Department of Modern Languages and Literatures and English Studies

# M.A. Thesis

# Do you eat *pasta* for dessert and *tender* your clothes? A comparison of cross-language activation in Turkish and Spanish learners of English

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*A mi madre, que siempre está ahí para darme el último empujón antes de que me rinda, gracias por todo.*

**Abstract**

The present study investigates whether L1 Turkish and L1 Spanish learners of English experience cross-language activation when recognising words that share spelling but differ in meaning across languages, i.e., interlingual homographs (IHs). Two primed lexical decision tasks in English were employed to examine if primes semantically related to the target IH's L1 meaning – e.g., *arena* (*sand* in Spanish) preceded by *beach* – would entail shorter reaction times. Additionally, this study examines if typological differences between participants' L1 (Turkish or Spanish) and L2 (English) influence L2 word recognition, a rather understudied relationship.

Results from both experiments revealed dual-language activation, as participants recognised interlingual homographs significantly slower than control words. However, no significant differences were found between the Turkish and Spanish group, thus, language typology did not have a significant effect on L2 visual word recognition. Moreover, no cross-language semantic priming effects were found, as IHs were processed slower than control words, which did not hold a semantic relationship with their primes. Importantly, the results from this study support the language-non-selective hypothesis, i.e., the notion that L2 word recognition entails co-activation of languages, even in monolingual settings.

**Keywords:** *L2 word recognition, interlingual homograph, cross-language activation, lexical decision task, semantic priming, language typology*

## Table of Contents

**Acronyms**

BIA = Bilingual Interactive Activation model

BIA+ = revised Bilingual Interactive Activation model

CLI = cross-linguistic influence

CW = Control Word

EFL = English as a Foreign Language

FLR = Fuzzy Lexical Representation

GLMM = Linear Mixed-Effects Model

IH = Interlingual Homograph

L1 = first language

L2 = second language

LEAP-Q = Language Experience and Proficiency Questionnaire

M = mean

ms = milliseconds

N = number

NW = Non-Word

RT = Reaction Time

SD = Standard Deviation

SOA = Stimulus-Onset Asynchrony

SOV = Subject, Object, Verb

SVO = Subject, Verb, Object

# 1. Literature Review

## 1.1. Introduction

More than half of the world's population speaks two or more languages or dialects on a daily basis (Grosjean, 2021). Therefore, understanding how bilinguals use their languages in distinct situations is of great relevance, as ongoing research attempts to ascertain how two languages coexist in the bilingual mind.

In relation to this, the study of bilingual word recognition sheds light on how the mental lexicon is organised and, hence, how bilinguals access words in either of their two languages. Understanding L2 word recognition has educational implications for teachers and second or foreign language learners, as efficient word recognition is said to contribute to comprehension performance in second and foreign languages (Koda, 1996).

Particularly, analysing how L2 users recognise words is key for fruitful communication, as "without grammar, very little can be conveyed; without words, nothing can be conveyed" (Wilkins, 1972, p. 11). Hence, the study of bilingual word processing enables further analysis of how bilinguals interact, even in monolingual contexts. It should be noted that monolingual settings sometimes entail activation of both the non-target and the target language. Moreover, previous research has observed "the highest level of interaction between L1 and L2 at the level of vocabulary" (Kormos, 2006, p. 55).

Consequently, the psycholinguistic processes of recognising words in an L2, as well as the organisation of the bilingual mental lexicon, language selectivity in lexical access, semantic priming paradigms, and language typology are topics that will be included in the present study to analyse cross-language activation in Turkish and Spanish learners of English.

## 1.2. Organisation of the bilingual mental lexicon

Prior to analysing how the bilingual lexicon is organised, the organisation of the monolingual lexicon will be briefly introduced. Levelt (1989) defined the mental lexicon as "a repository of declarative knowledge about the words" in a speaker's language, which presented an internal structure.

Hence, the mental lexicon consists of lexical entries, which include "semantic, syntactic, morphological, and formal (phonological and orthographic) specifications about a lexical item” (Jiang, 2000, p. 48). Each lexical entry comprises two elements: (1) the lemma, which includes syntactic and semantic information about the word, and (2) the lexeme, consisting of morphological, phonological, and orthographical information, as depicted in Figure 1.

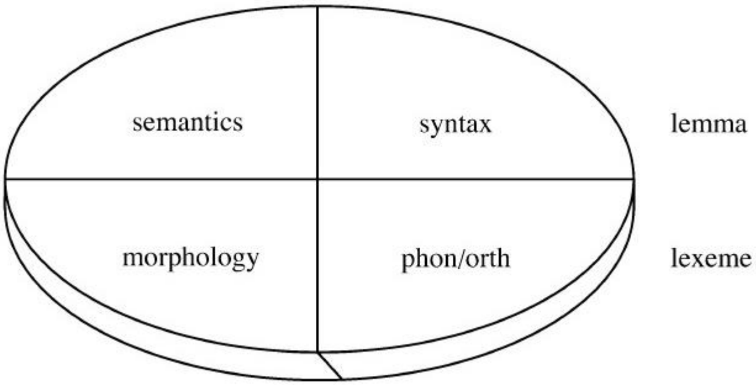


*Figure 1: The internal structure of a lexical entry (Jiang, 2000, p. 48).*

It should be noted that this division is solely “a spatial metaphor acknowledging the existence of two kinds of internal organization in the mental lexicon: one according to the meaning of items and one according to their form properties” (Levelt, 1989, pp. 187–188). Still, lexical entries’ structure plays a role during word recognition, which entails simultaneous activation of several types of information in lexical entries, e.g., visual word recognition also activates the phonological information of a word (Jiang, 2000).

Conversely, word representation in the bilingual mental lexicon is said to be hierarchical, whereby presenting different layers. The hierarchical, three-component model of lexical representation suggests that bilingual memories are constituted by three elements: two distinct word-form representations for each language, (1) one in the L1 and (2) one in the L2, as well as (3) a meaning (or conceptual) representation which is shared across languages (de Groot, 2002).

Two variants of the hierarchical three-component model attempted to analyse the connections between such three components, named the word-association model and the concept-mediation model by Potter et al. (1984). The former assumed a direct association between words in the L1 and L2, and that learners of a second language use this association to understand the L2 by means of “retrieving a word in the first language” (Potter et al., 1984). Alternatively, the latter proposed that both L1 and L2 word-form representations share a conceptual representation to which they are connected, yet they are not directly connected to each other. Research on bilingual lexical representation postulates that during the initial stages of second language acquisition, learners present word-association connections, which, with practice, evolve into concept-mediation structures. A visual representation of both versions is presented in Figures 2.1 and 2.2.

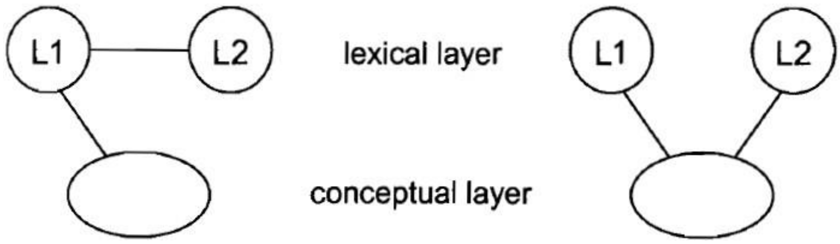


*Figure 2.1: The word-association model. Figure 2.2: The concept-mediation model. (de Groot, 2002, p. 37).*

In addition, a model that encompassed both previous versions was introduced by Kroll and Stewart (1994): the revised hierarchical model, which included connections between L1 and L2 words, and "separate connections between each of these words and the representation of their meaning" (Green, 1998, p. 72). Figure 3 depicts how the links between the L1 word-form and the conceptual representation are stronger than those between the L2 form and the conceptual layer. Moreover, the connection from the L2 to L1 is more robust than that from the L1 to the L2, as learners initially learn words in their L2 by means of establishing L2-L1 translation pairs. Importantly, this model suggests that "with increased proficiency, the L2 word-form to concept mappings become stronger", hence, it considers the role of proficiency in bilingual word recognition (van Hell & Tanner, 2012, p. 149).

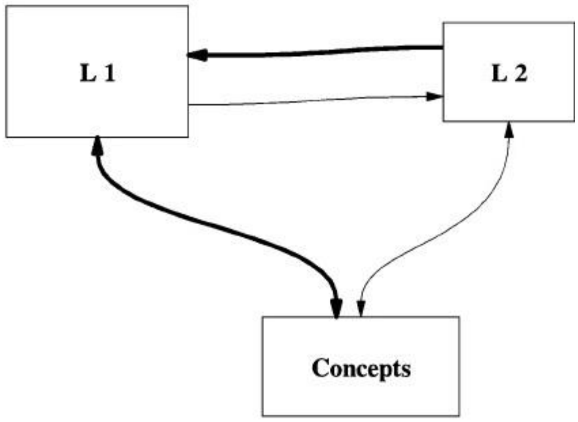


*Figure 3: The revised hierarchical model by Kroll and Stewart (1994) (Green, 1998).*

Similarly, second language learners are said to present fuzzy lexical representations (FLRs), i.e., imprecise encoding of a word's "form and/or meaning, and potentially, the mapping between them" (Gor et al., 2021, p. 1). Furthermore, lexical encoding in L2 users is influenced by age of onset, the L1 mental lexicon, and input frequency as learners develop novel L2 lexical representation form-meaning mappings.

In relation to this, it is worth highlighting that bilinguals differ in terms of how lexical items are represented in their memories, and they might present more than one type of memory representation. Furthermore, their relative level of proficiency in both languages and the L2 learning environment will influence the type of memory representations in the bilingual mental lexicon. According to de Groot (2002), "when some critical level of L2 proficiency has been reached, all representations in bilingual memory suddenly change from word-association structures to concept-mediation structures". Similarly, Gor et al. (2021) suggest that "lexical encoding becomes more precise as L2 learners' proficiency increases".

Having said this, the aforementioned models of bilingual lexical representation did not include any reference to lexemes, i.e., morphological, phonological, and orthographic information of lexical items. Not only this, but also, no difference was made between orthographic and phonological representations, which "are likely to be stored in separate subsystems of the word-form store … and the elements of *both* subsytems map onto the conceptual representations" (de Groot, 2002, p. 45). In literate bilinguals, this entails mapping of both languages' subsystems onto conceptual representations.

Altogether, models of representation in the bilingual mental lexicon provide insights on how bilinguals with differing levels of proficiency in their languages might store, recognise, and acquire new lexical items in their L2.

### 1.3. Bilingual word recognition

Different visual word recognition models have attempted to ascertain how cross-language activation is related to the bilingual mental lexicon. Thus, the question at hand is whether or not word recognition in bilinguals entails coactivation of both languages. Dijkstra and van Heuven (1998) proposed the Bilingual Interactive Activation (BIA) model, which defined visual word recognition as "the retrieval of orthographic representations from the mental lexicon corresponding to the input letter string" (Dijkstra & van Heuven, 2002, p. 176).

The BIA postulates that lexical representations of both languages are stored in an integrated mental lexicon. If this is the case, bilinguals are required to inhibit the non-target language's lexical candidates in a given situation to process the target language. As shown in Figure 4, this model includes four different layers, each of them including representations of (1) languages, (2) words, (3) letters, and (4) letter features in the mental lexicon.

According to the BIA, recognising a string of letters activates letters in the same positions and inhibits letters without those features, leading to "excite words in both languages in which the activated letter occurs at the position in question while all other words are inhibited" (Dijkstra & van Heuven, 2002, p. 176). On the word level, word nodes which have been activated consequently activate their respective language node, which eventually leads to inhibition of words that were active in the non-target language.

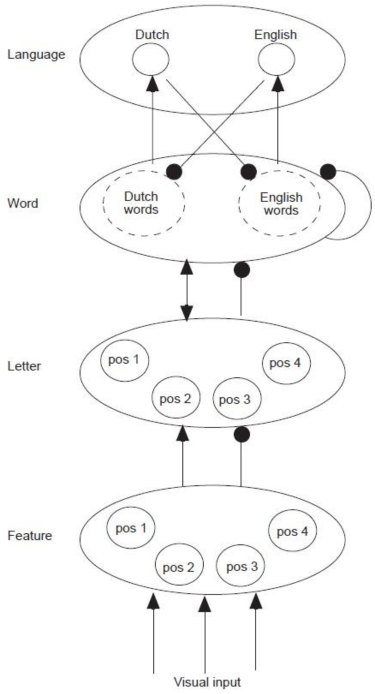


*Figure 4: The Bilingual Interactive Activation (BIA) model for bilingual word recognition (Dijkstra & Van Heuven, 2002).*

Although the BIA model introduced levels that were not present in the aforementioned bilingual lexical representation models, it lacks "a layer that stores word meanings" (de Groot, 2002, p. 46). Notwithstanding, Dijkstra and van Heuven (2002) set forth some of the BIA model's limitations, e.g., the absence of semantic and phonological representations.

As a result, they presented a revised model: the BIA+ model for bilingual word recognition. Again, it suggests integration of both languages in the bilingual lexicon, yet it does not only focus on orthographic representations of words. In fact, the BIA+ implies that “bilingual word recognition is affected not only by cross-linguistic orthographic similarity effects, but also by cross-linguistic phonological and semantic overlap” (Dijkstra & van Heuven, 2002, p. 182). Moreover, the model also includes task schemas as a factor that influences how bilinguals recognise and process words, given the tasks’ differing conditions.

Furthermore, Kormos (2006) suggested that words’ similarity across languages influences how they are encoded in the bilingual lexicon. In relation to this, regardless of language, the activation of a lexical representation is affected by the orthographic, phonological, or semantic similarity between it and a visually presented word. The revised model suggests that “the larger the overlap between the input string and a representation in the mental lexicon, the more the internal representation is activated” (Dijkstra & van Heuven, 2002, p. 182). Figure 5 includes an image of the BIA+ model for bilingual word recognition, where arrows portray activation flows between differing levels of representation.

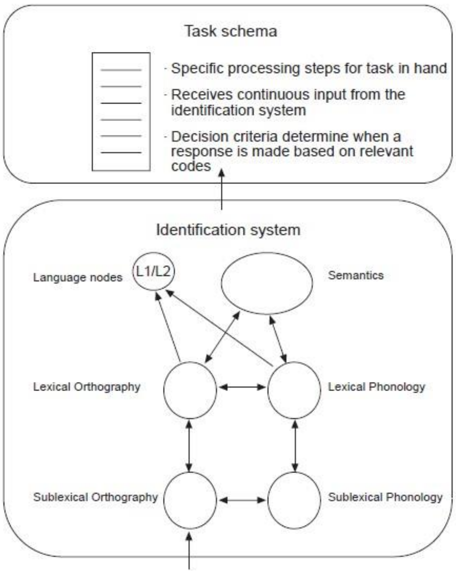


*Figure 5: The BIA+ model for bilingual word recognition (Dijkstra & van Heuven, 2002).*

In addition, the BIA+ model attempts to answer the question of how interlingual homographs (IH) are represented in the bilingual lexicon. Previous studies suggest that “the bilingual memory structures for cognates … are more integrated across a bilingual’s two languages than the structures for non-cognates” (de Groot, 2002, p. 43). The revised model implies that cognates – words with the same or similar spelling and meaning across languages – present shared representations; however, “interlingual homographs have separate representations for each language” (Lemhöfer & Dijkstra, 2004, p. 533).

Experimental research involving interlingual homographs, i.e., words that share spelling in both languages but differ in meaning across them, has proven that "L2 representations are generally activated less strongly or less rapidly than L1 representations" when the L1 is the target language (Lemhöfer & Dijkstra, 2004, p. 534). Conversely, monolingual lexical decision tasks with L2 as the target language show that interlingual homographs present small or no differences in reaction times (RTs) when compared to control words (Lemhöfer & Dijkstra, 2004).

In fact, differences in RTs in lexical decision tasks for trials including interlingual homographs in comparison to control words bring forth a homograph effect. The effect may present two directions: (1) faster RTs than control words, i.e., facilitatory effects, or (2) slower RTs than their control counterparts, i.e., inhibitory effects of interlingual homograph recognition. The former would entail that cross-language activation when recognising IHs led to facilitation; whereas the latter would imply that IH recognition was effortful due to the need to supress the non-target language.

Van Hell and Tanner (2012) postulate that "if … homographs … are processed differently from noncognates (e.g, faster and more accurately), one inference is that the representations of … homographs … in the two languages were co-activated at some point during lexical activation (at the level of orthography, phonology, or meaning), which altered the time-course or ease of activation". Therefore, finding a homograph effect would entail dual language activation in bilingual participants, either at the orthographic or phonological level.

Moreover, Lemhöfer and Dijkstra (2004) presented the temporal delay hypothesis, namely that when performing in an L2 lexical decision task, responses to the L2 readings of an interlingual homograph can be affected by the earlier available L1 readings, in all lexical codes (orthography, phonology, and semantics). Consequently, interlingual homographs might entail cross-language activation and processing according to orthographic, phonological, and semantic encoding from either the L1 or L2.

### 1.4. Language selectivity in bilingual lexical access

Two opposing views have dominated research on bilingual lexical access in the field. For instance, the language-selective hypothesis presumes that when bilinguals recognise a given word, "only words of the language targeted in the communicative setting are considered" (Dijkstra et al., 1998, p. 51). Alternatively, the language-non-selective hypothesis proposes that word recognition in bilinguals entails activation of both languages “even in situations and tasks that are purely monolingual” (van Heuven et al., 2008, p. 2706).

In fact, some studies support the notion that bilinguals are able to select the target language with no cross-language effects (Macnamara & Kushnir, 1971; Scarborough et al., 1984; Gerard & Scarborough, 1989). Conversely, more recent studies show that when bilinguals recognise words in one language, both languages are simultaneously activated (Dijkstra et al., 1998; van Heuven et al., 1998; de Groot et al., 2000; Lemhöfer & Dijkstra, 2004; Macizo et al., 2010; Hoshino & Thierry, 2012). Stronger evidence exists for the second view, which implies that “even though lemmas in the nonintended language are also activated, they are ignored in selection” (Kormos, 2006, p. 64).

In relation to interlingual homograph recognition, the aforementioned hypotheses predict lexical access and consequently, response latencies to visual presentation of a word. The language-selective hypothesis suggests that reading an interlingual homograph solely activates the target language, therefore, such IH will be recognised as fast as its control word counterparts. However, the language-non-selective hypothesis proposes dual-language activation upon visual presentation of the IH, hence, “different response times (RTs) to homographs and one-language controls in particular experimental circumstances” (Dijkstra et al., 2000, p. 445).

It should be noted that most studies including cognates and/or interlingual homographs have “compared two groups of bilinguals with low versus high proficiency levels in the L2” (van Hell & Tanner, 2012, p. 149). Therefore, word recognition and processing has mostly been studied by comparing L2 users on either side of the proficiency continuum. Subsequently, van Hell and Tanner (2012) postulate that when proficient bilinguals recognise interlingual homographs, “the co-activation of the semantic codes will slow down responses, because the two different meanings of false friends compete”.

As a result, L2 word recognition in less proficient L2 users has been understudied, although bilingual lexical representations presumably change depending on a bilingual’s level of L2 proficiency. Consequently, the present study includes participants ranging from intermediate to upper-intermediate levels of L2 proficiency, in order to ascertain if such degrees of proficiency would present homograph and semantic priming effects.

### 1.5. Cross-language semantic priming

McDonough and Trofimovich (2008) defined semantic priming as "a general tendency for language users to show facilitation in their processing of words due to a previous experience with words similar in meaning". Semantic priming paradigms thus involve the presentation of a target word, preceded by a semantically related prime. Previous research following this paradigm has found that "processing of the target is easier when the pair of words is semantically and/or associatively related (e.g., *cat-dog*) than when the words are unrelated (e.g., *nurse-dog*)" (Chiappe et al., 1996, p. 249).

Three distinct types of semantic priming can be distinguished:

1) Associative priming, i.e., target and prime are semantic associates but they are not members of the same semantic category, e.g., *grass-green*;
2) Category priming, where both items pertain to the same semantic category such as *furniture-table*;
3) Mediated priming includes words that are not directly related, e.g., *stripes-lion*, which are semantically mediated by the word *tiger* (McDonough & Trofimovich, 2008).

This distinction is relevant to ascertain the relationship between items and, hence, what priming procedures are employed in a given experiment. It should be noted that the aforementioned semantic priming studies and examples focus on L1 processing. However, cross-language priming experiments have also analysed semantic links across languages, either by presenting L1-L2 translation pairs or L1-L2 semantically related pairs (McDonough & Trofimovich, 2008). In fact, semantic priming effects have also been found "when the prime is a word from one of the participants' two languages" and the target word is in another language (de Groot, 2002, p. 36). Importantly, if between-language priming occurs, "the two languages are shared and stored together in memory" (Nkrumah & Neumann, 2018, p. 364).

Relatively few studies employ a semantic priming paradigm including interlingual homographs, such as Macizo et al.'s (2010) or Hoshino & Thierry's (2012). Both studies included target words that were semantically related to the interlingual homograph's (prime) meaning in the non-target language, e.g., *pie-toe*, as *pie* in Spanish means *foot*.

Similarly, the present study includes associated primes (e.g., *sweet-pasta*, as the Turkish meaning for *pasta* is *cake*); categorically-related items, such as *toe-pie*, where both *toe* and *foot* – the Spanish meaning of the IH – belong to the same semantic category; and mediated primes, e.g., *play-as,* because *as* means *ace* in Spanish, and *play* and *ace* are mediated by the word *card*. Word lists are included in Appendices A (Turkish-English word list) and B (Spanish-English word list).

### 1.6. Language typology

Little research has examined the influence of language typology and cross-linguistic similarity on the organisation of the mental lexicon. Language typology can be defined as "the classification of the world's languages according to similarities and differences in their linguistic structures and genetic relationships" (Kashyap, 2019, p. 767).

Consequently, each language belongs to a language family, i.e., both English and Spanish are Indo-European languages, however, English pertains to the Germanic subfamily, whereas Spanish is a member of the Romance subfamily. Alternatively, Turkish pertains to the Ural-Altaic linguistic family, specifically to the Turkic subfamily. Hence, although Spanish and English do not belong to the same subfamily, they both stem from the same linguistic family and are thus genetically related. Nonetheless, Turkish does not hold any relationships with English.

When it comes to morphological typology, Turkish is an "almost ideal case" of an agglutinative language "where there is a one-to-one correspondence between meaning and form" (Eifring & Theil, 2005). Thus, in Turkish, each morpheme has precise boundaries and a specific meaning. However, Spanish and English are fusional languages, because they "use a single morpheme in combination with affixes to denote multiple grammatical, syntactic, or semantic changes" (Farhood Khudheyier AlA'amiri & Fadhil Jameel, 2019, p. 717). Hence, English and Spanish share a linguistic family as well as morphological features, whereas Turkish pertains to a distinct language family and presents a radically different way of encoding morphemes.

In relation to this, research on bilingual aphasic patients led Paradis (1987) to suggest that "the less two languages have in common, the more they are represented separately". Based on Paradis' assumptions, de Bot (1992) postulated that speakers of typologically close languages "will for the most part use the same procedural and lexical knowledge when speaking either of the two languages, while in the case of languages which are not related, an appeal is made to much more language-specific knowledge".

Additionally, Kastenbaum et al. (2019) found that "bilingual lexical access varies based on language combination" and in fact suggested that "there may be something different about the way Turkish–English speakers access lexical items". Thus, similarity across a bilinguals' languages is suggested to influence lexical organisation, representation, and, therefore, L2 word recognition.

In fact, de Bot (1992) arrives to the conclusion that a bilingual who speaks two typologically distant languages must present a lexicon with two separate language systems, as it is "unlikely that languages which differ in the way in which intentions are formed syntactically … can be processed by the same system". Therefore, perhaps Turkish learners of English present two distinct language systems, as both languages are typologically distant; whereas Spanish learners of English could exhibit a single language system to process both languages. In fact, although Putnam et al. (2018) suggest that both languages are integrated in a single system, they propose that "related representations are connected (such that they can influence each other in processing), and unrelated representations are not".

Hence, presenting an integrated system or two separate systems for each language (or related/unrelated representations) can have an effect on visual word recognition, i.e., learners with two typologically different languages might experience less cross-linguistic influence (CLI) when recognising interlingual homographs due to the separation of both languages into two distinct systems or the unrelatedness of their representations. Contrastingly, learners with typologically close languages might experience more CLI, as inhibition of the target language may be more effortful within a shared language system or between related representations.

As a result, the present study aims at analysing the differences between participants with a typologically close L1 (Spanish) and a typologically distant L1 (Turkish) to L2 English in order to shed light on the role of typology in word recognition. Moreover, the effect of language typology on cross-language semantic priming is examined by comparing how semantically primed Turkish-English and Spanish-English interlingual homographs are recognised by learners with typologically different L1s.

Consequently, the purpose of this study is to analyse L2 word recognition in L1 Turkish and L1 Spanish learners of English, particularly how they recognise interlingual homographs in their second language. In fact, the present study aims at analysing the effects of typologically similar/different first languages and cross-linguistic semantic priming on word recognition. Therefore, this study attempts to investigate cross-language effects when encountering IHs in a purely English monolingual primed lexical decision task, considering L1 typological differences and semantic priming effects.

## 2. Research Questions

The present study addressed the following research questions:

1) Does recognition of interlingual homographs in the L2 lead to L1 activation?
2) How does language background modulate cross-language activation? Is there an effect of language typology on L2 word recognition?
3) Do primes related to the L1 meaning of the IH presented in English (L2) reveal semantic priming effects?

To address these research questions, three hypotheses were elaborated. Firstly, that recognition of IHs will entail dual language activation and, thus, will present a homograph effect for participants. The homograph effect may present one of the following directions: (1) homograph facilitation, i.e., shorter response latencies in IH trials than in control trials; or (2) homograph inhibition: larger reaction times. Previous research shows that the direction of the homograph effect can change depending on task demands (de Groot, 2002).

Secondly, linguistic background, understood as the languages that a given person speaks and their typology may influence cross-language activation when recognising words in English. Typological distance (i.e., separate/integrated systems or un/related representations) between Spanish and English in comparison to Turkish and English may bring forth significant differences in L2 word recognition. Albert and Obler (1978), as cited in Paradis (1987) suggested that “the proximity of structurally similar languages may entail "effort" to avoid interference”. Consequently, perhaps Spanish learners will experience more cross-language activation when recognising words in English (L2) than Turkish learners, due to the former languages being typologically closer than the latter.

In relation to the third research question, my hypothesis is that, although encountered in English, primes that are related to the interlingual homograph’s meaning in the L1 will entail a semantic priming effect and therefore shorter RTs, due to activation of the meaning of the semantically-related prime in the L1. This hypothesis is based on the idea that words are processed faster when they follow semantically related words than when preceded by unrelated words (de Groot, 2002, p. 36).

In fact, previous studies such as Kerkhofs et al.'s (2006) showed that interlingual homographs preceded by semantically related primes were recognised faster than those with primes that were semantically unrelated. Having said this, the present study includes primes that are semantically related to the IHs' L1 meaning (non-target language). Therefore, the present study aims at ascertaining the semantic priming effect of primes related to interlingual homographs' L1 meaning, either Turkish or Spanish.

## 3. Methodology

The present study consists of two primed lexical decision tasks involving word recognition: Experiment 1, including Turkish-English interlingual homographs, and Experiment 2, with Spanish-English IHs. Although a total of 41 people were tested, data from two participants from the Turkish group – due to missing data – and data from three participants from the Spanish group was excluded, as two participants had learnt Spanish as an L2, and one was a dyslexic learner.

### 3.1. Participants

The present study includes 36 participants (18 male, 18 female): 17 Turkish learners of English (10 male, 7 female) living in Istanbul, Turkey; and 19 L1 Spanish learners of English (8 male, 11 female) living in Barcelona (Catalonia) and Bilbao (Bizkaia), Spain. They were between 18 and 40 years of age (*M*=26.33, *SD*=6.43). L1 Turkish participants had begun to learn English at age 8 or later (*M*=11.23, *SD*=2.33), whereas L1 Spanish participants started at age 3 or later (*M*=6, *SD*=2.47).

Most L1 Turkish participants (70.58%) spoke Turkish and English, whereas the remaining also had some knowledge of a third or fourth language (French, Spanish, Chinese, or Russian). All L1 Spanish participants were trilingual (Spanish-Catalan-English or Spanish-Basque-English), 47.36% of participants spoke four languages, and 10.52% spoke five languages. Also, 7 participants were Spanish-Catalan early bilinguals, and one was a Spanish-Basque early bilingual.

Participants from the Turkish group were right-handed, with the exception of one participant who was ambidextrous, i.e., they were able to use both their hands equally well. In the L1 Spanish group, most participants were right-handed, except for one left-handed participant and one ambidextrous participant. Furthermore, participants gave informed consent to participate in this study. They had no learning impairments and presented normal (or corrected-to-normal) vision. Demographics of the 36 participants (18 male, 18 female) from the present study are presented in Table 1.

**Table 1: Means (standard deviations in parentheses) for participants' demographic variables.**

| **Variable** | ***Total (N=36)*** | ***L1 Turkish (N=17)*** | ***L1 Spanish (N=19)*** |
|---|---|---|---|
| **Age at testing** | 26.33 (6.43) | 28.76 (4.91) | 24.15 (6.96) |
| **Age of onset of L2 learning** | 8.47 (3.55) | 11.23 (2.33) | 6 (2.47) |
| **Self-rated overall L2 proficiency (1-9)** | 5.6 (1.79) | 6.05 (1.98) | 5.36 (1.46) |
| **Self-rated L2 proficiency (0-10)** | 6.34 (1.69) | 6.21 (2.04) | 6.45 (1.34) |
| **Self-rated L1 proficiency (0-10)** | 9.56 (0.65) | 9.72 (0.6) | 9.42 (0.67) |
| **Self-rated L1/L2/L3* proficiency (0-10)** | - | - | 8 (2.13) |
| **L2 speed of lexical access (ms)** | 693.32 (.11) | 693.54 (.12) | 693.14 (.11) |
| **L1 Exposure (%)** | 52.81 (28.1) | 78.11 (14.17) | 58.36 (19.1) |
| **L2 Exposure (%)** | 31.4 (24.59) | 19.81 (9.82) | 13.88 (11.9) |
| **L1/L2/L3* Exposure (%)** | - | - | 29.44 (18.24) |
| **Gender (female)** | 18 | 7 | 11 |
| **Handedness (left-handed)** | 1 | 0 | 1 |

**All participants in the L1 Spanish group were trilingual. Thus, Basque or Catalan were either their other L1, their L2, or L3.*

Participants were asked to rate their level of proficiency in English, on a 9-point Likert scale from *1=complete beginner* to *9=fully proficient*, resulting in a mean self-rating of 6.05 (*SD*=1.98) for Turkish learners of English, and 5.36 (*SD*=1.46) for Spanish learners. Subsequently, participants completed the Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian et al., 2007), either in the English, Turkish, or Spanish pencil-and-paper version. The LEAP-Q was employed as it is "a validated questionnaire tool for collecting self-reported proficiency and experience data from bilingual and multilingual speakers ages 14 to 80" (Kaushanskaya et al., 2019, p. 1). In fact, the LEAP-Q survey gathers language dominance, exposure, and preference data (Kaushanskaya et al., 2019).

As a result, participants were asked to report what percentage of the time they were currently and on average exposed to each language. L1 Turkish participants reported they were exposed to Turkish 78.11% of the time (*SD*=14.17), whereas they were exposed to English 19.18% of the time (*SD*=9.82). Participants from the L1 Spanish group were exposed to Spanish 58.36% of the time (*SD*=19.1), while their exposure to English amounted to 13.88% of the time (*SD*=11.9). Also, this group of participants was exposed to either Basque or Catalan 29.44% of the time (*SD*=18.24).

The LEAP-Q included three 11-point Likert scales of self-rated proficiency, where participants were asked to assess their level of proficiency when *speaking*, *understanding spoken language*, or *reading* ranging from *0=None* to *10=Perfect*. Additionally, they were asked to rate their overall English proficiency, resulting in a mean self-assessment of 6.21 (*SD*=2.04) in the L1 Turkish group, and of 6.45 (*SD*=1.34) in the L1 Spanish group.

Moreover, Turkish participants reported the following average self-ratings for each category: speaking (*M*=5.35, *SD*=2.23), listening comprehension (*M*=6.29, *SD*=2.33), and reading proficiency (*M*=7, *SD*=2). Spanish participants' self-assessment for speaking, listening comprehension, and reading in English were *M*=5.84 (*SD*=1.64), *M*=6.89 (*SD*=1.44), and *M*=6.63 (*SD*=1.38), respectively.

Participants were also asked to rate their first language to assess their language dominance. Thus, average self-rated proficiency in Turkish was 9.72 (*SD*=0.6), with *M*=9.58 (*SD*=0.79), *M*=9.82 (*SD*=0.72), and *M*=9.76 (*SD*=0.56) as mean self-ratings for speaking, understanding spoken language, and reading, respectively. Hence, exposure percentages and proficiency self-ratings enabled participants from this group to be classified as Turkish-dominant bilinguals. On average L1 Spanish participants rated their Spanish proficiency with a score of *M*=9.42 (*SD*=0.67), with the following scores for speaking (*M*=9.36, *SD*=0.76), understanding spoken language (*M*=9.42, *SD*=0.69), and reading comprehension (*M*=9.47, *SD*=0.69).

Additionally, as participants within this group were trilingual, their other languages (Basque or Catalan) were also rated, obtaining an overall score of *M*=8 (*SD*=2.13), and separate scores for speaking (*M*=7.57, *SD*=2.61), listening (*M*=8.26, *SD*=1.96), and reading (*M*=8.15, *SD*=1.92) skills. As a result, participants from this group were considered Spanish-dominant multilinguals. Table 2 includes scores for all language components for L1 Turkish and L1 Spanish participants.

**Table 2: L1 Turkish and L1 Spanish participants' average proficiency scores (SDs in parentheses).**

| | Overall proficiency | | Speaking | | Listening | | Reading | |
|---|---|---|---|---|---|---|---|---|
| | *L1 Turkish* | *L1 Spanish* | *L1 Turkish* | *L1 Spanish* | *L1 Turkish* | *L1 Spanish* | *L1 Turkish* | *L1 Spanish* |
| **L1 (Turkish/Spanish)** | 9.72 (0.6) | 9.42 (0.67) | 9.58 (0.79) | 9.36 (0.76) | 9.82 (0.72) | 9.42 (0.69) | 9.76 (0.56) | 9.47 (0.69) |
| **L2 (English)** | 6.21 (2.04) | 6.45 (1.34) | 5.35 (2.23) | 5.84 (1.64) | 6.29 (2.33) | 6.89 (1.44) | 7 (2) | 6.63 (1.38) |
| **L1/L2/L3 (Basque/Catalan)** | - | 8 (2.13) | - | 7.57 (2.61) | - | 8.26 (1.96) | - | 8.15 1.92) |

In addition, participants' speed of lexical access when processing control words was calculated, in order to assess the comparability of both L1 groups' proficiency. In fact, Segalowitz and Frenkiel-Fishman (2005) employed speed of lexical access as an alternate measure of general language proficiency. Therefore, an independent samples t-test was employed to compare Turkish and Spanish learners' speed of lexical access when recognising control words in English. Results from the independent samples t-test reveal that no significant differences were found between Turkish and Spanish learners' control word recognition ($p$=.883). Please refer to Table 1 for each L1 group's mean speed of lexical access and to Appendix C, Table 9 for the results from the independent samples t-test.

## 3.2. Materials

Two sets of stimuli were employed in the present study: a set of words including Turkish-English interlingual homographs, and a set of words with Spanish-English interlingual homographs. Each set of words was used to test each of the L1 groups, respectively. Stimuli were presented in English and included a total of 180 items, with 30 control words, 30 non-words, and 30 interlingual homographs, as well as 30 primes for each category. Thus, each target item had a corresponding prime. Primes were real English words throughout the entire experiments, and all target words were classified according to their frequency and length. Word frequency was measured according to van Heuven et al.'s (2014) SUBTLEX-UK Zipf scale, which includes word frequencies that "explain more of the variance in the lexical decision times" in British English.

The Zipf scale was chosen as it is a standardised frequency measure which ranges from 1 (very low frequency words) to 6 (very high frequency words), or 7 in the case of some pronouns, function words, and verbs like 'have' (van Heuven et al., 2014). Hence, the breaking point from low to high frequency items is between 3-4. Target words employed in the Turkish-English experiment presented a mean frequency of 5.35 ($SD$=.9), hence, the vast majority were high frequency words in British English. Mean target word frequency in the Spanish-English experiment was of 5.06 (*SD*=1.04), thus, stimuli include many items of high frequency in British English.

Additionally, word length was measured in number of letters, obtaining a mean target word length of 4 letters in the Turkish-English wordlist, and a mean target word length of nearly 5 letters in the Spanish-English stimuli. Table 3 includes the set of words' mean frequency and word length. Please refer to Appendices A and B for the full wordlists as well as each item's lexical properties.

**Table 3: Mean target word frequency and length (SDs in parentheses)**

| | *N* | *L1 Turkish* | *L1 Spanish* |
|---|---|---|---|
| **Frequency** | 60* | 5.35 (.9) | 5.06 (1.04) |
| **Word length** | 90 | 4.23 (1.59) | 4.89 (1.31) |

**Frequency was not measured for non-words.*

In trials including interlingual homographs as target words, English primes were semantically (associatively, categorically, or mediately) related to their corresponding IH's meaning in Turkish or Spanish. For instance, for the IH *bay* (*gentleman* in Turkish) the English prime was *woman* and the IH *arena* (*sand* in Spanish) was primed by the item *beach*. However, the remaining primes were unrelated to their corresponding target words, i.e., non-words and control words.

A set of Turkish-English interlingual homographs was prepared before the testing sessions. The Turkish-English "false cognates" from Uzun and Salihoğlu's (2009) study as well as Uzun's (2021) list of English-Turkish false-cognates served as a basis for developing the word list. Nonetheless, to my knowledge, a comprehensive corpus of Turkish-English interlingual homographs is yet to be produced. Moreover, prior to testing sessions, a set of Spanish-English interlingual homographs was created. Macizo et al.'s (2010) list of IHs was one of the main sources for the elaboration of this word list.

Furthermore, IHs were categorised following one of Lemhöfer and Dijkstra's (2004) conditions of overlap across languages, i.e., items that share orthography (O). Also, an additional category was created to classify the remaining IHs: O*, for words that share most of their orthography, e.g., *fabrika*, and *fabric*; *quité* and *quite*. This taxonomy was employed to control for the overlap of codes as it "seemed to have additive effects on word recognition" (Lemhöfer & Dijkstra, 2004, p. 536). Twenty of the English non-words were extracted from the ARC Nonword Database (Rastle et al., 2002). The remaining 10 non-words were retrieved from the lexical decision task in Mora-Plaza et al. (2022). The table below provides the distribution of Turkish-English and Spanish-English interlingual homograph across categories, which reveals that both wordlists are comparable in terms of orthographic overlap across languages.

**Table 4: Interlingual homographs' orthographic classification**

| **Category** | ***Turkish-English*** | ***Spanish-English*** |
|---|---|---|
| **Shared spelling (O)** | 24 | 24 |
| **Shared most spelling (O*)** | 6 | 6 |
| **Total (*N*=60)** | 30 | 30 |

### 3.3. Procedure

Participants were tested individually in a quiet environment. Instructions and materials were provided in English, to maintain participants in monolingual mode (Grosjean, 2012). Nevertheless, some participants required additional guidance in Turkish, which was provided by an L1 Turkish research assistant.

Furthermore, stimuli were presented in a randomised order using DMDX software (Forster & Forster, 2003). Instructions were presented prior to the experiment, before completing 6 non-randomised practice trials, which included three control words and three non-words as target items. All items were presented in the middle of the computer screen over a white background in black lowercase letters.

Primes were presented for a total of 600ms, followed by target words which appeared and remained on the screen until participants responded or 2,500ms had elapsed. In fact, a prime-target word delay of 600ms was used since semantic priming effects are rarely found after delays longer than 1-2 seconds (McDonough and Trofimovich, 2008). A fixation point "+" was presented in the middle of the screen in between trials for 500ms. In addition, written feedback was provided for accuracy and speed, i.e., if responses were too slow, correct, or incorrect.

Participants were asked to press the "LEFT Alt" button if they identified a string of letters as an English word and the "Alt Gr" button if they did not. Both letter strings were colour-coded, whereby "LEFT Alt" was coloured in green letters, and "Alt Gr" in red letters on the screen. Moreover, in order to avoid confusion during testing sessions, a green and a red sticker were placed on each of the testing laptop's keys. Participants were asked to react as accurately and quickly as possible when deciding if the second word was real in English or not.

Additionally, participants were sent an online survey in order to gather demographic data, including age, gender, L1 and L2s, handedness, highest level of education, occupation, language exposure, and self-rated level of proficiency in English. Also, participants were provided the LEAP-Q (Marian et al., 2007) to fill in paper-and-pencil form, either in their L1 (Turkish/Spanish) or L2 (English) about their experience with the languages they spoke. In total, each experimental session took around 15-20 minutes.

## 4. Data analysis

Prior to data analysis, RT data was screened for incorrect responses and extreme values, i.e., those above and below 2.5 standard deviations from each participant's mean. As shown in Table 5, 20.2% of trials were excluded based on accuracy, whereas an additional 2.1% of cases (extreme values) were excluded. Consequently, up to 22.3% of the total data was excluded to remove incorrect answers and extreme values for each participant from further data analysis.

Following screening procedures, RTs that were lower than 200ms (0.3% of the data) were also excluded from the analysis, as they were considered excessively anticipatory (Whitney & Lavidor, 2004). As a result, 22.6% of the data was excluded. Table 5 comprises included and excluded percentages of the total data.

**Table 5: Data Screening Summary**

| | Cases | | | |
|---|---|---|---|---|
| | Included | | Excluded | |
| | *N* | *Percent* | *N* | *Percent* |
| **RT** | 3240 | 100.0% | 0 | 0.0% |
| **RT cleaned by Accuracy** | 2584 | 79.8% | 656 | 20.2% |
| **RT cleaned by Accuracy and Extreme Values** | 2516 | 77.7% | 724 | 22.3% |
| **RT cleaned by Accuracy, Extreme Values and Anticipatory Responses** | 2508 | 77.4% | 732 | 22.6% |

In addition, the comparability of stimuli from both experiments was assessed before carrying out the corresponding statistical analyses. Therefore, word frequency (for all items except non-words), L1–L2 orthographic overlap (for IHs), and word length (for all items) were analysed across experiments to assess if the materials were comparable. In fact, interlingual homographs in Experiments 1 and 2 present the exact same distribution in terms of orthographic overlap, as can be seen in Table 4.

In terms of word frequency, an independent samples t-test was conducted in order to assess the potential differences across groups for IHs and control words ($N$=120). The results from the t-test can be found in Appendix C (Tables 10 and 11), which reveal that there were no significant differences between the Turkish and Spanish experiments in terms of word frequency ($t(118)=1.62$, $p=.107$).

Subsequently, the assessment of significant differences was carried out for word length of all items, by conducting another independent samples t-test ($N$=180). Tables 12 and 13 in Appendix C report the results, which indicate that a significant different exists between length of words in Experiments 1 and 2 ($t(178)=-3.01$, $p=.003$).

Consequently, word length was included in the following analysis to account for its variability. Subsequently, normality tests were run on the cleaned RT data prior to running the necessary statistical analyses. RT data was not normally distributed, as revealed by the Shapiro-Wilk normality test ($p<.001$). Please refer to Appendix D (Table 14 and Figure 6) for the results from the normality test, which reveal positively skewed data.

As a result, a Log10 normalisation procedure was applied in order to obtain normally distributed data. Although the Shapiro-Wilk value was also lower than $p=.05$ ($p<.001$), the normality curve in the histogram enables the assumption that the data is normally distributed (Appendix D, Table 15 and Figure 7).

Subsequently, a Linear Mixed-Effects Model (GLMM) was conducted to assess if control words were acting as such, i.e., real English words which were not cognates or interlingual homographs across languages and which were not semantically related to their prime, thus, items that acted as a baseline. Hence, items were categorised as *Test* items (IHs and non-words) or *Control* items, in order to compare performance on test and control items.

Therefore, the GLMM included *L1* (Turkish/Spanish) and *Test items* (Test/Control) and their interaction as fixed factors, whereas random intercepts for *Item number*, *Word length*, and *Participant ID* were included (see model coefficients in Appendix E, Table 16). As a result, the main effect of *L1* did not reach significance ($F(1, 2504)=.001$, $p=.98$), however, both the main effect of *Test items* ($F(1, 2504)=100.9$, $p<.001$) and the *L1 x Test items* interaction reached significance ($F(1, 2504)=26.05$, $p<.001$).

The main effect of *Test item* reached significance (*F*(1, 2504)=100.9, *p*<.001) because test items were processed significantly more slowly than control words (*t*(2504)=10.04, *p*<.001). In fact, recognition of test items was significantly slower than recognition of control words for the L1 Turkish group (*t*(2504)=6.38, *p*<.001), as well as for the L1 Spanish group (*t*(2504)=11.56, *p*<.001). Therefore, the *L1 x Test* interaction arose and reached significance (*F*(1, 2504)=26.05, *p*<.001) because both L1 groups performed significantly more slowly when encountering *Test* items in comparison to *Control* items.

However, the main effect of *L1* did not reach significance (*F*(1, 2504)=.001, *p*=.98), as the difference between Turkish and Spanish participants when recognising all items was not statistically significant (*t*(2504)=.025, *p*=.98). Also, the *L1* effect was non-significant due to the lack of significant differences between Turkish and Spanish participants when recognising *Test* items (*p*=.438), or *Control* items (*p*=.414). Consequently, *Control* words were in fact processed significantly faster than *Test* items by both L1 groups (*p*<.001), thus, these items can in fact be considered control words, i.e., words that are not processed differently across L1s and that are recognised faster than test items.

## 5. Results

A linear mixed-effects model (GLMM) was conducted to assess the fixed effects of *L1* (Turkish/Spanish), *Condition* (Interlingual homograph/Control word/Non-word) and their interaction on RTs in Turkish and Spanish learners of English. Moreover, *Word length*, *Participant ID* and *Item number* were included as random factors, to account for their variability in the model (please refer to model coefficients in Appendix E, Table 17).

Subsequently, tests of fixed effects revealed no significant main effect of *L1* (*F*(1, 2502)=.142, *p*=.707). However, the main effect of *Condition* did reach significance (*F*(1, 2502)=129.716, *p*<.001), as well as the *L1 x Condition* interaction (*F*(1, 2502)=11.057, *p*<.001). The main effect of *Condition* reached significance (*F*(1, 2502)=129.716, *p*<.001) because the difference between all items was significant: IHs were recognised significantly faster than non-words (*t*(2502)=-8.193, *p*<.001), recognition of non-words was significantly slower than recognition of control words (*t*(2502)=15.994, *p*<.001), and IH recognition was significantly slower than control word recognition (*t*(2502)=8.3, *p*<.001).

Also, the significant interaction between *L1* and *Condition* ($F(1, 2502)=11.057$, $p<.001$) arose for three reasons. Firstly, both L1 groups were significantly faster when recognising IHs in comparison to non-words: Turkish ($t(2502)=-6.507$, $p<.001$) and Spanish ($t(2502)=-7.381$, $p<.001$). Also, they were significantly slower when recognising non-words than control words, Turkish group: ($t(2502)=10.736$, $p<.001$), Spanish group: ($t(2502)=16.755$, $p<.001$). Furthermore, both Turkish ($t(1808)=4.24$, $p<.001$) and Spanish participants ($t(1808)=8.47$, $p<.001$) were significantly slower when processing IHs than control words.

Nevertheless, the main effect of *L1* did not reach significance ($F(1, 2502)=.142$, $p=.707$), because although Turkish participants were faster at processing words than their Spanish counterparts, this difference was not significant ($t(2502)=-.376$, $p=.707$). Also, Turkish participants processed IHs and non-words faster than their Spanish counterparts, although these differences did not reach significance either ($t(2502)=-.837$, $p=.403$; $t(2502)=-.867$, $p=.386$, respectively). Having said this, L1 Spanish participants processed control words more rapidly than L1 Turkish participants, although this difference was not significant either ($t(2502)=-.61$, $p=.542$). On average, Turkish participants recognised interlingual homographs 209ms and non-words 217ms faster than Spanish participants, and L1 Spanish participants' average processing speed for control words was 152ms quicker than that of the L1 Turkish group.

## 6. Discussion

In relation to the first research question, i.e., if recognition of interlingual homographs in participants' L2 (English) leads to L1 (Spanish or Turkish) activation, results reveal that recognition of IHs entails co-activation of languages in L1 Spanish and L1 Turkish learners of English. Therefore, a homograph effect was found, thus, words that share spelling but differ in meaning across languages were processed differently than control words.

In fact, IH recognition was significantly slower than control word recognition. Processing in both L1 groups followed the same direction, wherein interlingual homographs were recognised more slowly by L1 Turkish and L1 Spanish participants than control words. As a result, longer reaction times in IH trials reveal a homograph inhibition effect and the presence of L1 activation during L2 word recognition for L1 Spanish and L1 Turkish participants.

Furthermore, the null hypothesis must be accepted for the second research question, whereby language typology does not have a significant effect on L2 word recognition. Although the initial prediction was confirmed, i.e., L1 Spanish participants were slower when processing words in English than their L1 Turkish counterparts, this difference did not reach significance (*p*=.707).

Therefore, L1 Spanish learners of English could have experienced more cross-language activation when processing items in English than L1 Turkish learners. Nevertheless, attributing this disparity to typological differences across languages would be too courageous. Also, the lack of statistical significance requires a cautious evaluation of these results, hence, by establishing that language typology does not affect L2 word recognition significantly.

Consequently, semantic priming effects were not found in the present study in either the Turkish-English or Spanish-English experiments, as interlingual homographs – which held a semantic relationship with their primes – entailed longer response latencies than control items. It should be noted that, since primes in the present study were related to the L1-meaning of IHs, they might have reinforced L1 activation when recognising interlingual homographs as target items. Furthermore, this finding also reveals that cross-language semantic priming may in fact entail larger RTs in intermediate L2 learners.

Hence, being able to use more than one language raises the question of how bilinguals recognise words in their second language. In fact, the present study investigated three main issues: (1) the presence of dual-language activation during recognition of interlingual homographs; (2) the influence of language typology on L2 word recognition; and (3) the existence of cross-linguistic semantic priming effects in an L2 purely monolingual primed lexical decision task.

Two experiments were conducted in order to explore the aforementioned topics: two primed lexical decision tasks with Turkish-English and Spanish-English interlingual homographs, respectively. Consequently, results from both experiments revealed dual-language activation when encountering IHs in a purely monolingual task.

In fact, interlingual homographs were recognised slower than control words, but faster than non-words by Turkish and Spanish participants. Lemhöfer and Dijkstra (2004) postulate that slower recognition of non-words in L2 users occurs as they "wait for a longer period of time until the word/nonword distinction process is completed". Thus, L2 non-word recognition is slowed down relative to L1 (Lemhöfer & Dijkstra, 2004).

Furthermore, a homograph inhibitory effect was obtained, whereby recognition of IHs entailed L1 activation and was effortful. It should be noted that slower L2 word processing is due to the "relatively weak connections between phonological, orthographic, and semantic information in the less proficient speakers' L2 lexical system" (van Hell & Tanner, 2012, p. 149). Perhaps participants in the present study present weaker L2 word-form to concept mapping and fuzzy lexical representations, i.e., their L2 word encoding is still imprecise.

Consequently, the intermediate level EFL users who took part in the present study might have recognised IHs more slowly than control words in the L2 precisely because of their weak form-to-meaning mapping. Brenders et al.'s (2011) study revealed that when encountering an IH in an L2 lexical decision task, participants activated the L1 (stronger) representation – which would entail a "no" (incorrect) response – as well as the L2 (weaker) representation – which would bring forth a "yes" (correct) response. Therefore, Brenders et al. (2011) postulate that response competition and inhibition effects arise for false friends in participants with lower L2 proficiency levels.

Additionally, no significant differences were found between both L1 groups, thus, no significant effect of language typology was identified. Moreover, both lexical decision tasks included a semantic priming paradigm for target words, i.e., interlingual homographs. Nonetheless, IHs were processed more slowly than control words, which did not present semantic relationships with their primes. Consequently, no semantic priming effects were obtained by introducing items related to the L1 readings of interlingual homographs in a monolingual L2 lexical decision task. Macizo et al. (2010) suggest that "the absence of priming effect is open to alternative interpretations".

In the present study, such a lack of semantic priming effects could be due to the stimulus-onset asynchrony (SOA), i.e., millisecond intervals between primes and target words. Beauvillain and Grainger (1987) obtained cross-language semantic priming effects with short SOAs (150ms), however, no facilitation effects were found with longer SOAs (750ms). Thus, perhaps no semantic priming effects were found in the present study since the SOAs were of 600ms, despite being a brief delay of several hundred milliseconds (McDonough and Trofimovich, 2008).

## 7. Conclusion

Following the BIA+ model's assumptions, during word recognition, the complete or partial orthographic overlap of interlingual homographs across languages per se might lead to excitation of words in both languages which share the position of letters from the presented string. Also, since recognition of interlingual homographs entails co-activation of languages, it could in fact be effortful for intermediate level EFL users.

As suggested by van Hell and Tanner (2012), activation of an interlingual homographs' meanings in both languages might lead to competition between them. In fact, both L1 Turkish and Spanish participants recognised interlingual homographs much slower than control words. Thus, inhibitory effects were obtained in the present study during recognition of IHs in a primed L2 lexical decision task. Consequently, the results from the present study seem to align with Dijkstra and van Heuven's (2002) notion that "interlingual homographs are represented by two (possibly partially overlapping) representations rather than one".

Subsequently, interlingual homographs' orthographic representations are distinct across languages, although they somehow overlap. Such orthographic overlap thus entails activation of both orthographic codes, however, interlingual homographs' L1 and L2 conceptual representations are activated and compete during L2 visual word recognition in less proficient bilinguals. Furthermore, in accordance with Lemhöfer and Dijkstra (2004) temporal delay hypothesis, responses in an L2 lexical decision task could have been influenced by the earlier available L1 code rather than by the interlingual homograph's corresponding L2 reading.

If this was the case, previous activation of the L1 meaning must have been actively ignored in order to recognise IHs as real words in English (L2), which might have been responsible for their slower response latencies in comparison to control words. Moreover, weaker L2 word form-to-meaning mapping could also be responsible for slower RTs, as participants with intermediate proficiency levels will rely on the faster and stronger L1 form-to-meaning mapping when reading an interlingual homograph.

Importantly, the present study supports the language-non-selective hypothesis, whereby L2 visual word recognition in bilinguals entails activation of both languages. In the present study, both Turkish and Spanish learners of English experienced dual-language activation when recognising interlingual homographs in a purely L2 monolingual lexical decision task. Thus, participants in this study were not able to supress the non-target language (L1) when recognising IHs, i.e., they experienced language conflict.

Nonetheless, this study is not free from limitations. One limitation of this study is the comparability of both groups, i.e., L1 Turkish and L1 Spanish groups. The former group is comprised mainly by bilinguals (with multilinguals as the exception) whereas the latter consists entirely of multilinguals. Moreover, both groups differed in terms of age of acquisition of English as a foreign language: the mean age of onset was of 6 for the Spanish participants, and 11 for the Turkish participants.

Also, in terms of language exposure, the L1 Turkish group can easily be classified as Turkish-dominant. Although exposure to English was higher in the Turkish group (*M*=19.18%) than in the Spanish group (*M*=13.88%), L1 exposure was much higher for Turkish participants (*M*=78.11%) than for their Spanish counterparts (*M*=58.36%). This could be explained by the amount of exposure to other languages within the L1 Spanish group, i.e., Basque and Catalan, which accounts for 29.44% of participants' language exposure, with much within-group variability. Therefore, classifying participants from the L1 Spanish group as Spanish-dominant may not be possible, especially in comparison to their Turkish counterparts.

Additionally, results concerning language proficiency also bring forth differences between groups. Both groups presented similar mean self-ratings for their English proficiency and rated themselves as highly competent in their first language; however, many participants within the L1 Spanish group provided high proficiency self-ratings in Basque or Catalan (*M*=8).

Consequently, as mentioned above, this group of participants is not necessarily Spanish-dominant. Having said this, participant selection was an arduous task, and finding strictly Spanish-English bilingual participants was extremely complex, since both data collection locations (Bilbao, Basque Country and Barcelona, Catalonia) are bilingual communities.

Furthermore, language use during testing sessions could be posed as another limitation. Despite attempting to maintain participants in a strictly English monolingual mode, some participants required instructions in their L1. As pointed out by Grosjean (2012), when participants recognise that "the interlocutor (often the researcher) knows the other language, there is a fair chance that the bilingual speaker will leave the monolingual end of the language mode continuum".

In fact, some participants noticed they could code-switch with the Turkish research assistant (in Turkish) or with the researcher herself (in Spanish) and asked for clarifications in their L1. In relation to this, Grosjean (2012) suggests that conducting studies in bilinguals' weaker language makes keeping them in a monolingual mode even more complex. Consequently, participants' L1s were only employed when communication had broken down and if participants seemed overwhelmed by the lack of comprehension in their L2.

Moreover, the comparability of items between experiments can been identified as a limitation in the present study. As mentioned above, word length was significantly different between Experiments 1 and 2, i.e., words in the second experiment were longer than those in the first experiment. Hence, this could have affected L2 word recognition, as the presence of longer words might have brought forth longer response latencies in the Spanish group.

Notwithstanding, the longest words in both experiments had 8 letters. This is relevant because previous research has revealed that "reaction times are constant for words between 5 to 8 letters, but they increase with length for words longer than 8 letters" (Ginestet et al., 2019, p. 1). As a result, although items might not be completely comparable across experiments in terms of word length, perhaps this variable did not affect L2 word recognition negatively.

Altogether, Turkish and Spanish learners of English experienced language co-activation when deciding if interlingual homographs were real words in English. Despite not presenting significant differences between each other, the former group was slightly faster at recognising these items that the latter. Moreover, no cross-language semantic priming effects were obtained, as IHs were processed slower than non-semantically-primed items. To summarise, perhaps Turkish EFL learners eat *pasta* (cake) for dessert, and Spanish EFL learners *tender* (hang) their clothes, even when performing in English monolingual contexts.

These findings have implications concerning L2 visual word recognition in intermediate language learners and, thus, how they recognise, access, comprehend, and use words in their second language. Future research with comparable stimuli and groups (in terms of L1 and L2 proficiency and exposure) could benefit from employing the L1 as the target language, as perhaps the L2 (non-target language) is not activated due to its weaker links and representations. In sum, further research with carefully structured methods including understudied and typologically different languages may present key findings in the field of bilingual word processing.

9,441 words (including Abstract)

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## Appendix A – Experiment 1: non-words, control words and Turkish-English interlingual homographs (including word frequency and length)

**Table 6: Experiment 1 (Turkish-English) stimuli**

| Trial type | Prime | Length | Frequency | Target word | Length | Frequency | Turkish IH meaning |
|---|---|---|---|---|---|---|---|
| Practice (non-word) | find | 4 | 5.89 | pheck | 5 | X | |
| Practice (non-word) | pretty | 6 | 5.50 | snorth | 6 | X | |
| Practice | break | 5 | 5.23 | open | 4 | 5.41 | |
| Practice (non-word) | stuff | 5 | 5.39 | gwut | 4 | X | |
| Practice | lose | 4 | 5.11 | door | 4 | 5.26 | |
| Practice | strong | 6 | 5.25 | next | 4 | 5.89 | |
| Non-word | dream | 5 | 5 | ballop | 6 | X | |
| Non-word | happen | 6 | 5.32 | bannow | 6 | X | |
| Non-word | marry | 5 | 4.43 | diller | 6 | X | |
| Non-word | lunch | 5 | 4.72 | glistow | 6 | X | |
| Non-word | believe | 7 | 5.56 | hampent | 7 | X | |
| Non-word | song | 4 | 5.10 | prindle | 6 | X | |
| Non-word | box | 3 | 5.12 | rubid | 5 | X | |
| Non-word | jump | 4 | 4.84 | sladding | 7 | X | |
| Non-word | body | 4 | 5.18 | tafflest | 8 | X | |
| Non-word | love | 4 | 5.88 | featon | 6 | X | |
| Non-word | mouth | 5 | 4.78 | crult | 5 | X | |
| Non-word | glass | 5 | 4.92 | scomb | 5 | X | |
| Non-word | win | 3 | 5.49 | cloozed | 7 | X | |
| Non-word | grass | 5 | 4.58 | coth | 4 | X | |
| Non-word | hill | 4 | 4.71 | twert | 5 | X | |
| Non-word | shut | 4 | 4.85 | grons | 5 | X | |
| Non-word | call | 4 | 5.54 | barse | 5 | X | |
| Non-word | thing | 5 | 5.94 | guct | 4 | X | |
| Non-word | need | 4 | 6.07 | leighth | 7 | X | |
| Non-word | way | 3 | 6.12 | stroob | 6 | X | |
| Non-word | feel | 4 | 5.73 | swarb | 5 | X | |
| Non-word | parent | 6 | 4.21 | knorld | 6 | X | |
| Non-word | water | 5 | 5.53 | thun | 4 | X | |
| Non-word | city | 4 | 5.40 | vib | 3 | X | |
| Non-word | deal | 4 | 5.34 | floist | 6 | X | |
| Non-word | free | 4 | 5.25 | dreathe | 7 | X | |
| Non-word | weird | 5 | 4.75 | knerp | 5 | X | |
| Non-word | course | 6 | 5.67 | gusk | 4 | X | |
| Non-word | point | 5 | 5.60 | drutched | 8 | X | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Non-word | afraid | 6 | 5.03 | chorn | 5 | X | |
| Interlingual homograph | hip | 3 | 4.37 | bell | 4 | 4.54 | *bel = waist* |
| Interlingual homograph | woman | 5 | 5.22 | bay | 3 | 4.55 | *gentleman* |
| Interlingual homograph | work | 4 | 5.99 | fabric | 6 | 3.97 | *fabrika = factory* |
| Interlingual homograph | offend | 6 | 3.45 | and | 3 | 7.32 | *to swear* |
| Interlingual homograph | plus | 4 | 4.78 | on | 2 | 6.89 | *ten (10)* |
| Interlingual homograph | play | 4 | 5.69 | top | 3 | 5.64 | *ball* |
| Interlingual homograph | cow | 3 | 4.44 | at | 2 | 6.69 | *horse* |
| Interlingual homograph | spirit | 6 | 4.66 | moral | 5 | 4.28 | *spiritual state* |
| Interlingual homograph | near | 4 | 5.08 | gel | 3 | 3.62 | *come!* |
| Interlingual homograph | mode | 4 | 3.84 | tip | 3 | 4.55 | *style* |
| Interlingual homograph | slow | 4 | 4.81 | art | 3 | 5.15 | *behind* |
| Interlingual homograph | many | 4 | 5.87 | bin | 3 | 4.49 | *thousand (1.000)* |
| Interlingual homograph | measure | 7 | 4.48 | boy | 3 | 5.28 | *height, size* |
| Interlingual homograph | health | 6 | 5.14 | can | 3 | 6.56 | *life, spirit* |
| Interlingual homograph | sweet | 5 | 4.98 | pasta | 5 | 4.19 | *cake* |
| Interlingual homograph | rank | 4 | 3.90 | cat | 3 | 4.83 | *kat = layer. floor* |
| Interlingual homograph | cool | 4 | 5.07 | climate | 7 | 4.47 | *klima = air conditioning* |
| Interlingual homograph | drive | 5 | 5 | hat | 3 | 4.76 | *route* |
| Interlingual homograph | laugh | 5 | 4.77 | mascara | 7 | 3.05 | *maskara = joker* |
| Interlingual homograph | volume | 6 | 4.07 | say | 3 | 6.13 | *sound* |
| Interlingual homograph | abort | 5 | 2.92 | son | 3 | 5.17 | *end. finish* |
| Interlingual homograph | hero | 4 | 4.53 | put | 3 | 5.99 | *idol* |
| Interlingual homograph | title | 5 | 4.77 | ad | 2 | 4.09 | *name* |
| Interlingual homograph | time | 4 | 6.35 | sure | 4 | 5.80 | *süre = period, duration* |
| Interlingual homograph | face | 4 | 5.44 | bash | 4 | 3.71 | *baş = head* |
| Interlingual homograph | earth | 5 | 5 | kill | 4 | 4.91 | *kil = clay* |
| Interlingual homograph | negation | 8 | 1.74 | red | 3 | 5.41 | *rejection, denial* |
| Interlingual homograph | street | 6 | 5.20 | ray | 3 | 4.56 | *track* |
| Interlingual homograph | error | 5 | 4.17 | pot | 3 | 4.76 | *clumsy mistake* |
| Interlingual homograph | burn | 4 | 4.40 | mum | 3 | 5.46 | *candle* |
| Control | date | 4 | 4.94 | sleep | 5 | 4.94 | |
| Control | place | 5 | 5.78 | have | 4 | 6.90 | |
| Control | town | 4 | 5.24 | hard | 4 | 5.58 | |
| Control | brother | 7 | 5.01 | easy | 4 | 5.32 | |
| Control | vase | 4 | 4.27 | get | 3 | 6.49 | |
| Control | fun | 3 | 5.31 | know | 4 | 6.43 | |
| Control | honey | 5 | 4.60 | think | 5 | 6.51 | |
| Control | mind | 4 | 5.47 | wear | 4 | 4.89 | |
| Control | other | 5 | 5.98 | want | 4 | 6.22 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Control | worry | 5 | 5.14 | good | 4 | 6.35 |
| Control | bottle | 6 | 4.65 | like | 4 | 6.53 |
| Control | heart | 5 | 5.30 | look | 4 | 6.23 |
| Control | sister | 6 | 4.91 | coin | 4 | 4.05 |
| Control | eye | 3 | 5.13 | friend | 6 | 5.29 |
| Control | story | 5 | 5.42 | man | 3 | 5.86 |
| Control | child | 5 | 5.14 | suppose | 7 | 5.02 |
| Control | book | 4 | 5.21 | people | 6 | 6.35 |
| Control | game | 4 | 5.54 | year | 4 | 5.92 |
| Control | hair | 4 | 5.03 | night | 5 | 5.65 |
| Control | news | 4 | 5.41 | baby | 4 | 5.29 |
| Control | hand | 4 | 5.44 | crazy | 5 | 4.79 |
| Control | month | 5 | 5.08 | girl | 4 | 5.29 |
| Control | walk | 4 | 5.19 | house | 5 | 5.83 |
| Control | dog | 3 | 5.17 | school | 6 | 5.45 |
| Control | drink | 5 | 5.06 | money | 5 | 5.84 |
| Control | hour | 4 | 5.17 | write | 5 | 4.89 |
| Control | forget | 6 | 5.04 | world | 5 | 5.88 |
| Control | couple | 6 | 5.42 | room | 4 | 5.60 |
| Control | dinner | 6 | 4.77 | week | 4 | 5.66 |
| Control | food | 4 | 5.45 | morning | 7 | 5.50 |

## Appendix B – Experiment 2: control words and Spanish-English interlingual homographs (including word frequency and length)

Practice and non-word items were identical to those in Experiment 1.

**Table 7: Experiment 2 (Spanish-English) stimuli**

| Trial type | Prime | Length | Frequency | Target word | Length | Frequency | Spanish IH meaning |
|---|---|---|---|---|---|---|---|
| Interlingual homograph | toe | 3 | 4.08 | pie | 3 | 4.55 | *foot* |
| Interlingual homograph | butter | 6 | 4.68 | pan | 3 | 4.60 | *bread* |
| Interlingual homograph | fish | 4 | 5.19 | red | 3 | 5.41 | *net* |
| Interlingual homograph | out | 3 | 6.48 | sale | 4 | 4.89 | *(he/she/it) exits* |
| Interlingual homograph | live | 4 | 5.50 | son | 3 | 5.17 | *(they) are* |
| Interlingual homograph | young | 5 | 5.51 | mayor | 5 | 4.39 | *older* |
| Interlingual homograph | add | 3 | 5.00 | once | 4 | 5.51 | *eleven (11)* |
| Interlingual homograph | not | 3 | 6.72 | sin | 3 | 3.96 | *without* |
| Interlingual homograph | leave | 5 | 5.49 | van | 3 | 4.69 | *(they) go* |
| Interlingual homograph | speak | 5 | 5.09 | dice | 4 | 3.71 | *(he/she/it) says* |
| Interlingual homograph | clothes | 7 | 4.74 | tender | 6 | 4.06 | *to hang* |
| Interlingual homograph | jewel | 5 | 3.76 | collar | 6 | 3.98 | *necklace* |
| Interlingual homograph | beach | 5 | 4.72 | arena | 5 | 4.04 | *sand* |
| Interlingual homograph | play | 4 | 5.69 | as | 2 | 6.61 | *ace* |
| Interlingual homograph | work | 4 | 5.99 | fabric | 6 | 3.97 | *fábrica = factory* |
| Interlingual homograph | join | 4 | 5.10 | grape | 5 | 3.54 | *grapé = (I) stapled* |
| Interlingual homograph | now | 3 | 6.44 | actual | 6 | 4.60 | *current* |
| Interlingual homograph | food | 4 | 5.45 | come | 4 | 6.26 | *(he/she/it) eats* |
| Interlingual homograph | involve | 7 | 4.07 | liar | 4 | 3.97 | *wrap, complicate* |
| Interlingual homograph | engage | 6 | 4.13 | case | 4 | 5.43 | *casé = (I) got married* |
| Interlingual homograph | drink | 5 | 5.06 | vase | 4 | 4.27 | *vaso = glass, cup* |
| Interlingual homograph | fake | 4 | 4.51 | time | 4 | 6.35 | *timé = (I) tricked, deceived* |
| Interlingual homograph | ring | 4 | 4.92 | llama | 5 | 3.12 | *(he/she/it) calls* |
| Interlingual homograph | catch | 5 | 5.04 | quite | 5 | 5.92 | *quité = (I) took, snatched* |
| Interlingual homograph | fix | 3 | 4.57 | taller | 6 | 3.77 | *workshop* |
| Interlingual homograph | sweet | 5 | 4.98 | pastel | 6 | 3.08 | *cake* |
| Interlingual homograph | stop | 4 | 5.55 | fin | 3 | 3.59 | *end* |
| Interlingual homograph | myself | 6 | 5.28 | soy | 3 | 3.64 | *(I) am* |
| Interlingual homograph | shake | 5 | 4.58 | revolver | 8 | 2.85 | *to stir* |
| Interlingual homograph | hold | 4 | 5.32 | pillar | 6 | 3.54 | *to catch* |
| Control | date | 4 | 4.94 | sleep | 5 | 4.94 | |
| Control | place | 5 | 5.78 | have | 4 | 6.90 | |
| Control | town | 4 | 5.24 | hard | 4 | 5.58 | |
| Control | brother | 7 | 5.01 | easy | 4 | 5.32 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Control | miss | 4 | 5.21 | get | 3 | 6.49 |
| Control | fun | 3 | 5.31 | know | 4 | 6.43 |
| Control | honey | 5 | 4.60 | think | 5 | 6.51 |
| Control | mind | 4 | 5.47 | wear | 4 | 4.89 |
| Control | other | 5 | 5.98 | want | 4 | 6.22 |
| Control | worry | 5 | 5.14 | good | 4 | 6.35 |
| Control | bottle | 6 | 4.65 | like | 4 | 6.53 |
| Control | heart | 5 | 5.30 | look | 4 | 6.23 |
| Control | sister | 6 | 4.91 | coin | 4 | 4.05 |
| Control | eye | 3 | 5.13 | friend | 6 | 5.29 |
| Control | story | 5 | 5.42 | man | 3 | 5.86 |
| Control | child | 5 | 5.14 | suppose | 7 | 5.02 |
| Control | book | 4 | 5.21 | people | 6 | 6.35 |
| Control | game | 4 | 5.54 | year | 4 | 5.92 |
| Control | hair | 4 | 5.03 | night | 5 | 5.65 |
| Control | news | 4 | 5.41 | baby | 4 | 5.29 |
| Control | hand | 4 | 5.44 | crazy | 5 | 4.79 |
| Control | month | 5 | 5.08 | girl | 4 | 5.29 |
| Control | walk | 4 | 5.19 | house | 5 | 5.83 |
| Control | dog | 3 | 5.17 | school | 6 | 5.45 |
| Control | part | 4 | 5.67 | money | 5 | 5.84 |
| Control | hour | 4 | 5.17 | write | 5 | 4.89 |
| Control | forget | 6 | 5.04 | world | 5 | 5.88 |
| Control | couple | 6 | 5.42 | room | 4 | 5.60 |
| Control | dinner | 6 | 4.77 | week | 4 | 5.66 |
| Control | ready | 5 | 5.52 | morning | 7 | 5.50 |

## Appendix C: Results from speed of lexical access, word frequency, and word length independent samples t-tests

**Table 8: Group statistics (speed of lexical access)**

| | L1 | *N* | *M* | *SD* | *SE Mean* |
|---|---|---|---|---|---|
| **RT_N1** | **Turkish** | 444 | 2.7670 | .12409 | .00589 |
| | **Spanish** | 560 | 2.7654 | .11340 | .00479 |

**Table 9: Independent Samples Test (speed of lexical access)**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *F* | *p* | *t* | *df* | *p (2-tailed)* | *Mean Difference* | *SE Difference* | *95% CI of the Difference* Lower | Upper |
| **RT_N1** | Equal variances assumed | 1.565 | .211 | .211 | 1002 | .833 | .00159 | .00751 | -.01316 | .01633 |
| | Equal variances not assumed | | | .209 | 908.269 | .835 | .00159 | .00759 | -.01332 | .01649 |

**Table 10: Group Statistics (word frequency)**

| | L1 | *N* | *M* | *SD* | *SE Mean* |
|---|---|---|---|---|---|
| **Frequency** | **Turkish** | 60 | 5.35 | .90 | .11 |
| | **Spanish** | 60 | 5.06 | 1.04 | .13 |

**Table 11: Independent Samples Test (word frequency)**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *F* | *p* | *t* | *df* | *p (2-tailed)* | *Mean Difference* | *SE Difference* | *95% CI of the Difference* Lower | Upper |
| **Frequency** | Equal variances assumed | 2.354 | .128 | 1.623 | 118 | .107 | .28951 | .17839 | -.06375 | .64277 |
| | Equal variances not assumed | | | 1.623 | 115.803 | .107 | .28951 | .17839 | -.06382 | .64284 |

**Table 12: Group Statistics (word length)**

| | L1 | *N* | *Mean* | *SD* | *SE Mean* |
|---|---|---|---|---|---|
| **Word length** | **Turkish** | 90 | 4.23 | 1.594 | .168 |
| | **Spanish** | 90 | 4.89 | 1.311 | .138 |

**Table 13: Independent Samples Test (word length)**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *F* | *p* | *t* | *df* | *p (2-tailed)* | *Mean Difference* | *SE Difference* | *95% CI of the Difference* | |
| | | | | | | | | | *Lower* | *Upper* |
| **Word length** | Equal variances assumed | 7.345 | .007 | -3.014 | 178 | .003 | -.656 | .218 | -1.085 | -.226 |
| | Equal variances not assumed | | | -3.014 | 171.597 | .003 | -.656 | .218 | -1.085 | -.226 |

## Appendix D: Normality tests for RT data

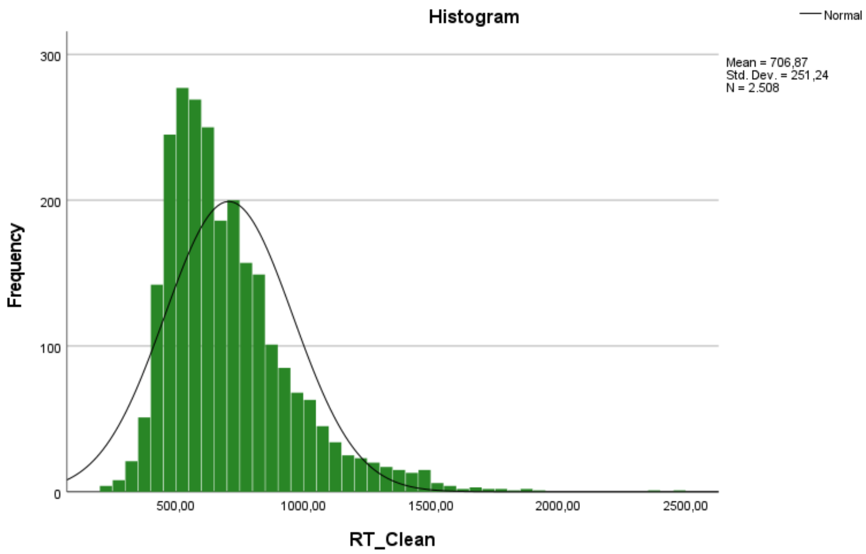


*Figure 6: Histogram representing cleaned RT's lack of normality of distribution.*

**Table 14: Shapiro-Wilk test of Normality (N=36)**

| | Shapiro-Wilk | | |
|---|---|---|---|
| | ***Statistic*** | ***df*** | ***p*** |
| **RT_Clean** | .902 | 2508 | .000 |

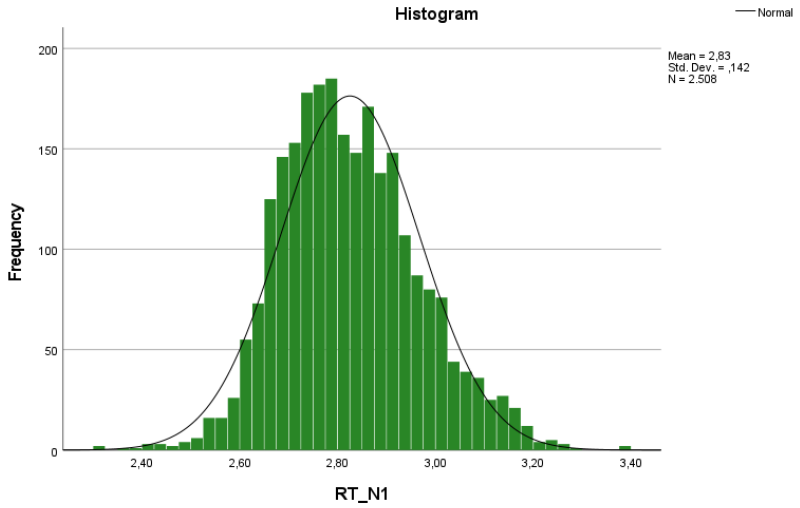


*Figure 7: Histogram representing cleaned and normalised RT's normality of distribution.*

**Table 15: Shapiro-Wilk test of Normality (N=36)**

| | Shapiro-Wilk | | |
|---|---|---|---|
| | ***Statistic*** | ***df*** | ***p*** |
| **RT_N1** | .043 | 2508 | .000 |

## Appendix E: Parameter estimates for linear mixed model analyses

**Table 16: Results for the analysis of control words across L1s (Turkish-Spanish)**

| | ***β*** | ***SE*** | ***t*** | ***p*** | ***95% CI*** |
|---|---|---|---|---|---|
| **Intercept** | 2.703 | .0227 | 119.173 | .000 | 2.658-2.747 |
| **L1 Turkish** | .023 | .0278 | .816 | .414 | -.032-.077 |
| **L1 Spanish** | .023 | .0278 | .816 | .414 | -.032-.077 |
| **Test items (Test)** | .116 | .0101 | 11.568 | .000 | .097-.136 |
| **Test items (Control)** | .116 | .0101 | 11.568 | .000 | .097-.136 |
| **L1 (Turkish) x Test items (Test)** | -.044 | .0086 | -5.104 | .000 | -.061--.027 |
| **L1 (Turkish) x Test items (Control)** | -.044 | .0086 | -5.104 | .000 | -.061--.027 |
| **L1 (Spanish) x Test items (Test)** | -.044 | .0086 | -5.104 | .000 | -.061--.027 |
| **L1 (Spanish) x Test items (Control)** | -.044 | .0086 | -5.104 | .000 | -.061--.027 |

**Table 17: Results for the analysis of interlingual homographs and control words across L1s (Turkish-Spanish)**

| | ***β*** | ***SE*** | ***t*** | ***p*** | ***95% CI*** |
|---|---|---|---|---|---|
| **Intercept** | 2.729 | .0216 | 126.481 | .000 | 2.687-2.771 |
| **L1 Turkish** | .017 | .0275 | .610 | .542 | -.037-.071 |
| **L1 Spanish** | .017 | .0275 | .610 | .542 | -.037-.071 |
| **Condition (Interlingual homograph)** | .083 | .0088 | 9.398 | .000 | .065-.1 |
| **Condition (Non-word)** | .154 | .0092 | 16.755 | .000 | .136-.172 |
| **Condition (Control word)** | .154 | .0092 | 16.755 | .000 | .136-.172 |
| **L1 (Turkish) x Condition (IH)** | -.040 | .0098 | -4.057 | .000 | -.059--.021 |
| **L1 (Turkish) x Condition (NW)** | -.041 | .0106 | -3.855 | .000 | -.062--.02 |
| **L1 (Turkish) x Condition (CW)** | -.041 | .0106 | -3.855 | .000 | -.062--.02 |
| **L1 (Spanish) x Condition (IH)** | -.041 | .0106 | -3.855 | .000 | -.062--.02 |
| **L1 (Spanish) x Condition (NW)** | -.041 | .0106 | -3.855 | .000 | -.062--.02 |
| **L1 (Spanish) x Condition (CW)** | -.041 | .0106 | -3.855 | .000 | -.062--.02 |

## Appendix F: Consent forms

### English version

Informed consent to participate in research

Researcher: Lara Maite Kelly Iturriaga

Email address: larakelly75@gmail.com

Introduction

I am currently conducting research in Applied Linguistics at the University of Barcelona – Universitat de Barcelona (UB). This research project focuses on word recognition in learners of English as a foreign language.

The purpose of this study is to investigate how learners of English as a foreign language process and recognise words in their second language. The procedure for data collection in the present study will be the following:

1) An online language background questionnaire will be given, including demographic and linguistic data. Your information and survey responses will be strictly confidential.
2) The experiment in this study will include a lexical decision task, where you will be asked to decide if a given word is a real word in English or not. The duration of the task will be of approximately 5 minutes.
3) The Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian, Blumenfeld, & Kaushanskaya, 2007) will be given in paper-and-pencil form. You will be offered the possibility to complete the form in your first language, i.e., Turkish or Spanish.

Confidentiality

The data that I will be collecting will be completely anonymous and confidential. Participants' privacy will be respected at all times. Moreover, feel free to contact the researcher if you have any questions or doubts about the study, its procedure, and any other relevant factors.

New findings

If you would like me to, I will contact you to explain the results of this study after it has been concluded.

Your rights as a participant

Your participation in this study is completely voluntary and you will face no penalty for not taking part in it. You are free to decide if you are willing to participate and can withdraw from the process whenever you may request to do so. Having said this, the present study could contribute to the academic field as well as to society as a whole.

I understand that my participation is voluntary and that I can withdraw from the study at any time. I have understood and express my consent to take part in the present study.

Name: Signature:

Surname:

## Spanish version

### Consentimiento informado para participar en un proyecto de investigación

Investigadora: Lara Maite Kelly Iturriaga

Email: larakelly75@gmail.com

### Introducción

Estoy llevando a cabo un proyecto de investigación en Lingüística Aplicada en la Universitat de Barcelona (UB), cuyo objetivo es analizar cómo las personas que hablan inglés como lengua extranjera reconocen palabras en inglés.

El objetivo de este estudio es investigar cómo dichas personas procesan y reconocen palabras en su segundo idioma. El procedimiento para la recolección de datos será el siguiente:

1) Se proporcionará un cuestionario on-line sobre experiencia previa con idiomas, incluyendo datos demográficos y lingüísticos. Su información y sus respuestas serán estrictamente confidenciales.
2) El experimento de este estudio incluirá una tarea de decisión léxica, donde deberá decidir si una palabra existe en inglés o no. La tarea tiene una duración aproximada de 5 minutos.
3) Se le entregará el Cuestionario de Experiencia y Competencia Lingüística (LEAP-Q) (Marian, Blumenfeld, & Kaushanskaya, 2007), y tendrá la opción de completarlo en inglés o en su idioma materno, i.e., castellano.

### Confidencialidad

Los datos recopilados serán completamente anónimos y confidenciales. La privacidad de los y las participantes será respetada en todo momento. Además, no dude en contactar con la investigadora para consultar dudas o preguntas que pueda tener sobre el proyecto, su procedimiento, o cualquier otro factor que le resulte relevante.

### Nuevos descubrimientos

Si quisiera, podría ponerme en contacto con usted para explicarle los resultados del estudio una vez finalizado.

### Sus derechos como participante

Su participación en este proyecto es completamente voluntaria y no recibirá ningún tipo de sanción por decidir no tomar parte en él. Usted es libre de decidir si desea participar y puede solicitar retirarse del proceso en cualquier momento. Dicho esto, este proyecto de investigación puede contribuir al campo académico, además de a la sociedad en general.

Entiendo que mi participación es voluntaria y que puedo retirarme del estudio si lo deseo. He comprendido y doy mi consentimiento para participar en este proyecto.

Nombre: Firma:

Apellidos:

## Turkish version

### Katılımcı bilgilendirme formu

**Araştırmacı:** Lara Maite Kelly Iturriaga

**E-posta adresi:** larakelly75@gmail.com

### Giriş

Şu anda Barselona Üniversitesi – Universitat de Barcelona'da (UB) Uygulamalı Dilbilim alanında araştırma yapıyorum. Araştırma projesi, İngilizceyi yabancı dil olarak öğrenen kişilerde kelime tanımaya odaklanmaktadır.

Bu çalışmanın amacı, yabancı dil olarak İngilizce öğrenenlerin ikinci dillerindeki kelimeleri nasıl tanıdıklarını ve nasıl öğrendiklerini araştırmaktır. Bu çalışmada veri toplama prosedürü aşağıdaki gibi olacaktır:

1) Demografik ve dilsel verileri içeren bir çevrimiçi dil geçmişi anketi verilecektir. Bilgileriniz ve anket yanıtlarınız kesinlikle gizli tutulacaktır.
2) Bu çalışmadaki deney, verilen bir kelimenin İngilizce'de gerçek bir kelime olup olmadığına karar vermenizin isteneceği bir sözlüksel karar görevi içerecektir. Görevin süresi yaklaşık 5 dakika olacaktır.
3) Dil Becerisi ve Yeterlilik Anketi (LEAP-Q) (Marian, Blumenfeld ve Kaushanskaya, 2007) kağıt-kalem şeklinde verilecektir. Formu ana dilinizde, yani Türkçe veya İspanyolca olarak doldurma imkanı sunulacaktır.

### Gizlilik

Toplayacağım veriler tamamen anonim ve gizli olacaktır. Katılımcıların mahremiyetine her zaman saygı duyulacaktır. Ayrıca, çalışma, prosedürü ve diğer ilgili faktörler hakkında herhangi bir sorunuz veya şüpheniz varsa, araştırmacıyla iletişime geçmekten çekinmeyin.

### Yeni bulgular

Eğer isterseniz, bu çalışmanın sonuçlarını, çalışma bittikten sonra açıklamak için sizinle iletişime geçeceğim.

### Katılımcı olarak haklarınız

Bu çalışmaya katılımınız tamamen isteğe bağlıdır ve katılmadığınız için herhangi bir ceza ile karşılaşmazsınız. Katılmak isteyip istemediğinize karar vermekte özgürsünüz ve istediğiniz zaman süreçten çekilebilirsiniz. Bununla birlikte, bu çalışma bir bütün olarak topluma olduğu kadar akademik alana da katkıda bulunabilir.

Katılımımın gönüllü olduğunu ve istediğim zaman araştırmadan çekilebileceğimi anlıyorum. Yukarıda yazılanları anladım ve bu çalışmaya katılmak için onayımı ifade ediyorum.

İsim: İmza:

Soyisim: