Comesaña, M., Soares, A. P., Sánchez-Casas, R., & Lima, C. (2012). Lexical and semantic representations of L2 cognate and noncognate words acquisition in children: Evidence from two learning methods. *British Journal of Psychology*, 103, 378-392. DOI:10.1111/j.2044-8295.2011.02080.x.

Abstract

How bilinguals represent words in two languages and which mechanisms are responsible for second language acquisition are important questions in the bilingual and vocabulary acquisition literature. This study aims to analyze the effect of two learning methods (picture-based vs. word-based method) and two types of words (cognates and noncognates) in early stages of children's L2 acquisition.

Forty-eight native speakers of European Portuguese, all sixth graders (mean age= 10.87 years; SD= 0.85), participated in the study. None of them had prior knowledge of Basque (the L2 in this study). After a learning phase in which L2 words were learned either by a picture- or a word-based method, children were tested in a backward-word translation recognition task at two times (immediately vs. one week later). Results showed that the participants made more errors when rejecting semantically-related than semantically-unrelated words as correct translations (semantic interference effect). The magnitude of this effect was higher in the delayed test condition regardless of the learning method. Moreover, the overall performance of participants from the word-based method was better than the performance of participants from the picture-word method. Results were discussed concerning the most significant bilingual lexical processing models.

Keywords: second language acquisition; vocabulary acquisition; learning methods; cognate words; noncognate words; Hierarchical Revised Model.

Lexical and semantic representations in the acquisition of L2 cognate and noncognate words: Evidence from two learning methods in children

Learning a word in a second language (L2) usually requires linking a new lexical form with an existing concept already connected to the equivalent word in the first language (L1). How this mapping is established and how it develops over time are critical issues in Second Language Acquisition (SLA) research, and in particular in the vocabulary acquisition field. Despite the number of studies developed to answer these questions (e.g., Altarriba & Mathis, 1997; De Groot & Poot, 1996; Ferré, Sánchez-Casas, & García, 2001; Ferré, Sánchez-Casas, García-Albea, & Guasch, 2006; Frenck-Mestre & Prince, 1997; Guasch, Sánchez-Casas, Ferré, & García-Albea, 2008; Kroll & Stewart, 1994; Kroll & Link, 2007; Sunderman & Kroll, 2006; Talamas, Kroll, & Dufour, 1999) they are still object of controversy.

One of the most influential models in the SLA field is the Revised Hierarchical Model (RHM) proposed by Kroll and Stewart (1994). The model regards bilingual memory organization as composed of three interconnected systems: two independent lexicons (L1 and L2) and an integrated conceptual system (CS) shared by the two languages. A fundamental feature of RHM is the assumption that connections between the two lexicons and the CS change according to L2 proficiency (see Figure 1).

<INSERT FIGURE 1>

The model assumes that in the early stages of new vocabulary acquisition (i.e., low levels of proficiency), the direct links between L2 lexical representations and CS are weak (represented by the thin lines in the diagram). Thus, at this stage, L2 learners would rely almost exclusively on the lexical connections between L2 and L1 to access

the CS (bold lines in the diagram). The model further assumes that as proficiency increases the links between L2 and CS will develop, and consequently the dependency on the L2-L1 lexical links to access CS will diminish. Proficient bilinguals show semantic links between L2-CS as strong as those between L1-CS. For example, in early stages of English vocabulary acquisition, the English word “house” would be lexically connected to the European Portuguese word “casa”. Since RHM assumes that L1 words have direct access to meaning, the connection between the word “house” and the corresponding concept would be mediated by the lexical connection to the word “casa”. As the learner becomes more proficient, connections between the word “house” and the shared concept will be strengthened, and access to its meaning will be as fast and accurate as with the word “casa”.

Most of the evidence regarding RHM comes from translation recognition studies, where participants have to decide whether an L2 word is or is not the correct translation of an L1 word. According to the model, as novice learners have weak direct access to the CS, translation from L2 into L1 is lexically mediated. Therefore, when translating L2 words, novice learners rely less on the stored information about the features and attributes of concepts than proficient bilinguals do. Some studies have provided support for these predictions. Using a translation recognition task Guasch et al. (2008) and Talamas et al. (1999) found that in the no translation trials proficient bilinguals took more time and made more mistakes in rejecting L2 words that were semantically related to an L1 word (e.g., wing-plane) than when they were unrelated (e.g., house-plane). This experimental result is known as the semantic interference effect. In contrast, novice learners are not sensitive to this semantic manipulation and do not show evidence of the interference semantic effect.

However, although these and similar findings (e.g., Kroll & Stewart, 1994; Sholl, Sankaranarayanan, & Kroll, 1995) seem to support the RHM claim that proficiency in L2 is critical to gain direct access to meaning from L2 words, other studies do not support this assumption. For example, Altarriba and Mathis (1997), Finkbeiner and Nicol (2003), and Lima, Comesaña, and Soares (2010) used a recognition translation task to observe the semantic interference effect (i.e., slower responses to the non-translation semantically-related word pairs than to unrelated ones) in novice learners. This finding suggests that direct access to the CS from L2 words could be observed in early stages of L2 acquisition as well.

Given the inconsistency of the findings in the literature it has been considered that other variables besides proficiency could shape the type and the stability of L2-L1 lexical and semantic connections during SLA. Two crucial variables have been suggested: the learning method used (e.g., Chen, 1990; Comesaña, Perea, Piñeiro, & Fraga, 2009; Finkbeiner & Nicol, 2003; Kroll, Michael, & Sankaranarayan, 1998), and the type of words learned (e.g., Tokowicz, Kroll, de Groot, & van Hell, 2002; Tonzar, Lotto, & Job, 2009). This has led to a fruitful line of research in SLA that has contributed not only to determine how word-to-concept interlanguage connections develop, but also to clarify under what conditions SLA is more effective.

The present study was carried out within this line of research, examining the influence of these variables in children's L2 vocabulary acquisition. The majority of the studies developed tested the assumptions of RHM in adult learners and very few attempts have been made to explore the processes and mechanisms of L2 vocabulary acquisition in children (Comesaña et al., 2009; Tonzar et al., 2009). This work aims to fill this gap. Specifically, we aim to analyze the role of two learning methods (a picture-based method – in which each L2 word was associated with its corresponding picture

vs. a word-based method – in which each L2 word was associated with its L1 word translation) in the establishment of lexical and conceptual links from L2 words when children have to learn two different types of words (cognate vs. noncognate). Cognate words are equivalent translations that are orthographically and/or phonologically similar (e.g., the European Portuguese-English pair *papel*-paper) whereas noncognate words are equivalent translations that are not similar in form (e.g., *cavalo*-horse). Furthermore, in order to assess the stability of results over time, data from a backward-word translation recognition task were collected in two moments: ten minutes after the learning phase (immediate condition) and one week later (delayed condition).

Although both factors have already been recognized by Kroll and colleagues as important variables in the conceptual processing of L2 words (e.g., Kroll, et al., 1998), the few studies developed so far lead to inconclusive results. Regarding the learning method, some studies point to an advantage of the picture-based method over the verbal method (Comesaña et al., 2009; Tonzar et al., 2009), while others show the opposite pattern of results (Lotto & de Groot, 1998), or even fail to find a main effect of the learning method (Chen, 1990). In Comesaña et al.'s (2009) study, the authors found that similarly to adults, Spanish-speaking children with no previous knowledge of Euskera, the official language of the Basque county in Spain (from now on Basque), showed a semantic interference effect when processing L2 noncognate words after just one learning session. Moreover, the results obtained revealed that the semantic interference effect was greater with the picture-based method. Comesaña et al. concluded that the initial learning of L2 words in children seems to involve access to the shared conceptual representations of the two languages, and that the extent to which this occurs appears to depend on the way new words were learned.

Concerning the evidence on the effect of type of words, the studies that have manipulated this variable testing different learning methods are scarce. To our knowledge, only one study carried out by Tonzar et al. (2009) was developed with this aim, although evidence from several studies conducted with adult learners has shown that cognate words are recognized and translated faster than noncognate words (e.g., De Groot, 1992a; 1992b; De Groot, Dannenburg, & Van Hell, 1994; Hall, 2002; Sánchez-Casas, Davis, & García-Albea, 1992). Additionally, there is also evidence indicating that cognate words are easier to learn than noncognate words (e.g., Lotto & De Groot, 1990; De Groot & Keijzer, 2000). Thus, it is crucial to develop studies that aim to explore if the access to CS from L2 words is different for each of these two types of words in children and if those connections could be modulated by the type of learning method used.

Tonzar et al. (2009) compared the performance of fourth- and eighth-grade Italian children learning L2 cognate and noncognate words in English and German using two learning methods (picture-based method vs. word-based method). Children were also assessed in immediate and delayed testing conditions, although in Tonzar et al.'s study they were asked to recall the corresponding translations in response to either a set of L1 words or a set of pictures, depending on the learning method used. Consistent with Comesaña et al. (2009), Tonzars' results showed that the picture-based method leads to a better performance than the word-based method (especially in delayed testing conditions), although this effect was modulated by the type of words and school years. Specifically, in younger children (from the fourth school year) the effect of the method was stronger to noncognate words in the delayed test condition, while to cognate words the effect was uniform across testing sessions. Moreover, in older children (i.e., from the eighth school year) cognate words were found to facilitate

L2 word acquisition when the language was familiar (i.e., English). The type of words also interacted with the learning method in older children, indicating that the word method was particularly effective for cognate words.

In line with Comesaña et al.'s (2009) findings, the advantage of the picture-based method (especially with noncognate words), confirms the idea that the use of pictures allows stronger and more stable links between L2 words and their corresponding conceptual representations. Within RHM, the advantage of cognate words in the word-based method could be explained by its effectiveness to strengthen interlexical connections. Since the RHM model predicts that in early stages L2 learners would rely more on lexical connections, cognate words would benefit more from an L2-L1 word association method.

The results reported by Comesaña et al. (2009) and Tonzar et al. (2009) confirm the importance of considering the influence of learning methods and word status in determining how L2 words-to-concepts interlanguage connections are established in early stages of children's L2 vocabulary acquisition. Following Comesaña et al.'s work, in this study we used the translation recognition task to examine how the performance of European Portuguese native speaker children (L1) was modulated by the type of learning method used (picture-based vs. word-based method) as well as by the type of words to be learned (cognate and noncognate Basque words -L2). Additionally, we aimed to explore the stability of the effects in time by collecting two tests (immediately after initial learning and one week later).

We consider that the semantic interference effect is a good measure of the L2 semantic processing and provides complementary information when compared to recall tasks in what refers to RHM predictions. In fact, not only does it allow us to study the children's overall performance (either in terms of response times and errors committed

or recall) but also to manipulate other conditions beyond the correct translation (i.e., adding the incorrect conditions of the semantically-related and unrelated pairs). For instance, we could observe an influence of learning method in the magnitude of semantic interference even when the overall performance would be very similar with the two vocabulary training methods, as Comesaña et al. (2009) observed. In this sense, the recognition interference paradigm leads to a more complex picture of the phenomena. Furthermore, and contrary to the Tonzar et al.'s study, in our work we chose to use an unknown language (Basque) in order to avoid any confounding effects of language familiarity, as well as concurrent effects associated with the acquisition of two foreign language simultaneously.

Thus, based on the literature, we predicted a larger semantic interference effect on the picture-based method than on the word-based method, since the former seems to strengthen L2-CS connections. A word type effect was also expected. Learning cognate words would be easier during the early stages of L2 acquisition especially in the word-based method (since novice learners rely more on lexical links rather than on conceptual ones), while the picture-based method would facilitate the acquisition of L2 noncognate words. Additionally, the effect of the word-based learning method was expected to decrease over time with a more pronounced advantage of the picture-based learning method in the delayed testing condition.

Experiment

Method

Participants

Forty-two children (mean age=10.87; SD= 0.85) participated in the experiment. All were sixth graders recruited from Portuguese private elementary schools. All were

native speakers of European Portuguese (EP) with no previous knowledge of the Basque language (L2). None had learning or intellectual disabilities or had repeated any school year. They had knowledge of other languages equivalent to their educational level.

Stimuli

Forty-two high frequency Basque words (21 cognates, 21 noncognates) were selected from the EuskalHitzak database (Perea et al., 2006). Each Basque word was paired with three types of EP words: (i) a correct translation [e.g., *zeru*(sky)-*céu(*sky)]; (ii) a semantically-associated word [e.g., *zeru*(sky)-*azul*(blue)]; and (iii) an unrelated word [e.g., *zeru*(sky)-*marca*(mark)]. In the associated condition, 32 words were selected from Albuquerque's (2008) study and 10 came from a pilot study. In this study, 18 children (M= 10.11; SD= 0.78) had to write the first word that came to mind after reading a given word. The most frequently written words were selected as experimental stimuli. Most of the associated words were syntagmatic responses, i.e., words that are associated in a syntactic sequence (e.g., coffee-hot). The unrelated words were matched to the associated ones in length (5.66 and 5.86 letters, respectively), frequency (96.4 and 107.4 per million, respectively), orthographic neighbours (3.42 vs. 2.96, respectively), concreteness (5.65 vs. 5.24, respectively), and familiarity (4.97 and 5.59, respectively, on a 7-point scale) using EP lexical databases (Soares et al., 2010; Gomes & Castro, 2003; Marques, Fonseca, Morais, & Pinto, 2007; Pereira et al., 2008).

Besides, no statistical differences were found between cognate and noncognate words neither in frequency (203.76 vs. 186.47, respectively), length (5.28 vs. 5.70, respectively) and concreteness (6.36 vs. 6.48, respectively). Word pairs were counterbalanced across three experimental lists, so that a given pair appeared in only one condition in each list. For instance, if a Basque word appeared in List 1 with its

equivalent translation, in List 2 it would appear with its associate word and in the third list with an unrelated word. Each list was composed of 36 experimental word pairs (12 translations, 12 associate words and 12 unrelated words). Half of the words in each condition were cognate and the other half non cognate. Additionally 6 word pairs (2 translations, 2 associate words and 2 unrelated words) were included for practice purposes. The experimental stimuli are presented in the Appendix.

Procedure

The procedure mimicked the procedure used by Comesaña et al. (2009). The task was divided into two phases: the learning and the test phases. Before the learning phase the participants were randomly assigned to the word-based learning method group (L2-L1 words) and to the picture-based learning method group (L2 word-picture). Then the 42 Basque words (36 experimental trials + 6 practice trials) were learned individually in a quiet room. Participants were presented with four sheets of paper (the first two sheets contained eleven L2 words and the two last contained ten L2 words to be learned). In the word-based group the words were paired with the equivalent translations and in the picture-based group with the corresponding pictures. The pictures were black and white line drawings with dimensions of approximately 8 x 8 cm. They were collected from different databases such as Snodgrass and Vanderwart's (1980) pictures and Google images (www.images.google.com). The procedure for the two groups was the same, the experimenter read aloud the word list in Basque four times in the same order. Children had approximately nine minutes to memorize each word list.

After the four sheets of words had been presented, the experimenter read the 42 Basque words again and gave the children nine minutes more to revise the words. Then, the children answered a vocabulary test (the same for both groups) that consisted of the translation of the Basque words. During this assessment, the experimenter corrected any

possible errors and allowed the children to check the correct answers of the incorrect words in the list before carrying out the experiment. Only the data from those participants who scored 85% or better on the overall test in a maximum of 60 minutes were considered for the analysis. Thirteen children were excluded (eight children in the word-based group and five children in the picture-based group) and were replaced by other children with the same characteristics. It is worth noting that the total time spent in this phase was the same for the children of the two learning groups (55 minutes, on average). Besides, the percentage of accuracy was similar for the children in the word-based and picture-based groups (89.46% vs. 93.25%, respectively, $p>.20$).

After the learning phase, children were randomly divided into three groups (one group per experimental list) to perform the backward translation recognition task (i.e., L2-L1). The presentation of the stimuli and the recording of response times and errors were controlled by a laptop. The procedure was created using the Superlab 4.0 software (Cedrus Corporation, 2006). On each trial, a fixation point (+) was presented for 1000 ms in the centre of the screen. A Basque word appeared for 250 ms and was immediately replaced by an EP word until the participant's response or after 2500 ms. Participants had to decide as quickly and accurately as possible whether the second word was the correct translation of the first word presented (pressing two different buttons for each case). Six practice trials were displayed prior to the experimental trials. In order to test stability of results this task was conducted in two times: ten minutes after the learning phase (immediate condition), and one week later (delayed test condition).

Results

Table 1 presents the reaction times (RTs) of correct answers and the percentage of errors by learning method and type of word.

<INSERT TABLE 1>

Repeated-measures analyses of variance ANOVA were conducted for RTs of the correct responses and for the percentage error by subjects (F1) and by items (F2) based on a 2 (Prime-target relation: associated vs. unrelated) x 2 (Type of word: cognate vs. noncognate) x 2 (Time of test: immediate vs. delayed) x 2 (Learning method: word- vs. picture-based method) x 3 (List: list 1, 2 and 3) mixed design. The first three variables were assumed as intra-subject factors and the latter two as between-group factors in the data analyses. The dummy factor List was included in the analyses to exclude the variance of error. Note that on the prime-target relation only two of the three experimental conditions (when subjects had to respond “no”) were considered in the ANOVA analysis since in our study the critical question was to examine the semantic interference effect (i.e., the difference between semantically-related trials and unrelated ones). Only results that reached or approached significance were presented.

The ANOVA results for RTs showed that the responses in the immediate-test condition were slower than the responses in the delayed-test condition: F1 (1,36)=8.91; p=.005; η2=.20; F2 (1,30)=43.6; p<.001; η2=.59, and that the responses in the word-based method group were faster than in the picture-based method group: F2 (1,30)=34.05; p<.001; η2=.53. The Prime-target relation x Type of word interaction effect was also significant: F1 (1,36)=6.4; p<.05; η2=.15. Noncognate unrelated pairs

showed higher RTs than both noncognate related ones (differences approached the significance, t1 (1,41)=1.95; p=.058), and cognate unrelated ones: t1 (1,41)=2.7; p=.010.

Error analyses showed that participants made more errors in semantically-related pairs than in unrelated pairs: F1 (1,36)=20.97; p<.001; η2=.37; F2 (1,30)=12.8; p<.001; η2=.3, and that the percentage of errors was higher for the picture-based method group than for the word-based method group: F2 (1,30)=8.6; p<.05; η2=.22. Furthermore, a greater interference effect was observed in the delayed testing condition than in the immediate testing condition: F1 (1,36)=8.8; p<.05; η2=.20. The interaction Type of words x Learning method effect was also significant: F1 (1,36)=4.4; p<.05; η2=.11. In the picture-based method group subjects made more errors in noncognate pairs than in the word-based group: t1 (1,40)=1.4; p=.016, and more errors in noncognate pairs than in cognate pairs: t1 (1,20)=1.1; p=.03. The three-way Prime-target relation x Type of word x Learning method interaction effect approached significance in the subject analysis: F1 (1,36)=3.12; p=.08; η2=.10. This result showed that for the word-based method group, the interference effect was significant for cognate pairs: t1 (1,20)= 3.6; p= .002, and approached significance for noncognate pairs: t1 (1,20)= 1.9; p= .07. In contrast, for the picture-based method group, the interference effect was only significant for cognate pairs: t1 (1,20)= 3.3; p=.004. Moreover, for both learning methods, the percentage of errors was higher for noncognate unrelated pairs than for cognate unrelated ones: t1 (1,20)= 2.9; p= .009 for the word-based group and t1 (1,20)= 2.7; p= .014 for the picture-based group.

Discussion

This work aimed to analyze the effects of two learning methods (picture- vs. word-based method) in a backward translation recognition task to determine how L2

(Basque) cognate and noncognate word-to-concept interlanguage connections were established in the early stages of children's L2 vocabulary acquisition. As expected, and in accordance with previous studies with children (Comesaña et al, 2009; Fraga, Comesaña, & Perea, 2006), as well as with adults (Ferré et al., 2006; Finkbeiner & Nicol, 2003; Lima et al., 2010), the results obtained after a single session of L2 word learning showed a semantic interference effect in the error data, i.e., children made more errors in related pairs than in unrelated pairs. However, in the reaction time data the effects were somehow noisy and in most cases they did not reach statistical significance, not even concerning the "semantic interference effect". This is consistent with the findings obtained in previous studies with children (see Fraga et al., 2006). The authors found that semantic interference appears first in the error data and it is more robust than in the response times. More important, as prior research with young readers has revealed, errors (inevitable in both first and second language acquisition) are the most evident marks of progress in language learning, reflecting the gaps in the learners' knowledge (Canale & Swain, 1996; Ellis, 1997; Fraga et al., 2006). Several studies developed with children using different experimental tasks (e.g., Acha & Perea, 2008; Castles, Davis, Cavalot, & Forster, 2007; Comesaña, Perea, Piñeiro, & Fraga, 2009; Laxon, Coltheart, & Keating, 1987) have shown substantially higher reaction times and larger variability than the adult data. Hence, making conclusions on the locus of an effect by analyzing the reaction times data when the error rates are high (as in our case) is difficult (Moret-Tatay & Perea, in press; Perea, Rosa, & Gómez, 2002). The available evidence with children supports the view that errors seem to be more informative and reliable than response times to contribute to understand the underlying process of word learning. However, even though the semantic interference effect was not found in reaction times, an interesting pattern emerged: the responses of participants

from the word-based group were faster than the responses of participants from the picture-based group. These findings could be explained because the mode of testing (presenting pairs of words) matched the mode of learning in the word-based method. This idea is reinforced by the fact that cognate words were recognized faster than noncognate words.

Additionally, error data showed a semantic interference effect, which was modulated by the time of test: the effect was more robust in delayed test condition (as in the Comesaña et al., 2009, experiment). This suggests that conceptual information from recently learned words may be enhanced in long-term memory. Moreover, although the overall performance of the word-based group was better than the performance of the picture-based group, the findings did not confirm the expected advantage of the word-based method for cognate words as far as the semantic interference effect is concerned. However, given the similar magnitude of semantic interference effect for cognate words obtained with the two methods (14.3 vs. 15.1 - for word-based and picture-based groups, respectively), the data suggest that the orthographic similarity between L2-L1 cognate words was an important factor in driving children´s performance with this type of words, leading to some sort of ceiling effect. The results for noncognate words were less clear. Indeed, for these words the semantic interference effect only approached significance for participants from the word-based method. We could argue that the word-based method seems to be more effective in strengthening the direct links between L2 words and the CS than the picture-based method both with cognate and noncognate words. However, before drawing definitive conclusions, it is important to take into consideration the pattern of error data observed in both methods together with the pattern of reaction times. In fact, the participants' responses for noncognate words from the word-based method had longer RTs to unrelated than related pairs for non-cognates

(a reverse semantic interference effect) and this, together with the high rate of error in the picture-based condition undermines the idea that the word-based method was more effective in creating links between L2 words and the CS. Anyway, the expected advantage of the picture-based method for noncognate words was not confirmed. Hence, both methods seem to be equally effective in strengthening the direct links between L2 words and the CS, especially for cognate words. The data are at odds with the findings reported in Tonzars' study (2009) in which the cognate status was found to modulate the effect of the learning method used. However, it is important to attempt to explain the differences across studies. It is possible that the access to the CS from L2 words that we observed with both methods may result from a lexically-mediated access via the activation of their equivalent translations in L1 rather than a direct access from L2 words to CS. This lexical mediation could have inadvertently been favoured by the methodological option of the present study to manipulate the type of words as an intra-subject factor as well as to the type of task used. As a matter of fact, the presentation of both cognate and noncognate words in the learning phase could have led children to adopt one learning and response strategy based on the orthographic and/or phonological similarity between words. Thus, such a strategy could have enhanced the activation of the L1and strengthened the lexical relations between L2-L1 mitigating the possible effects of the learning method observed in other studies (Comesaña et al., 2009; Kroll et al., 1998). It is worth noting that one crucial element to improve proficiency in the second language is the ability to inhibit the first language (see Kroll et al., 1998; and also Linck, Kroll, & Sunderman, 2009 for more detail). Accordingly, if learners were able to overcome the early dependence on L1 to gain access to the CS from L2 words as well as to lexicalize concepts into L2 words, then the L2 lexical and semantic development could be substantially improved (see Jiang, 2000, for a review of the

stages in the development of second language acquisition, and also Kroll, van Hell, Tokowicz, & Green, 2010), even assuming that the activation of translation equivalents takes place in second language use without the bilingual's awareness (Thierry & Jing Wu, 2007). Thus, if our argument is correct, the inclusion of cognate words might have hampered the inhibition of the L1, strengthening the L2 and L1 lexical links in both learning methods. This idea is sustained by the fact that the magnitude of the semantic interference effect observed for cognate words was similar in both learning methods. However, given that the test mode matched the learning mode in the word-based method, it was expected that the overall performance of the participants from this group would be aided, as in fact happened.

In the study carried out by Comesaña et al. (2009) the semantic interference effect was stronger and more stable with the picture-based learning method than with the word-based learning method, but in that study children only had to learn noncognate Basque words. Thus, it is possible that under certain conditions (for example, using the picture-based method to learn noncognate words), genuine L2 semantic processing effects could be observed. In contrast, the simultaneous use of cognate and noncognate words could affect the results. Indeed, as several authors have pointed out, the composition of the stimuli list is an important methodological factor to take into consideration in studies of word recognition (see Dijkstra, Miwa, Brummelhuis, Sappelli, & Baayen, 2010; Dijkstra & van Heuven, 2002; Malmberg & Murname, 2002). However, little attention has been paid not only to exploring the effects of list stimuli composition in word recognition, specifically in children, but also in how these effects change according to age. For instance, Dijkstra,Van Jaarsveld, and Ten Brinke (1998) stated that the typical inhibitory effects observed for interlingual homographs as false friends (words that are written identically in L1 and L2 but do not share the

meaning) in an L2 lexical decision task can be annulled when cognate words are included in the list. They explain the null-effects by the activation of inhibitory mechanisms (owing to crosslinguistic competition) and facilitatory mechanisms (owing to cross-linguistic overlap) that are cancelling each other. Comesaña, Fraga, Perea, and Soares (2008) also showed an effect of stimuli list composition in an L2-L1 translation recognition task. The authors found a slowing down in the data as the number of false friends in the list increased. This result was explained by a greater crosslinguistic competition that hampers the performance when the subjects are using the L2 and L1 lexical links.

However these studies have been developed with adults and, as far we know, only a recent study carried out by Brenders, van Hell, & Dijkstra (2011) explored the effect of stimuli list composition in SLA with children. They found that the processing of cognate words was inhibited when the stimuli list contained false friends. In line with the language-non selective access view (Dijkstra & van Heuven, 2002), they stated that beginner learners activate both L1 and L2 word representations when they encounter false friends. Thus, their response will be affected by mechanisms of inhibition and lexical competition.

Moreover, data from developmental psycholinguistic research showed that the influence of contextual and stimulus factors on word recognition have differential effects as a function of age and L2 proficiency (e.g., Garlock, Walley, & Metsala, 2001; Schwantes, Boesl, & Ritz, 1980; West, Stanovich, Feeman, & Cunningham, 1983). Children seem to rely more on contextual information to aid word recognition than adults do (Schwantes, Boesl, & Ritz, 1980; West, Stanovich, Feeman, & Cunningham, 1983). The differences in visual word recognition as a function of age can be observed if we compare our results with the results obtained in a recent study carried out by Lima

et al. (2010). The authors employed a similar learning experiment with an adult population using the same task that we used. Unlike the present study, not only did the authors find an advantage of the picture-based method over the word-based method, but this advantage remained even when the words to be learned included cognate and noncognate words. Therefore, and even recognizing that further evidence is needed in order to obtain a clear picture of the processes involved in SLA in children, it seems clear that participants' age can affect new vocabulary acquisition.

List composition as well as participants' age, however, cannot account for the different pattern of results reported by Tonzar et al. since they employed cognate and noncognate words and observed a better performance with the picture-based method. Nevertheless, there are methodological differences between Tonzar's study and the present study that make a direct comparison of both studies difficult. The most relevant is that Tonzar et al. assessed the lexicalization processes of new words (production) via L1 words or pictures, i.e., as a function of the learning method used (word-based method vs. picture-based method) whereas we assessed the access to new words via a backward recognition process independently of the learning method used. As the processing of L1 involves different representations in L2 production and in L2 comprehension the differences in the results could be explained by these different assessment procedures used (see Kroll & Link, 2007, for more detail). In addition, it is also important to note that in Tonzar et al.'s study the experimenter informed children that after the learning phase they would have to write the names of the learned words in the L2. Given that the pictures have an important role in recall (e.g., Cheng & Leung, 1989; Paivio & Csapo, 1973) the use of explicit instructions to recall could have motivated the use of different strategies as a function of learning method. Hence, we think that not only the stimuli list composition but also the task demands

(comprehension vs. production) and the type of task used could affect results, especially in children. Nevertheless, we acknowledge that future studies should explore how the stimuli list composition could be affecting the effect of the learning method in the acquisition of new vocabulary. This will allow to rule-out or to sustain the idea that children's performance is driven primarily by form similarity when cognate and non cognate words are learned together in a mixed way.

In sum, our results showed a semantic interference effect which was greater in the delayed test condition than in the immediate test condition – regardless of the learning method. The effectiveness of one method over the other according to the type of words to be learned was not demonstrated. The data obtained extend the results found in previous studies with children (Comesaña et al., 2009; Tonzar et al., 2009) and highlight the importance to explore in SLA research with children not only the stimuli list composition but also the learning strategies in L2 vocabulary acquisition.

Appendix

Experimental prime-targets pairs

The items are arranged in quadruplets in the following order: L1 word, L1 associate, unrelated control, and L2 word to cognate (in black) and non-cognate words (in red).

sopa, macarrão, chuveiro, zopa; texto, letras, oferta, testu; barco, mar, pai, barku; moeda, dinheiro, madeira, moneda; bronze, medalha, beleza, brontze; céu, azul, marca, zeru; ilha, areia, braço, isla; carta, correio, língua, karta; futebol, bola, nove, futbol; cinema, filme, pobre, zinema; hospital, doente, conta, ospitale; porta, entrada, mudança, borta; café, quente, perto, kafe; verde, floresta, polízia, berde; livro, cultura, humano, liburu; médico, branco, câmara, mediku; papel, caneta, ciclo, paper; escola, aprender, abranger, eskola; velho, respeito, estado, agure; costas, ombro, botão, bizkar; peixe, água, sete, arrain; tribunal, justiça, passagem, auzitegi; prisão, grades, cabeça, kartzela; sombra, sol, povo, itzal; janela, vidro, sorte, leiho; igreja, religião, europeu, eliza;

cozinha, comida, divisão, sukalde; aldeia, índio, classe, baserri; ouro, jóia, dedo, urre; cama, dormir, acabar, ohatze; pedra, rocha, beira, harri; rapaz, bonito, perigo, mutil; edificio, alto, nota, eraikin; rosto, olhos, sonho, aupergi; jardim, flores, modelo, lorategi; casa, familia, premio, etxe.

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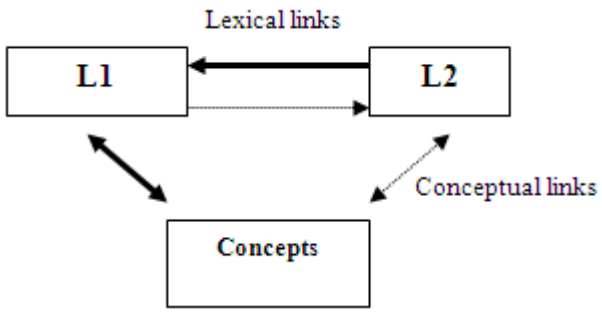

Figure 1. Hierarchical Revised Model (adapted from Talamas et al., 1999).

Table 1: Mean response latencies (RTs) and Standard Deviations (in brackets) of the correct participant's answers and the percentage of errors (% E) by learning method (word- vs. picture based) and type of word (cognate vs. noncognate) in the immediate and delayed test conditions.

			Prime-target relation					
Learning Method	Type of word	Dependent Variables	Immediate test condition			Delayed test condition		
			Translation	Related	Unrelated	Translation	Related	Unrelated
Word-based	Cognate	RTs	831 (247)	1051 (251)	1033 (279)	786 (161)	975 (206)	955 (244)
		% E	8.7 (15.5)	19.8 (22.1)	4.8 (9.3)	2.4 (6)	15.1 (16.6)	1.6 (5)
	Noncognate	RTs	1046 (261)	1026 (237)	1110 (328)	1075 (297)	953 (233)	989 (247)
		% E	15.9 (15.3)	15.1 (16.6)	9.5 (12.4)	23 (17.9)	11.9 (12.6)	7.1 (12.4)
Picture-based	Cognate	RTs	794 (204)	1159 (348)	1080 (329)	782 (209)	971 (282)	966 (235)
		% E	8.4 (11.3)	15.1 (21.7)	4.8 (11.9)	13.5 (15.5)	26.2 (24.5)	6.3 (12.3)
	Noncognate	RTs	1017 (309)	1089 (290)	1139 (329)	1097 (375)	1038 (285)	1020 (284)
		% E	11.9 (14.1)	15.1 (18.2)	11.9 (15.9)	39.4 (21)	19 (31.1)	15.9 (15.3)