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Escola de Psicologia

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Trabalho realizado sob orientação da
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da
Professora Doutora Ana Paula Soares
e da
Professora Doutora Séverine Casalis

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DECLARAÇÃO

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Mestrado Integrado em Psicologia da Universidade do Minho

Área de especialização em Psicologia Clínica e da Saúde

Estádios iniciais de aquisição de palavras cognatas e não cognatas em crianças: o papel da composição da lista de estímulos

Ana Júlia Moreira

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Ana Paula Soares

Séverine Casalis

Resumo

Uma questão central no bilinguismo é saber que fatores podem afetar as ligações léxico-semânticas entre palavras da língua materna e as de um novo idioma. Estudos recentes demonstraram que o método de aprendizagem (baseado em imagens *vs.* palavras), bem como o estatuto da palavra (cognata *vs.* não cognata) (Comesaña, Soares, Sanchez-Casas, & Lima, 2012a), influenciam o acesso ao sistema conceptual mesmo em fases iniciais da aprendizagem de uma segunda língua (L2) (Comesaña, Perea, Pineiro, & Fraga, 2009). Este estudo procurou explorar os efeitos de composição da lista de estímulos no estabelecimento dessas ligações, bem como a sua estabilidade no tempo. Crianças no quinto ano aprenderam palavras cognatas e não cognatas separadamente (condição bloqueada) ou em conjunto (condição mista), através de um método baseado em imagens. De seguida, realizaram uma tarefa de reconhecimento de traduções, imediatamente após a aprendizagem e uma semana depois. Tal como esperado, as crianças demoraram mais tempo e cometeram mais erros a rejeitar palavras semanticamente relacionadas do que palavras não relacionadas com a palavra na L2 (efeito de interferência semântica). Adicionalmente, na condição bloqueada, o efeito foi observado apenas para cognatas. As implicações destes resultados são discutidas à luz do Modelo Hierárquico Revisto (Kroll & Stewart, 1994).

Palavras-chave: aquisição de segunda língua; efeito de interferência semântica; composição da lista de estímulos; estatuto da palavra

Integrated Master in Psychology of University of Minho

Specialty of Clinical and Health Psychology

Early stages of cognate and noncognate word acquisition in children: The role of list composition

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Abstract

Understanding the type of lexical-semantic connections and their establishment in second language (L2) acquisition is a main topic in bilingualism research. Recent studies showed the learning method used (picture vs. word-based methods) influence the access to the conceptual system in early stages of L2 learning (Comesaña et al., 2009). Moreover, this effect seems to vary according to word status, especially in children (Comesaña et al., 2012a). This study aimed to further explore list composition effects in the establishment of L2 words-to-concepts connections by using a picture-based method. Fifth-grade children were taught cognate and noncognate words, presented separately or in a mixed way. Afterwards, they performed a backward-translation recognition task. Results revealed, as expected, that children took longer and made more errors when rejecting semantically related than unrelated words as correct translations (semantic interference effect). Importantly, a differential processing for cognate words was observed in the blocked condition. These findings are discussed within the light of the Revised Hierarchical Model (Kroll & Stewart, 1994).

Keywords: second language acquisition; semantic interference effect; stimuli list composition; cognate status

Introduction

One important topic on the field of bilingualism and second language acquisition (SLA) concerns the study of how words of both languages are represented in bilingual memory, as well as how they are accessed and selected (Comesaña et al., 2012a; Dijkstra, Miwa, Brummelhuis, Sappelli, & Baayen, 2010; Jiang, 2000; Jiang & Forster, 2001; Van Hell & Kroll, 2012).Based on the Revised Hierarchical Model (RHM) developed by Kroll and Stewart (1994) (see Kroll, van Hell, Tokowicz, & Green, 2010; Van Hell & Kroll, 2012, for more recent reviews), several studies have been developed in order to explore the lexical-semantic connections between words in both languages (e.g., Altarriba & Mathis, 1997; Dijkstra, Grainger, & van Heuven, 1999; Guo, Misra, Tam, & Kroll, 2012; Kroll & Stewart, 1994; Sunderman & Kroll, 2006; Tokowicz, Kroll, de Groot, & van Hell, 2002). The RHM depicted in Figure 1 portrays the existence of a common conceptual (semantic) system to both languages, and a separate lexical memory system for each language.

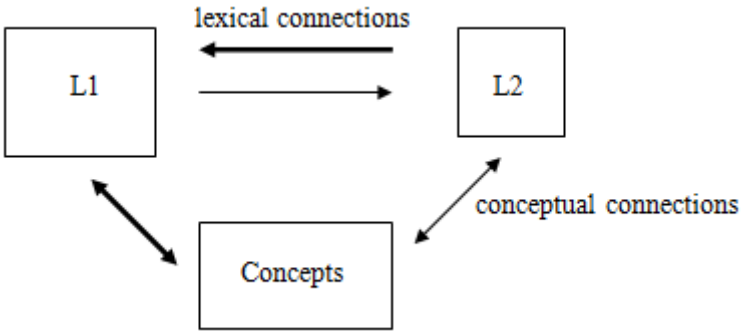

Figure 1. The Revised Hierarchical Model (adapted from Talamas, Kroll, & Dufour, 1999), with L1 corresponding to first language and L2 referring to second language.

According to the model, the strength of lexical and conceptual connections changes as L2 proficiency increases. When considering L2 beginners, connections in the L2-L1 direction will always be stronger than on the other direction (L1-L2), because L2 words are usually learned through association with L1 translation (Jiang, 2000), and also because more knowledge will always be attributed to L1. Besides, as L1 words are learned as semantic and

formal entities, and L2 words are mainly learned as formal entities, the access to the conceptual system varies for both languages. Thus, the access to the conceptual system is direct from L1 words, while for L2 words it is made by L1 mediation. Because of this, in tasks such as translation, processing is expected to be faster and less influenced by semantic information in L2-L1 direction than the other way around. As L2 proficiency grows, direct links between L2 and the conceptual system are expected to become stronger, allowing for a proficient bilingual to equally access the conceptual system directly from either L1 or L2. Thus, for L2 beginners, the RHM predicts forward translation (L1-L2 direction) to be based on conceptual mediation, whereas backward translation (L2-L1 direction) to be mostly lexically mediated.

Studies using different methodologies assumed to tap conceptual processing, such as translation (e.g., de Groot, Dannenburg, & Vanhell, 1994; Sánchez-Casas, García-Albea, & Davis, 1992), translation recognition (e.g., Talamas et al., 1999), or between-language masked semantic priming lexical decision tasks (e.g., Perea, Duñabeitia, & Carreiras, 2008) support the assumptions of the RHM. For instance, Talamas and colleagues (1999) asked high and low English-Spanish proficient adult bilinguals to perform a translation recognition task in order to analyze the way in which new L2 words were mapped to meaning. In this task, participants saw a word in one language and were asked to decide whether the following word was or not the correct translation of the first word. The critical conditions were those in which the second word was an incorrect translation. These could be related to the correct translation in form (e.g., *man-hambre* [hunger] instead of *man-hombre* [man]) or meaning (e.g., *man-mujer* [woman] instead of *man-hombre* [man]). As incorrect translations require the same "no" response, they allowed researchers to understand the conceptual processes involved in SLA, specifically the establishment of the connections between lexical and conceptual systems. In this sense, proficient bilinguals were expected to take more time and commit more errors answering "no" to a semantically related pair, than to an unrelated pair (the so-called semantic interference effect - SIE), while less proficient bilinguals were expected to show a greater interference effect considering the form of the words. In fact, Talamas and colleagues (1999) found that formal interference was greater for less proficient bilinguals, while the SIE was greater for more proficient bilinguals, as in line with RHM predictions. Also, similar results were found by Ferré, Sánchez-Casas, and Guasch (2006), with low and high proficient bilinguals.

Despite the evidence supporting the tenets of the RHM, more recent studies have challenged its predictions, concerning the following aspects: a) proficient bilinguals show both lexical and conceptual mediation when processing L2 words (Guo et al., 2012), and b) not only proficient bilinguals, but also L2 beginners show direct access to the conceptual system from L2 words, i.e., without L1 mediation, both in adults (Altarriba & Mathis, 1997; de Groot & Poot, 1997), and children (Comesaña et al., 2009; Comesaña et al., 2012a). The inconsistency of these results may be due to the influence of other variables besides level of proficiency, such as the learning method used (e.g., Comesaña et al., 2009; Finkbeiner & Nicol, 2003), the type of the word taught (Comesaña et al., 2012a; Davis et al., 2010; Tokowicz et al., 2002; van Heuven, Dijkstra, & Grainger, 1998), learning or translation direction (Davis et al., 2010; Heij, Hooglander, Kerling, & van der Velden, 1996), or even participants age (Lotto & de Groot, 1998). For instance, in a study developed by Chen and Leung (1989), performance of children and adults was compared by using translation and picture naming tasks in L2, showing that adult L2 beginners were faster translating, while children L2 beginners were faster naming pictures. The authors suggested children depended more on conceptual cues to learn, whereas adults depended more on lexical cues. This study is interesting as its findings highlight the importance of the chosen L2 learning method for both populations, and its implications on the establishment lexical-semantic connections during early stages of SLA.

One should bear in mind that the RHM was developed based on empirical data from adult population. However, the study of whether its tenets work for children is also interesting, not only for the model, but also for educational practices (as in which is the best way to learn words from a new language). Indeed, as children are still developing their L1, the impact of L1 on L2 word processing can be different in comparison with adults. Following this reasoning, Comesaña and colleagues (2009) developed a study to explore the influence of L2 learning method in the establishment and stability of L2 word-to-concepts connections in a children population. Specifically, they aimed to explore whether conceptual access from L2 words is mediated by L1 lexical representations or whether it may involve a direct access, as previous studies with adults had shown (Altarriba & Mathis, 1997; Ferré et al., 2006; Finkbeiner & Nicol, 2003). For that, two different learning methods were used to teach new L2 words: the L2-L1 word association method *vs.* L2 word-picture association method. While the first one refers to the association between a word in L2 and its direct

translation in L1 (reinforcing therefore lexical connections), the latter refers to the association between a word in L2 and its corresponding picture (i.e., reinforcing conceptual connections). Authors compared the performance of beginners and fluent children bilinguals in a backward-translation recognition task, similar to the one used by Talamas and colleagues (1999). After being presented the L2 word, participants had to decide whether the following L1 word was or not the correct translation of the previous L2 word. The presented L1 word could either be the correct translation, a semantically related word or an unrelated word. This task was done by L2 beginners immediately after learning and a week later in order to assess the stability of results over time. The issue under scrutiny was that if the learning method influences the establishment and stability of direct links between L2 words and the conceptual system, children who learned L2 words via L2 word-picture method would show longer reaction times and more errors answering "no" to a semantically related L1 word (i.e., SIE), than those who learned L2 words via L2-L1 word method. Researchers found a SIE for proficient bilingual children, replicating the findings of Altarriba and Mathis (1997) with adult populations. Notably, a SIE was also found for L2 beginners. That is, beginners seemed capable of accessing meaning information directly from L2 words. More importantly, the SIE observed immediately and after a week was restricted to participants who had learned L2 words through the picture-word method, leading to the conclusion that the L2-picture learning method influenced the establishment and stability of L2-word-to-concept connections. However, in this study, as well as in the majority of studies on new vocabulary acquisition with adults, only noncognate words were considered, leaving to answer if these effects could change according to cognate status (i.e., cognate *vs.* noncognate words).

Cognate words are equivalent translations sharing orthography, phonology and meaning (e.g., the European Portuguese (EP) - English translation *papel-paper*), while noncognate words correspond to equivalent translations only similar in meaning (e.g., the EP - English translation *árvore-tree*). This is not a trivial question, as evidence has shown that cognate and noncognate words are differently processed (e.g., Comesana et al., 2012b; Davis et al., 2010; Dijkstra et al., 2010; Ferré et al., 2006). Specifically, cognate words have been shown to evoke faster response times and fewer errors in comparison to noncognate words (e.g., Brenders, van Hell, & Dijkstra, 2011), showing a non-selective language access, i.e., when processing cognates, both languages are activated whilst only one language is required for the task (Dijkstra et al., 2010). Being aware of that and following the study of Comesaña

and colleagues (2009), authors underwent another study with the main aim to explore the efficacy of the L2 word-picture method over the L2-L1 word method in the establishment of L2 word-to-concepts connections, when both noncognate and cognate words were learned (Comesaña et al., 2012a). In this study, which followed the same procedure as used by Comesaña and colleagues (2009), results showed that just after one session of L2 learning, children showed a SIE, i.e. committed more errors when rejecting a semantically related than an unrelated pair as an incorrect translation, being this effect higher for the L2-picture method. Findings did not confirm the expected advantage of the word-based method for cognate compared to noncognate words (Tonzar, Lotto, & Job, 2009). This led authors to hypothesize that, as cognates and noncognates were learned together, this could have instigated participants to learn the words considering their orthographic and phonological similarities, therefore reinforcing the lexical links between both languages and attenuating the effects associated with the L2-picture method. Hence, instead of accessing the conceptual system directly from L2, this access was hypothesized to be made through L2-L1 lexical mediation. This reinforcement of lexical connections between both languages might have made L1 inhibition more difficult, thus, leaving open the possibility that the stimuli list composition may be modulating the influence of the learning method in L2 words-to-concepts mappings. In fact, research has shown that the stimuli list composition may be affecting results (Brenders et al., 2011). In Brenders and colleagues' study (2011), Dutch children of different L2 proficiency levels, who learned L2 in a classroom context, were asked to perform a lexical decision task, considering cognate words and false friends (words sharing orthographic and phonological characteristics, but with different meanings; e.g., *costume* [English] – *costume* [EP], while the former means "disguise", the latter means "habit" in English), also in a blocked (learning cognates and false friends separately) or mixed way (learning cognates and false friends altogether). Cognate words were processed faster and more accurately than false friends, when presented separately. However, when they were mixed, an inhibition effect on the processing of cognate words arose. In light of the RHM, this was explained by the fact that L2 beginners focus more on wordform representations than on word meaning.

In order to better understand if different type of connections could arise considering learning cognate and noncognate words separately compared to altogether, the main goal of the present paper was to further explore the effect of stimuli list composition on the

establishment of L2 words-to-concepts interlanguage connections in a children population. To that aim, children were taught cognate and noncognate words separately, or in a mixed way (blocked *vs.* mixed condition), by using a L2-picture method. Immediately after learning and a week later, a backward translation recognition task was performed. Both tests were included to assess the stability of lexical-semantic connections over time. Importantly, the use of two different list compositions (blocked *vs.* mixed) allowed to avoid any potential limitation of using a backward translation recognition task to explore direct connections between L2 words and the conceptual system. Indeed, the existence of a SIE through this task could be due to the access of the conceptual system via L1 rather than L2 (see Comesaña et al., 2009; Comesaña et al., 2012a). Thus, the rationale for the inclusion of two different list compositions in learning and testing was the following: if the SIE varies across conditions, then the above argument cannot be used, as in the present study both materials and task were the same for both groups. Any difference in the size of SIE across conditions could be due to a different pattern of conceptual access. To better illustrate: if L2 words-to-concept connections are fully developed when participants learn cognate and noncognate L2 words in a blocked manner compared to when participants learn these words altogether, this would suggest that learning words in a blocked manner is more effective to employ meaning information directly from L2 words.

Having the reviewed research in mind, it was hypothesized that the stimuli list composition (blocked *vs.* mixed condition) would modulate results, with the occurrence of a more robust SIE when words were learned separately than when they were learned in a mixed way, especially one week after. The rationale for this was that the presence of cognate words in the word list would reinforce the mediation of L1 in conceptual access due to cross-linguistic similarities (Brenders et al., 2011; Comesaña et al., 2012a).

Method

Participants

Fourty-eight fifth grade children from a Portuguese public school in Porto, Portugal (M_{age} = 10.29, DP_{age} = 0.46), participated in the experiment. All of them were native speakers of EP with no previous knowledge of the Basque language (L2). Participants neither had learning or intellectual disabilities nor repeated any school year.

Stimuli

Fourty-eight high-frequency Basque words were selected from the EuskalHitzak database (Perea et al., 2006). Each Basque word was paired with three EP words: (i) a correct translation (e.g., *zuhaitz* [tree] – *árvore* [tree]), (ii) a semantically related word (e.g., *zuhaitz* [tree] – *folhas* [leaves]), and (iii) an unrelated word (e.g., *zuhaitz* [tree] – *faixas* [sashes]). Semantically related words were selected from the EP word association database for children (Comesaña, Fraga, Moreira, Frade, & Soares, in press). Words in the semantically related and unrelated conditions were matched in word length (5.96 and 5.81, respectively), frequency per million (58.40 and 59.84, respectively), number of orthographic (2.53 and 2.56, respectively) and phonological neighbors (2.19 and 3.11, respectively), as well as grammatical category – note that most of the selected words were nouns (85%), with these values being taken from P-Pal database (Soares et al., in press). The appendix presents the stimuli used in this experiment. All word pairs were counterbalanced across three different experimental lists, so that a given pair appeared in only one condition per list. Notably, each Basque word is associated to all three conditions. To illustrate, the Basque word *zuhaitz* [tree] was paired: a) with its EP equivalent translation *árvore* [tree] in the first list; b) with an EP semantically related word *folhas* [leaves] in the second list; and c) an EP unrelated word *faixas* [sashes] with in the third list. Each list was composed of forty-eight Basque-EP word pairs, half of them cognates (e.g., *eskola-escola* [school], respectively) and the other half noncognates (e.g., *esku-mão* [hand]). Per word status, there were eight translations, eight semantically related words, and eight unrelated words. Six word pairs were added for practice purposes (two translations, two semantically related words, and two unrelated words). For the learning phase, each Basque word was paired to a picture corresponding to its translation. All images were selected from Snodgrass and Vanderwart (1980) (31%) or from googleimages (69%), and they were all black and white, with the size of 8x8cm.

Procedure

The procedure was similar to the one used by Comesaña and colleagues (2012a) with the exception that in the present study only the L2 word-picture learning method was used. The learning and test phases were run individually in a quiet room. In order to make sure participants were thinking about the target word portrayed in the pictures, before learning the words, participants were asked to say what they thought the pictures meant, in their L1. When

the word they said did not correspond to the target word, they were corrected. During the learning phase, half of the participants learned cognate and noncognate words separately while the other half learned both cognate and noncognate words in a mixed manner. Word presentation was counterbalanced both in blocked and mixed conditions. During the learning phase, participants were presented first with half of the stimuli and then with the other half (e.g., in the blocked condition, participants learned first cognate words and after a break noncognate words or vice-versa). In each part, participants saw three blocks of nine words each (eight experimental, and one for practice), each presented three times. During the first two L2 word-picture pair presentations, the experimenter read aloud the Basque word, both at the time of presentation and removal of the cards. Each set of words took approximately twenty minutes to learn, with the whole learning phase taking usually forty minutes to complete, per participant. After learning each set of words, participants answered a verbal vocabulary test, in which the translation of each learned Basque word was asked. Only data of participants with a score of, at least, 85% of correct answers on the overall test were considered for the analysis (being therefore 3 participants excluded). After learning each block of stimuli (cognate *vs.* noncognate in the blocked condition), there was a brief pause followed by a test phase – note that in the mixed condition, the pause occurred when half of the experimental words (cognate and noncognates) were learned. Thus, in total, participants did two tests immediately after the acquisition words (immediate test condition) and other two tests one week later (delayed test condition). For the test phase, participants had to perform a backward translation recognition task, in which participants were asked to decide as quickly and accurately as possible whether the second word presented on the screen was the correct translation of the first presented word or not, through the use of two different buttons (yes or no). Stimuli presentation and recording of response times and errors were controlled by using SuperLab 4.5 software. After given the instructions written and orally, participants began the experiment. On each trial, a fixation point was presented, at the center of the screen, during 1000 ms. After that, the Basque word was displayed on the screen during 250 ms, and followed by the EP word, which remained on the screen until a response was given by the participant or 2500 ms had elapsed.

Results

Reaction times and percentage of errors from the translation recognition task, both immediately after learning new L2 words and one week after, were considered in the analysis.

Incorrect answers, as well as responses faster than 250 ms and slower than 2000 ms were excluded for the latency analyses. Repeated-measures ANOVA considering participants' (F1) and items' (F2) mean reaction times and percentage of errors were made based on a 2 (cognate status: cognate *vs.* noncognate) x 2 (relatedness: semantically related *vs.* unrelated) x 2 (test moment: immediate *vs.* delayed) x 2 (list composition: blocked *vs.* mixed) x 3 (list: list 1, list 2, list 3) design. In analyses by participants (F1), list composition and list were considered as between-group factors, while cognate status, relatedness and test moment were considered as within-subject factors. In analyses by items (F2), cognate status and list were assumed as between-group factors, while relatedness, test moment and list composition were assumed as within-subject factors. The list was considered in analysis in order to reduce error variance (see Pollatsek & Well, 1995). The translation condition (i.e., "yes" responses) was excluded from analysis, as the critical question was to analyze the difference between semantically related and unrelated words, i.e., the SIE. Notwithstanding, mean reaction times (ms) and percentage of errors per condition are presented in Table 1, as well as the SIE observed, calculated as the difference between the unrelated and semantically related conditions. Plus, initial repeated-measures ANOVA were carried out including the translation condition in order to ensure that words had been actually learned. Repeated-measures ANOVA showed that participants were faster, $F_1(2, 41) = 42.33$, $p < .001$, $\eta^2 = .67$, $MSE = 418574.48$; $F_2(2, 41) = 66.73$, $p < .001$, $\eta^2 = .77$, $MSE = 408720.44$, and committed globally less errors, $F_1(2, 41) = 47.88$, $p < .001$, $\eta^2 = .70$, $MSE = 7378.34$; $F_2(2, 41) = 25.21$, $p < .001$, $\eta^2 = .55$, in the translation condition compared to the other conditions, as already was observed in previous studies (Comesaña et al., 2009; Comesaña et al., 2012a).

Only results that reached statistical significance or results marginally significant were reported. ANOVA results for reaction times showed a significant main effect of list composition for items and marginal for participants, $F_1(1, 42) = 2.79$, $p = .10$, $\eta^2 = .06$, $MSE = 744409.93$; $F_2(1, 42) = 42.63$, $p < .001$, $\eta^2 = .50$, $MSE = 506728.98$. Participants were slower to respond to words in the blocked condition ($M = 1153$) compared to words in the mixed condition ($M = 1065$). There was also a significant main effect for relatedness, $F_1(1, 42) = 13.25$, $p < .001$, $\eta^2 = .24$, $MSE = 250150.84$; $F_2(1, 42) = 15.41$, $p < .001$, $\eta^2 = .27$, $MSE = 241651.19$. Participants were slower to answer to words on the semantically related condition ($M = 1134$) compared to the unrelated condition ($M = 1083$). Moreover, results showed a main effect of the test moment, $F_1(1, 42) = 36.62$, $p < .001$, $\eta^2 = .47$, $MSE = 2045789.93$;

$F_2(1, 42) = 153.30$, $p < .001$, $\eta^2 = .79$, $MSE = 2010018.43$, with participants being faster to respond in the delayed test condition ($M = 1036$), compared to the immediate test condition ($M = 1182$). A significant interaction between cognate status and relatedness was also found, $F_1(1, 42) = 8.84$, $p < .01$, $\eta^2 = .17$, $MSE = 90932.58$; $F_2(1, 42) = 7.81$, $p < .01$, $\eta^2 = .16$, $MSE = 122539.74$. Pairwise comparisons revealed that the SIE was restricted to cognates, as semantically related cognate words were responded slower (M = 1142) than unrelated cognate ones (M = 1060). Besides, participants were slower to respond to unrelated noncognate words than to unrelated cognate words (1106 and 1060, respectively).

Error analysis showed that there was a significant main effect of list composition on items' analysis, $F_1(1, 42) = 2.62$, $p = .11$, $\eta^2 = .06$, $MSE = 2604.17$; $F_2(1, 42) = 16.88$, $p < .001$, $\eta^2 = .29$, $MSE = 2604.17$. More errors were committed in the mixed condition ($M = 21.5$) than in the blocked condition ($M = 16.3$). There was also a significant effect for relatedness, $F_1(1, 42) = 97.9$, $p < .001$, $\eta^2 = .70$, $MSE = 27931.32$; $F_2(1, 42) = 42.19$, $p < .001$, $\eta^2 = .50$, $MSE = 27931.32$. Participants made more errors concerning the semantically related condition ($M = 27.4$) than the unrelated condition ($M = 10.4$). There was also a significant main effect of the test moment, $F_1(1, 42) = 21.17$, $p < .001$, $\eta^2 = .34$, $MSE = 4401.04$; $F_2(1, 42) = 29.01$, $p < .001$, $\eta^2 = .41$, $MSE = 4401.04$, with more errors being committed in the delayed test condition ($M = 22.3$) compared to the immediate test condition ($M = 15.5$). The interaction between relatedness and list composition was also marginal significant for participants, and significant for items, $F_1(1, 42) = 3.02$, $p = .09$, $\eta^2 = .07$, $MSE = 861.003$; $F_2(1, 42) = 5.99$, $p < .05$, $\eta^2 = .13$, $MSE = 861.003$. Pairwise comparisons showed more errors were made in the semantically related condition ($M = 23.3$) compared to the unrelated condition ($M = 9.2$), for the blocked condition. Pairwise comparisons also showed more errors in the semantically related condition ($M = 31.5$) compared to the semantically unrelated condition ($M = 11.5$), for the mixed condition. Moreover, Pairwise comparisons showed more errors occurred in the mixed learning condition ($M = 31.5$), than in the blocked learning condition ($M = 23.3$). The interaction between cognate status and list composition was

Table 1. Mean reaction times (RT) in milisseconds and percentage of errors (% Errors) with standard deviations, in parentheses, by list composition (blocked *vs.* mixed condition) and cognate status, considering test moment (immediate *vs.* delayed), through all three experimental conditions (translation, related, unrelated). SIE (SIE) for each list composition is also presented.

			Immediate test condition				Delayed test condition			
List composition	Cognate status	Dependent Variable	Translation	Related	Unrelated	SIE	Translation	Related	Unrelated	SIE
Blocked condition	Cognate	RT	988 (180)	1,235 (239)	1,166 (224)	-69	952 (198)	1,101 (186)	1,043 (213)	-58
		% Errors	5.7 (8.2)	19.3 (18.4)	4.7 (7.2)	-14.6	7.8 (8.9)	21.9 (23.4)	9.9 (17.7)	-12
	Noncognate	RT	1,193 (179)	1,299 (178)	1,238 (216)	-61	1,103 (207)	1,061 (226)	1,078 (241)	17
		% Errors	13 (11.9)	22.4 (17.7)	6.8 (10.4)	-15.6	25 (21.8)	29.7 (22.1)	15.6 (22.2)	-14.1
Mixed condition	Cognate	RT	916 (222)	1,177 (233)	1,077 (201)	-100	818 (183)	1,053 (321)	953 (192)	-100
		% Errors	10.9 (15.3)	30.2 (24.7)	9.9 (13.8)	-20.3	6.3 (7.4)	36.5 (22.4)	12 (15.9)	-24.5
	Noncognate	RT	1,096 (257)	1,131 (239)	1,129 (183)	-2	960 (228)	1,016 (261)	981 (236)	-35
		% Errors	20.3 (13.7)	22.9 (19)	7.8 (15.6)	-15.1	33.9 (22.9)	36.5 (17.3)	16.2 (18.2)	-20.3

marginally significant for participants, $F_1(1, 42) = 3.83$, $p = .06$, $\eta^2 = .08$, $MSE = 861.003$, and significant by items, $F_2(1, 42) = 5.58$, $p < .05$, $\eta^2 = .12$, $MSE = 861.003$. Pairwise comparisons showed that, in the blocked condition, more errors were made for noncognate words (M = 18.6) compared to cognate words (M = 13.9), and that more errors were made for cognates in the mixed learning condition (M = 22.1) than in the blocked condition (M = 13.9)

Discussion

The aim of this study was to explore the role of stimuli list composition in the establishment and stability of L2-word-to-concept interlanguage connections in two different moments, in children. To that aim, cognate and noncognate words were learned in a blocked *vs.* mixed condition, by using the L2 word-picture learning method. Immediately after learning and a week later EP children performed a backward translation recognition task. Results were clear cut, as children took more time and made more errors when rejecting a semantically related pair than an unrelated pair (SIE) – although the effect in reaction times was restricted to cognate words. Overall, the effect tended to be higher one week after L2 learning for both cognate and noncognate words, especially in error data, which is in line with previous studies (Comesaña et al., 2009; Comesaña et al., 2012a). Notwithstanding, even though children from the blocked condition were more precise than children from the mixed condition, the SIE was of the same magnitude in both conditions.

Although the finding that the SIE magnitude was virtually the same for both lists compositions was unexpected, it goes in line with previous research (Brenders et al., 2011). In their study, Brenders and colleagues (2011) found a SIE for cognates when they were learned altogether with false friends. They explained this result has a consequence of a greater lexical competition between both languages when they were presented in a mixed way. As processing of cognate words seem to depend more on formal similarities, namely orthography and phonology, this emphasizes lexical L2-L1 connections (Comesaña et al., 2012a; Tonzar et al., 2009). While presenting cognate and noncognate words separately facilitates the "choice" of a strategy (a more lexical mediated one for cognate words, and a more conceptual mediated one for noncognates), presenting them in a mixed way may have hindered this strategy expected preference, thus creating also an interference effect in the mixed condition. Notably, the SIE was not modulated by list composition, but by the processing of cognate words, as in

the mixed condition participants had a similar percentage of errors for both cognates and noncognates, thus extinguishing the facilitation effect found for cognates in the blocked condition. Most likely, this was due to the fact that, when in the blocked condition, access to the conceptual system is being done without L1 mediation, as previously shown by Comesaña and colleagues (2012a), hence the activation of the equivalent translation (L1) will elicit a lesser inhibition. Therefore, the blocked presentation of cognate and noncognate words seems to be more effective in terms of SLA, as it leads to: a) a higher accuracy in performance; b) a facilitation effect on cognates' processing (thus, reducing lexical interlanguage competition); and c) even though not reaching statistical significance, a higher SIE was observed on reaction times. Regarding the last point, although stimuli list composition did not interact with relatedness in reaction times, a separated and *a posteriori* analysis of the SIE by list composition (blocked *vs.* mixed) showed a SIE independently of cognate status in the blocked condition ($p < .05$), and a marginal SIE just for cognates in the mixed condition (as the interaction between cognate status and relatedness showed; $p = .013$).

In the present study, when considering the blocked condition, differences arose regarding cognate status, with cognate words being answered more accurately than noncognate words. The existence of a greater SIE for cognate words in the mixed condition was explained as a consequence of a strengthening of both lexical and conceptual connections regarding cognate words (Comesaña et al., 2012a). That is, words were learned through a L2 word-picture method, which facilitates the establishment of direct connections between L2 words and the conceptual system, whereas cognate words, due to their formal similarities across languages, activate more extensively L1 words. At this point, it should also be noted that a key-point in SLA is the capability of inhibiting L1 (Linck, Kroll, & Sunderman, 2009). Hence, besides cognate words hindering L1 inhibition, they suffer a "double" activation (conceptual and lexical) that occurs when they are being processed, thus explaining their higher percentage of errors when learned in a mixed way. Notably, cognate words are very useful in the study of language (non) selective access. If compared to control words (i.e., noncognates), the processing of cognates does not differ, then access to language should be done selectively (Brenders et al., 2011). As presently the processing of cognate words differed compared to the processing of noncognate words, and as in light of the notion that cognate words are lexically mediated, a language non-selective access seems to take place.

The fact that participants needed more time and committed more errors towards the semantically related than to the unrelated words showed that even after having contact with L2 just once, direct connections between L2 words and the conceptual system were formed, through the use of L2 word-picture learning method, hence contradicting initial assumptions made by RHM regarding the establishment of connections and level of L2 proficiency (Kroll & Stewart, 1994). It is important to bear in mind that the RHM does not distinguish between adults or children. The fact that children seem to rely more on conceptual than lexical information in order to retrieve a L2 word (Chen & Leung, 1989), may explain the pattern of results obtained as well as reinforce the idea that, in order to learn new L2 vocabulary, children access directly the conceptual system, without any L1 lexical mediation.

According to the RHM, beginners of L2, while learning L2 words, initially focus more on the form of the word than on its meaning (Brenders et al., 2011). As L2 beginners look at a newly learned cognate word, they will take into consideration its wordform representation first, reinforcing the use of the lexical connections between both languages. Moreover, the recurrence to the meaning of the word through conceptual connections will allow a higher activation for the processing of cognate words to take place compared to noncognate words. Although the RHM was primarily thought of as a model of word production, and not of word recognition (Kroll et al., 2010), its developmental perspective regarding L2 proficiency allows to comprehend how lexical and conceptual connections are formed through SLA. Though the realization that direct conceptual mediation for L2 also occurs in initial phases of SLA may pose a problem for the RHM, the model never stated the absence of such connections, but the existence of an asymmetry (Kroll et al., 2010). In fact, the overall found SIE may be explained by a direct conceptual mediation between a given L2 word and its meaning. Moreover, in this study, cognate words used were similar, but not identical (e.g, *banku* – *banco*). This is important to take into consideration as studies have shown that according to the demanded task and the level of similarity between the cognate words, interference effects may differ (see Dijkstra et al., 2010).

In the present study, a trade-off effect occurred in the sense that, one week after learning L2 words, participants were faster to respond, but also committed more errors. One should keep in mind that differences in performance were more visible considering the percentage of errors, instead of reaction times. This can be explained by previous studies on young readers that attest errors as giving a clearer notion of progress when learning a

language (Fraga, Comesaña, & Perea, 2006). The higher percentage of errors one week after learning the words may be more directly explained as a consequence of participants forgetting the words they learned with time. Although no significant interaction was found between relatedness and test moment, the higher percentage of errors one week after learning could point to the justification that recently learned words can be enhanced in long-term memory, activating more semantic related words, hence, creating more competition when trying to retrieve a given word (Jones, 2004).

Although the present study only considered one learning method, it showed once again how the L2 word-picture learning method may evoke a SIE, both in cognate and noncognate words, providing more information about the processes involved in the establishment of lexical and conceptual connections between languages. Future research on this topic should consider replicating this study, through a L2-L1 word learning method, in order to better understand the connections involved between cognate status, stimuli list composition, and type of learning. Also, considering the use of longitudinal designs could bring richer and more accurate information on the developmental changes involved in SLA, as it has been previously shown how age and L2 proficiency can evoke different results (e.g., Silverberg & Samuel, 2004; Tonzar et al., 2009). Moreover, the presently used task was not one of production. As studies that use production tasks suggest that L2 production is slower and less precise in the beginning of vocabulary acquisition (Howard, Nickels, Coltheart, & Cole-Virtue, 2006; Kroll & Tokowicz, 2001), it could be very interesting to see the possible implications regarding the processing of L2 words, specifically how connections between form and meaning are established, and how they change as age or L2 proficiency increases.

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Appendix

Experimental prime-targets pairs

The items are presented in the following order: word in Basque, correct translation in EP, word semantically related in EP, word semantically unrelated in EP.

Cognate pairs: aktore, actor, teatro, sábado; aireportu, aeroporto, aviões, normas; arku, arco, redondo, furioso; armairu, armário, roupa, ponta; banku, banco, sentar, limpar; kafe, café, chávena, caverna; kaxa, caixa, guardar, desejar; zinema, cinema, filme, apoio; korrikaldi, corrida, velocidade, integração; eskola, escola, aprender, proteger; família, família, pais, greve; ospitale, hospital, doentes, fortes; irla, ilha, deserta, cuidada; lanpara, lâmpada, luz, rede; lapitz, lápis, escrever, utilizar; liburu, livro, ler, cair; mediku, médico, doutor, outono; pareta, parede, branca, activa; erradio, rádio, ouvir, viver; erloju, relógio, horas, acções;

arrosa, rosa, flor, libra; zopa, sopa, legumes, bonecos; tapiz, tapete, chão, negro; testu, texto, palavras, semanas.

Noncognate pairs: zuhaitz, árvore, folhas, faixas; itsasontzi, barco, mar, povo; haragi, carne, comer, dever; beribil, carro, automóveis, histórico; bihotz, coração, amor, fogo; bizkar, costas, coluna, quantia; sukalde, cozinha, comida, larga; eraikin, edifício, prédio, código; iturri, fonte, água, ideia; eliza, igreja, padre, álbum; leiho, janela, vidro, envio; egunkari, jornal, notícias, unidades; esne, leite, vaca, tela; mingain, língua, portuguesa, responsável; esku, mão, dedos, bares; txanpon, moeda, dinheiro, serviço; ohar, nota, teste, rumo; harri, pedra, dura, vaga; cárcel, prisão, ladrão, credor; mutil, rapaz, rapariga, guitarra; itzal, sombra, escura, mágica; adinekoak, velho, idoso, ácido; haize, vento, frio, culto; ardo, vinho, uva, cruz.