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POSTGRADUATES' SCIENCE COMPREHENSION MONITORING IN EFL[1]

Control de la comprensión de ciencias en ILE en posgraduados

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INTRODUCTION. Nowadays, accessing the European labour market opportunities implies having a high command of English. For this reason, most Spanish universities offer their Bachelor Degrees/Undergraduate Degrees in English. Learning at university, especially in distance learning, strongly depends on the student's own comprehension monitoring when reading instructional materials, usually expository texts. The present work compares comprehension monitoring (CM) in Spanish and in English of Spanish university students with a high level of English proficiency. A replication study is developed to increase the validity of the interesting results obtained on English-Spanish differences in CM at micro and macro-structural levels. **METHOD.** Two related empirical studies were carried out: the second one aimed at replicating the first one in a different academic context. In Study 1, thirty-three post-graduate students of a Master's Degree in Teaching Training for Compulsory Secondary Education *(ESO)*, Upper Secondary Education *(Bachillerato)*, Vocational Training and Language Teaching (Specialising in English Language) participated. They read three texts in English and three in Spanish in order to judge their comprehensibility. Following the error detection paradigm micro and macro-structural inconsistencies were embedded in the texts. **RESULTS.** Results showed that students' CM was better in Spanish than in English as expected but, in addition, an intriguing interaction effect CM-level X Language was found: in English, students' Micro-structural CM was more effective than their Macro-structural CM, whereas when reading in Spanish, the differences vanished. Study 2 was conducted with twenty-six students of a Master's Degree in Applied Linguistics. Results replicated the interaction effect found in Study1. **DISCUSSION.** Although students had an advanced English level, differences between the two languages, especially at macro-structural level, still remained. This suggests that English teaching has to be improved, at least in order to guarantee suitable comprehension of long texts. Results also suggest possible processing L1-FL differences. Although some hypotheses are offered to explain these differences, these should be further contrasted in future experiments.

Keywords: *Teacher education, Science education, Reading Skills, Metacognition, Graduate Students.*

Introduction

Since the integration of Spanish universities in the European Higher Education Area (EHEA, http://www.ehea.info/) the knowledge and acquisition of foreign languages, especially English, becomes essential in the academic context of present-day university students. English is necessary not only to communicate in daily life but also to develop and apply knowledge in labour contexts. Therefore, many Spanish universities are implementing English teaching within their educational policies and are starting to offer the possibility of studying some of their degrees and master courses in English. In that way, specific and specialized knowledge usual at university could be acquired in English and could be used later in the European market. Moreover, students are demanded to finish their university degrees with a B1/B2 English proficiency level (CEFRL, Council of Europe, 2001) and this language has also become a pre-requisite to access certain master courses. In this context, it seems important to study what kind of understanding difficulties university students may find when they deal with learning materials in English as a foreign language.

Much of university information is provided by means of expository texts. Understanding these texts in English involves certain linguistic competences -certain knowledge of vocabulary and grammar- and other cognitive and metacognitive skills. Thus, developing good reading comprehension skills in English is of prime importance. Moreover, learning at the university has become an autonomous process, where learners are totally responsible of their own learning and they have to decide what, where, when and how to learn according to their own goals. In this context, metacognitive skills, especially comprehension monitoring, become very relevant since they allow the subject to internally control his/her own learning and to have at his/her disposal the necessary means to overcome the obstacles which he/she may find (Kolic-Vehovec and Bajsanski, 2007; Alexander and Jetton, 2000; Auerbach and Paxton, 1997; Pressley and Afflerbach, 1995; Carrell, Pharis and Liberto, 1989; Baker and Brown, 1984; Wagoner, 1983). Poor reading monitoring skills can cause shallow understanding and academic failure. In fact, metacognitive strategies have been proved to be very important not only for reading comprehension (Campanario and Otero, 2000; Otero, Campanario and Hopkins, 1992; Otero and Campanario, 1990; Zabruky and Ratner, 1986) but also for academic success in general (Wang, Haertel and Walberg, 1993).

Hence, developing reading comprehension monitoring seems to be a promising way to improve deep reading comprehension, especially in university students.

Difficulties for comprehension monitoring in EFL

In spite of its importance, there are not many studies devoted to comprehension monitoring in EFL/L2. These studies have compared the efficiency of CM in L1 and in L2/FL, controlling the L2/FL proficiency level, and have found better efficiency in CM when reading in L1 than in FL/L2 (Block, 1986, 1992; Morrison, 2004; Han & Stevenson, 2008). In these studies, the L2-L1 differences in CM were mainly attributed to L1-FL/L2 differences in the proficiency level (Han & Stevenson, 2008; Morrison, 2004): the higher the L2/FL proficiency, the more efficient CM in that language and more similar to the one in L1 (Block, 1992). However, up to our knowledge, these results were not explained in terms of cognitive mechanisms. Moreover, the foreign language proficiency level does not seem to be trivially related to the CM effectiveness. In fact, many students having high language proficiency (even in L1) showed poor comprehension monitoring skills (Otero & Campanario, 1990; Sanjosé, Fernández-Rivera, & Vidal-Abarca, 2010). In addition, CM assessment is scarcely

considered in most usual foreign language placement tests, so subjects' proficiency level in a particular language wouldn't be related to the comprehension monitoring effectiveness.

In the Spanish context, replicated evidence has been obtained about the poor level of comprehension monitoring skills in Spanish university students with low or intermediate EFL proficiency, when they read in EFL. The students participating in the studies of Gómez and Sanjosé (2012) and Gómez, Devís and Sanjosé (2013) were unable to notice most of the errors embedded in 200-word texts about science–for-all-citizens topics in reading for understanding tasks. The texts in Spanish and in English provided in these studies had similar length and the same 3-paragraph structure (see Appendix 1). English texts were adapted to the readers' proficiency so their reading difficulty was controlled. The embedded errors consisted in semantic inconsistencies in single non-important ideas and also in important ideas. In the first case (micro-structural errors) the inconsistency was implemented by unfitting adjectives (i.e., "hot ice"). Micro-structural errors were of "external" nature, as they need the readers' world knowledge activation to be detected (i.e., "the ice is cool"). Errors embedded in important ideas were implemented by stating a macro-idea which explicitly contradicted important ideas previously read in the text. Hence, they were of "internal nature" (see underlined ideas in Appendix 1). Compared to their performance in Spanish, the detection-and-highlighting of embedded errors was significantly worse in English (Gómez and Sanjosé, 2012; Gómez, Devís and Sanjosé, 2013).

These results have been obtained repeatedly in different studies (Sanjosé, Solaz and Gómez, 2011; Gómez and Sanjosé, 2012; Gómez, Devís and Sanjosé, 2013), as stated before. However, in one of these mentioned studies (Gómez, Devís and Sanjosé, 2013), we obtained intriguing data from a small group of university post-graduates having an advanced level of English proficiency. It was expected that the higher the English proficiency, the similar the error detection would be in Spanish or in English. According to Alderson (1984) most of the reading difficulties in a foreign language may be related to two main components: the linguistic component (problems with language proficiency) and the cognitive one (difficulties regarding general reading skills, irrespective of the language which is being read in). Much research work studying the transfer of reading skills from L1 to L2/LE has found that language proficiency may be an obstacle for the transfer of certain reading skills (Tsai, Ernst and Talley, 2010). Accordingly, we expected that advanced students would show similar performances in CM when reading in EFL than in L1. However, in the aforementioned study (Gómez, Devís and Sanjosé, 2013) this only happened for micro-structural errors, but not for errors embedded in macro-ideas. In fact, subjects having an advanced level of English proficiency (C1 according to the CERFL, Council of Europe, 2001) detected the "external" errors embedded in single, non-important ideas ("micro-structural errors") with a similar effectiveness in Spanish and in English. However, they showed significant Spanish-English differences detecting "internal" errors embedded in important ideas ("macro-structural errors"), although these differences were smaller than the ones in students with low or intermediate English proficiency levels.

It seems reasonable to obtain additional evidence from other similar studies before trying to explain these unexpected outcomes. If replication were obtained, then new hypotheses should be proposed at the end of this paper to be contrasted in further studies.

Aims and goals

In this work we aimed at extending the aforementioned study on CM effectiveness in EFL

(Gómez and Sanjosé, 2012; Gómez, Devís and Sanjosé, 2013) with Spanish participants having an advanced level of English proficiency. There are two main procedures to increase the external validity of the outcomes obtained in a particular study: 1) using a wide sample representing the population involved, with a low sampling error; 2) replicating as much as possible the study with high internal validity, using different samples, and in different contexts, places, times, etc. The second procedure is very usual in educational studies when representative samples are not at hand. In the present paper, this second procedure was used due to the difficulties to obtain a representative sample for Spanish university students with advanced English proficiency.

According to this, in this paper we conducted two empirical studies with Spanish post-graduates having an advanced proficiency in English (C1, according to the European standards: CEFRL, Council of Europe, 2001). The second study was developed in a different academic year, different context and different place from the first one, although the same materials and procedures were used. The analysis of the first study consisted in considering the number (averages) of embedded errors (micro and macro-structural) correctly detected and highlighted, instead of the total absence of underlining as it was done in the cited paper (Gómez, Devís and Sanjosé, 2013). It seems reasonable considering the correct monitoring (detection and control or regulation) for advanced readers in English.

Specifically, we aimed at replicating two interesting outcomes from the first study: a) a significant lower effectiveness in error detection reading in English, compared to reading in Spanish; b) specific L1-EFL differences in the error detection effectiveness when the errors are embedded in micro or in macro-ideas, i.e. a significant Language (Spanish/English) X Semantic Level (Micro/Macro-structural) interaction effect.

Method

Participants

In study 1, 33 post-graduate students of a Master Course of Secondary School Teacher Training in English as Foreign Language, in one of the big Spanish universities participated in the experiment. In study 2, the sample group was made up by 26 post-graduate students of a Master Course in Applied Linguistics in a middle size university in Spain. There was a convenience sampling. Therefore, even though external validity increases with convergent replication, it is not guaranteed.

Students of both Study 1 and Study 2 had previously completed their university degree in English Philology. Their level of English was C1 or higher (CEFRL, Council of Europe, 2001). All of them were native speakers of Spanish and, as university students, their command of this language was also C1 or beyond.

Design and Variables

In order to contrast our hypothesis, two independent studies were carried out. Study 2 had the same goals as Study 1, but it was conducted in a different academic context. As we focused on the L1-EFL comparison in micro/macro-level CM, a 2x2 experimental design implied two within-subjects factors: Language (Spanish/English) and CM-level (micro/macrostructural). This within-subjects design allows L1/EFL comparisons minimizing the error variance.

Following the 'Error Detection Paradigm' (Baker, 1979, 1985; Baker & Brown, 1984; Baker &Anderson, 1982; Winograd & Johnston, 1982) the effectiveness in the use of CM was related to the ability to detect semantic inconsistencies while reading for understanding in each language. We used the same materials as in the study conducted by Gómez,

Devís and Sanjosé (2013) and described in the Introduction. Therefore, we focused on two semantic levels in comprehension monitoring: micro and macro-structural. A micro-structural inconsistency involved a single and non-important text idea and was of external nature. Macro-structural inconsistencies involved important text ideas, to which other ideas were connected, and were of internal nature (although some readers could also detect them by their prior knowledge). Students frequently accounted for 'unknown words' in the texts. Therefore, we take these unknown words underlined by students into account as a complementary measure (a kind of Lexical level monitoring).

Materials and Measurements

The same materials were used in Study 1 and 2 to obtain CM measures. We used 6 expository texts (3 in English and 3 in Spanish) on general science topics validated in previous empirical studies (Gómez and Sanjosé, 2012). Validation consisted in several steps: selection of ten English texts from university entry exams; rewriting of the texts to make them equivalent in structure and length; setting the difficulty of texts by means of a double procedure: experts' agreement (three experts; average kappa > .7) on the CEFRL levels and Flesch score; selection of the texts with the same reading difficulty; translation of three of the texts into Spanish; revision and correction of the texts by a bilingual native British teacher. The six texts had the same structure, similar length and reading difficulty. The three texts in English had between 210 and 230 words and a Flesch average score of 55.6. The three texts in Spanish had similar parameters: between 211 and 241 words, and a Flesch-Szigriszt average score for texts in Spanish of 54.6.

Each text contained three paragraphs. The first one included an introduction to the topic; the second paragraph added more details or varied opinions about the topic; and the last paragraph was a summary of the text. Following the 'Error Detection Paradigm', we modified the texts so that they contained four, 2 micro and 2 macro-level, errors. Micro-level errors were always positioned in the central paragraph, leaving the introductory paragraph free of mistakes. Micro-level errors always consisted of adding an unfitting adjective to a noun, such as '*hot ice*'. They affected the meaning of a single idea. Each of the two macro-level errors was built modifying one of the text macro-ideas to express the opposite meaning, and placing this modified idea in the closing summary paragraph. Readers did not need other ideas but the ones explicitly expressed in the text to detect macro-errors. However, readers having high previous content knowledge could detect these inconsistencies because they contradict this knowledge. For these readers, macro-inconsistencies will be of "external" nature too, and easier to detect than for other readers. Appendix 1 shows an example of two experimental texts used in both studies.

A key-code on how to classify the different underlined information was provided to participants. This key-code was used by participants to write "(1)" under nonsense or absurd information, "(2)" under incoherent information. In addition, and even though we did not focus on surface-level monitoring (so we did not embed word-level errors), we let participants to underline any word having an unknown meaning for them. Thus, the key-code demanded the readers to write "(3)" under any unknown word in the texts. In this way, we discriminated between CM at the propositional level and CM at the lexical level in information involving the target ideas (i.e. ideas with the embedded errors).

Therefore, we accounted for the following CM measures:

- Total amount of words underlined as 'unknown' (undetermined).

- Correct detection and highlighting[2] of embedded micro-errors (ranging from 0-6 in each language).
- Correct detection and highlighting of embedded macro-errors (ranging from 0-6 in each language). Equivalent.

Procedure

Both in study 1 and study 2 the activity was introduced as research into improving science texts for educational purposes, as they are usually difficult to understand for many students. The experiment took place in just one of the usual classroom sessions. The written instructions (in L1) were given out to participants prior to them receiving the texts. One of the researchers read the instructions out loud. Special emphasis was made on how to use the underlining key-code. For this purpose, an example for practice was developed and explained. This code was present throughout the experiment and could be consulted at the students' pace. Participants were asked to judge and classify the difficulties they found in understanding the texts in order "to improve them for educational purposes". However, they were explicitly warned both, in the written and oral instructions, that they could find "different comprehension obstacles, inconsistencies, contradictions, absurd information or nonsense words depending on each person's criteria and knowledge". They were also told that some of them may find some texts comprehensible enough and therefore they would not need to underline anything. We did not describe the task to students as an "error-seeking activity" to keep the experimental reading conditions as natural as possible.

As obtained in other studies, we expected better error detection performance in Spanish, so previously having worked on a text in their own language could have alerted students to be extra-aware in their checking for similar errors in the English texts. To avoid this spurious extra-awareness we gave out the 3 English texts first. In that way, we followed the same procedure than in the first, to-be-replicated study. However, the possible effects due to the opposite order have not been assessed yet.

The English texts were handed out in a counter-balanced order and retrieved on completion so that students could not go back to previous texts. When the 3 English texts had been done, we followed the same procedure with the 3 Spanish texts. There was no time limit set but the whole session took less than 60 min.

Statistical analyses

Statistical tests were used to find significant differences due to the two considered factors (or independent variables): the language of the experimental texts (Spanish/English) and the level of monitoring (micro/macro-structural). The SPSS-19.0 was used to perform different ANOVAs.

Results and discussion

Study 1

Participants in study 1 were post-graduate philologists in a Master Course of Secondary School Teacher Training in English as Foreign Language at a big University in Spain.

Table 1 shows the mean values (Standard Deviations in parentheses) per subject and per text of CM measures in English and Spanish. Data shows poor results in the macro-structural level of monitoring in English only. As there were not embedded errors at the word level in the texts (for instance, pseudo-words), the low average of underlined words is an expected result because participants had high English (and Spanish) command. Micro and macro-structural monitoring was good enough in Spanish (80% and 78% of the embedded errors

were respectively detected and highlighted) as expected in native Spanish philologists. In English subjects monitored slightly worse the macro-structural embedded errors (69% of correct detection and highlighting) than in Spanish, but their monitoring of macro-structural embedded errors was clearly lower than in Spanish (47% of correct detection and highlighting).

Table 1. Study 1: Correct detection & highlighting of embedded errors. Mean values (Standard Deviations in parentheses) per subject and per text for CM in English and Spanish

CM-level	English	Spanish
Word-CM	0.51 (0.43)	0.28 (0.29)
Micro-Level (Max. 2)	1.37 (0.57)	1.59 (0.46)
Macro-Level (Max. 2)	0.93 (0.48)	1.56 (0.52)

CM at Word level

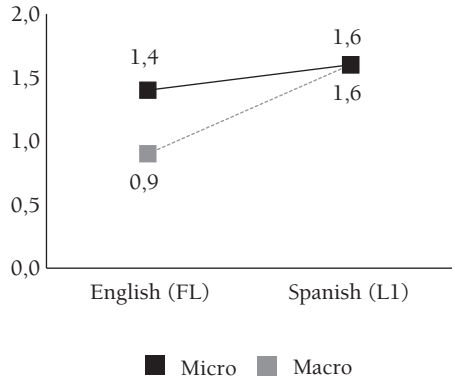
There were significant differences in CM at Word level between English and Spanish ($F(1,32)= 10.831$; $p = .002$; $\eta^2= .25$). Although the mean values were very low in both languages, participants in Study 1 underlined more unknown words in English than in Spanish.

CM at Micro-structural and Macro-structural level

Figure 1 shows the results obtained in English and in Spanish in CM at Micro and Macro structural levels.

Repeated measures 2X2 ANOVA with two within-subjects factors, Language (English/Spanish) and CM level (micro/macro-structural), was computed. The main effect of the Language factor was significant ($F(1,32)= 27.577$, $p< .001$; $\eta^2= .46$). Globally, participants detected and highlighted the embedded errors significantly better in Spanish than in English. The main effect of the CM level was significant with a large effect size ($F(1,32)= 9.393$, $p= .004$; $\eta^2= .23$). Therefore, participants showed a significant higher effectiveness monitoring errors embedded in micro-ideas than in macro-ideas. More interesting was the LanguageXCM level interaction effect ($F(1,32)= 20.360$; $p< .001$; $\eta^2= .39$) suggesting that Micro-Macro differences were of different magnitude in Spanish or in English.

Figure 1. Study 1: Mean amount of micro and macro-level errors correctly detected and highlighted by the participants



Independent analyses were also conducted for micro and macro-structural errors. A repeated measures ANOVA showed that students monitored their comprehension in Spanish significantly better than in English at the micro-structural level ($F(1,32)= 4.771$; $p = .036$). There was a moderate effect size ($\eta^2= .13$). At Macro-structural level, students monitored their comprehension much better in Spanish than in English. Again repeated measures ANOVA showed significant differences between English and Spanish ($F(1,32)= 52.122$; $p < .001$; $\eta^2= .62$).

In the within-language micro/macro comparison, there were not significant differences in Spanish ($F(1,32)< 1$) so readers monitored their comprehension of micro and macro-ideas with similar efficacy in average (see Table 1).

However, in English readers monitored micro-ideas significantly better that macro-ideas ($F(1,32)= 25.600$; $p< .001$; $\eta^2= .44$).

Study 2

Participants in study 2 were also post-graduate philologists in a Master Course of Applied Linguistics in a medium size Spanish University, different from the one implied in study 1. Table 2 shows the mean values (Standard Deviation) of CM measures, per subject and per text, in English and Spanish.

TABLE 2. Study 2: Correct detection & highlighting of embedded errors. Mean values (Standard Deviation in parentheses) per subject and per text for CM in English and Spanish

CM-level	English	Spanish
Word-CM (WC)	0.46 (0.41)	0.18 (0.30)
Micro-Level (Max. 2)	1.06 (0.60)	1.38 (0.51)
Macro-Level (Max. 2)	0.69 (0.51)	1.56 (0.53)

Analyses developed in Study 2 were exactly the same as the ones developed in Study 1.

CM at Lexical level

As it was expected, the participants in Study 2 underlined more unknown words in English than in Spanish. Repeated measures ANOVA showed significant differences in CM at Word level between English and Spanish ($F(1,25)= 8.403$; $p = .008$; $\eta^2= .25$; $P= .80$).

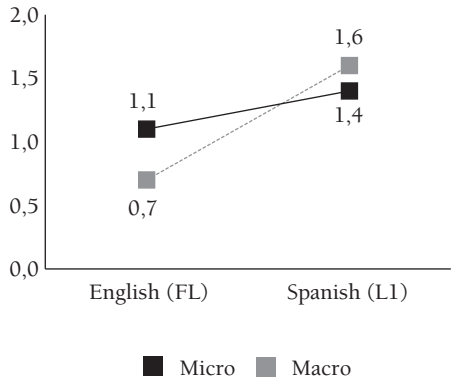
CM at Micro-structural and Macro-structural levels

Repeated measures 2X2 ANOVA with two within-subjects factors, CM level (micro/macro-structural) and Language (English/Spanish), was computed. The main effect of the CM level was not significant ($F(1,25)< 1$). The main effect of the Language factor was significant and powerful ($F(1,25)= 78.201$, $p< .001$; $\eta^2= .76$). Our interest focused on the CM-level X Language interaction effect ($F(1,25)= 17.799$; $p< .001$; $\eta^2= .42$) suggesting that participants monitored their micro-level and their macro-level comprehension in a different way in English or in Spanish.

Figure 2 shows the differences between English and Spanish in CM at Micro and Macro structural levels.

Next, we conducted independent analyses for the micro and the macro-structural monitoring. Significant differences between English and Spanish in macro-structural CM, with a large effect size were obtained ($F(1,25)= 73.913$; $p < .001$; $\eta^2= .75$). At micro-structural level, again there were significant differences in CM between English and Spanish ($F(1,25)= 13.988$; $p = .001$; $\eta^2= .36$). Students monitored their comprehension significantly better in Spanish than in English at both, macro and micro-structural levels.

FIGURE 2. Study 2: Mean amount of micro and macro-level errors correctly detected and highlighted by the participants



In the within-language micro/macro comparison, there were not significant differences in Spanish ($F(1,25)= 2.038$; $p= .166$) so readers

monitored their comprehension of micro and macro-ideas with similar effectiveness. However, in English readers monitored micro-ideas significantly better than macro-ideas ($F(1,25)= 9.332$; $p= .005$; $\eta^2= .27$).

Replication analysis: comparison between Study 1 and Study 2

Although the results obtained in studies 1 and 2 were very similar we performed a specific analysis to know whether the second study replicated the first one or not. Specifically, we attempted to replicate the Language X CM-level interaction effect observed in both studies. For this purpose we conducted a mixed 2X2X2 ANOVA with the Language (English/Spanish) and the CM-level (micro/macro) as the within-subjects factors, and the 'Study' (study1/2) as the between subject factor. If study 2 replicated study 1, the effects produced by the between subjects factor would be non-significant on the intriguing language X CM-level interaction detected.

ANOVA showed a non-significant three-way 'Study' X Language X CM-level interaction ($F(1,57) < 1$). Therefore, the most interesting result obtained in both studies, i.e. the language X CM-level interaction was replicated as it was of similar magnitude in both studies 1 and 2. The remaining effects associated to the Study factor were also non-significant.

Conclusions

In this paper we aimed at replicating previous intriguing results obtained from Spanish university students having advanced levels of English proficiency.

In the two studies presented here, participants detected embedded errors in English with significantly lower effectiveness than in Spanish. This happened in micro-structural as well as in macro-structural embedded errors. Therefore, and despite the readers' certified advanced English proficiency, their monitoring of text comprehension in this language was significantly lower than in Spanish.

These results are opposite to our expectations exposed above in this manuscript: advanced proficient readers are supposed to use their strategic reading knowledge (in the present work, comprehension monitoring) with similar effectiveness to the one shown in their mother tongue. As a first (provisional) conclusion, the content of the usual placement test should be reconsidered. Some reading strategies, as comprehension monitoring of large texts, seem to be not considered in most test to assess the proficiency level.

In addition, micro-level and macro-level detections and highlighting were similar in Spanish, but in English there were significant differences, as micro-level errors were better detected than macro-level errors. This suggests that, although the performance could be better, reading in Spanish implied similar monitoring for the text micro and the macro-structure, and the participants' reading goals (the mental representations attempted) included establishing local and global coherence. In English, participants' differences in micro-level or macro-level monitoring have to be explained in cognitive terms, beyond the simple attribution to "readers' L1-EFL differences in proficiency".

Given the small size of the sample used in the first study, the second one was aimed at replicating the first one in order to gain external validity.

Results in Study 1 and Study 2 showed an interesting Language X CM-level interaction effect, similar to the one found in the first study by Gómez, Devís and Sanjosé (2013).

One of the main results we should explain is the differences in micro /macro-structural

monitoring in English. As monitoring effectiveness was assessed by embedded error detection, the question is what causes these differences detecting inconsistencies embedded in micro-ideas or in macro-ideas?

Although detecting an inconsistency does not always leads to an observable regulation action (Otero, Campanario and Hopkins, 1992), the absence of detection always implies absence of regulation actions. What can cause the reader's non-detection of a semantic inconsistency? The semantic inconsistencies imply two mutually contradictory propositions. Therefore, and according to the Kintsch and van Dijk's reading comprehension model (1978), detecting inconsistencies in a text involves processing both contradictory propositions in WM at the same time. First, both propositions have to be built by the reader. Second, the reader has to activate both in a particular processing cycle. In this cycle, when the reader is building the meaning of one of the two contradictory propositions, he/she has to activate the other proposition, sometimes from his/her LTM, sometimes re-reading previous parts of the text including the inconsistent proposition. This second possibility may be associated to the reader's use of some reading strategy (for instance, re-processing separated text segments to stablish global coherence under metacognitive control). Therefore, if a reader's fails to elaborate or to (re)activate or to compare the two contradictory propositions in his/her WM, then the embedded error is not detected.

Vosniadou, Pearson & Rogers (1988) found that children's difficulties in the detection of textual inconsistencies in L1 were not due to their inability to compare both contradictory propositions in WM, but to a poor mental representation or activation of one or both contradictory propositions during reading. Once both propositions were well represented, children were able to detect the contradiction. If we assume that EFL non-proficient readers have similar obstacles to understand texts as young children when they read in L1 (Segalowitz et al., 1991), then their low effectiveness detecting inconsistencies would be due to a poor representation or low activation of one (at least) of the two contradictory propositions.

Under which conditions a proposition will be poorly represented or poorly activated by university students -expert readers in L1- when they read in a foreign language? According to the Kinstch's Construction-Integration model (1988), a particular proposition can be poorly represented or can result in low activation when:

a) The reader's cognitive mechanism fails to build certain propositions. In this case the considered proposition cannot be part of the net of propositions in the Construction phase of a particular cycle.
b) The readers' previous knowledge (including the text ideas read before) inhibits the considered proposition. The considered proposition results inactivated by the opposite, more activated and contradictory proposition at the end of the Integration phase in a particular processing cycle (Otero & Kintsch, 1992).
c) The mental representation of the text the reader attempts to build, does not involve local or global coherence. Finally, if the reader does not activate his/her coherence building strategies in order to connect different parts of a text, both contradictory propositions couldn't enter together in the reader's WM to be processed. This can happen when the inconsistency involves two propositions located in distant segments of a text.

The specific difficulties detecting the errors embedded in important text ideas (macro-ideas) in English should be explained by one of the above factors. These factors could be considered as explanation hypotheses. Hypothesis (a) seems to be non-appropriate for proficient

readers: they are supposed to be able to build macro-propositions in expository texts. Hypothesis (b) seems more appropriate, especially for readers having high previous knowledge about the text topic. Hypothesis (c) also seems promising: readers' could process textual information in English in a local way, involving less effort integrating distant ideas in a text. In this case, it would be difficult detecting contradictory propositions which are placed in distant segments of a text, as was the case in our studies for macro-level errors.

Now, we are conducting experiments focused on contrasting hypotheses (b) and (c), even though evidence should be used to discard reason (a). We have to obtain independent evidence for monitoring at micro and macro-structural level, for reading goals and for readers' previous knowledge.

Notas

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[2] It should be noted that in a previous study, Gómez, Devís and Sanjosé (2013) analysed the absence of any underlining in the "target information". In the present analysis, the opposite readers' behaviour was considered, i.e. the correct detection-and-highlighting of the embedded errors. Both measures are not equivalent because the second one involves regulation in addition to the detection of the inconsistency. The absence of a particular regulatory action (as underlining), does not necessarily imply the absence of detection (see for example, Otero, Campanario, & Hopkins, 1992).

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Appendix 1

Examples of experimental texts in English and in Spanish used in the studies 1 and 2. Micro and Macro-structural embedded errors have been underlined here to facilitate its location.

The Arctic Sea Ice is Melting Faster

Length: 214 words. Reading difficulty score: 62.2 (Flesch Reading Ease Formula)

Greenhouse effect in the Earth is caused by heat-trapping gases like carbon dioxide in the atmosphere. An increase of the greenhouse effect will cause global warming and environmental changes. One of these changes is the reduction of the mass of sea ice floating on the Arctic Ocean.

Dr Julienne Stroeve is the author of a new study about the Arctic's ice surface. Warm waters entering the Arctic region combined with warming air temperatures are causing the destruction of the sea ice. Dr Stroeve found that since 1953 the area of hot ice in the Arctic has declined at an average rate of 7,8 per cent per decade. She compared the observed tendencies between 1953 and 2150 with the projections made by a rustic group of experts on climate change. This study estimated the ice area is decreasing at an average rate of 2,5 per cent per decade in the same period.

In summary, sea ice on the Arctic Ocean is going up year-by-year. Climate experts may have underestimated the power of global warming from human-generated greenhouse gases. When the concentration of carbon dioxide grows up, the greenhouse effect becomes less important. If emissions of heat-trapping gases were not significantly decreased, the Arctic region could end up with no floating ice in a few decades.

Los Anfibios y la Amenaza Global

Length: 241 words. Reading difficulty score: 62.7 (Flesch-Szigriszt Formula for Spanish texts)

Los anfibios fueron los primeros vertebrados en colonizar la tierra con éxito hace aproximadamente 350 millones de años. Han desarrollado una gran diversidad. Están adaptados a muchos hábitats acuáticos y terrestres diferentes. Los anfibios tienen una piel altamente permeable. Esta piel actúa como un "barómetro natural". Los hace muy sensibles a los efectos del cambio climático y la contaminación.

Los anfibios se pueden encontrar en casi todo tipo de hábitats. Viven en montañas frías, desiertos secos, junglas polares y climas templados como el de España. Cualquier cambio drástico en el mundo natural es muy probable que afecte primero a los anfibios. Se ha realizado un estudio de los anfibios en una amplia variedad de sus hábitats lunares. Casi una de cada tres especies de ranas en el mundo está en peligro de extinción. Entre las 5.743 especies de anfibios, el 32% está en peligro. Por comparación, solo el 12% de las especies de aves y el 23% de todas las especies de mamíferos están en peligro. El informe muestra que 122 especies de anfibios han desaparecido desde 1980.

En resumen, la piel de los anfibios es uno de los mejores indicadores naturales de la salud medioambiental global. Su permeabilidad hace que los anfibios sean muy resistentes a la contaminación ambiental. Existen datos que muestran un gran aumento de las especies de anfibios. Este fenómeno es visto por muchos investigadores como un aviso: nos enfrentamos a un inminente desastre medioambiental global.

Resumen

Control de la comprensión de ciencias en ILE en posgraduados

INTRODUCCIÓN. En la actualidad, tener acceso a las oportunidades laborales del mercado europeo implica tener un buen nivel de inglés. Es por ello que la mayoría de las universidades españolas están ofreciendo sus grados en inglés. El aprendizaje en la universidad y, especialmente, a distancia, depende fuertemente del control de la comprensión del sujeto cuando lee materiales instruccionales, usualmente textos expositivos. El presente trabajo compara el control de la comprensión (CC) en español y en inglés de estudiantes universitarios españoles con un nivel avanzado de inglés. Se realiza un estudio de replicación para aumentar la validez de los interesantes resultados encontrados acerca de las diferencias entre inglés y español en CC micro y macroestructural. MÉTODO. Se desarrollaron dos estudios empíricos relacionados: el segundo, como replicación del primero en un contexto académico diferente. En el Estudio 1 participaron 33 estudiantes de posgrado del Máster de profesor de inglés de educación secundaria. Leyeron tres textos en inglés y tres en español con el fin de juzgar su comprensibilidad. De acuerdo con el paradigma de detección de errores, los textos contenían inconsistencias micro y macroestructurales. RESULTADOS. Como se esperaba, los resultados mostraron que el CC de los estudiantes fue mejor en español que en inglés. Además, apareció un curioso efecto de interacción Nivel-CC X Idioma: en inglés, el CC microestructural de los estudiantes fue más eficaz que el CC macroestructural, mientras que en español, las diferencias desaparecieron. En el Estudio 2 participaron 26 estudiantes del Máster de Lingüística Aplicada. Se replicó el efecto de interacción encontrado en el Estudio 1. DISCUSIÓN. Aunque los estudiantes tenían un nivel avanzado de inglés (LE), todavía se mantuvieron las diferencias entre las dos lenguas, especialmente a nivel macroestructural. Esto aconseja una mejora en la enseñanza del inglés para garantizar la comprensión adecuada de textos extensos. Los resultados también sugieren que existen posibles diferencias de procesamiento entre L1-LE. Se proponen algunas hipótesis para explicar estas diferencias que deben ser contrastadas en futuros estudios.

Palabras clave: *Formación de profesores; Didáctica de la lengua extranjera; Enseñanza de las ciencias; Control de la comprensión lectora; Estudiantes universitarios.*

Résumé

Contrôle de la compréhension des sciences en ALE des étudiants du master d'enseignants du secondaire

INTRODUCTION. Dans l'actualité, l'accès aux possibilités d'emploi du marché européen implique d'avoir un bon niveau d'anglais. C'est pourquoi la plupart des universités espagnoles offrent ses cours en anglais. L'apprentissage à l'université et, en particulier quand il est fait à distance, dépend étroitement du contrôle de la compréhension du sujet en lissant matériaux qui contiennent des instructions, généralement textes expositifs. Ce travail compare le contrôle de la compréhension en lecture (CC) que les étudiants espagnols ont dans sa langue maternelle (L1) mais aussi dans l'anglais ayant un niveau avancé de l'anglais comme langue étrangère (ALE). On a fait une étude de réplication pour faire augmenter la validité des résultats obtenus à propos des différences de contrôle de la compréhension entre l'anglais et l'espagnol aux niveaux micro et macro-structurel. MÉTHODE. Se sont déroulées deux études empiriques, étant le deuxième une réplication du premier mais dans un contexte académique différent. Dans l'Étude 1 ont participé 33 étudiants du Master d' Enseignants du Secondaire en Anglais Langue Etrangère. Il faut qu'ils lissèrent trois textes en anglais et des autres trois en espagnol avec la fin d'évaluer leur compréhension. En accord avec le paradigme de détection des erreurs, les textes contenaient inconsistances micro et macro-structurels. RÉSULTATS. Comme il était prévisible, les résultats ont montré que la CC des étudiants a été meilleure en espagnol qu'en anglais. En plus, ils montrent un effet d'interaction au Niveau-CC X Langue qui mérite nôtre attention: dans l'anglais, le CC micro-structurel des étudiants a été plus efficace que le CC macro-structurel, tandis qu'en espagnol ces différences disparaissent. Dans l'Étude 2 ont participé 26 étudiants du Master en Linguistique Appliquée. De nouveau, il a été éprouvé l'effet d'interaction trouvé dans l'Étude 1. DISCUSSION. Bien que les étudiants avaient un niveau avancé d'ALE, encore restent des différences entre tous les deux langues, en particulier au niveau macro-structurel. Cela suppose une amélioration dans l'enseignement de l'anglais pour assurer une compréhension suffisante des textes. Les résultats suggèrent également qu'il existe des différences de traitement entre la L1 et l'ALE. On propose certaines hypothèses pour expliquer ces différences qui devraient être vérifiés dans les études futures.

Mots clés: *Formation des enseignants, Didactique de la langue étrangère, Enseignement des sciences, Contrôle de la Compréhension en Lecteure Étudiants universitaires*

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