the information in the paragraphs except for the two short semantic explanation questions. On the other hand, the latter are productive in nature as they have to judge, correct or complete the questions.

Finally, we should recall that we have been working with data collected from authentic tests aiming at scoring the students' performance in their academic subject[5]. This circumstance may be regarded as positive since the students are supposed to strive to take the best use of their knowledge when doing the tests which, in turn, were designed with this purpose in view.

5. Results and discussion

Here we shall present and comment on the results derived from this study. We shall do so by focusing on each of the six research questions. The data were reduced to 10base to achieve greater reliability and avoid discrepancies due to the uneven representation of the tests and the question types.

5.1. *How far does grammar knowledge account for competence in F2 reading comprehension in university students?*

We first approach research question 1 through linear regression analysis to determine to what extent the dependent variable (reading) can be predicted by the independent variable (grammar) and their correlation. This statistical procedure is widely utilized in second language reading comprehension to predict performance on a dependent variable via a independent variable. Nevertheless, recent empirical studies have also been carried out using the componential approach to modelling reading ability (see Brantmeier 2004; Shiotsu and Weir 2007 for review in this area). The relationship is summarized below in table 1:

2007:	2008:
Read = 4,366 + 0,358. Grammar (0,344) (0,070)	Read = 3,933+0,370 Grammar (0,338) (0,056)
F-ANOVA = 26,17; p=0,000; R^2 = 22%	F-ANOVA = 42,25; p=0,000; R^2 = 31%
Correlation Coefficient = 0,476	Correlation Coefficient = 0,558

Table 1. *Linear regression analysis of the reading and grammar variables in 2007 and 2008*

The results show that there is a statistically significant relationship between reading comprehension and grammar knowledge for a 99% confidence interval (p< .01) in both analyses. R^2 indicates that *this model explains 22 % and 31 % of the variance in reading in 2007 and 2008 respectively*. The correlation coefficient is equal to 0,476 and 0,558 showing *a relatively weak relationship between the variables in 2007 and a relatively strong relationship between the variables in* 2008.

Therefore, the most noteworthy features that can be observed in these findings, obtained in two discrete tests, are, on the one hand, that in 2007 *the test-takers' overall grammar knowledge* (three grammar type questions combined) *only accounts for 0, 22% of the variance in reading comprehension* and, consequently, scores on reading comprehension *cannot be predicted* by scores on grammar performance. On the other hand, after examining the correlation among the two variables, we can conclude that the knowledge of a variable only *yields a medium amount of information about the other one* (0,476).

The 2008 data are slightly different from the 2007 ones showing a stronger relationship (0,558) between the variables, however, the R^2 (31%) does not allow the scores on reading comprehension to be predicted, either. Consequently, reading comprehension proficiency cannot be predicted by grammar performance.

5.2. *Are there significant differences between reading comprehension performance and grammar knowledge performance?*

As a complement of the regression analysis, we attempted to carry out a descriptive analysis of the two variables: reading comprehension and grammar knowledge to inquire into the variation between and within the groups of variables. We first examine the results in order to calculate and to compare the means and the standard deviation of the two variables by applying a simple analysis of variance so that research question number 2 (whether there are significant differences between reading comprehension performance and grammar performance) could be answered. The 2007 analysis showed that the standard asymmetry level for reading (-3,10) was out of the range of -2 to +2, indicating that it is not within normal limits, which violates the assumption that the data are drawn from a normal distribution. Therefore the Wilcoxon test was used to compare medians instead of means showing a statistically significant difference between the medians of the two variables for a 95% confidence interval (P-value = 8, 55E-7). However, interesting enough, the 2008 data showed a normal distribution. Table 2 shows the main feature of these analyses. The results, although different in figures, indicate general trends in both analyses, namely, that *the students performed better on reading than on grammar and that the standard deviation is also higher in grammar performance than in the reading one*. With respect to the variance of the variables, *reading showed less amount of variance than grammar*. In this sense, students' performance in reading turned out to be more homogeneous than in grammar.

Variables	Mean	Median	Variance	Standard deviation	Minimum	Maximum	Range	Standard asymmetry	Standard Kurtosis
2007									
Reading	5,94	6,0	2,67	1,63	0,0	8,87	8,87	- 3,10	1,98
Grammar	4,40	4,15	4,72	2,17	0,0	9,41	9,41	0,90	- 1,69
2008									
Reading	5,89	6,0	3,14	1,77	1,5	9,5	8,0	-1,19	-0,93
Grammar	5,30	5,5	7,17	2,67	-0,25	11,43	11,68	0,35	-1,13

Table 2. *Descriptive analysis for reading and grammar performance*

5.3. *How can the relationship between total reading scoring and the three question types be described?*

At this point we focus our attention on the reading question types used to elicit the responses since, as previously mentioned in this paper, the testing techniques can

enhance or diminish the readers' performance. We approach the study in the same manner through a linear regression analysis to provide information regarding question 3. Thus, the aim is to investigate the influence of three independent variables (multiple-choice, identifying referents and semantic explanation) on the readers' overall scoring. As already mentioned, the data from the three types of questions were reduced to the same scale (10 base), that is, scored out of 10.

As shown in Table 3, firstly, we can state that there exists a statistically significant relationship between total reading scoring and the independent variables (p=0,000) for a 99% confidence interval. Secondly, it is interesting to note that the three types of questions contribute to the total scoring unevenly, showing a similar tendency in both analyses. Thus there exist a relatively strong correlation between the total scoring and semantic explanation questions (0,84 and 0,83); a moderately strong correlation between total scoring and identifying referents (0,71and 81%) and a moderately weak with respect to multiple-choice question (0,63 and 0,58) for 2007 and 2008 respectively.

Hence, we can conclude that question types do influence readers' performance in the line of other research studies. One way to interpret these results is that some question types prove to be better predictors of overall test marks than other types. Thus, reading comprehension performance *can be better predicted by semantic explanation questions than by identifying referent questions and multiple-choice questions.*

VARIABLES	2007 Total scoring			2008 Total scoring		
	R^2	F-ANOVA	correlation coefficient	R^2	F-ANOVA	Correlation coefficient
Q1 Multiple-choice	38%	56,04	0,62	34%	29,64	0,58
Q2 Identifying referent	50%	91,05	0,71	67%	115,25	0,81
Q3 Sem antic explanation	72%	230,15	0,84	69%	127,72	0,83

Table 3. *Linear correlation coefficient: R^2 Reading question types and total scoring*

5.4. *Is there any correlation among the reading question types?*

Here we turn to the analysis of the data to examine the correlation among the three types of questions. All the estimates were statistically significant at the following levels: For 2006 Multiple-choice and Identifying referent p=0,000; Multiple-choice and Semantic explanation p=0,0003 and Identifying referent and Semantic explanation p=0,0118. For 2008 Multiple-choice and Identifying referent p=0,0613; Multiple-choice and Semantic explanation p=0,0025 and Identifying referent and Semantic explanation p=0,0004.

Table 4 displays the results of the three reading types for both analyses. The statistically correlations among the variables found are the following: Q1 and Q2 (0,434), Q2 and Q3 (0,263) and Q1 and Q3 (0,368) for 2007; Q1 and Q2 (3,65), Q2 and Q3 (0,445) and Q1 and Q3 (0,386) for 2008.

2007 VARIABLES	Q1 Multiple-choice			Q2 Identifying referent			Q3 Semantic explanation		
	R^2	F-ANOVA	correlation coefficient	R^2	F-ANOVA	correlation coefficient	R^2	F-ANOVA	correlation coefficient
Q1 Multiple-choice	100%			19%	20,72	0,434	13%	14,02	0,368
Q2 Identifying referent	19%	20,72	0,434	100%			7%	6,62	0,263
Q3 Semantic explanation	13%	14,02	0,368	7%	6,62	0,263	100%		
2008 VARIABLES	Q1 Multiple-choice			Q2 Identifying referent			Q3 Semantic explanation		
	R^2	F-ANOVA	correlation coefficient	R^2	F-ANOVA	correlation coefficient	R^2	F-ANOVA	correlation coefficient
Q1 Multiple-choice	100%			6%	3,65	0,245	15%	10,03	0,386
Q2 Identifying referent	6%	3,65	0,245	100%			14%	14,12	0,445
Q3 Semantic explanation	15%	10,3	0,386	20%	14,12	0,445	100%		

Table 4. *Linear correlation coefficient: R^2 Reading question types*

From the above data we can state that there is *no correlation among the questions*, that is to say, *the scoring obtained on each of the questions does not influence the others*.

The results then reveal that the success in accomplishing a question type task, for example multiple-choice questions, might not guarantee the success in the others: semantic explanations or identifying referents.

5.5. *To what extent does question type account for differences in the students' performance?*

We outline our fifth question in order to find out which question type works best obtaining superior marks in the reading tests. Table 5 shows a descriptive analysis of each of the reading question types in the two sets. This includes such measurements as the mean, the median, SD-standard deviation, the minimum and maximum scores and variance. Of particular interest are the Standard asymmetry and Standard Kurtosis which determine the lack of a normal distribution in both samples: Identifying referent -2,91398 and Semantic explanation in the 2007 exam and Identifying referent 2,345592 in the 2008.

It was concluded that there exist statistically significant differences among the medians of the three variables for a 95% confidence interval: identifying referents being the highest and semantic explanation obtaining exactly the same median (5,0) in both analyses. However multiple-choice gets a higher mark than semantic explanations in the 2008, thus, differing from the 2007 data. Interesting enough, the variance and SD are much higher in identifying referent and semantic explanations than in multiple-choice in the two analyses.

Variables	Mean	Median	SD	Min.	Max.	Variance	Range	Standard asymmetry	Standard Kurtosis
2007									
Multiple-Choice	4,31	4,4	0,99	2,00	6,40	0,99	4,4	-1,06678	-0,609637
Identifying referent	6,79	8	2,57	0,00	10,0	6,65	10,0	-2,91398	0,11322
Semantic explanation	4,06	5,0	3,72	0,00	10,0	13,84	10,0	1,23705	-2,18825
2008									
Multiple-Choice	5,55	5,71	1,69	1,43	9,29	2,87	7,86-	0,114754	-0,400412
Identifying referent	6,66	6,67	3,43	0,00	18,3	11,77	18,33	1,49262	2,345592
Semantic explanation	4,4	5,0	3,15	0,00	10,0	9,99	10,0	0,408465	-1,6076

Table 5. *Descriptive analysis for reading question types*

It is also well worthwhile noting that the same patterns emerged for the medians as for the means of the variables, since the highest and lowest values are located on the same question types.

The three types of questions were then submitted to the Kruskall-Wallis test which confirms that there exist significant differences among the medians of the three comparisons of the reading test (multiple-choice, identifying referent and semantic explanation) p= 4,6 E-12 and p=0,0007 for 2007 and 2008 respectively. Therefore, as expected, *test question types affect the readers' results, identifying referent being the type that provides us with significantly a higher average mark in the reading questions in both test occasions.*

5.6. *Does text topic influence the readers' performance?*

As successful comprehension may be affected by the particular passages chosen, to complement our study, we analyze data to show whether text topic influences the readers' performance (research question number 6), again through analysis of regression; the topic being the difference among the five different tests used in the two academic years. Findings indicate that for the 2007 set there exists a statistically significant relationship between total scoring and text version (p=0, 0017) for a 99% confidence interval, however, R^2 explains but a 10, 5% of variation in the dependent variable and that the correlation coefficient (0,32) depicts a relatively weak relationship between the variables. In the 2008 set, the data reveal that there was no statistically significant differences between the two text topics (p=0,50) for a 90% confidence interval. R^2 explains but a 0,79 of variation in the dependent variable and that the correlation coefficient (0,09) depicts a weak relationship between the variables. Therefore, *the text topic does not make any difference to the readers' scores and, therefore, cannot explain in this case students' reading comprehension performance.*

6. CONCLUSIONS

This study investigates the proficiency of reading comprehension and grammar knowledge in university students with the aim of determining the correlation between them in test results. To achieve our goal, university students' performances on reading comprehension tests and on grammar tests were compared and analyzed. We also attempt to work out whether the question types chosen for the tests influence the students' performance. Finally, we take into account the differences of the texts regarding topics.

The findings of this study are in line with previous research mentioned in this paper in that they show the restricted and controversial role that grammar knowledge may play in advanced reading comprehension (Bernhardt 2000; Kobayashi 2002; Gascoigne 2005; Lesaux, Lipka and Siegel 2006; Shiotsu and Weir 2007). The outcomes reject our first hypothesis which states that the stronger control over syntactic structures is, the greater reading improvement will be.

It seems that grammar knowledge although essential, there remains limited to account for all the complex reading process (first research question). Consequently, reading comprehension proficiency cannot be predicted by grammar performance and so we cannot claim that students who perform well in the grammar tests will likely do the same in the reading tests. This means that many other factors related to the reader, the text and the reading purpose interrelate to achieve the goal. Furthermore, reading comprehension tests resulted in higher average marks than grammar tests (second research question). This suggests that the test-takers were able to cope with the texts using reading strategies apart from their grammar knowledge. Therefore, the extent to which grammar knowledge directly or indirectly influences specific test performance remains inconclusive and warrants further research.

We also investigate the effect of question types on the students' performance. Contrary to the first hypothesis, our second hypothesis –testing techniques do influence students' performance– was confirmed by the results derived from the following research questions. Regarding the third research question, findings shed some light on the effects of question types on the readers' performance in agreement with prior studies. By comparing the correlation coefficients of the three question types, we see that they contribute to the total scoring unevenly. Thus, reading comprehension can be better predicted by semantic explanation questions, being more influential than the other question types in producing higher total scoring. In other words, those students who achieve higher marks in the semantic explanation questions will also obtain total higher marks in the reading test.

With respect to the fourth research question, no correlation among the three question types was found, demonstrating that the success in accomplishing a question type task, for example multiple-choice questions, might not guarantee the success in the others: semantic explanations or identifying referents. This finding implies that question

type is also important as it may reveal the different competence levels that test-takers have in reading comprehension.

With the fifth research question, the results clearly state that there is a statistically significant relationship between the types of questions and the students' performance, therefore, as expected, test question types affect the readers' results, identifying referents being the technique that provides us with significantly a higher average mark in the reading tests in our study. Based on this finding, it may be inferred that reference questions are found to be easier and better controlled by the students. Curiously enough, it is also worth noting that this question type involves more underlying grammar knowledge than the others.

Consequently, confirmation of our second hypothesis suggests that question types play a crucial role in testing reading and proves the complex interactions of the reader with question types and the texts. This finding has implications for assessment of reading comprehension which assumes the paramount importance of question type choice when designing the tests (Graesser, Hoffman and Clark 1980; Reder and Anderson 1980; Bachman 1990; Shohamy and Inbar 1991; Weir 1993; Kobayashi 2002 and Koda 2005).

Hypothesis three –text topic does not influence the readers' performance– was also verified since it was found that the regression coefficients in both exams depict a weak relationship between the variables (sixth research question). Thus, the five text topics chosen for the tests do not make any difference to the readers' marks and, therefore, cannot explain in this case students' reading comprehension performance.

While we acknowledge that the present study has involved a limited sample of Spanish university students and a short set of reading and grammar tests, we think that research of this kind points out the complex process underlying competence in advanced reading comprehension, which, as mentioned in this paper, entails many other skills than grammar knowledge. This all suggests that competence in EFL reading comprehension cannot be enhanced with grammar knowledge alone and that several other factors also need to be considered. Additionally, this study, though not directly involved in the designing of EFL reading tests, may offer methodological useful insights that can be directly applied to reading testing. The main difficulty in designing EFL reading tests is often not the information to be elicited but the techniques, formats or question types used to reach this goal. A further conclusion of this study is the need to make teachers aware of the great importance of designing valid and reliable question types in order to assess FL reading.

Many questions remain open to further research in this field. To mention but a few, we believe that it would be worthwhile replicating this study using a series of tests which would avoid biases in the data obtained, namely, control for possibly important differences between the question types as opposed to formats and use of grammar content not restricted to the structures studied in the course.

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