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Towards text simplification for poor readers with intellectual disability: When do connectives enhance text cohesion?

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ABSTRACT

Cohesive elements of texts such as connectives (e.g., *but*, *in contrast*) are expected to facilitate inferential comprehension in poor readers. Two experiments tested this prediction in poor readers with intellectual disability (ID) by: (a) comparing literal and inferential text comprehension of texts with and without connectives and/or high frequency content words (Experiment 1) and (b) exploring the effects of type and familiarity of connectives on two-clause text comprehension by means of a cloze task (Experiment 2). Neither the addition of high frequency content words nor connectives in general produced inferential comprehension improvements. However, although readers with ID were less likely to select the target connective in the cloze task than chronologically age-matched readers (mean age = 21 years) in general, their performance was affected by the type of connective and its familiarity. Familiarity had a facilitative effect for additive and contrastive connectives, but interfered in the case of temporal and causal connectives. The average performance of a reading level-matched control group (typically developing children) was similar to the group of readers with ID although the pattern of interaction between familiarity and type of connectives varied between groups. The implications of these findings for the adaptation of texts in special education contexts are discussed.

1. Introduction

It is well established that individuals with intellectual disability (ID) present reading difficulties at both decoding and comprehension levels (see Conners, 2003 for a review). Despite intervention efforts in special education settings to improve literacy in students with ID, several studies have recently indicated that the average level of reading and comprehension abilities of students with ID (aged 16–22) is equivalent to that observed in primary students in the age range of 6–10 years (Fajardo, Ávila, Tavares, & Ferrer, 2010; Moni & Jobling, 2001; Morgan & Moni, 2008). This reading literacy problem is dramatically constraining their academic success, access to information (e.g., news), job opportunities (e.g., access to job offers) and even their entertainment options (use of digital social networks, forums, etc.).

In academic settings, the instructional intervention approach, aimed at directly improving reading abilities (e.g., Alberto, Waugh, & Fredrick, 2010; Allor, Mathes, Champlin, & Cheatham, 2009; Cohen et al., 2006; Gersten, Fuchs, Williams, & Baker, 2001; Joseph & Eveleigh, 2011; Van der Bijl, Alant, & Lloyd, 2006), has been used alone or in combination with the text simplification approach. The second approach is characterised by the modification of the text in order to make it more legible for a target reader group. Both approaches seem to be essential for making reading activities not only profitable but enjoyable for readers with special needs (Mastropieri & Scruggs, 1992).

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Therefore, the deliberate simplification of texts is a common practice for teachers dealing with adolescents and adults with intellectual disabilities (Morgan & Moni, 2008). The interest in this type of approach is represented by official educational programs like the one framing the study presented here. The program, called "LecturaFácil" (funded by the Spanish Ministry of Industry in 2009), "Easy-Reading" in English, is aimed at promoting newspaper reading in students with ID. As part of the program, news articles within the range of interests of students with ID are selected on a daily basis, simplified and uploaded on a website especially designed for this aim, which has been operating since 2009 (http://www.noticiasfacil.es). The general aim of the first experiment of the study reported here was to measure the utility of the program by comparing different ways of simplifying the news articles to improve their readability (how easy a text can be read and understood).

Text simplification is not a straightforward issue. In order to simplify, adapt, create or simply select texts that match students' reading level, several factors can be considered, such as interest and relevance for the learner, use of illustrations, orthotypography issues or linguistic features of the texts (Morgan & Moni, 2008; Tronbake, 1997). The purpose of the present study was to bring the latter ones, that is, text linguistic features, into focus by identifying, which and how they might influence text comprehension for students with ID.

From a linguistic point of view, Crossley, Louwerse, McCarthy, and McNamara (2007) suggest two approaches to evaluate text readability: (a) the use of shallow-based readability measures and (b) the use of textual cohesion measures (also called deep readability measures). Following the framework of Kintsch's construction-integration model (1988), each approach would be related to different levels of reading comprehension. On the one hand, shallow-based readability measures, for example, word length (number of characters or syllables), sentence length (number of words) and word frequency (number of appearances of a word in a corpus of texts) would mainly affect the literal comprehension of texts, that is, comprehension of the strict meaning of single propositions. On the other hand, textual cohesion features (presence or density of connectives-linking devices such as *but*, *and* or *for that reason* and co-references – anaphors such as pronouns or repeated names in a text) would affect the inferential level, that is, the integration between text segments or between text and prior knowledge.

In the following sections, the literature about the influence of word frequency and presence of connectives (a shallow-based and a cohesion linguistic feature respectively) on reading comprehension performance of students with and without ID is briefly reviewed. Afterwards, the research goals and hypotheses of Experiment 1 are stated.

2. The effect of word frequency on reading comprehension

Traditional shallow-based readability measures assume that the shorter the word and sentence length (measured by means of standard formulas such as the Flesch Index by Flesch, 1948) and the higher the word frequency [e.g., using word frequency databases such as CELEX by Baayen, Piepenbrock, and Gulikers (1995) for English or Alameda and Cuetos (1995) for Spanish], the lower the text difficulty and the higher the readers' comprehension. However, empirical evidence does not provide clear support for this assumption, especially with regard to word frequency. While some studies have found a facilitative effect of word frequency on reading comprehension (Doctorow, Wittrock, & Marks, 1974; Ozuru, Rowe, O'Reilly, & McNamara, 2008), others studies have shown no effect for readers with a regular level of reading skills (Freebody & Anderson, 1983; Ryder & Hughes, 1985).

When it comes to students with ID, who tend to present a small receptive vocabulary (amount of words a person recognises and understands when read or heard), which is strongly correlated with their reading comprehension performance (Nash & Heath, 2011), we would expect that texts with high word frequency would certainly enhance literal comprehension. For instance, in the sentence "Anne and Tom spent an agreeable afternoon", the substitution of the term "agreeable" with the term "lovely" would theoretically make the sentence easier to understand for a person with an equivalent vocabulary age of 6 years since "lovely" is a more frequent word than "agreeable".

To our knowledge, there are only two previous studies that have addressed this issue in students with ID showing, as in the case of regular readers, contradictory findings. On the one hand, Karreman, der Geest, and Buursink (2007) adapted several digital texts (texts included on a website) by modifying different linguistic elements (e.g., word and sentence length, frequency and abstractness of words) and asked groups of students with ID to answer comprehension questions after reading both versions (between-subject manipulation). The results showed that both literal and inferential comprehension were higher in the adapted version than in the non-adapted version of the same digital texts. However, as word frequency was manipulated at the same time as other linguistic features (word length, sentence length, etc.) in the adapted texts, it is unclear whether word frequency actually contributed to the comprehension and, if so, to what extent.

On the other hand, in a previous study conducted by the authors of this manuscript within the program "LecturaFácil" (Fajardo et al., 2010) students with mild ID were asked to read a set of 48 journalistic texts (during a period of 16 weeks) and answer literal and inferential questions about them afterwards. In this case, participants did not read adapted and non-adapted versions of the same texts like in Karreman et al.'s (2007) study. It was assumed instead that the 48 texts varied in the target linguistic variables (e.g., word frequency, word and sentence length, etc.), which were measured and correlated with students' comprehension scores. Contrary to the word frequency facilitation assumption, there was no significant positive correlation between word frequency and comprehension (at either the literal or inferential level). Using the dictionary of frequencies of the Spanish linguistic units (Alameda & Cuetos, 1995), a database of two million words, some studies have considered a minimum frequency of occurrence of 20 per two-million as the high frequency boundary for regular readers (e.g., Álvarez et al., 2001). Therefore, in Fajardo et al.'s study (2010), presumably there was a ceiling effect of

this variable since the average word frequency of the 48 texts of the study was very high (average frequency of 21,361 [*SD* = 4427] occurrences per two million words according to Alameda and Cuetos' database). That means that given a specific level, word frequency would no longer have an effect on reading comprehension. However, which is the minimum critical level of word frequency for students with ID? As we will explain later, this question is related to the first goal of Experiment 1, that is, to test whether text word frequency matched to the receptive vocabulary level of this kind of students would improve their text reading comprehension at the literal level.

Finally, with the aim of augmenting the probability that text vocabulary is known by readers, direct vocabulary training is presented as an alternative to text word frequency increment. If training improved reading comprehension, it could be taken as indirect evidence of the facilitative effect of word frequency on text comprehension. Therefore, to conclude this section, we should mention the study of Pany, Jenkins, and Schreck (1982) who observed that direct vocabulary training in students with learning disabilities transferred to comprehension of single sentences. However, no effects attributable to vocabulary instruction on passage comprehension (measured by global and inferential measures such as a cloze test – a short text with blanks where some of the words should be and readers had to fill by integrating parts of the text – and a story-retell test – whereby readers were asked to tell everything they could remember about the story and the number and complexity of inferences made by them were analysed) were observed. This finding suggests that the understanding of the literal meaning of sentences enhanced by vocabulary knowledge does not guarantee higher levels of text reading comprehension for which inferential reasoning is required (Deane, Sheehan, Sabatini, Futagi, & Kostin, 2006). In the next section, the literature about the use of connectives to increase inferential comprehension is discussed.

3. The effect of connectives on reading comprehension

As we said above, connectives are linking or cohesive features that would affect the inferential level of reading comprehension, that is, the integration between text segments or between text and prior knowledge. A connective (e.g., *but*, *in addition*, *because*) is characterised as a lexical unit that makes sentence relations explicit. For instance, the causal connective *because* marks the cause–effect relationship between the current clause and, usually, the previous one in the sentence. The reactivation hypothesis of Millis and Just (1994) proposes that the presence of connectives increases the activation level of the content of the preceding clause, thus facilitating inter-clause integration. This mechanism could explain the findings of Sanders, Land, and Mulder (2007) who observed that individuals with poor comprehension levels (non-ID) obtained higher comprehension scores after reading texts with connectives than texts without them.

In typically developing children (aged 8–10 years), connectives seem to aid text processing as well. For instance, Cain and Nash (2011) observed that, although knowledge and comprehension of connectives is still developing in young readers, they are able to read texts more quickly when two-clause sentences are linked by an appropriate connective compared with texts with an inappropriate or not present connective.

Then, could we expect a facilitative effect of connectives in poor readers with ID? There are few previous experiments about the effect of connectives on ID readers' text comprehension. The study of Verhoeven and Vermeer (2006) measures the ability of children with ID to infer connectives and other types of linking devices (e.g., pronouns). In this study, children with ID were asked to complete text fragments in which those linguistic elements had been omitted (the typical cloze task). For example, in the sentence *Daniel put on his coat before going out. He did it____it was raining*, the missing connective is *because*. The results showed that the scores of children with ID in this task were significantly lower than those of typically developed children.

Reading ability-related differences in the use of connectives by typically developed children have also been observed. Cain, PAtson, and Andrews (2005) found that children with poor reading comprehension levels (aged 8–9 years) were less likely to select the correct target connective in a cloze task than good comprehenders.

One possible explanation for this finding is that poor readers find it difficult to understand (to infer) the type of relationship established between sentences (e.g., causality or temporality) and consequently they are unable to correctly guess the connective that should accompany them. This seems to suggest that the presence of connectives in the text could help the comprehension process by making explicit the relation between clauses (e.g., by increasing the activation level of the preceding clause).

However, negative effects of connectives have also been reported in the literature. For instance, Noordman, Vonk, and Kempff (1992) observed that the presence of connectives tends to speed up reading time, but interfere with the inferential process by preventing readers from activating prior knowledge. In other words, connectives would make explicit the relationship between sentences (e.g., causal, adversative, etc.), increasing the passivity of readers during the reading process.

Another example of the negative impact of connectives on reading comprehension comes from our own research. In the already mentioned Fajardo et al. (2010) study, deep readability variables such as number of connectives and co-references in the sample of 48 texts read by students with ID were also measured. We observed that the number of connectives was negatively correlated with literal comprehension, in other words, the higher the number of connectives the lower the comprehension of single sentences. Nevertheless, in this study the number of connectives co-varied with other variables such as the number of sentences of the text. The negative effect on comprehension could be explained as follows: the longer the text, the number of ideas contained in the text and also the higher the number of connectives needed to link these ideas. In other words, connectives could facilitate inter-clause integration but, simultaneously, their presence in a text would mean that it contains a higher number of ideas that must be recalled, processed and locally (literally) comprehended.

Therefore, it seems that the manipulation of connectives, as it might occur with other types of linguistic features, rarely has an isolated effect on comprehension. In the next section the effect of simultaneously combining the two linguistic features discussed up to now, word frequency and connectivity is addressed.

4. Combined effect of word frequency and connectivity on comprehension

A priori, independent effects of each variable could be hypothesised since each one would affect a different level of reading comprehension, as Crossley et al.'s (2007) classification of text readability measures suggests. A text with high frequency words and connectives would facilitate the literal understanding of sentences and the connection between them (inferential comprehension) respectively. Paradoxically, the traditional text simplification approach has made the manipulation of shallow and deep features interdependent, for instance, by eliding connectives (deep measure) in order to reduce sentence length (shallow measure). Consequently, some researchers (e.g., Goodman & Freeman, 1993; Long & Ross, 1993) have argued that simplified texts lack the cohesiveness of authentic texts (because of the absence of connectives) and as a result are more difficult to comprehend and decipher than the latter.

As the empirical literature is not conclusive, we designed Experiment 1 to examine the isolated and combined effects of word frequency and connectivity on literal and inferential comprehension in students with ID. In particular, two linguistic features, word frequency and connectives, classified as shallow and deep (cohesion) readability features respectively, were used both separately and combined to simplify a set of texts. The effect of these two conditions on literal and inferential comprehension was compared to non-adapted texts in students with mild ID. Next, the particular hypotheses and the methodology used to explore this issue are described.

5. Experiment 1

5.1. Hypotheses

H1. Text simplification based on increasing word frequency (frequency adaptation) by means of the substitution of low frequency words with high frequency words (according to the receptive vocabulary level of readers) will improve literal comprehension for students with ID compared to original texts.

H2. Text simplification based on increasing text connectivity (connectivity adaptation) by means of adding connectives between sentences where necessary will improve inferential comprehension for students with ID compared to original texts.

H3. Text simplification based on frequency plus connectivity (combined adaptation) will improve both literal and inferential comprehension in students with ID compared to original texts, that is, everything else controlled; an independent effect of each variable is expected when both frequency and connectivity adaptations are implemented simultaneously.

5.2. Method

5.2.1. Participants

Nineteen students (nine males, ten females with an average age of 19, $SD = 2$) recruited from *Camí Obert*, a vocational training centre for students with ID belonging to the *Asociación Pro-Discapacitados Psíquicos de Alicante* (Spain) participated in this study. Students signed an informed consent form prior to their participation in the study.

5.2.2. Measures of students' IQ and baseline reading abilities

The selection criteria to participate in this experiment were two-fold: (a) borderline to mild intellectual disabilities and (b) reading comprehension level equivalent to the third grade of elementary school (ages eight to nine). Third grade students in Spanish curricula are asked to work on text comprehension (reading longer texts than in previous grades and distinguishing between a variety of genres) so they are supposed to have basic decoding skills. Participants who fulfilled this criterion were supposed to be able to manage the reading task used in this experiment.

In what follows, characteristics and results of the IQ and reading comprehension tests are described. Two additional measures obtained to set a baseline of abilities related to reading are also reported.

Intelligence. The Kaufman Brief Intelligence Test (K-BIT, Kaufman & Kaufman, 1997) was used to measure the verbal and non-verbal intelligence of the students. It is a brief, individually administered measure of the intelligence of a wide range of individuals spanning the ages of 4–90 years. It is composed of two subtests: Vocabulary (Expressive Vocabulary and Definitions) and Matrices. It takes 15–30 min to administer. The IQ composite standard score (a combination of vocabulary and matrices scores) of the group was 71 ($SD = 15$, 3rd percentile), which corresponds to mild intellectual disability according to the classification of the DSM-IV-TR Manual (American Psychiatric Association, 2000).

Reading comprehension. This was measured through the Reading Comprehension Test 1 (ECL1, De la Cruz, 1999), which consists of three short texts (approx. average length of 100 words) accompanied by literal and inferential questions. The average direct score was 9.8 ($SD = 2.7$), which corresponds to the 65th percentile for the 3rd grade level.

Receptive vocabulary. Receptive vocabulary was measured through the Peabody Picture Vocabulary Test-III (PPVT; Dunn, Dunn, & Arribas, 2006). Students were asked to match a spoken word with one of four pictures. The average direct score was 116.7 (*SD* = 25, 1st percentile), which corresponds to an equivalent age of 10 years and 1 month (*SD* = 3 years and 2 months).

Syntactic knowledge. The syntactic knowledge was measured through the syntactic subtest of the PROLEC-SE (Ramos & Cuetos, 1999). It consists of sets of pictures that represent scenes (for instance, a policeman arresting a burglar). Participants were asked to select one written sentence out of four that correctly describes the scene. The syntactic complexity of the sentences increases as trials are displayed, so that the syntactic competence of participants can be established. The average direct score in this subtest was 14 (*SD* = 4.5, 5th percentile).

In summary, the 19 students fulfilled the first inclusion criterion, that is, they presented mild intellectual disability. With regard to reading abilities, the group was below its chronological age in all tests: they fall below the 5th percentile in the PPVT and PROLEC-SE tests, which means that their vocabulary and syntactic knowledge was very poor. However, they had acquired, at least, a minimum level of reading comprehension (equivalent to 3rd grade level) as shown in the reading comprehension test, so they also fulfilled our second criterion to participate in this experiment.

5.2.3. Texts and comprehension questions

Participants were asked to read four versions of short Spanish journalistic texts and answer literal and inferential comprehension questions after each one.

Journalistic texts. The four journalistic texts were selected from real Spanish newspapers (see an example text in Spanish in Appendix A). With the aim of improving generalizability, the topics ranged from sports to economy. To ensure that texts were of similar difficulty, a word limit of 250 words was established (the average number of words was 214, range 205–221). The Fernández-Huerta Index (Fernández Huerta, 1959), a Spanish version of the classical Flesch index for measuring text difficulty, was used as a measure of external validity. The Fernández-Huerta Index is expressed as follows: $206{,}84 - (60 \times (S/P)) - (1.02 \times (P/F))$, where S is the number of syllables, P is the number of words in the text and F is the number of sentences (defined as the content between two punctuation marks). The Fernández-Huerta scale runs from 0 (practically unreadable) to 100 (easy to read). The average Fernández-Huerta Index of our four texts was 62 (range = 55–66).

Three adapted versions of each text were created in addition to the original non-adapted versions: frequency adaptation, connectivity adaptation and combined adaptation. That is, there were four versions of each text. In what follows the four versions are described (see an example text in Appendix A):

(1) Non-adapted version: the texts were used in their original form. The selection criteria were: (a) length limit of 250 words and (b) no presence of between-sentence connectives (although some of the selected texts did contain within sentence connectives such as *and* or *or*).
(2) Frequency adaptation: low frequency words were substituted with high frequency words in the non-adapted texts. Words were considered of low frequency when their occurrence per two million words was below 53 (according to Alameda and Cuetos' 1995 database). Words were considered of high frequency when their occurrence per two million words was above 53. This frequency limit was the average frequency of the words corresponding to the age-equivalent vocabulary level of our participants as measured with the PPVT-III. For instance, the low frequency word *calificaciones* (the Spanish term for *scores* with a frequency of 2) was substituted with *notas* (the high frequency Spanish synonym of *scores* with a frequency of 78).
(3) Connectivity adaptation: connectives between sentences (e.g., *however*, *for that reason*) were added to the non-adapted texts. For instance, the connective *however* was added between these two sentences: [...] *one of the companies has announced a drastic measure. However, the rest of the companies opted for more progressive measures* [...].
(4) Combined adaptation: both frequency and connectivity adaptation were simultaneously applied to the non-adapted texts.

Comprehension questions. After reading each text, participants were asked to answer literal and inferential multiple-choice questions with three answer alternatives (see examples in Appendix A). For literal questions, the answer was either explicitly stated or restructured within a single sentence. The number of literal questions per text was three, except for one of the texts for which four questions were designed. Inferential questions required the integration of information between-sentences. There were four of this type for each text.

5.2.4. Design

The design was a repeated measures Latin-square design to counterbalance experimental conditions (adaptation version) across texts (sport, economy, technology and society). We constructed four lists of texts, with one version of each text appearing in each list. The total number of texts per list was four. Participants were randomly assigned to one of the four lists. Thus, each participant read each text and each experimental condition (non-adapted, frequency adapted, connectivity adapted and combined), but never saw more than one version of the same item.

5.2.5. Procedure

Each participant read four texts in total and answered from seven to eight comprehension questions after reading each one. In order for participants to get familiar with the procedure, they performed a practice trial with a different text before

Table 1
Experiment 1. Reading comprehension scores for each condition of text adaptation.

Type of adaptation	Percentage of correct answers M (*SD*, *Mdn*)	
	Literal	Inferential
Word frequency	.77 (.30, 1)	.51 (.29, .50)
Connectivity	.79 (.23, .67)	.47 (.23, .50)
Combined	.72 (.30, .67)	.61 (.19, .60)
Non-adapted	.77 (.25, .67)	.47 (.28, .50)

reading the four experimental texts. Afterwards, one of the four lists of texts was randomly assigned to each participant. Within each list, texts were presented in a randomised order on a computer screen and participants were told to click the button *questions* as soon as they finished reading. Each question and its three answer choices were presented sequentially on separate screens. Participants were allowed to move between a question and the text until they gave the answer. Once the answer was given, the next question was presented and participants could not go back to the previous one. When the questions on a text had been answered, the participants were asked to read the next text. There was no time limit for completing the task. The software controlling the administration of the experiment and registration of the participants' answers was written in Visual Basic by the researchers.

5.3. Results

The descriptive results for the percentage of correct answers for literal and inferential questions for each condition are shown in Table 1.

As the sample size was small and the distributions of dependent variables were not normal, data were analysed using the Wilcoxon matched pairs non-parametric test. Firstly, the non-adapted condition was compared with each of the adaptation conditions per level of comprehension (medians for each group are shown in Table 1). Literal comprehension did not differ significantly between any of the adapted and the non-adapted versions of the texts. Regarding inferential comprehension, there was no effect of type of adaptation, that is, none of the adapted versions of the texts obtained significantly higher scores than the non-adapted condition.

Additionally, Wilcoxon matched pairs tests were performed in order to compare literal and inferential comprehension for each adaptation level. Literal comprehension was significantly higher than inferential comprehension in all experimental conditions (word frequency, $Z = 2.5$, $p = .01$; connectivity, $Z = 3.5$, $p = .001$; combined, $Z = 3.8$, $p = .001$; non-adapted, $Z = 3.03$, $p = .002$).

5.4. Discussion

This study aimed to explore the isolated and combined effects of two linguistic features, word frequency and connectivity, considered as shallow and cohesion measures respectively, in literal and inferential reading comprehension of students with ID.

The absence of isolated effects of word frequency agrees with previously observed findings in readers with a regular level of reading skills (Freebody & Anderson, 1983; Ryder & Hughes, 1985) and readers with ID (Fajardo et al., 2010). However, this result contrasts with the facilitative effects found by other authors and hypothesised by us (H1). In the area of vocabulary training, for instance, Pany et al. (1982) observed that the modality of direct training in students with learning disability transferred to comprehension of single sentences, called *literal comprehension* in the present work. Certainly, vocabulary training and the substitution of low frequency words with high frequency words are quite different approaches to improve reading comprehension. The use of high frequency words does not guarantee that students know the word meaning, while direct vocabulary training does. As some authors have noted before (see discussion in Crossley et al., 2007), the fact that high frequency words in languages such as English or Spanish tend to be polysemous could have meant that adapted versions of the texts were more ambiguous as a whole.

Regarding connectivity, again no isolated effect was found either at the literal level or the inferential level. This result disagrees with previous findings (Cain & Nash, 2011; Sanders et al., 2007) and the reactivation hypothesis of Millis and Just (1994), which proposes that a connective increases the activation level of the content of the preceding clause, thus facilitating between-sentence integration (H2). Obviously, if independent effects of connectivity and frequency did not appear, the additive effect of both variables predicted by H3 is not supported either.

There are two possible explanations for the lack of facilitative effect of connectivity: (a) the presence of connectives induces a passive processing of texts, preventing the activation of prior knowledge (Noordman et al., 1992) and (b) connective facilitation could be restricted to certain types of connectives. Although both explanations are not incompatible, it seems that there is a larger corpus of research supporting the second one (e.g., Crosson, Lesaux, & Martiniello, 2008; Geva, 2006; McNamara, Louwerse, McCarthy, & Graesser, 2010; Shapiro & Hudson, 1991). For instance, McNamara et al. compared high- versus low-cohesion versions of texts extracted from published discourse psychology studies. In all cases, high

cohesion versions improved reading comprehension (measured differently in each study). McNamara et al. calculated the connective incidence by type (additive, causal, temporal and clarification connectives) finding that high-cohesion texts included more causal connectives than low-cohesion texts. However, regarding the other types of connectives, there were no differences between the texts, which suggests that only enhanced causality contributes to text coherence and consequently to reading comprehension improvements. This conclusion must be taken cautiously though, since the authors selected a corpus of texts that were specifically designed to provide additional causal connections between the ideas, so the study presented a bias towards this type of connectivity.

Leaving aside this methodological issue, as we said, there is further evidence for the effect of connective type on comprehension (oral or written) coming from the field of language development and second language acquisition. Regarding language development, the literature signals that the developmental acquisition order for connectives is as follows: additive, contrastive, temporal, causal, and adversative (e.g., Bloom, Lahey, Hood, Lifter, & Fiess, 1980; Geva, 2006; Shapiro & Hudson, 1991). This order seems related to the complexity of the semantic relation between sentences or segments linked by the connective. Such a complexity would derive from two dimensions (Spooren & Sanders, 2008): *basic operation* (segments can either be connected strongly – in causal relations – or weakly – in additive relations) and *polarity* (in a positive relation, the segments are linked directly, while in a negative relation the link involves a negation of one of the segments) in a way that additive and negative connectives like the adversatives (e.g., *even though*) would be the most cognitively complex. As far as second language acquisition is concerned, the evidence also suggests an interesting interaction between the type of semantic relationship marked by the connective and its familiarity. Crosson et al. (2008) found that children learning English as a second language present more difficulties when facing temporal, causal or adversative low familiar connectives between sentences than additive and contrastive ones. However, when high familiar connectives were used, the level of comprehension was similar for all semantic types, cancelling or smoothing the effect of cognitive complexity. From the point of view of text simplification, the confirmation of this type of interaction in students with ID would lead to the substitution of low with high familiar connectives.

The type and familiarity of connectives were variables that we did not control for in Experiment 1 (different types of connectives were added to the texts wherever they were appropriate to connect sentences), a circumstance that could be producing a confounding effect in the data. A post hoc correlational analysis between types of connectives and inferential comprehension in Experiment 1 could help to elucidate whether this hypothesis is certain, but the number of texts and connectives by category (additive, temporal, causal, etc.) is too low to allow this type of analysis.

Therefore, Experiment 2 was designed to compare the effects of familiarity and connective type on text comprehension by means of cloze-type task, the Text Cohesion Task (TCT) (adapted from Crosson et al., 2008).

6. Experiment 2

6.1. Hypotheses

H1. In line with previous studies (Fajardo et al., 2010), we predict that students with ID and theirs pairs in reading comprehension (8–9 years) will have more difficulties in a TCT when using low familiarity connectives than high familiarity connectives, showing a delay more than an inability in the acquisition of semantic and syntactic relations.

H2. Following previous findings with regular readers (e.g., Geva, 2006; Shapiro & Hudson, 1991), we predict that students with ID will have more difficulties in a TCT when inferring low familiar temporal, causal or adversative connectives than additive and contrastive ones.

6.2. Method

6.2.1. Participants

Sixteen students with ID (6 males and 10 females with an average age of 20, $SD = 2.2$) and two control groups of students without ID: (1) Chronological age-matched control group: 18 Psychology undergraduate (3 males and 15 females with an average age of 21, $SD = 2$) and (2) reading level-matched control group: 18 children of third grade of elementary school (9 males and 9 females), average age of 8.34 ($SD = 0.29$) participated in this study.

6.2.2. Base-line measures

Experimental group. The inclusion criteria for participants with ID were the same as in Experiment 1: (a) borderline to mild intellectual disabilities and (b) reading comprehension level equivalent to the third grade of elementary school (ages eight to nine). Fourteen of the 19 students with ID who participated in Experiment 1 participated again in Experiment 2. In addition, there were two new students who were evaluated with the same base-line measures as in Experiment 1, that is, the Kaufman Brief Intelligence Test (K-BIT, Kaufman & Kaufman, 1997) and the ECL1 (De la Cruz, 1999). The average scores of students in each measure were again calculated. The IQ composite standard score for K-BIT (combination of vocabulary and matrices scores) of the group was 67.5 ($SD = 11$, 3rd percentile), which corresponds to mild intellectual disability according to the classification of the DSM-IV-TR Manual (American Psychiatric Association, 2000). The average direct score in the ECL1 was 9.1 ($SD = 2.4$), which corresponds to the 50th percentile for the 3rd grade level.

Chronological age-matched control group. The 18 participants of this group were undergraduate students of Psychology. Reading level and IQ were assumed to be regular since they were undergraduate students, so baseline measures were not applied in this group.

Reading level-matched control group. The 18 participants of this group were 3rd graders (8–9 years) of a regular education school. Reading level was tested through the ECL1 test. The average direct score in the ECL1 was 10.61 (SD = 1.54) which corresponds to the 71st percentile for the 3rd grade level. IQ was assumed to be regular since control group children were in a regular school without special education support.

6.2.3. Experimental task

The Text Cohesion Task (TCT; see Appendix B) used by Crosson et al. (2008) was adapted to Spanish. In this task, students are asked to read sentences that are missing a connective that links ideas between two sentences or two clauses and choose the connective that makes the most contextual sense from three choices. In order to select target connectives, two factors were taken into consideration: class of semantic relations and word familiarity of the connective. Regarding class of semantic relations, we selected the five classes used by Crosson et al. (2008), which typically appear in most taxonomies (e.g., Graesser, McNamara, Louwerse, & Cai, 2004; Sanders, Spooren, & Noordman, 1992): additive, temporal, causal, adversative and contrastive.

The connective is considered *additive* when the two linked segments are equally true, add new information, examples or make a restatement to support a previous argument such as *furthermore* or *for example*. Contrastive connectives such us *on the contrary* or *either* indicate oppositions or exceptions between the two non-causally related segments. Temporal connectives indicate a temporal relation between segments such as *prior to* and *after*. Causal connectives signal that one segment occurs as a result of the other, such as *as* or *given that*. Finally, adversative connectives signal a causal relationship between two segments that is in opposition or contrast, for example, *even though* and *although*.

Connective familiarity was pre-tested in a familiarity test composed of 43 connectives, which pertained to each of the above categories. The pre-test was first performed by an additional chronological age-matched group. Participants were asked to rank connective familiarity from 1 to 7 (1 = most unfamiliar, 7 = most familiar). The mean word familiarity was 5.71 (SD = 1.13). Those connectives below the 33rd percentile (5.11) were considered low familiar connectives, those between the 33rd and the 66th percentile (6.40) were considered medium familiar connectives and those above the 66th percentile were considered high familiar connectives. Within each semantic relation class, a target connective representing both low and high familiarity was selected, except for temporal connectives where there were no low familiar connectives. Finally, for each one of the nine different target items, three two-clause texts were designed (see examples in Appendix B). Target connectives of low familiarity were only matched with low- or medium-familiarity distractor connectives in the TCT. Target connectives that were medium or high familiarity were matched only with medium- and high-familiarity distractor connectives. In addition, distractor connectives did not make sense in the context of the cloze item. Therefore, the TCT task contained 30 items, that is, two-clause texts in which the cloze was embedded. The percentage of correct answers was used as the dependent variable of this task.

6.2.4. Procedure

In the case of the experimental group, all assessments were administered in two sessions. In the first session, a consent form was firstly signed by participants and then baseline measures were applied in a fixed order. In the second session, the 30 trials of the TCT were individually administered on a desktop computer. The program, designed in Visual Basic 6.0 by the researchers, administered the 30 items in three different orders randomly assigned to participants and registered their answers. The adult control group signed the consent form and then performed the TCT in the same session. In the case of the 3rd graders, the parents did sign the consent before the experimental session.

6.2.5. Design

A within subject design with type of connective (five levels: additive, contrastive, temporal, causal and adversative) and familiarity of connective (two levels: low and high) as independent variables and percentage of correct answers as the dependent variable was used.

6.3. Results

The descriptive results (M, SD and Mdn) are shown in Table 2. The normality criterion was not satisfied, so non-parametric tests were used.

H1 stated that students with ID would have more difficulties in a TCT when using low familiarity connectives than high familiarity connectives. In effect, the Wilcoxon matched pairs test confirmed that, for the experimental group, the percentage of correct answers in the TCT was higher in the high familiarity condition than in the low familiarity condition with the type of connective collapsed (Z = 2.02; p = .042). Neither in the case of the adult control group nor in the children's the effect of connective familiarity was significant (Z = 1.86; p = .063, Z = 1.90; p = .06). The Kruskal–Wallis analysis revealed significant differences among groups in both high ($H(2)$ = 31.39; p = .00) and low familiarity ($H(2)$ = 31.45; p = .00) so Mann–Whitney U analysis were performed to explore those differences. Mann–Whitney U tests showed that adult control students obtained significantly higher scores in the TCT than participants with ID in both high (Z = −4.11; U = 25; p = .00) and low

Table 2
Experiment 2. Percentage of correct answers in the TCT (M, *SD* and *Mdn*) for each condition of type and frequency of connective.

Type of connective	Percentage of correct answers in TCT M (*SD*, *Mdn*)					
	ID group		Chronological age control group		Reading level-matched control group	
	Low familiarity	High familiarity	Low familiarity	High familiarity	Low familiarity	High familiarity
Additive	.42 (.26, .33)	.69 (.35, .67)	.87 (.17, 1)	.96 (.11, 1)	.28 (.37, .17)	.46 (.31, .33)
Contrastive	.42 (.33, .33)	.79 (.36, 1)	.91 (.15, 1)	1 (0, 1)	.48 (.31, .50)	.69 (.33, .67)
Temporal	.85 (.24, 1)	.73 (.33, .84)	1 (0, 1)	.98 (.08, 1)	.65 (.40, .67)	.52 (.33, .67)
Causal	.73 (.35, 1)	.50 (.37, .33)	1 (0, 1)	1 (0, 1)	.50 (.33, .33)	.61 (.40, .67)
Adversative	.58 (.31, .67)	.67 (.27, .67)	1 (0, 1)	.93 (.14, 1)	.33 (.40, .17)	.48 (.31, .50)

familiarity items ($Z = -4.28$; $U = 20$; $p < 001$). They also performed significantly better than the children's group in high ($Z = -5.13$; $U = 0$; $p = .00$) and low familiarity connectives ($Z = 5.06$; $U = 2$; $p = .00$). The comparison between the group of students with ID and the 3rd graders was not significant neither in high ($Z = 1.45$; $U = 102$; $p = .15$) nor in low ($Z = 1.36$; $U = 104$; $p = .17$) familiarity conditions.

The familiarity facilitation hypothesis (H1) was tested again for each type of connective and group by means of the Wilcoxon matched pairs test. In the experimental group, the advantage of high familiarity conditions was only observed for the two types, additive, $Z = 2.5$; $p = .013$, and contrastive, $Z = 2.93$; $p = .003$. However, they obtained higher scores in the TCT with temporal and causal connectives of low familiarity than the same type of connectives with high familiarity (temporal, $Z = 2.2$; $p = .027$; causal, $Z = 2.13$; $p = .033$). In the case of the 3rd graders, the familiarity facilitation hypothesis was confirmed for additive ($Z = 2.43$; $p < .02$) and contrastive connectives ($Z = 1.89$; $p < .059$, marginally significant difference in this case). The adults' control group, whose percentage of correct answers was above 87% in all conditions, only took advantage of high familiarity in contrastive connectives ($Z = 2.02$; $p = .04$).

H2 stated that students with ID will have more difficulties in a TCT when inferring low familiar temporal, causal or adversative connectives than additive and contrastive ones. Therefore, in order to test this hypothesis, we analyzed the effect of "semantic class of the connector" for each level of familiarity. For the group of students with ID, Wilcoxon matched pairs tests confirmed an effect of type of connective (class of semantic relation) but not in the predicted way, especially in the case of low familiar connectives (see Table 2). For high familiar connectives, students with ID obtained higher scores in the TCT with contrastive connectives, followed by temporal connectives. They obtained lower scores with causal connectives, followed by adversative connectives, but the difference was only significant between contrastive and causal conditions ($Z = 2.67$; $p < .01$) and causal and temporal ($Z = 2.24$; $p = .02$). However, for low familiar connectives, students with ID obtained a higher percentage of correct answers in the TCT with temporal and causal connectives followed by adversative, additive and contrastive (results resumed in Table 2), that is, just the opposite pattern to what was predicted (more difficulties in a TCT when using temporal, causal or adversative connectives than additive and contrastive ones). In the high familiarity condition, the reading level-matched control group obtained the highest scores in contrastive and causal followed by temporal, adversative and additive connectives. Only the differences between contrastive and additive were significant ($Z = 2.09$; $p = .04$). Regarding low familiarity connectives, the reading level-matched control group obtain the highest scores with temporal connectives, followed by causal, contrastive, adversative and additive. The difference between temporal and additive and adversative connectives was significant (temporal vs. additive, $Z = 2.67$; $p = .01$; temporal vs. adversative, $Z = 2.23$; $p = .03$). That is, opposite to the predicted pattern, low familiarity additive connectives were the hardest to infer by the reading level-matched control group.

7. Discussion

In Experiment 2, two hypotheses were tested. H1 predicted a facilitative effect of connective familiarity that was supported in general terms, that is, all groups obtained higher general performance in the TCT when using high familiar connectives than low familiar connectives. However, there was an interaction of familiarity with type of connectives, which constrained the facilitation of familiarity to additive, contrastive and, showing a non-significant trend, adversative connectives, while low familiar temporal (*prior to*) and causal (*given that*) connectives were easier to infer by readers with ID than high familiar temporal (*after that*) and causal (*as*) connectives. In the case of causal connectives, a plausible explanation for this effect is that the high familiar causal connective used in this experiment (*as*) also has more senses than the low familiar connective (i.e., *as* can be temporal, causal or adversative while *given that* can only be causal; the same happens with the original Spanish conjunctions *pues* vs. *puesto que*). Therefore, the process of decision making between target and distractors in the TCT would have been more difficult for the high familiar connective [in spite of the fact that, following Crosson et al. (2008), distractors were carefully selected to ensure that they did not make sense in the context of the cloze item]. That is, as noted before by Crossley et al. (2007), the fact that highly familiar words in languages such as English or Spanish tend to be polysemous could mean that texts that contain them become ambiguous as a whole, so they would be an inadequate simplification solution.

In the case of temporal connectives, a methodological flaw could explain the facilitation of the low familiar connective (*prior to*). As we noted in the *Method* section, the low familiar temporal connective was actually of medium familiarity since

no low familiarity connective for this class was obtained in the familiarity test. This fact could explain why the temporal connective was significantly easier to infer in the TCT than the rest of the low familiar connectives. Therefore, in a strict sense, only the rest of the connectives should be considered in our analysis of the type of connective effect.

The interaction between familiarity and type of connective also qualified H2, which – based on previous findings (e.g., Geva, 2006; Shapiro & Hudson, 1991) and according to the cognitive complexity theory (Spooren & Sanders, 2008) – stated that the order of connectives from easiest to most difficult to process would be as follows: additive, contrastive, temporal, causal, and adversative. However, additive and contrastive connectives proved easier to process only in the high familiar condition, while the opposite pattern was observed in the low familiar condition where temporal connectives (followed by causal and adversative connectives) were easier to infer by readers with ID than additive and contrastive connectives. Actually, only 40% of answers in TCT trials with low familiar additive and contrastive connectives were correct, a lower rate overall for students with ID.

The cognitive complexity theory was neither supported for the 3rd graders group who, as the group of students with ID, obtained the highest scores in the TCT for the low familiarity temporal connective condition. However, the facilitation of low familiarity causal connectives was not found in this group. A possible explanation of this result is that the polysemy of the casual connective could be overcome by this group of students using a more general decision making strategy in the TCT like discarding the connective options which did not make sense and selecting the remaining connective even if they were not sure about its meaning, strategy that could be unavailable for the group of students with ID.

Another interesting result concerns the comparison between groups. In general terms, as the 3rd graders control group, the poor readers with ID were less able to select the appropriate answer in TCT than the chronological-age control group. This result agrees with those observed recently in younger readers (10- and 8-year olds) by Cain and Nash (2011). However, the different profiles of connective facilitation between the ID group and the 3rd graders control group suggests that readers with ID present a specific deficit more than a simple delay in the acquisition of connectives.

Finally, it is worthy to discuss the lack of support to the cognitive complexity theory in the case of the 3rd graders control group. This result could be explained by the fact that the particular connectives used in our experiment for each semantic class was different to the used in other experiments. As highlighted by Cain and Nash (2011), different connectives of a particular class of semantic relation between segments might indicate different types of temporality, causality or addition being more difficult, for example, to infer "for example" than "and" although they both pertain to the category of "additive" connectives.

8. Conclusions

Low reading literacy achievement of students with ID is noticeably constraining their academic success and consequently their access to information, employment opportunities and even their entertainment options. This research was conducted in order to meet the educational challenge identified by Morgan and Moni (2008) of overcoming the limited availability of "literacy resources" for adolescents and adults with ID by testing the effects of some linguistic variables that could be deliberately measured and manipulated to select and design suitable texts.

In particular, we focused on connectives (e.g., *but*, *in contrast*, etc.), cohesive elements of texts, which are expected to facilitate inferential comprehension in poor readers. This prediction was tested by means of two experiments. Experiment 1 compared literal and inferential text comprehension of texts with and without connectives and/or high frequency content words. That is, we compared a deep readability measure (connective presence), expected to have a higher impact in inferential comprehension with a shallow-based measure (content word frequency), expected to affect literal comprehension (Crossley et al., 2007). The results indicated that neither the addition of high frequency content words nor connectives in general produced inferential comprehension improvements. A possible explanation for connectives' lack of facilitation is that such facilitation would depend on the class of semantics relation made explicit by the connective. This hypothesis was then tested in Experiment 2. In addition, this second experiment explored the effect of a second variable, the connective familiarity and its interaction with connective type on two-clause text comprehension by means of a cloze task (Text Cohesion Task – TCT). In particular, we predicted that high familiar connectives would be easier to infer in the TCT than low familiar connectives and, according to the cognitive complexity theory (Spooren & Sanders, 2008) and previous findings from the language acquisition field, we hypothesised that additive and contrastive connectives would be more easily inferred than temporal, causal and adversative connectives, especially when familiarity was low.

The results of Experiment 2 showed that, although readers with ID were less likely to select the target connective in the cloze task than chronological age-matched readers in general and similar, also in general terms, to reading age-matched, their performance level was affected by the type of connective and its familiarity. They obtained lower comprehension scores with low familiar additive connectives (e.g., *furthermore*) and contrastive connectives (e.g., *on the contrary*) and higher comprehension scores with low familiar temporal (e.g., *prior to*) and causal (*given that*) connectives. One of the most plausible explanations for this interaction effect between familiarity and type of connective is the polysemy of high familiar words in languages like English or Spanish (see discussion in Crossley et al., 2007). For instance, high familiar connectives also have more senses than low familiar connectives (e.g., *as* can be temporal, causal or adversative, while *given that* can only be causal), so the process of decision making between target and distractors in the TCT would have been more difficult for high familiar connectives. Reading level-matched control group with regular intellectual abilities, who did not show this reverse effect of familiarity for casual connectives, could have overcome the polysemy problem by applying a more general decision making strategy in the cloze task like discarding those connectives that do not make sense and select the remaining

item even if you were not sure about its meaning. That conclusion highlights that the cloze task used in this experiment is not just a reading comprehension task but a decision making one so both processes, reading comprehension and decision making, could have been confound in this study. Future research should overcome this limitation by measuring reading comprehension by means of open comprehension questions.

Alternatively, as noted before by Cain and Nash (2011), within the group of connectives that express a particular class of semantic relation between segments, different connectives might indicate different types of temporality, causality or contrast. Therefore, instead of paying attention to the theoretical connective semantic category, it may be more important to consider specific connectives because they could differ in cognitive complexity regardless of their category.

The hypothesis of the "particular connective" could also explain the results of the children control group who, although obtain a similar low level of performance in general in the TCT than the experimental group, its pattern of results for each type of connective and familiarity varied and was contrary to the found in previous studies.

From an applied point of view, our results shed some light on how to simplify and select suitable texts for adolescents and adults with ID, which is one of the challenges of the official educational programs like the one framing this research, the "Lectura Fácil" project (funded by the Spanish Ministry of Industry in 2009), aimed to promote newspaper reading in students with ID. In particular, as Cain and Nash (2011) recommend for children with poor reading skills: "[. . .] in contrast to the conclusions of text readability formulae, a longer sentence in which the link between two clauses is explicitly signaled may be easier to understand than two short separate sentences, if the individual has reached a certain level of knowledge of the specific connective. Thus, appropriate and informative connectives appear to help, not hinder, young readers to process and understand written text. Connectives, as well as other markers of text cohesion, should inform calculations of text complexity to identify suitable texts for different levels of reader" (p. 439). Our findings suggest that this conclusion could also be applied to poor readers with ID. Future research should investigate in depth which are the specific connectives that facilitate text segment integration for young students and adults with mild ID.

Finally, it is important to highlight methodological limitations of our research. The first one is that, in spite of using within-subject designs, the sample sizes of our two experiments are not large, so the lack of effects in Experiment 1, for example, would have been due to a lack of statistical power. The second one concerns the genre of the journalistic texts used in Experiment 1 that were narrative, expository or a mixture of both. As showed by Bos and Tierney (1984), text cohesion is easier to establish in narrative texts than in expository ones by readers with ID. Therefore, a potential way of simplify journalist texts could be change the genre from expository to narrative when possible. Unfortunately, we did not control for this variable in our study so future research should address this issue explicitly. The third limitation refers to the specific connectives used in Experiment 2, which were selected based on a pilot study with students without ID, a fact that could be an alternative explanation to the polysemy explanation for the paradoxical detrimental effects of some high familiar connectives in the sample of readers with ID and the 3rd graders control group. The fourth limitation concerns the use of the cloze task in Experiment 2, which is not simply a test of reading comprehension but involves also decision making which might have make the task even more difficult for reading with ID. At least, these four particular methodological drawbacks should be overcome in future research.

Appendix A

Extract of one of the journalistic texts used in Experiment 1 translated into English (the original texts were in Spanish) in three versions: non-adapted version, frequency adapted and connectivity adapted. Note that the order of words for Spanish and English versions varied due to syntactic differences between the languages. One example of the two types of comprehension questions that accompanied the text, literal and inferential, are also provided.

Non-adapted version (Spanish)

El ministro de Trabajo, Celestino Corbacho, ha reiterado (1) que el paro "va a seguir creciendo" en los próximos meses después de que en agosto se rompiera una racha (2) de tres meses consecutivos (3) de caída del desempleo (4). Según Corbacho, históricamente los meses de otoño han registrado (5) subidas del desempleo (6). Como ha afirmado, "No hay por qué pensar que este trimestre tiene que ser diferente". Ha afirmado que el Gobierno prevé (7) que este trimestre "no va a tener la dureza" del mismo en el año pasado.

Non-adapted version (English)

Minister of Labour, Celestino Corbacho, has insisted (1) that the unemployment rate will keep rising during the next months after the idleness (4) propensity (2) to rise was stopped during three consecutive (3) months starting in August. According to Corbacho, autumn months have historically registered (5) idleness (6) risings. As he affirmed, "There is no reason to think that this trimester has to be different". He has affirmed that the government anticipates (7) that this trimester is not going to be as hard as last year's trimester.

Frequency adapted version (Spanish)

El ministro de Trabajo, Celestino Corbacho, ha dicho que el paro "va a seguir creciendo" en los próximos meses después de que en agosto se rompiera una temporada de tres meses seguidos de caída del paro. Según Corbacho, históricamente los meses de otoño han tenido subidas del paro. Como ha afirmado, "No hay por qué pensar que este trimestre tiene que ser diferente. Ha afirmado que el Gobierno cree que este trimestre "no va a tener la dureza" del mismo en el año pasado.

Frequency adapted version (English)

Minister of Labour, Celestino Corbacho, has said (1) that the unemployment rate will keep rising during the next months after the unemployment (4) tendency (2) to rise was stopped during three repeated (3) months starting in August. According to Corbacho, the autumn months have historically shown (5) unemployment (6) risings. As he affirmed, "There is no reason to think that this trimester has to be different". He has affirmed that the government expects (7) that this trimester is not going to be as hard as last year's trimester.

Connectivity adapted version (Spanish)
El ministro de Trabajo, Celestino Corbacho, ha reiterado que el paro "va a seguir creciendo" en los próximos meses después de que en agosto se rompiera una racha de tres meses consecutivos de caída del desempleo. Según Corbacho, históricamente los meses de otoño han registrado subidas del desempleo. Por tanto (1), como ha afirmado, "No hay por qué pensar que este trimestre tiene que ser diferente". Sin embargo (2), ha afirmado que el Gobierno prevé que este trimestre "no va a tener la dureza" del mismo en el año pasado.

Connectivity adapted version (English)
Minister of Labour, Celestino Corbacho, has insisted that the unemployment rate will keep rising during the next months after the idleness propensity to rise was stopped during three consecutive months starting in August. According to Corbacho, the autumn months have historically registered idleness risings. Thus (1), as he affirmed, "There is no reason to think that this trimester has to be different". However (2), he has affirmed that the government anticipates that this trimester is not going to be as hard as last year's trimester.

Comprehension questions (Spanish):
1. ¿Qué noticia ha dado el ministro de trabajo? Literal
   a. Que el paro va a seguir creciendo. Correct
   b. Que va a haber menos paro que el año pasado.
   c. Que va a haber el mismo paro que el año pasado.
2. ¿Por qué se espera una subida del paro este otoño? Inferential
   a. Porque lo dice el ministro Corbacho.
   b. Porque muchas personas estarán en paro.
   c. Porque todos los años sube el paro en otoño. Correct

Comprehension questions (English):
1. ¿Which news has the Minister of Labour announced? Literal
   a. The unemployment rate will keep rising. Correct
   b. The unemployment rate will be lower than last year.
   c. The unemployment rate will be the same as last year.
2. ¿Why is a risein unemployment expected this autumn? Inferential question
   a. Because Minister Corbacho has said so.
   b. Because many people will be unemployed.
   c. Because the unemployment rate rises every autumn. Correct

Appendix B

Example of the Text Cohesion Task (TCT) adapted from Crosson et al. (2008). Our original version was in Spanish.

Class of semantic relation	Familiarity	Target connective	Distractor	Distractor	Example sentence
Additive	B	asimismo furthermore	verbigracia	tal como	A Tomás le gusta jugar a la videoconsola. **Asimismo** le gustapintar. *Tomás likes to play videogames.* **Furthermore**, *he likes to paint.*
Additive	A	por ejemplo for example	incluso	así que	Julia odia los colores vivos, **por ejemplo** el amarillo, el rosa y el verde. *Julia hates bright colours,* **for example**, *yellow, pink and green.*
Contrastive	B	por el contrario on the contrary	por lo tanto	pese a	El animal preferido de Susana es el perro. **Por el contrario**, Carolina prefiere los gatos. *The favourite animal of Susana is the dog.* **On the contrary**, *Carolina prefers cats.*
Contrastive	A	tampoco either	luego	ya que	Mario sólo habla español. Pedro **tampoco** habla otros idiomas. *Mario only speaks Spanish. Pedro cannot speak other languages* **either**.
Temporal	M	antes de (que) prior to	de modo que	por consiguiente	Mi abuela nació **antes de que** terminara la Guerra Civil Española. *My grandmother was born* **prior to** *the end of the Spanish Civil War.*
Temporal	A	después After that	además	cuando	Estudiaron para el examen más de cuatro horas. **Después** fueron a pasear para relajarse. *They studied for the exam for more than four hours.* **After that**, *they went for a walk to relax.*
Causal	B	puesto que given that	verbigracia	tal como	Necesita ganar más dinero, **puesto que** tiene que mantener a su familia. *He needs to earn more money* **given that** *he has to support his family.*
Causal	A	pues as	también	cuando	Mañana haré un regalo a mi madre, **pues** es su cumpleaños. *Tomorrow, I'll give a present to my mother* **as** *it is her birthday.*
Adversative	B	pese a even though	ya que	de otra forma	Sonia piensa que María es su mejor amiga **pese a** que se pelean continuamente. *Sonia thinks that María is her best friend,* **even though** *they argue frequently.*
Adversative	A	aunque although	además	sin embargo	Jaime no estaba contento **aunque** su equipo había ganado el partido de baloncesto. *Jaime was not happy,* **although** *his team had won the basketball match.*

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