SECOND LANGUAGE LEXICAL PROCESSING:
Influence of Teaching Method and Word Characteristics

by

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ABSTRACT

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Word learning was investigated in two experiments: a word translation experiment and a picture naming experiment. Two groups of bilinguals, differing in second language proficiency, were taught 40 Spanish words using one of these two tasks. One group of participants translated a set of words from L1 (English) to L2 (Spanish) Another group of participants named pictures. For each task, the training involved two presentations of the same 40 Spanish words, coupled either with the translation in English or with a picture. In both experiments subjects heard each Spanish words repeated 3 times in each presentation. Subjects' task was to name the Spanish word either given an English word prompt (word translation) or a picture prompt (picture naming). The stimulus materials were manipulated on word frequency and cognate status. The results show that cognate and high frequency words were easier to learn (fewer errors and shorter response times). Proficiency and task hardly affected error rates. Overall, picture naming showed better recall for beginner learners whereas word translation showed better recall for learners with a good proficiency level. This suggests that conceptual memory appeared to operate as much in the translation task as in the picture naming task.

DEDICATION PAGE

"I do not know what I may appear to the world, but to myself I seem to have been only a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

Isaac Newton, from Brewster, *Memoirs of Newton* (1855)

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2. THE BILINGUAL LEXICON

> "Knowing words is the key to understanding and being understood. Children acquire words first, and next the grammar of a language. The bulk of learning a new language consists of learning **new words**: grammatical knowledge does not make for great proficiency in a language" (Vermeer, 1992: 147).

This quote from Vermeer highlights the relevance of learning the lexicon when studying a second/foreign language. Supporting this idea, Marslen-Wilson (1989) described the lexicon as the central link in language processing. It seems undeniable that the knowledge of the second lexicon is key to the development of skill in language use. Therefore, the questions that arise are: What goes on in our mind that helps us remember some words and forget others? Are there any differences in the way words are conceptually represented in our mind that determine how well and fast they are retrieved when communicating?

A challenging question in the study of language and the brain concerns the way L1 and L2 vocabulary are represented and processed in the mind, in particular whether this structure is the same for bilinguals (who have acquired more than one language as their native tongue) and second language learners (who have learned a second language later – via formal instruction or in a natural setting). If one considers more than one language system determining the overall structure, then the relationships within and between this structure becomes complex. One of the reasons is that lexical items in different languages may not correspond to only one concept. Besides, one has to specify the precise level of representation under investigation during word processing.

A much-debated issue in the mapping of form to meaning within theories of bilingual language representation is whether there are two separate lexicons or a common mental representation underlying linguistic knowledge of two languages (Snodgrass, 1984). The question of whether there are different 'mental lexicons' underlying distinct languages or a common representation shared by all language systems is also known as common versus shared storage (Kolers and González, 1980), interdependence versus independence issue (McCormack, 1977; Jin, 1990) and single versus dual code hypothesis (Durgunoglu and Roediger, 1987).

This debate on the nature of the relationship between L1 and L2 lexicons has been strongly influenced by Weinrich's (1953) tripartite definition of bilingualism. In compound bilingualism, there is equal prominence of languages and a common concept underlies the two different lexical forms in the two languages, i.e. there is one set of signifieds for two signifiers. In coordinate bilingualism and subordinative bilingualism one language is before the other. But in the case of coordinate bilingualism there are separate sets of word-concept pairs and in the case of subordinative bilingualism, the L2 is entirely parasitic on the L1.

In looking at these different mental representations of L1 and L2 lexical organization, the effects of different factors have been analyzed. The view that a relationship may exist between the ways a new language is learned and bilingual memory organization and processing goes back to at least 1954, when Ervin and Osgood suggested that different acquisition contexts lead to different bilingual memory structures (Ervin and Osgood, 1954).

An alternative to Ervin and Osgood's hypothesis and more related to teaching method is a combination of the proposals put forth by Potter et al. (1984) and Chen (1990). These two proposals distinguish between three different models:

1. The WORD-ASSOCIATION model: this model supports the idea that the form representations of L2 words are connected directly with the corresponding L1 words' form representations and only the form representations of L1 words are connected directly to the representations of the associated concepts in the conceptual system. During early stages, the salient form of interconnection between the two languages appears to be lexical. Like Talamas, Kroll & Dufour (1999) indicate, word associations between L1 and L2 mediate second-language performance tasks such as picture naming and translation (Chen & Leung, 1989; Kroll & Curley, 1988).

2. The CONCEPT-MEDIATION model: this model relies on the existence of direct connections between the shared representations in the conceptual system and the corresponding representations in each of the two lexical stores. As the second-language learner becomes more proficient, both L1 and L2 words gain access to conceptual memory directly, making L2 functionally similar to L1.

3. The DEVELOPMENTAL model: this model is actually a combination of the other two proposals. It assumes that the word-association model holds for bilinguals with relatively low L2 proficiency, whereas the concept-mediation organization holds for more proficient bilinguals.

These three models are especially relevant to elaborate predictions about which task is going to be more effective in vocabulary teaching, regarding two teaching methods in particular: picture naming and word translation. This will be discussed in more detail in section 2.2.1.

2.1. Some Factors that Influence Vocabulary Learning and Retention

2.1.1. Teaching Method

Having a sizeable lexicon is critical for language proficiency. The size of an adult speaker's native language vocabulary is often estimated at 50,000 known words (Aitchinson, 1994). The majority of these words are learned implicitly, as children, without the need for formal instruction in a classroom. Therefore, how can a second language learner build up a vocabulary strong enough to comprehend and communicate effectively? It is obvious that acquiring a vocabulary in a foreign language as quickly as possible is critical. In this respect, the teaching method used to teach these L2 words may play a key role.

Two main methods have been used traditionally in the second language classroom: word translation and picture naming. These two tasks have also been chosen to provide support for the models discussed in Section 2.1. which mainly derives from a comparison of response times in two semantic-memory tasks: translating from L1 to L2 and picture naming in L2.

2.1.1.1. Picture Learning

The picture learning method consists in presenting pictures to the learner and attaching L2 words to those pictures. The intention behind this method is to strengthen the weak connections between the L2 word and the concept. If the semantic information of an L2 word is copied from the lemma of its L2 translation, we may expect relatively weak connections between these L2 words and their corresponding conceptual representations.

Studies by Kroll & Curley (1988), Chen & Leung (1989) and Kroll & Borning (1987) show that less fluent subjects did take longer to name a picture in the L2 than to translate an L1

word to L2. This fact seems to be an indicator that there exist direct relations between the lexical nodes of L1 and L2, slowing down a task like picture naming but facilitating a task like word translation. However, more fluent subjects were equally fast in picture naming and translating in L2. This seems to indicate that those initial direct connections between the L1 and the L2 words cease to exist over time or may be still there but bypassed in the translation task and the connections between the L2 words and their corresponding conceptual representations are enhanced.

Going back to the models presented in Section 2.1, the word-association model predicts that translating L1 into L2 takes less time than picture naming in L2 because the route to the response is shorter in the first task than in the second. Translation from L1 to L2 involves tracing the link between the corresponding L1 and L2 representations in the lexical store, bypassing conceptual memory. However, picture naming in L2 comes about by tracing the longer route from the "images" store, via conceptual memory and the L1 lexical store to the L2 lexical store.

The question is, if pictures are supposed to be visual representations of mental concepts, is it possible to use a picture naming method to build up a strong connection between the L2 word and the underlying concept at an early stage of learning? By never explicitly attaching the L1 words to the L2 words in the classroom environment, we may be building up those strong lexical-conceptual ties and facilitating retrieval, something that seems to be true for more advanced learners.

2.1.1.2. Word Translation

Vocabulary teaching through translation pairs is probably one of the most extensively used methods in the foreign language classroom. This method consists of simply provide the L2 word always paired with the corresponding translation in L1. In this respect, Jiang (2000) states that the meaning of an L2 word is 'told' to the learner by means of providing its L1 translation. The meaning is not 'discovered', so to speak, by the learners themselves. This method is likely to encourage the learner's tendency to rely on L1.

Word translation relies heavily on an established conceptual/semantic system in the L1 and promotes the creation of a "bridge" between the L1 and L2 lexicon. This really seems to be

the case for foreign language learners, in particular adult learners, who may tend to rely on this system in learning new words in a second language, a tendency that has long been acknowledged (Lado, 1957).

According to the developmental model (Jiang, 2000) proposed in Section 2.1., it seems unlikely that when one learns a word in a second language a new concept will be created in the process because corresponding, or at least similar, concepts or semantic specifications already exist in the learner's semantic system. Instead, it is more likely that the existing concepts or semantic specifications will be activated.

The questions now are: Are there classes of words that are particularly good candidates for sharing relatively many/few representational elements across languages? And if so, should we use different teaching methods to train second language learners to facilitate vocabulary learning and retrieval? Answers to these questions may provide information on how multilinguals mentally represent and process their second language and may provide valuable suggestions on how to construct foreign-language learning programs.

2.1.2. Word Characteristics

A relation between word type and bilingual-memory representation is suggested by an increasing number of studies that show word-type effects in a number of bilingual word-processing tasks, such as cross-language priming, word translation and cross-language word association (Lotto & De Groot, 1998). Two variables will be analyzed in this section: cognate status and word frequency.

2.1.2.1. Cognate status

As regards the cognate status variable, it involves differences between words in terms of the form relation with their translation in the target foreign language (FL). "Cognate words share (parts of) their orthographic and/or phonological form with their translations, whereas noncognate words are dissimilar in form to their translations" (De Groot & Keijzer, 2000: 3).

Both production and recognition experiments on this area have demonstrated faster reaction times and recall scores to cognates than to noncognates. Studies show that cognates evoke primary associates (Taylor, 1976), and that they are easier to learn than noncognates in

terms of faster response times and better recall scores (Lotto & De Groot, 1998; Ellis & Beaton, 1993). De Groot & Nas (1991) also looked at the effect of cognate status on repetition priming and its effects on semantic priming and they found a strong interlingual semantic priming effect for cognates but not for noncognates. A similar facilitation effect was obtained in word recognition in Dijkstra, Grainger & Van Heuven's (1999) study. Therefore, there seems to be strong evidence for what Sherkina (2003) calls CFE (Cognate Facilitation Effect). The essence of the CFE is that bilinguals produce and recognize cognates faster than noncognates.

One particular view on monolingual and bilingual word representation can readily account for the effects of cognate status: Kirsner and her colleagues (1993) have proposed that word memory is organized according to morphology. Morphologically related words share a representation in memory, thus, conceptual representations may be more similar because cognates look more alike than noncognates (Anthony, 1953; Carroll, 1992; De Groot, 1992). This organizational principle holds not only for words belonging to one language but also for words of different languages. If morphology is critical, it follows that language does not define a boundary condition for representation and that words that share meaning and form will be represented in closely linked structures regardless of language (Lalor & Kirsner, 2000). According to Bybee (1985), when two words share the same meaning and structure, they share the same lexical representation or cluster. She suggests that the strength of the relationship between morphologically related words is dependent on the degree of similarity. The same could be suggested for cognates, where the strength of the relationship between cognates is dependent on their similarity in meaning and form.

According to an alternative point of view, called the localist view by De Groot & Nas (1991), morphology is not critical to lexical representation and both cognates and noncognates depend on access to connected but distinct lexical representation. For them, cognates and noncognates involve reference to qualitatively distinct structures but the difference involves conceptual as distinct from the lexical level of representation. Therefore, learning cognates does not involve creating a new entry in memory, but rather, adding new information to an existing entry. This relatively undemanding process provides an explanation for the higher recall scores and shorter retrieval times for cognates than for cognates in experiments such as that of Lotto & De Groot (1998) or De Groot & Keijzer (2000).

On the other hand, the distributional view (De Groot, 1992) accounts for the facilitation effect that takes place for cognate words as compared to noncognate words from the point of view of "quantity": the representations of cognates may share more meaning elements than those of noncognates.

Now, relating these word characteristics of cognate status to teaching method (discussed in section 2.2.1), the question posed is: Does the CFE materialize when study of the L2 is associated with a picture instead of its word equivalent in L1? After all, the picture does not share any form similarity with the L2 name for the picture. Also, why is it that noncognates, unlike cognates, are represented language-specifically in conceptual memory? And finally, why is it that orthographic and acoustic similarity between translations enhances their chance of being stored in a single conceptual representation?

2.1.2.2. Word Frequency

The second variable, word frequency, considers differences between words in terms of how often they are encountered in language comprehension and used in language production.

The word frequency effect in both speech production and recognition has been known since the 1960s (Oldfield & Windfield, 1965). Numerous studies have clearly shown that lexical access and word retrieval come about faster for high-frequency words than for low-frequency words in the L1 (Balota & Chumbley, 1984, 1985; Bradley, 1979; Taft, 1979). As for L2, effects of word frequency have been shown too, but the results are not conclusive. Ellis and Beaton (1993) reported that low frequency words are learned slightly better than high frequency words, whereas Lotto & De Groot (1998) concluded that high frequency words are learned slightly better than low frequency words. However, in both cases the effect was of very small size: 3% in the analysis of percentage recall and 188 ms in the RT analysis (Ellis & Beaton, 1993) and 7% and 100 ms respectively in the case of Lotto & De Groot (1998).

2.1.3. Second Language Proficiency

The role of L2 proficiency has been extensively analyzed (Abunuwara, 1992; Chen & Leung, 1989; De Groot & Hoeks, 1995; Kroll & Curley, 1988; Potter et al., 1984). The intermediate hypothesis put forth by Potter et al. (1984), proposes that beginning and proficient bilinguals use different ways to process words in the two languages. According to this hypothesis, at the first stage of non-native language acquisition, the new language is operated through the native

language, but the new language gradually develops into a stage of independent operation as the learning process continues. Therefore, beginners use the L1-to-L2 association, whereas proficient users use the concept-to-L2 link to process L2 responses. Others, like De Groot & Poot (1997) have suggested not only that learners at different proficiency levels process words differently, but also that there are different types of underlying memory structures at different levels of L2 proficiency. Most studies have assumed that "the memory structures in bilinguals of different fluency levels differ in the types and strength of the connections between the various memory stores (and, incidentally, in the size of the L2 word-form store): Bilinguals with high L2 proficiency have relatively strong connections between representations in L2 word-form conceptual memory and the corresponding representations in conceptual memory as compared to the connections between corresponding L1 and L2 representations in the two word-form stores. Bilinguals with a low level of L2 proficiency show the opposite pattern" (De Groot & Poot, 1997:218).

The revised hierarchical model, put forth by Kroll & Stewart (1994) proposes that the early reliance on lexical-level associations between the two languages creates lexical-level connections from L2 to L1 that will be stronger than lexical-level connections from L1 to L2. Therefore, the less fluent students are likely to be relying on lexical associations from the second language to the first and hence are prone to confusions among words that share close lexical form.

Thus, in our experiment, we included two proficiency groups: Group 1, who were novice learners of Spanish or had had an average of 1.25 years of Spanish in Middle or High School; and Group 2, who were experienced learners of Spanish with an average of 5.3 years of Spanish at Middle, High School and/or College. Our experimental design was inspired by Lotto and De Groot's study (1998) who also manipulated word features (cognate status and frequency) and teaching method (word translation and picture naming). However, we made our learning session shorter (only 2 presentations as compared to 3 in Lotto & De Groot) because our stimuli were fewer in number than theirs (40 versus 80) and because they were testing not only vocabulary acquisition but also retention. Another variation was the inclusion of two proficiency levels for the reasons stated in this section (2.1.3) whereas Lotto & De Groot used native Dutch speakers with no knowledge of Italian. Finally, a major difference between our study and Lotto & De Groot's was the inclusion of phonological information of the stimuli presented int he

experiments. Their experiment made use of the orthographic representation of the L2 (Italian) words linked either to a picture or to the L1 (Dutch) words. On the other hand, the present study provided phonological information (the subjects had each stimulus repeated 3 times in each one of the two presentations) in both experiments (picture naming and word translation) and orthographic information only in the word translation experiment.

3. METHODS

3.1. Selection of Stimuli

A list of 76 cognates and 76 noncognates (all of them being nouns) in Spanish and English was selected. Only nouns were chosen because grammatical class seems to play a role. Studies (Gentner, 1978, 1981; Reina, 1987) have shown that nouns more often share a conceptual representation in the memory of bilinguals, whereas verbs may more often be represented in language-specific stores. Also, verbs seem to have less dense conceptual representations.

Some of the words were selected from textbooks of Spanish for speakers of a foreign language. Half of the cognates (10) and half of the noncognates (10) were high frequency words and the other half of the cognates (10) and half of the noncognates (10) were low frequency words. The log frequencies of the English words were derived from the frequency counts of Francis and Kuçera (1982). The log frequencies of the Spanish words were derived from the Corpus Lexesp-Corco, léxico informatizado del español, Versión 1.1. (1998). See the Appendix for a complete list of the high frequency cognates, high frequency noncognates, low frequency cognates and low frequency noncognates. Stimulus words were also controlled for length. The length of the Spanish words and their English words were determined simply by counting the syllables of each word. Mean values are presented in the Appendix.

3.2. Pretests

Prior to the actual learning experiment we performed two pretests. The first involved a picture-naming-in-L1 task that was used to produce picture agreement norms. The picture-naming pretest provided a way to know that a picture in the picture-learning condition of the main experiment would give rise to the L1 word presented on the corresponding trial in the word-learning condition. The second pretest involved the assessment of the cognate relation between Spanish words and their translations in English. The 15 participants tested in these pretests were all different from those tested in the main experiment, and were drawn from a different population. All of them were teachers of Spanish in the Department of Spanish and Portuguese at the University of Kansas, some of them were native speakers of Spanish and some of them were native speakers of English, but both groups being proficient in their respective second languages, whether it was English or Spanish.

In the picture-naming pretest, we presented 156 pictures. We asked 3 participants to name the pictures in their L1, Spanish. We considered good pictures those to which at least 2 participants (67%) gave the same lexical responses. The average picture-agreement score of the words that we chose for the experiment was 90%.

In the cognate-rating study, we presented 12 participants with 76 English-Spanish cognate pairs and asked the participants to rate each pair on a 7-point scale on how similar they thought the Spanish-English translations within each pair to be. A 7 was to be marked in case of very high similarity; a 1 in case of very low similarity. The subjects were told that any single rating should reflect a combined assessment of both spelling and sound similarity of the Spanish-English word pair under consideration. The 76 pairs were presented to the subjects in booklets, 12 pairs a page, all pairs underneath one another and the pages reshuffled in every new booklet. The subjects were randomly assigned to two groups of 4 each. Group 1 got the Spanish words to the left of their English translation (e.g. *catedral-cathedral*); Group 2 got the English words in left position (e.g. *cathedral-catedral*). No difference occurred across both groups.

Six of the raters were native speakers of Spanish, and six of them were native speakers of English with a good knowledge of Spanish. We calculated a mean similarity (cognate-) rating and the corresponding standard deviation for each English-Spanish pair in the cognate-rating study. Extremely high correlations between the two groups emerged (native Spanish speakers (mean = 5.4) & native American speakers (mean = 5.3): r = .885). Pairs with mean cognate ratings between 6.9 and 3.2 were selected.

Based on the picture naming pretest data and the cognate-rating results, 4 groups of 10 word pairs each were selected: high-frequency cognate pairs, high-frequency non-cognate pairs, low-frequency cognate pairs, and low-frequency noncognate pairs.

We regarded pairs of which the English term had a frequency of occurrence of 78 or more in a familiar English word-frequency count and in the Spanish corpus (Francis & Kucera, 1982; Lexesp-Corco, 1998) high-frequency pairs; pairs in which the English/Spanish terms had a frequency of occurrence of 49 or less we regarded as low-frequency pairs. Additional selection constraints were: that the cognates and noncognates within the two frequency conditions matched each other on frequency (MEANS: high frequency noncognates = 159; low frequency

noncognates = 10; high frequency cognates = 123; low frequency cognates = 16); that the number of syllables contained by the Spanish words was statistically equal in the 4 groups of word pairs (MEANS: high frequency noncognates = 1.8; low frequency noncognates = 2; high frequency cognates = 2; low frequency cognates = 2); that the picture-agreement scores were equally large across the 4 word groups (MEANS: high frequency noncognates = 93; low frequency noncognates = 86; high frequency cognates = 100; low frequency cognates = 100); and that the cognate ratings were balanced (MEANS: high frequency cognates = 5.1; low frequency cognates = 4.9). The Appendix shows the means of the relevant stimulus characteristics for the 4 groups of selected word pairs.

3.3. Main Experiments

Participants from the University of Kansas, with English as their L1, and varying degrees of proficiency in Spanish, participated. We randomly allocated participants to one of the 2 instructional conditions (17 participants in each condition). They received course credit for participation. We excluded data from 2 of them, each with mean test accuracy lower than 60%, from the statistical analyses because of their high error rates. Data from the remaining 32 participants was included in this study. Twenty of these subjects had a low proficiency level in Spanish (Low Proficiency), whereas the remaining twelve had a high proficiency level (High Proficiency).

3.4. Materials and Apparatus

The 40 word stimuli (see Appendix) consisted of the 4 different groups of words described earlier: high-frequency cognates, high-frequency noncognates, low-frequency cognates and low-frequency noncognates; 10 words per group. The complete set of stimuli, together with, for every individual stimulus, the word-frequency value (Francis & Kucera, 1982 and Lexesp-Corco, 1998), and the picture-agreement score, are reported in the Appendix. In addition to the 40 test stimuli, one Spanish word and its English translation was selected as a practice stimulus, different from any of the test stimuli.

For both the picture naming experiment and the word translation experiment, the same stimuli were used. A female native speaker of Spanish recorded all 41 words (40 stimuli and 1 practice trial) in an anechoic chamber on a Fostex DAT recorder. Each word was repeated 3 times and out of the 3 trials, the researcher selected the token that sounded most natural,

eliminating tokens that were spoken at a high speed or had distorted intonation. The sound tokens were digitized using a Digital Audio Recorder (PCM-R 300 Sony – high density Linear A/D, D/A converter), digitized at a sampling rate of 22,050 Hz using Multispeech software.

The experiment was run on a Dell computer to which a Cedrus voice key, an N D767 microphone and a Digital Audio Recorder PCM-MI Sony were connected. The voice key was with a small microphone attached and it recorded the response times. The N D767 microphone was connected to the DAT recorder, which recorded the actual words spoken by the subjects. We used SuperLab Pro[1] to set up the experiment.

3.5. Design and Procedure

We randomly divided the participants into 2 groups: 16 students participated in the word-learning experiment and 16 students participated in the picture-naming experiment. Each participant was run individually in an experimental session. Each experimental session included a learning phase (8 minutes) and a test phase (2-5 minutes). On each trial in the test phase the participant received a stimulus (an English word for the word learning experiment or a picture for the picture naming experiment) that had appeared in association with the Spanish word in the learning phase. The participants' task was to come up with the corresponding Spanish word (that is, to translate the English word into Spanish or to name the picture in Spanish). In other words, the experiment tested productive, not receptive, language learning.

Prior to the learning phase, participants received written instructions. In them, we told the participant about the exact nature of the stimuli presented during learning and test. The researcher then repeated the instructions and also presented the participant with 1 stimulus (word or picture, depending on the condition) for practice.

We created 2 experiments using the 40 stimuli. In the first experiment (the word-learning experiment) each stimulus consisted of an English word and the corresponding Spanish word, both being separated by a hyphen (e.g.: **cathedral – catedral**). The stimuli appeared pair by pair, in green lower-case letters (size 70, Times New Roman font) on a white background, at

[1](Version 2.0). Experimental Lab Software. © 1999 by Cedrus corporation.

the center of the computer screen. Simultaneously, the participant heard the Spanish word (e.g. "catedral") pronounced 3 times.

In the second experiment (the picture-learning experiment), each stimulus consisted of a picture that was 2.73" in height. The width was automatically adjusted by the Microsoft Photo Editor program to avoid distortion. All the pictures were centered horizontally and vertically. While seeing the picture on the screen, the participant heard the Spanish word pronounced 3 times.

Participants sat facing the screen at a comfortable viewing distance in a sound-attenuated room. We randomized[2] the entire set of stimuli across participants, and within participants across the 2 presentation rounds, so that each participant in each presentation round received the stimuli in a unique presentation order. This procedure ensured that possible order effects would not be a contributing factore. We presented the stimuli at a rate of 8 seconds each; they were preceded by a fixation stimulus (an asterisk) that appeared on the center of the screen for 1 second. The entire learning phase was repeated in its entirety, with a different randomization of stimuli.

After all the stimuli had appeared twice, the test phase started. In the test phase, we presented participants with stimuli congruent with the training they had received in the learning phase. Hence, the participants in the word-learning experiment received English words as stimuli, and those in the picture-learning experiment received pictures.

All participants in both groups had to produce the equivalent Spanish word in response to each of the stimuli, picture or English word. We encouraged them to produce their responses as quickly and accurately as possible. Response times and accuracy data was collected from the recordings of their productions.

[2] All experimental trials were presented in a random order determined by the computer randomization program (Superlab Pro).

4. RESULTS

We included both the accuracy of word retrieval and the speed of retrieval. For both the accuracy and RT data, ANOVAs were conducted both by subjects and by items. In the subject analyses we used cognate status (cognate vs. non-cognate) and frequency (high frequency (HF) vs. low frequency (LF)) as within-subjects variables and task (word translation vs. picture naming) and proficiency level (high proficiency (hp) vs. low proficiency (lp)) as between-subjects variables. In the item analyses[3], it was the reverse: task and group were within-items variables and cognate status and frequency were between-items variables.

4.1. Response Times

We performed a 2 (task) x 2 (proficiency level) x 2 (cognate status) x 2 (frequency) ANOVA on the response time data. For the reaction time data, only correct responses were analyzed. The resulting mean response times are reported in Table 1.

Table 1: Mean Response Times (and standard deviations) across the two teaching methods (word translation and picture naming) for both proficiency groups (high proficiency and low proficiency) and word characteristics (cognate status and frequency).

		WORD-TRANSLATION METHOD		PICTURE-NAMING METHOD	
		Low Proficiency	High Proficiency	Low Proficiency	High Proficiency
Cognate	HF	1891 (985)	968 (103)	1191 (283)	988 (179)
	LF	1663 (335)	1179 (273)	1256 (389)	1005 (185)
Non-cognate	HF	1706 (584)	2309 (1831)	1919 (685)	1100 (511)
	LF	2355 (1482)	3182 (1906)	3012 (1784)	2067 (969)

The ANOVAs indicated that there were two main significant effects both by subjects and by items: *cognate status* of the word: $F1(1, 15)= 3.61$, $p<.0001$ and $F2(1, 28) = 8.7$, $p = .006$; and *frequency*: $F1(1, 15) = 8.75$, $p = .006$ and $F2(1, 28) = 7.06$, $p = .018$. Responses to cognate

[3] For the item analysis, those words that had a response time value of 0 (=no response), were discarded. The number of words discarded was 9 and that left our analysis with the following items: 10 HF cognates, 9 LF cognates, 8 HF noncognates and 4 LF noncognates.

words were 939 ms faster than to noncognate words (cognates =1267 ms vs. noncognates = 2206 msec.). As shown in Figure 1, reaction time was shorter overall for cognate words (1267 ms) than for noncognate words (2206 ms), regardless of the task performed. As shown in Figure 2, there was also a significant frequency effect. Overall, high frequency words had a mean response time of 1509 ms, whereas low frequency words had a mean response time of 1965 ms, a 456 ms difference.

The results in Table 1 suggest that, as it may be expected, subjects with a high level of proficiency in Spanish have slightly shorter response times (1600 ms) than subjects with a low level of proficiency or no knowledge of Spanish at all (1874 ms) although this effect was not significant. However, it is to be noted that this overall effect is not observed in the case of noncognate words in the word-translation experiment. In this case, subjects with a low proficiency level have a shorter response time mean (2030 ms) than those with a high level of Spanish (2745 ms).

Figure 1: Main effect of cognate status

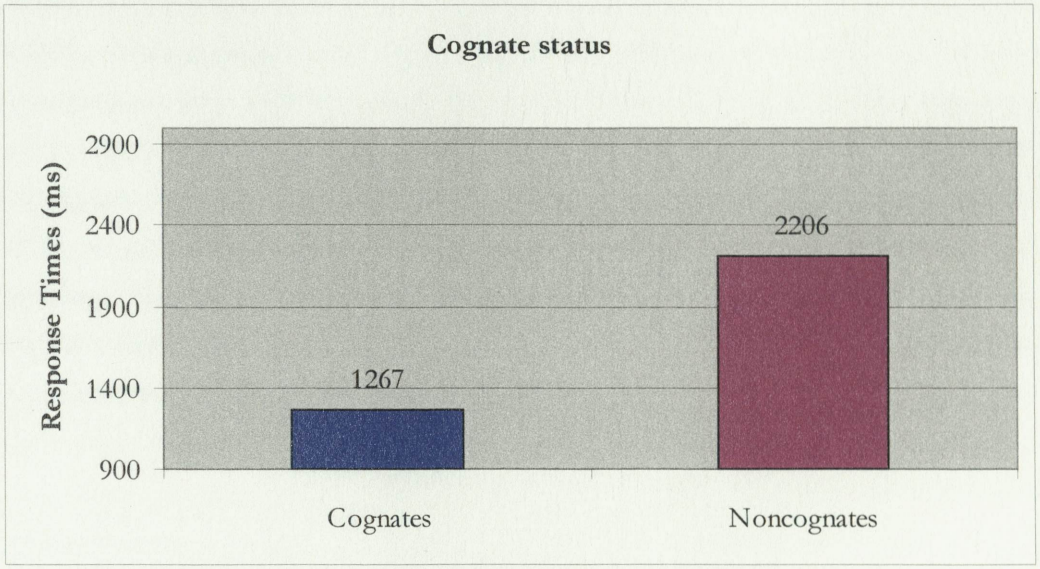
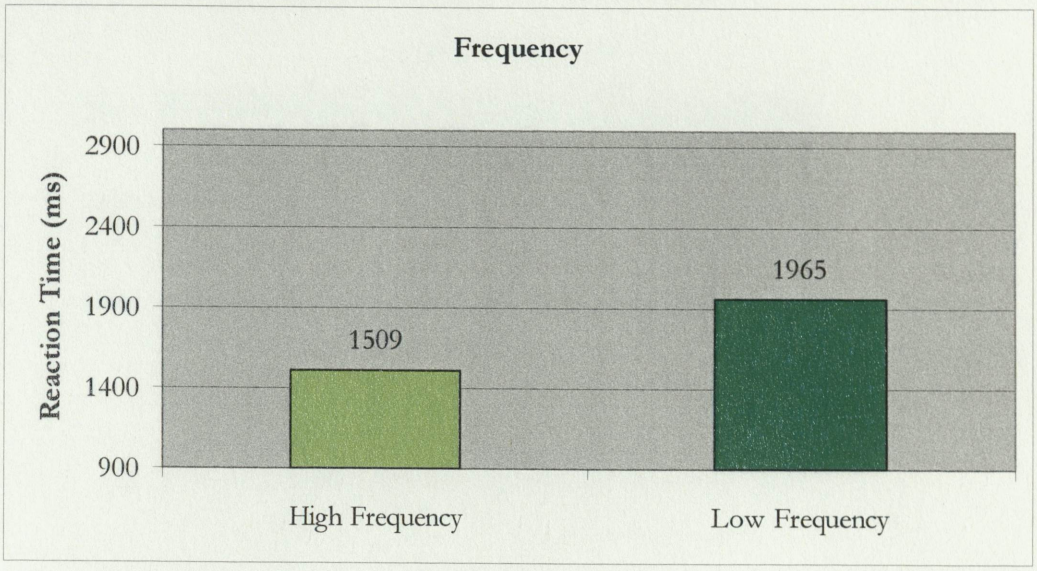
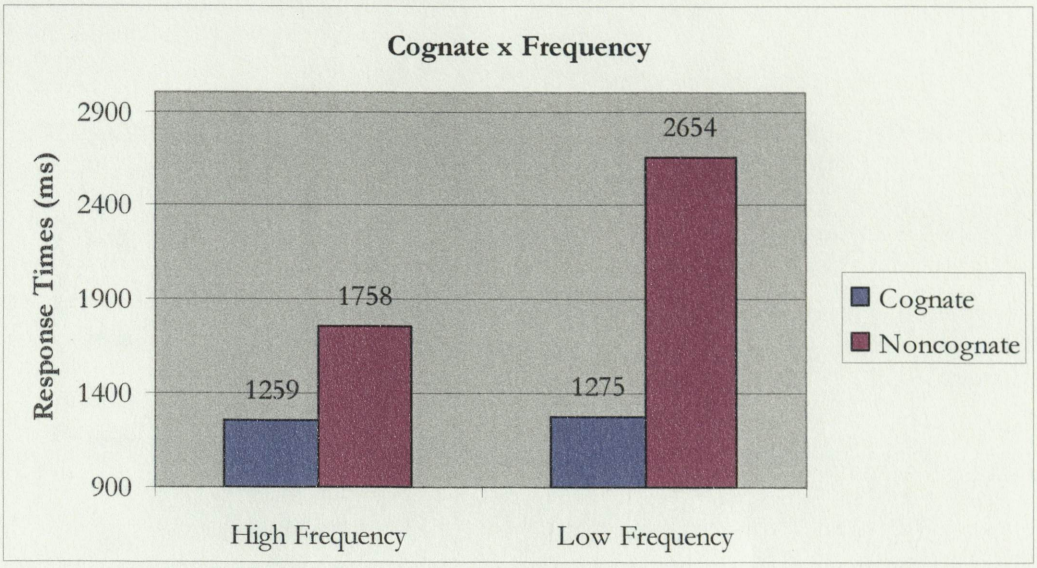


Figure 2: Main effect of frequency



The interaction between the two variables (*cognate status* and *frequency*) was also statistically reliable (see Fig.3) both by subjects (F1 (1, 15) = 14.7, p= .002) and by items (F2 (1, 28) = 5.3, p < .001). Although cognate words are recalled faster overall, there is little difference between the mean response time to high frequency cognates (1259 ms) and that of low frequency cognates (1275 ms). On the other hand, there is a sizeable frequency effect in naming times for noncognates, with substantial differences being observed between high frequency noncognates (1758 ms) and low frequency noncognates (2654 ms), a 896 ms difference. This finding, pointing to a larger frequency effect for noncognates than for cognates conflicts with that of Lalor & Kirsner's (2001), who found that the word frequency effect was greater for the words in the cognate set than for those in the noncognate set.

Figure 3: Interaction between cognate status and frequency.



There also was a three-way interaction between *task*, *cognate status* and *proficiency* (see Figs. 4 & 5), which was significant by subjects, F1 (1, 15) = 4.13, p = .060 and by items, F2 (1, 28) = 21.5, p < .001. Looking at the picture-naming experiment, the results suggest that the larger main cognate status effect observed overall (see Fig.4) is also true in the case of both proficiency groups: Cognates are recalled faster (hp = 1224 msec.; lp = 996 msec.) than noncognates (hp= 2465 msec.; lp = 1583 msec.). However, that difference between cognates and noncognates is actually greater for the low proficiency group (1241 ms faster for the low proficiency group compared to only 587 ms faster for the high proficiency group).

Does this prove true for the word-translation experiment? Cognates did prove to be faster than noncognates, but the overall means were slower than those of the picture-naming experiment (1060 msec. for the picture-naming exp.; 1425 msec. for the word-translation exp.). The relevant comparison between the cognates and the noncognates across proficiency for word-translation was quite different than that for picture naming. For word translation, the difference between cognates and noncognates is actually greater for the high proficiency group (hp = 1673 ms difference; lp = 704 ms difference).

Figure 4: Interaction between cognate status, proficiency and task (picture naming).

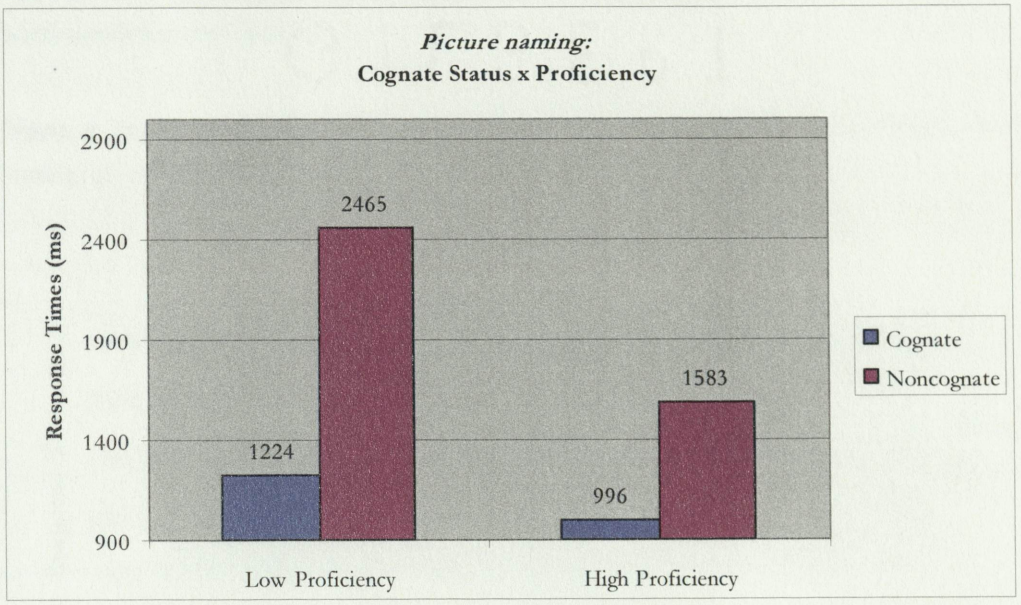
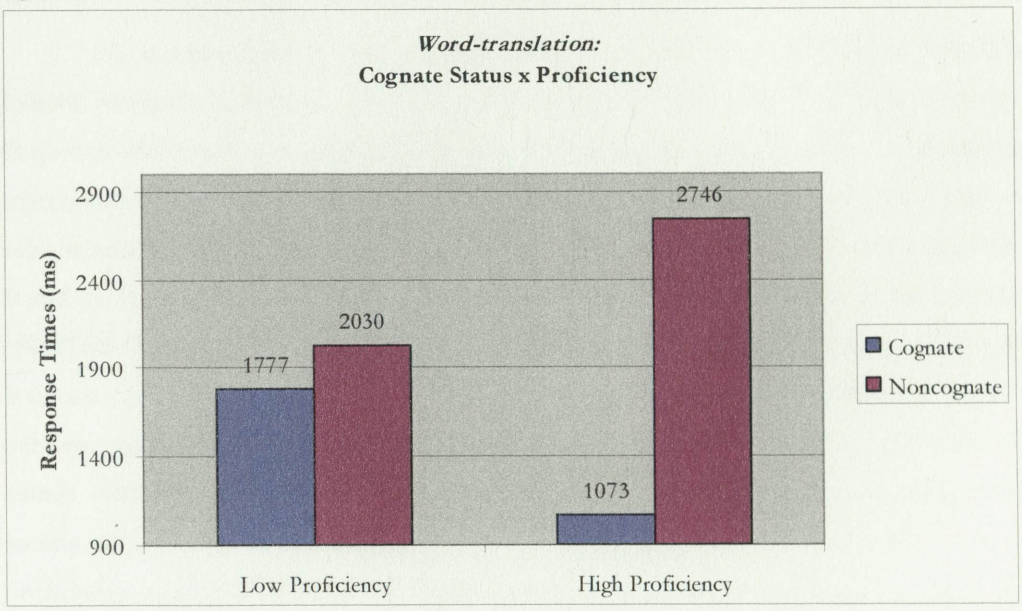


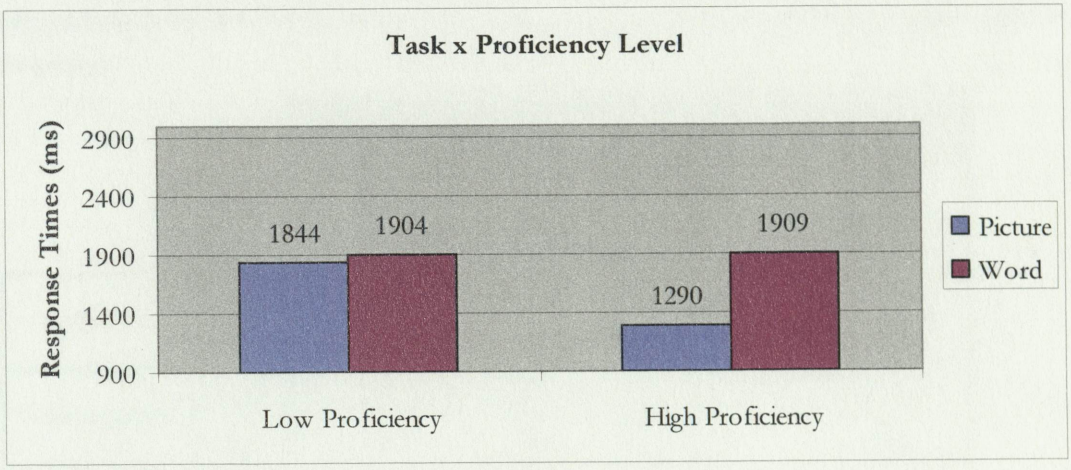
Figure 5: Interaction between cognate status, proficiency and task (word translation).



The interaction between task (picture naming and word translation) and proficiency level (low/high proficiency) proved to be significant by items (F2 (1, 28) = 8.77, p = .006; F1 (1, 15) = .855, p = .37). Participants with a low proficiency level seemed to have close response time values in both experiments (picture naming and word translation), whereas high proficiency level

subjects had shorter response times in the picture naming experiment (mean = 1290) than in the word translation experiment (mean = 1909).

Figure 6: Interaction between task (picture naming and word translation) and proficiency level (low proficiency and high proficiency).



The results of Experiment 1 and 2 in terms of response time data can be summarized as follows. First, the differential speed of cognate and noncognate, regardless of proficiency level, frequency effect and task, is consistent with the notion that cognates share a common lexical representation and noncognates do not. Cognates can thus be translated on the basis of the information contained within the common entry. The present pattern of results replicates that found by Sánchez & Casas (1994) and De Groot (1992). Second, there proves to be a frequency effect which is very much like the cognate facilitation effect. Both result in shorter naming latencies (for high-frequency words and cognates). Third, there is a significant interaction between these variables (cognate status and frequency) showing that the frequency effect is mainly carried by the noncognates. Finally, there was data supporting a three-way interaction among task, cognate status and frequency. There is a greater effect of cognate status for low proficiency participants in picture naming and a greater effect of cognate status for high proficiency participants in word translation. In order to investigate this relationship in more detail, we looked at percent correct data, which is analyzed in section 4.2.

4.2. Percent correct

A 2 x 2 x 2 x 2 ANOVA (cognate status x frequency x task x group) were conducted on the accuracy data. For the subject analysis, once again we used task and group as between-subjects

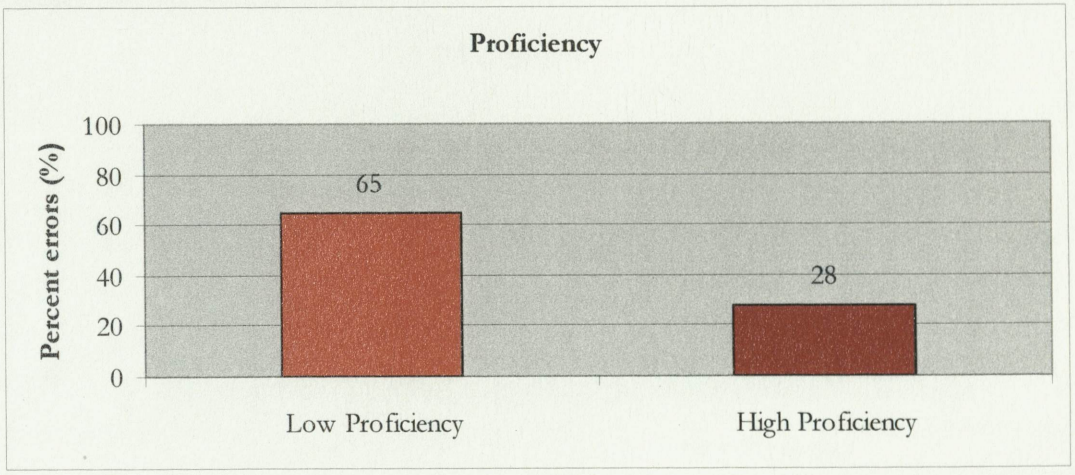
variables and frequency and cognate status as within-subjects variables. For the item analysis, we used frequency and cognate status as between-items variables and task and group as within-items variables. The resulting mean error rates are reported in Table 2.

Table 2: Mean Error Rates for both proficiency groups (high proficiency and low proficiency) across the two teaching methods (word translation and picture naming) and word characteristics (cognate status and frequency).

		WORD-TRANSLATION METHOD		PICTURE-NAMING METHOD	
		Low Proficiency	High Proficiency	Low Proficiency	High Proficiency
Cognate	HF	47%	8%	42%	17%
	LF	64%	24%	65%	28%
Non-cognate	HF	68%	20%	61%	31%
	LF	90%	38%	85%	60%

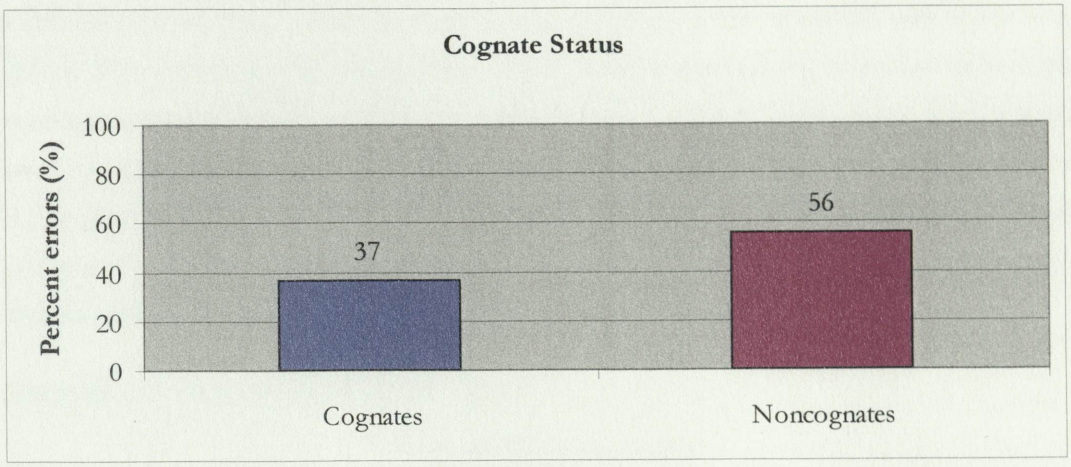
As it was expected, across both instructional conditions, high proficiency subjects (participants with an average of 5.3 years of Spanish) had lower error rates (mean = 28%) than low proficiency subjects (participants with a mean of 1.25 year of Spanish), whose mean was 66%. This difference in *proficiency* level was significant: $F1\ (1, 28) = 189.42$, $p < .001$ and $F2\ (1, 28) = 26.07$, $p < .001$ (see Fig. 7).

Figure 7: Main effect of proficiency level



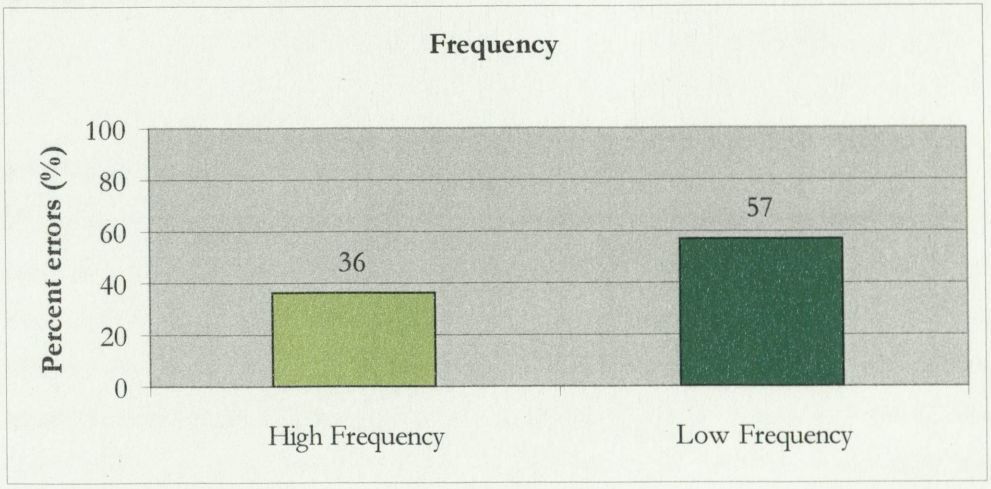
There was also a main effect of *cognate status*. Across both instructional conditions, *cognate* words (mean error rate = 37%) were recalled better than non-cognate (mean error rate = 56%) words. This difference is represented in Fig. 8 and it was significant both across subjects (F1 (1, 28) = 64.48, p< .001) and across items (F2 (1, 28) = 14.30, p= .001).

Figure 8: Main effect of cognate status



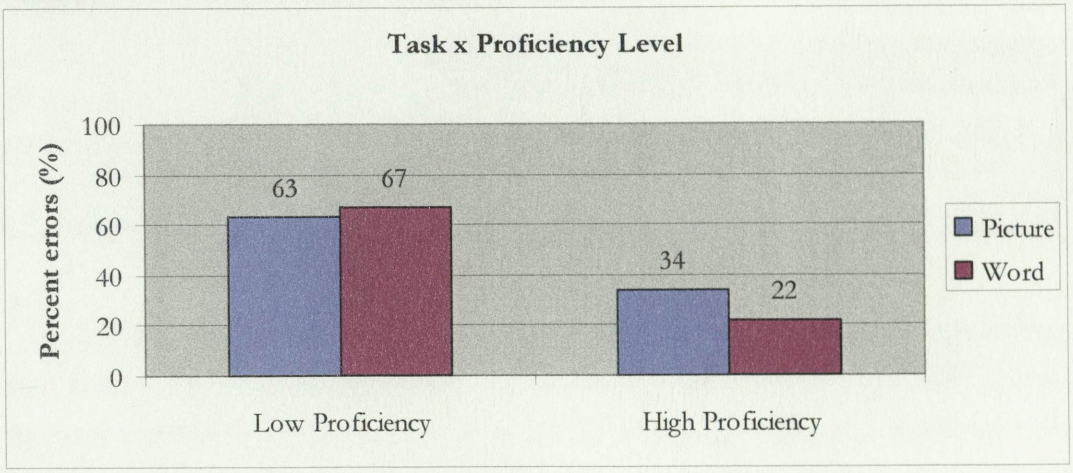
The mean effect of *frequency* proved to be significant too (see Fig.9). The mean error rates of high frequency words were lower (37%) than that of low frequency words (57%). And once again, this difference was significant across subjects (F1 (1, 28) = 73.20, p<.001) and items (F2 (1, 28) = 14.95, p<.001).

Figure 9: Main effect of frequency



Also, the interaction between the type of *task* (word translation or picture naming) and the *proficiency* level of the participants proved to be significant by items (F2 (1, 36) = 10.06, p = .003; F1 (1, 28) = .294, p = .592). While participants overall learning words through the word-translation method had fewer errors than those who received training with pictures, across the two conditions, participants with a higher level of Spanish (hp) had a smaller error percentage in the word translation experiment whereas those with no Spanish or less years of training (lp) had fewer errors in the picture naming experiment. This difference was significant only across items (F2 (1, 36= 10.06, p= .003; F1 (1, 28= .294, p = .592). The analysis of errors showed that teaching method does have an influence on the overall number of errors made when trying to recall the words. Remarkably, our findings support the view that pictures have a facilitation effect for beginners (63% errors in the picture-learning condition vs. 67% in the word-learning). However, we witness the reverse effect for the participants with a higher level of proficiency in Spanish (34% in the picture-learning condition vs. 22% in the word-learning).

Figure 10: Interaction between task and group



4.3. Nature of errors

The pattern of recall errors was analyzed in order to throw further light on the processes operating. For every trial, the errors were evaluated according to their nature and organized by their severity in the following categories: *stress* change (the stress was shifted from the correct syllable; e.g.: Target > '**lám**para vs. Response > lam'**pa**ra), *substitution* error (one sound in the word was substituted by another sound; e.g.: Target >perro vs. Response > perr**a**); *deletion* error (one sound in the word was deleted; e.g.: Target > tomate vs. Response > tomat**Ø**); *insertion* error

(one sound was inserted in the word; e.g.: Target > música vs. Response > mi̱úsica); or *multiple* errors (combination of two or more of the errors abovementioned).

For the sake of brevity, we will not present full analyses of the different error types but instead restrict ourselves to a summary of the pattern obtained. The differences that we describe here are represented in Tables 3 and 4.

Table 3: Picture-naming errors. Classification.

	PICTURE NAMING					
	Stress	Substitution	Deletion	Insertion	Multiple	No answer
Low Proficiency	2.80%	5.93%	1.88%	1.93%	5.62%	44.8%
High Proficiency	2.14%	2.14%	1.06%	1.06%	9.99%	17.7%

Table 4: Word-translation errors. Classification.

	WORD TRANSLATION					
	Stress	Substitution	Deletion	Insertion	Multiple	No answer
Low Proficiency	4.37%	8.74%	2.81%	1.87%	13.74%	35.4%
High Proficiency	.62%	2.5%	1.17%	0%	5.62%	12%

Also, in looking at how the errors pattern across proficiency levels and task, we observe that far more substitution errors (11.2% vs. 8%) and multiple errors (19.3% vs. 15.6%) occur in the word-translation experiment than in the picture-naming one. This is a surprising finding, because in the word-translation experiment, participants were helped not only by the phonological information of the word, but also by the orthographic information (the word appeared on the computer screen in both English and Spanish). However, despite this "extra" helping aid, participants tended to make more mistakes if trained with words.

5. DISCUSSION

The major concern of this study was whether proficient and beginner users of a nonnative language use a similar way to process words with different characteristics (cognates/noncognates; high frequency/low frequency) in the new language when different teaching methods are used. To examine this connection, we set out to conduct two experiments manipulating all of those variables. One of the experiments used word-translation as a method to teach a set of 40 Spanish words (manipulated in terms of cognate status and word frequency) to both beginners and proficient learners of Spanish. The second experiment used the same variables but the teaching method was changed to picture association instead of word-translation. In both tasks, participants were to learn novel Spanish words.

Our results clearly show that some types of foreign-language words are easier to learn than others. The results revealed that all subjects were more efficient (greater percent correct and shorter response times) in recalling cognates than noncognates, and high frequency words than low frequency words. Additionally, proficient bilinguals and beginners had distinctively different patterns of results as regards teaching method. These findings clearly indicate that *low proficiency* learners make fewer errors in the picture-naming experiment than in the word-translation task. In the case of subjects with *high proficiency* level, however, they make fewer errors in the word-translation experiment than in the picture-naming task. Also, the interaction between cognate status, proficiency level and task (picture naming and word translation) showed that low proficiency learners showed a greater difference in terms of response times between cognates and noncognates in the picture naming experiment than in the word translation experiment. The reverse was true for the high proficiency group; they showed a greater difference in terms of response times in the word-translation experiment than in the picture naming experiment.

Comparing these results to those found by Lotto & De Groot (1998), we notice that the effects of cognate status and frequency are stronger in our study. There were bigger differences in terms of response times between cognates and noncognates in our study than in Lotto & De Groot's (cognates =1267 versus 1298; noncognates = 2206 versus 1715 respectively). The same is true for the frequency effect (high frequency words = 1509 versus 1457; low frequency words = 1965 versus 1557). Remarkably, the response times for cognates and high frequency words are shorter in our study than in Lotto & De Groot's, but the opposite effect comes up for noncognates and low frequency words, where the response times in our study were longer. They

also found the interaction between cognate status and task to be significant. The cognate facilitation effect tended to be larger in the condition with picture presentation than in the word translation, something that proved to be true in the case of our results too. As an explanation for this result, they suggest that the form-relation between translation-equivalent terms probably underlies the effect of cognate status on acquisition and that the fact that this effect is stronger in the picture condition shows that the presentation of a picture gives rise to the generation of the form of the corresponding word. Furthermore, they suggest that only the phonological form (not the orthographic form) is generated for the visually presented words as well as for the pictures. Had the orthographic forms played a role too, they say, they would have obtained larger effects of cognate status in the word translation condition, where both during learning and at test the orthographic forms were explicit in the visually presented stimuli and therefore the participants would not have to generate them. This statement accounts for the larger facilitation effect in the case of our study, because phonological information about the L2 word form was provided, as opposed to their study, where, even if the subjects had no previous knowledge of Italian or its phonological system, they were asked to generate a phonological form at test. Following we will provide possible explanations of these results.

TEACHING METHOD

An important method used to teach foreign language vocabulary in many foreign language classes is paired-associate learning of the native-language words on the one hand and their translations in the foreign language on the other hand. Probably the reason for the widespread usage of this method is the fact that De Groot & Keijzer point out: "this procedure does not constrain the choice of materials to be presented for learning the way the picture-association technique (where the FL words are paired with a picture depicting the word's meaning) and the keyword method do" (2000: 2).

Various studies have shown that the word-association method happens to be a more efficient method than both the imagery-based keyword method and the picture-association method, especially for the rather experienced FL learners (Lotto & De Groot, 1998; Van Hell & Candia Mahn, 1997). On the other hand, for less experienced FL learners, the superiority of the word-association method may be less pronounced, as De Groot & Keijzer (2000: 3) remark, "it only occurs in terms of retrieval time, not in terms of percentage-recall scores"

For the present data, the effect of teaching method indicates that for *high-proficiency* participants, word-association is a more effective method to acquire L2 vocabulary. This finding proved to be significant only in terms of percent correct data, because as regards response times, there were no significant differences in terms of the teaching method used. Therefore, these results follow an opposite pattern to those of De Groot & Keijzer's (2000), who found a difference in terms of response times but not in terms of percent correct.

However, the findings of the present study support those of Wimer & Lambert (1959) and Lotto & De Groot (1998), whose results showed that word learning produced higher recall scores than picture learning for more experienced FL learners, who are most successful if the new vocabulary is associated with the corresponding L1 words. It also provides support to the results obtained by Chen & Leung (1989) and Potter et al. (1984) who tested beginning L2 learners and proficient L2 speakers in picture-naming and translation tasks. It was found that the proficient group were equally fast in picture-naming and translation in L2, suggesting that they seemed to rely on conceptual mediation in both tasks.

The analysis of the data for *low-proficiency* participants, on the other hand, demonstrated that presentation of pictures during learning provides a better opportunity for acquiring L2 words (at least at an early stage of learning) than does the presentation of L1-L2 words. Again, this finding is not supported by the response time data, which, as in the case of high-proficiency subjects, showed no significant differences across both teaching conditions. It also contradicts findings by Chen & Leung (1984), Kroll & Curley (1988) and Kroll & Borning (1987) showing adult beginners performed the translation task faster than picture-naming, suggesting that they relied on the faster lexical route.

The fact that beginners recall more words correctly in the picture-learning condition is a crucial finding of this study, because the word-association model predicts that during early stages of language learning the association occurs mainly between the two languages (L1 and L2), thus being mostly lexical, not conceptual. The same idea is suggested by Jiang's developmental model (2000), which predicts that a strong and direct connection will be formed initially between the L1 and L2 words and only a weak connection will exist between L2 lexical items and conceptual representations. Nowadays, most FL programs are designed to reinforce the strength of that direct connection by using the word-association method especially during early stages of

acquisition. It is only as one's experience in the second language increases, and highly contextualized input is received, that a pointer will be created to link the L2 word to the concept.

However, our data argues against this teaching approach and seems to suggest that, if trained with a picture (a visual representation of the concept), the beginning language learner may strengthen the connection between the concept and the L2 word, relying less on the L1 word and thus facilitating recall. We could therefore conclude that bilinguals of lower (or none) fluency levels apparently access and exploit conceptual memory representations even at an early stage of learning. Moreover, the mere fact that proficient and beginner learners of Spanish had significantly different results across the two experiments points out that more fluent and less fluent bilinguals may be using different strategies when accessing their second language (see also Kroll & Borning, 1987).

COGNATE STATUS

The effect of cognate status replicates the effect of this variable in Lotto & De Groot (1998), De Groot & Keijzer (2000), Lalor & Kirsner (2000). Lotto & De Groot manipulated cognate status in the learning of 80 Italian words, 40 of which were cognate. They explained in very simple terms the cognate status effect: "cognates are relatively easy to learn under all circumstances" (1998: 58). Their data pointed out that their participants generated the phonological forms for both the pictures and the visual word forms, suggesting that phonology plays a very strong role in learning vocabulary in an L2, not only when the learning material consisted of auditory presented word pairs but also when the presentation was visual. As De Groot & Keijzer (2000) point out, pictures do not share aspects of their form with the corresponding FL words. Therefore, it follows that the participants in the picture-naming experiment generated the corresponding L1 words in their mind, even if they were never provided in the actual experiment.

De Groot & Keijzer (2000) also used cognate status as a variable in designing 60 translation pairs consisting of Dutch words and pseudowords. Their findings showed that recall scores and response times were significantly better and shorter for cognate words than for noncognate words.

The results reported in this paper provide clear evidence of a cognate facilitation effect too. A strong effect of cognate status is present: cognates are relatively easy to learn. This was shown by the significant main effect of cognate status that surfaced in the analysis of both response times and percent correct (in both cases across subjects and items). Furthermore, the orthographic forms of the words did not need to be presented in order for a facilitation effect to take place. As in the case of Lotto & De Groot's (1998) study, the effect didn't occur only in the word-translation experiment, where the similarity of the words was made evident by presenting the participants with the words in both languages, but it also occurred in the picture-learning condition where an L1 word was presented. This indicates that pictures gave rise to a cognate effect of the same size as did words even if the participants did not have the orthographic representations of the words as a visual aid.

This result is consistent with the proposition put forth by Bybee (1985) that the mental lexicon consists of lexical paradigms or clusters where each paradigm is composed of a set of closely related surface forms. These clusters, as Kirsner (1986) are defined by morphology and constrained by practice, and they transcend language.

What implications does this finding have for general models of lexical representation and, specifically, the representation of cognates? It seems that cognates, even if they do not belong to any of the morphological categories discussed by Bybee (1985), stand for the same concept or object, and they may therefore involve the same semantic element. Since cognates are related to their translations in L1, the relationship between L1 and L2 cognates is not arbitrary and the learner can master the new term by reference to its cognate. On the other hand, noncognates are morphologically unrelated to their translations in L1, the orthographic and phonological relationship is arbitrary, and so rote learning is needed. It seems obvious that more effort and attention on the part of the learner needs to focus on the orthographic and phonological information when a noncognate is learned. If that is the case, it thus appears that the word-association hypothesis would be right in that it highlights the strength of the link joining the L1 and L2 forms and points out the weakness of the link between L2 and concept. Thus in conceptual memory there would exist a node representing for instance the English word "fruit" and the Spanish word "fruta"; one node representing both the English word "salt" and the Spanish word "sal". On the other hand, for words that do not bear any resemblance like the English word "ant" and the Spanish word "hormiga", two separate nodes would be necessary,

connected via their shared conceptual node (Potter et al., 1984). The representations of both cognate and noncognate translations are connected at the lexical level; but cognate translations share a representation at the conceptual level, whereas noncognate translations are represented in separate concept nodes. The reason for that different lexical organization is their form overlap (morphological and orthographic similarity).

The three factors (sharing of a conceptual node, the existence of a unique lexical entry that shares more meaning elements than that of noncognates, and the form similarity) come together to produce the cognate facilitation effect. This effect would account for the differential speed of cognate and noncognate words. Cognates can be translated/named on the basis of the information contained within the common entry. However, the translation/naming of noncognates may require the running of a time-consuming inference, or perhaps even a second lexical search based on the semantic information contained within the presented word. Finally, for the cognate effect to occur, the forms of the words need not be present during learning nor at test: Our results show that both when they were presented (word-association experiment) and when they were not (picture-naming), the effect took place, there being no significant differences in terms of response times across the two experiments.

WORD FREQUENCY

Earlier studies (e.g. De Groot & Poot, 1997) have attibuted the effect of word frequency to stronger connections between the L1 and L2 word-form representations, on the one hand, and the conceptual representation shared by L1 and L2, on the other, for frequent words than for infrequent words. De Groot & Keijzer (1989:41), support this idea when they quote, "the memory representations of frequent words contain (at least sometimes) *slightly* more information than those of less frequent words". Their study supports that idea of a denser informational load stored in the memory representations of high frequency words, even though word frequency played a marginal role in their study (an effect of 188 ms in the RT analysis and of 3% in the percentage recall), which may be due to the fact that they did not use a natural language, but instead, they used pseudowords. The effect was also small in Lotto & De Groot (1998; 100 ms and 7% respectively).

If their hypothesis is valid, then frequent words should have better correct percentage and shorter response times. The RT data and the percent correct data substantiate this

prediction: recall scores were higher for high-frequency words than for low-frequency words and the response times for the former were shorter.

The interaction of the RT analyses of cognate status and frequency proved significant too, showing that two word characteristics can combine together and aid learning. Furthermore, the lack of an interaction between frequency, teaching method and proficiency level indicated that high frequency words are learned significantly faster, regardless of the teaching method used or the proficiency level of the participants. Once again, it seems that there is a larger involvement of conceptual memory for high frequency words than there is for low frequency words.

SECOND LANGUAGE PROFICIENCY

Our main question about proficiency was whether it affects the degree of conceptual involvement in word translation, as assessed both by response times and percent correct. In other words, do L2 learners initially rely more on word-associations moving on, as they gain proficiency, to conceptually mediate the lexical access?

Proficiency did not have a significant effect on response times, except for in its interaction with task and cognate status. It thus seems that previous experience in the second language does not facilitate the subsequent learning of new vocabulary, because the difference in RTs was not significant across proficiency groups. We had expected that concept familiarity would aid learners with a high proficiency level and therefore they would have shorter RTs since some of them were already familiar with some of the words presented in the experiment. However, comparing the results of the two experiments in terms of the overall percent correct mean of experienced Spanish learners was significantly better than that of the inexperienced Spanish learners (see also Van Hell & Candia Mahn, 1997; Papagno & Vallar, 1995). In that case, our data support the idea that, while naming pictures, bilinguals with less L2 fluency concept-mediate more than those with more L2 fluency, and while translating words, they concept-mediate less than those with more L2 fluency.

Does this conclusion invalidate the common view that L2 learners rely on word-association during early stages of acquisition moving on to concept-mediation as they gain proficiency? The answer seems to be yes, because different teaching methods encourage concept-mediation or word-association (as shown by the effect on response times and percent of

errors). Therefore, picture-naming encourages the creation of a direct link between concept and L2 form, lessening the dependence on the L1 word; whereas word-translation reinforces the initial connection established between the L1 and the L2 words, so that when access to the concept is required, the link between L2 and the concept is still weak and it results in longer RTs or wrong answers.

IMPLICATIONS FOR SECOND LANGUAGE TEACHING

As Lotto & De Groot (1998: 61) conclude, "if the goal of an L2 curriculum is to introduce easy words before more difficult words, the teaching of cognate and common words should precede the teaching of noncognates and uncommon words". The sooner the learners build a vocabulary, the more their confidence will be built up and the sooner they will be ready to start expanding their vocabulary further. This is true according to the data found in the present experiment: cognate words and high frequency words were recalled faster and more accurately than noncognate and low frequency words.

Jiang (2000) stated that, at the initial stage of second language acquisition, the choice of L2 words is dependent on the activation of the lexical links between L2 and L1. If the aim of second language teaching is to reduce that dependency and strengthen the links between the L2 lexicon and the conceptual system, it seems that picture naming is an effective way to do that. If we use word-association, we are strengthening a connection that tends to be created naturally, when we would rather create one that is not normally as strong.

6. FUTURE DIRECTIONS

A number of restrictions of our study constrain the generality of the results and their practical implications. First of all, it would be interesting to see if the same results would come out of the same experiments conducted with a larger sample size. Second, our participants differed in the number of years that they had had exposure to the Spanish language, so it would be preferable to have more than two groups (high/low), more of a continuum, starting from individuals that had never studied Spanish before to students who had studied Spanish several semesters and were quite proficient. Third, since we wanted to be able to use pictures in one of the experiments, we had to limit our choice of words to only concrete words. A possible follow-up study would take into account what is the effect of introducing abstract words or even verbs into the experimental design. Finally, we did not look at the participants' retention (maybe a few days or weeks later) to see how lasting the learning effects were. All these are possible extensions for future research on vocabulary acquisition in a foreign language.

Nevertheless, the present experiment provides an initial investigation of vocabulary acquisition by varying degrees of proficient second language learners of Spanish to explore how words are stored in bilingual memory.

7. BIBLIOGRAPHY

- ABUNUWARA, E. (1992) The structure of the trilingual lexicon. *European Journal of Cognitive Psychology*, 4, 311-322.

- AITCHINSON, J. (1994) *Words in the mind.* Oxford: Blackwell.

- ANTHONY, E.M. (1953) The teaching of cognates. *Language Learning*, 4, 79-82.

- BALOTA , D.A. & CHUMBLEY, J.I. (1984) Are lexical decisions a good measure of lexical access? The role of word frequency in the neglected decision stage. *Journal of Experimental Psychology: Human Perception and Performance*, 10, 340-357.

- BALOTA & CHUMBLEY (1985) The locus of word-frequency effects in the pronunciation task: Lexical access and/or production? Journal of Memory and Language, 24 (1), Feb., 89-106.

- BRADLEY, D.C. (1979) Lexical representation and derivational relation. In M. Aronoff & M.L. Kean (Eds.) *Juncture*, Sarasota, CA: Anma Libri.

- BYBEE, J.L. (1985) *Morphology: A study of the relation between form and meaning.* Amsterdam: John Benjamins.

- CARROLL, S.E. (1992) On cognates. *Second Language Research*, 8 (2), 93-119.

- CHEN, H.-C & LEUNG, Y.-S.(1989) Patterns of lexical processing in a non-native language. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15, 316-325.

- CHEN, H.-C. (1990) Lexical processing in bilingual or multilingual speakers. In R.J. Harris (Ed.), *Cognitive processing in bilinguals* (pp. 253-264). Amsterdam: North Holland.

- De GROOT , A.M.B. (1992) Bilingual lexical representations: A closer look at conceptual representations. IN R. Frost & L. Katz (eds.) *Orthography, phonology, morphology and meaning*, pp. 389-412. Amsterdam: Elsevier.

- De GROOT, A.M.B. & HOEKS, J.C.J. (1995) The development of bilingual memory: Evidence from word translation by trilinguals. *Language Learning*, 45, 683-724.

- De GROOT, A.M.B. & KEIJZER, R. (2000) What is hard to learn and easy to forget: The roles of word concreteness, cognate status and word frequency in foreign-language vocabulary learning and forgetting. *Language Learning*, 50, 1-56.

- De GROOT, A.M.B. & NAS, G.L.J. (1991) Lexical representation of cognates and noncognates in compound bilinguals. Journal of Memory and Language, 30 (1), 90-123.

- DE GROOT, A.M.B. & POOT, R. (1997) Word translation at three levels of proficiency in a second language: The ubiquitous involvement of conceptual memory. *Language Learning*, 47, 215-264.

- DIJKSTRA, T., GRAINGER, J. & Van HEUVEN, W.J.B. (1999) Recognition of cognates and interlingual homographs: the neglected role of phonology. *Journal of Memory and Language*, 41 (4), 496-518.

- DURGUNOGLU, A.Y. & ROEDIGER, H.L. (1987) Test differences in accessing bilingual memory. *Journal of Memory and Language*, 26, 377-391.

- ELLIS, N.C. & BEATON, A. (1993) Psycholinguistic determinants of foreign language vocabulary learning. *Language Learning*, 43, 559-617.

- ERVIN, S.M. & OSGOOD, C.E. (1954) Second language learning and bilingualism. *Journal of Abnormal Social Psychology*, 49, Supplement, 139-46.

- FRANCIS, W.N. & KUçERA, H. (1982) *Frequency Analysis of English Usage. Lexicon and Grammar.* Boston: Houghton Mifflin Company.

- JIANG, N. (2000) Lexical representation and development in a second language. *Applied Linguistics*, 21/1: 47-77.

- KIRSNER , K. (1986) Lexical function: Is a bilingual account necessary? In J. Vaid (Ed.), Language Processing *In Bilinguals: Psycholinguistic and Neuropsychological Perspectives.* Hillsdale, NJ: Lawrence Erlbaum.

- KIRSNER, K. LALOR, E. & HIRD, K. (1993) The bilingual lexicon: Exercise, meaning and morphology. In R. Schreuder &B. Weltens (Eds.) *The Bilingual Lexicon* (pp. 215-248) Amsterdam/Philadelphia: John Benjamins.

- KOLERS, P.A. & GONZÁLEZ, E. (1980) Memory for words, synonyms and translations. *Journal of Experimental Psychology: Human learning and memory*, 6, 53-65.

- KROLL, J.F. & BORNING, L. (1987) *Shifting language representations in novice bilinguals: Evidence from sentence priming.* Paper presented at the Twenty-Seventh Annual Meeting of the Psychonomic Society, Seattle, WA, November.

- KROLL, J.F. & CURLEY, J. (1988) Lexical memory in novice bilinguals: The role of concepts in retrieving second language words. In M.M. Gruneberg, P.E. Morris, & R.N. Sykes (Eds.) *Practical aspects of memory: Current research and issues: Vol. 2, Clinical and educational implications* (pp. 389-395). Chichester: John Wiley & Sons.

- KROLL, J.F. & STEWART, E. (1994) Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language*, 33, 149-174.

- LADO, R. (1957) *Linguistics Across Cultures.* Ann Arbor: University of Michigan Press.

- LALOR, E. & KIRSNER, K. (2000) Cross-lingual transfer effects between English and Italian cognates and noncognates. *The International Journal of Bilingualism*, 4 (3), 385-398.

- LOTTO, L. & De GROOT, A.M.B. (1998) Effects of learning method and word type on acquiring vocabulary in an unfamiliar language. *Language Learning*, 48, 31-69.

- MARSLEN-WILSON, W. (1989) *Lexical representation and process*, Cambridge, Mass.: MIT Press.

- McCORMACK, P.D. (1977) Bilingual linguistic memory: the independence-interdependence issue revisited, in HORNBY, P.A. (ed) *Bilingualism: Psychological, Social and Educational Implications.* New York: Academic Press, 57-66.

- OLDFIELD, R.C. & WINGFIELD, A. (1965) Response latencies in naming objects. *Quarterly Journal of Experimental Psychology*, 17, 273-281.

- PAPAGNO, C. & VALLAR, G. (1998) Verbal short-term memory and vocabulary learning in polyglots. Quarterly Journal of Experimental Psychology, 48A, 98-107.

- POTTER, M.C., So, K.-F, Von ECKARDT, B., & FELDMAN, L.B. (1984) Lexical and conceptual representation in beginning and proficient bilinguals. *Journal of Verbal Learning and Verbal Behavior*, 23, 23-38.

- SÁNCHEZ-CASAS, R.M., DAVIS, C.M. & GARCíA-ALBEA, J.E. (1992) Bilingual lexical processing: Exploring the cognate/non-cognate distinction. *European Journal of Cognitive Psychology*, 4, 293-310.

- SHERKINA, M. (2003) The cognate facilitation effect in bilingual speech processing. *Toronto Working Papers in Linguistics*: 21, 135-151.

- SNODGRASS, J.G. (1984) Concepts and their surface representations. *Journal of Verbal Learning and Verbal Behavior*, 23, 3-22.

- TAFT, M. (1979) Lexical access via an orthographic code: The Basic Orthographic Syllable Structure (BOSS). *Journal of Verbal Learning and Verbal Behavior*, 18, 21-39.

- TALAMAS, A., KROLL, J.F. & DUFOUR, R. (1999) From form to meaning: Stages in the acquisition of second-language vocabulary. *Bilingualism: Language and Cognition*, 2 (1), 45-58.

- TAYLOR, I. (1976) Similarity between French and English words – A factor to be considered in bilingual language behavior? *Journal of Psycholinguistic Research*, 5 (1), 85-94.

- VAN HELL, J.G. & CANDIA MAHN, A. (1997) Keyword mnemonics versus rote rehearsal: learning concrete and abstract foreign words by experienced and inexperienced learners. *Language Learning*, 47, 507-546.

- VERMEER, A. (1992) Exploring the second language learner lexicon. In Verhoeven & De Jong (eds.) *The Construct of Language Proficiency. Applications of Psychological Models to Language Assessment.* Amsterdam/Philadelphia: John Benjamins. 147-162.

- WEINRICH, U. (1953) *Languages in contact*, The Hague: Mouton.

- WIMER, C.C. & LAMBERT, W.E. (1959) The differential effects of word and object stimuli on the learning of paired associates. *Journal of Experimental Psychology*, 57, 31-36.

8. APPENDIX

The Spanish-English Stimuli and Their Word Frequency Values, Length, Cognate Rating and Picture-Agreement Scores.

Table 5: HIGH FREQUENCY NONCOGNATES

LANGUAGE		FREQUENCY		PICTURE AGREEMENT	LENGTH	
English	Spanish	English	Spanish	(%)	English	Spanish
finger	dedo	106	50	100	2	2
glass	vaso	128	37	100	1	2
bed	cama	139	135	100	1	2
dog	perro	147	60	100	1	2
horse	caballo	203	62	100	1	3
book	libro	292	193	100	1	2
teacher	maestra	298	152	100	2	3
window	ventana	172	93	67	2	3
water	agua	486	293	67	2	2
chair	silla	89	47	100	1	2
MEAN VALUES		206	112	93	1.4	2.3

Table 6: LOW FREQUENCY NONCOGNATES

LANGUAGE		FREQUENCY		PICTURE AGREEMENT	LENGTH	
English	Spanish	English	Spanish	(%)	English	Spanish
compass	brújula	12	2	100	2	3
cane	bastón	13	11	100	1	2
pig	cerdo	14	13	100	1	2
orange	naranja	15	11	100	2	3
ant	hormiga	13	2	67	1	3
balloon	globo	13	10	67	2	2
purse	monedero	15	1	67	1	4
toilet	váter	17	2	67	2	2
fork	tenedor	20	3	100	1	2
apple	manzana	15	11	100	2	3
MEAN VALUES		14	6	86	1.5	2.6

Table 7: HIGH FREQUENCY COGNATES

LANGUAGE		FREQUENCY		PICTURE AGREEMENT	COGNATE RATING	LENGTH	
English	Spanish	English	Spanish	(%)	Mean	English	Spanish
family	familia	405	205	100	6.5	3	3
music	música	216	106	100	6.6	2	3
paper	papel	208	182	100	4	2	2
coffee	café	78	77	100	5	2	2
radio	radio	126	83	100	6.6	2	2
flower	flor	78	32	100	3.8	1	1
column	columna	107	37	100	5.5	2	3
wine	vino	97	127	100	3.2	1	2
garden	jardín	91	61	100	3.4	2	2
telephone	teléfono	79	80	100	6.9	3	4
MEAN VALUES		148	99	100	5.1	2	2.4

Table 8: LOW FREQUENCY COGNATES

LANGUAGE		FREQUENCY		PICTURE AGREEMENT	COGNATE RATING	LENGTH	
English	Spanish	English	Spanish	(%)	Mean	English	Spanish
serpent	serpiente	5	11	100	5.4	2	3
tomato	tomate	7	6	100	6.7	3	3
bike	bici	7	0.5	100	3.8	1	2
salad	ensalada	12	4	100	4.1	2	4
lemon	limón	16	6	100	5.4	2	2
soup	sopa	16	15	100	4.2	1	2
lamp	lámpara	24	16	100	5.2	1	3
cards	cartas	32	62	100	3.4	1	2
fruit	fruta	49	12	100	5.5	1	2
cathedral	catedral	11	20	100	6	3	3
MEAN VALUES		18	15	100	4.9	1.7	2.6