The Processing of English-Turkish (False) Cognates: Evidence from a Backward Lexical Translation Task

Türkçe-İngilizce (Yalancı) Eşdeğer Sözcüklerin İşlemlenmesi: Sözcüksel Tersine Çeviri Görevi Bulguları[1]

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Abstract
Cognate facilitation and false cognate inhibition effects have been tested in various language pairs with different experimental tasks and participant profiles so far. However, studies focusing on the recognition or production of (false) cognates are nearly absent for Turkish-English despite the prevalence of these words. Thus, using a backward lexical translation task (from L2 to L1), this study aimed to investigate whether cognate facilitation and false cognate inhibition effects could be observed in Turkish-English by testing 50 adult Turkish L2 speakers of English. The materials were made up of cognates, false cognates, and controls. The effect of L2 proficiency was also manipulated by dividing the participants into two proficiency groups (high vs. low) based on OPT scores. Also, the role of morphology was introduced by using mismatch items (polymorphemic in L2 but monomorphemic in L1). The findings showed a robust cognate facilitation and false cognate inhibition but no significant effect of L2 proficiency. The role of morphology was not conclusive and came with its limitations. These results provided supporting evidence for the language non-selective view and pointed towards the presence of these effects irrespective of language, task or participant profile. Also, a compelling need for measuring proficiency using multiple measures emerged.
Keywords: (false) cognate effect, Turkish, English, morphology, backward lexical translation task

Öz
Hızlandırıcı eşdeğer ve yavaşlatıcı yalancı eşdeğer etkileri şimdiye dek çeşitli dil ikililerinde farklı deneysel görevler ve katılımcı grupları kullanılarak sınanmıştır. Ancak (yalancı) eşdeğer sözcüklerin Türkçe-İngilizce dil ikilisi arasındaki yaygınlığına rağmen, bu sözcüklerin tanınması ve üretimine odaklanan çalışmalar bu ikili arasında yok denecek kadar azdır. Dolayısıyla bu çalışmada, hızlandırıcı eşdeğer ve yavaşlatıcı

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yalancı eşdeğer etkilerinin var olup olmadığı sözcüksel tersine çeviri (D2'den D1'e) görevi kullanılarak araştırılmıştır. Çalışmaya 50 yetişkin D1 Türkçe D2 İngilizce konuşuru katılmıştır. Çalışma kapsamında eşdeğer, yalancı eşdeğer ve kontrol türünde sözcükler sınanmıştır. Ayrıca, İngilizce Yeterlik Testi sonuçlarına göre katılımcılar iki gruba ayrılmış (yüksek ve düşük) ve böylece D2 yeterliği bağımsız değişken olarak çalışmaya eklenmiştir. Dahası, uyumsuz durum (D2'de çok biçimbirimli D1'de tek biçimbirimli) dahil edilerek olası biçimbilimsel etkiler sınanmıştır. Sonuçlar hızlandırıcı eşdeğer ve yavaşlatıcı yalancı eşdeğer etkileri ortaya koymuş ancak D2 yeterliğinin belirgin bir etkisine rastlanılmamıştır. Deneysel desen kaynaklı bazı kısıtlar sebebiyle biçimbilimin etkisi hakkında kesin iddialar ortaya koymak mümkün olamamıştır. Tüm bu bulgular seçici ikidilli (language non-selective) görüşünü ve bu etkilerin sınanan diller, kullanılan görev ve katılımcı profilinden bağımsız ortaya çıktığını destekler niteliktedir. Son olarak, bu çalışma dil yeterliğini ölçmede birden çok ölçütten faydalanılması gerekliliğini ortaya koymuştur.
Anahtar Kelimeler: (yalancı) eşdeğer etkisi, Türkçe, İngilizce, biçimbilim, sözcüksel tersine çeviri görevi

Introduction

The processing of cognates and false cognates has been quite a prominent topic for researchers interested in second language acquisition and psycholinguistics for decades (Otwinowska and Szewczyk 975). This interest mostly results from the orthographic and/or phonological similarity that (false) cognates have in the L1 and the L2, which might reveal important insights about not only the organization of the bilingual mental lexicon but also about cross-linguistic influence. Cognates can be described as words that have similar or the same orthographic and/or phonological appearance as well as the same meaning in two languages (e.g., meteor in Turkish and English). False cognates, on the other hand, do not bear the same meaning despite being orthographically similar or the same (e.g., pasta, which means cake in Turkish and pasta in English) (Otwinowska and Szewczyk 974).

Since cognates share orthographical and/or phonological as well as semantic information, they have been claimed to incur an advantage compared to non-cognates during processing. This advantage usually entails faster processing or production of cognates and lower error rates compared to non-cognate control words (Bosma et al. 372). Previous studies have investigated whether the cognate facilitation effect is observed for different L1-L2 language pairs such as Polish-English (Otwinowska and Szewczyk 974), English-French (Midgley et al. 1634; Janke and Kolokonte 1), Frisian-Dutch (Bosma et al.), Spanish-English (Rosselli et al. 649), Swedish-German (Lindgren and Bohnacker 587), German-English (Schröter and Schroeder 239), Japanese-English (Hoshino and Kroll 501) and Dutch-English (Dijkstra, Grainger, et al. 496; Brenders et al. 383). Overall, these studies indicate that the cognate facilitation effect is valid across participant groups (e.g., adults, bilingual children) in various tasks (e.g., lexical decision, receptive vocabulary, picture naming, backward lexical translation)

and regardless of the typological or script differences between the language pairs tested.

False cognates, on the other hand, have been claimed to cause a processing disadvantage (i.e., slower reaction times or lower accuracy) in comparison with control words, which are neither cognates nor false cognates, as they are in a sense deceiving the readers with their orthographic similarity but meaning difference. Most cognate studies have also integrated false cognates into their study designs to show how one word having different meanings in the L1 and L2 can affect word processing. The results on false cognates point towards a slower processing pattern and comparatively higher error rates compared to control words (de Groot et al. 408; Durlik et al. 12).

Considering the Turkish-English language pair, studies have mainly focused on listing cognate and false cognate pairs or on how to teach them since they may be easier or harder to learn for second language learners depending on their (false) cognateness (Uzun and Salihoglu 555; Solak and Cakir 431; Yetkin 1301). In a collaborative project with the participation of seven hundred university students, Turkish-English (false) cognate pairs were compiled with the help of four dictionaries. As a result, it was found that there were 2411 Turkish-English cognates and false cognates in total out of nearly 80,000 words that were inspected (Uzun and Salihoglu 566). However, despite the prevalence of Turkish-English cognates and false cognates, studies examining the recognition or production of (false) cognates are nearly non-existent. Thus, it is crucial to investigate whether cognate facilitation and/or false cognate inhibition can be observed for Turkish-English.

More recent studies have indicated that cognate effects are modulated by a number of factors like the nature of the stimulus materials, the L2 proficiency of the participants, and task demands. Among these, L2 proficiency appears to play a particularly important role in that the cognate facilitation effect has been reported to decrease with increasing L2 proficiency, which may imply that cognate facilitation is to a certain extent the result of a difference in relative activation strength of the two languages involved (Otwinowska and Szewczyk 978; Bultena et al. 1214). As L2 proficiency and exposure to L2 words increase due to greater exposure to lexical items in L2, the L2 is activated to a greater extent and the representational strengths activation levels in the two languages become more similar (Bultena et al. 1234). To the best of our knowledge, there is no experimental study investigating Turkish-English (false) cognate effects with a focus on the potential role of L2 proficiency.

Dwelling on this background, this study has two major aims. First, it aims to investigate whether the (false) cognate effect, which has been found to exist for different language pairs irrespective of typological or script distance, will be observed between Turkish (L1) and English (L2). The second aim is to examine whether the L2 English proficiency level of the participants has any impact on how Turkish-English cognates are processed.

Previous Studies

How cognates are processed compared to non-cognate controls has been utilized as supportive or contradictory evidence for language selective/non-selective access views. These views are used to explain whether bilingual/L2 speakers have access to only one of their languages or both of them while processing a word in either of the two languages that they speak. The language selective view is based on the idea that when bilingual/L2 speakers are presented with a word, they activate only the representation in that specific language but not the one in the other language(s) they know (de Groot et al. 398). The language non-selective view, on the other hand, refers to the access to both lexicons or the activation of representations in both (or all) languages when only one of them is seen (Dijkstra, Van Jaarsveld, et al. 51). If both lexicons are accessed, a cognate facilitation effect should be observed since seeing one member of a cognate pair (e.g., English camp) should activate the other member of the pair in the other language (e.g., Turkish *kamp*) due to orthographic, and/or phonological and semantic similarities. Any facilitation observed for cognate words compared to matched control non-cognate words is taken as evidence for the language non-selective view (Dijkstra et al. 497; Brenders et al. 384).

Most of the studies conducted with cognates and false cognates have found robust cognate facilitation and/or false cognate inhibition effects, which have been taken as evidence for the language non-selective view (de Groot et al. 397; Brenders et al. 384). To gain a better understanding of the effect and potential modulating factors, many factors potentially interacting with cognate or false cognate effects such as the participant profiles (i.e., adult, child, bilingual, L2 speaker etc.), task differences (i.e., lexical decision, translation etc.), language proficiency (i.e., high or low), and level of exposure (i.e., intense or not) have also been investigated in different studies.

For instance, in a longitudinal study testing Frisian-Dutch bilingual children, Bosma et al. investigated how various levels of exposure to Frisian and degrees of cross-linguistic similarity (i.e., phonological similarity between cognate pairs) shape cognate processing (375). The task was a Frisian receptive vocabulary task where children were expected to choose a picture corresponding to a word presented from among four options (Bosma et al. 377). The results indicated that cognates were processed faster and with fewer errors compared to control words when the level of exposure to Frisian was low. This was interpreted as evidence for the idea that children had a chance to refer to their Dutch for cognates when their Frisian exposure was limited. Also, children with low levels of exposure were shown to be affected to a greater extent by the cross-linguistic similarity, and the cognate facilitation gradually emerged based on the degree of similarity between cognate pairs. Namely, the facilitation was greater for the identical pairs in terms of pronunciation compared to the non-identical ones (Bosma et al. 381–82).

In an event-related potentials (ERP, i.e., brain activity relevant to cognition; Sur and Sinha 70) study, L1 English-L2 French speakers participated in a go/no-go

semantic categorization task where they were expected to understand the meaning of a word presented and to decide whether they belonged to a certain semantic category (e.g., animals). The word list contained not only cognates but also non-cognates in both English and French (Midgley et al. 1636–37). As a result, a cognate facilitation effect showed itself as a smaller amplitude of N400 (i.e., negative brain waves associated with semantic discrepancies) for cognates compared to non-cognates in L2. The same effect was obtained for L1 but in an earlier time window (i.e., 200-300 ms). It was therefore concluded that cognates catalyzed the form-meaning mappings (Midgley et al. 1644).

Durlik et al. focused on the false cognate inhibition effect and the potential impact of L2 proficiency. Polish-English unbalanced bilinguals completed a semantic relatedness judgment task where they had to decide whether a given pair of L2 words (including false cognates as well as controls and translations of false cognates) were semantically related (6-8). The results indicated a false cognate inhibition effect but no role of L2 proficiency. Reported proficiency levels were based on a standardized proficiency test (LexTALE) (Lemhöfer and Broersma 325). Many other measures including fluency and picture-naming performances were also analyzed as proficiency components. The null effect of L2 proficiency prevailed nevertheless (Durlik et al. 13).

Brenders, Van Hell, and Dijkstra, on the other hand, tested not only cognates but also cognates and false cognates within the same experiment. Children who were beginner-level or intermediate-level Dutch speakers of L2 English completed an English lexical decision task (383). As a result, a cognate facilitation effect was observed, which manifested itself in the form of shorter reaction times and fewer errors observed for cognates compared to controls. This facilitatory effect disappeared when the task employed was a Dutch lexical decision task. This absence was claimed to result from the low level of L2 proficiency the participants had, which might have played a role in L1 processing (Brenders et al. 389). In other experiments, Brenders, Van Hell, and Dijkstra also manipulated the content of the item list and added both cognates and false cognates into an L2 lexical decision task (390). For this task, it was found that both cognates and false cognates were processed slower and with more errors compared to controls (393).

Using a stimulus list made up of cognates, false cognates and controls, Schröter and Schroeder found a facilitatory effect of cognates and a null effect for false cognates with German-English balanced bilingual children in a lexical decision task in both languages (241-242). Unlike L2 speakers, balanced bilinguals were found to process cognates faster compared to controls in both languages, which was claimed to be because of bilinguals' having equally high proficiency in both languages. Regarding false cognates, the effect was inhibitory for the German lexical decision task; however, it turned out to be null for the English task. While discussing the null effect in English, Schröter and Schroeder referred to the distinct semantic representations of false cognates. They claimed that when children saw the orthographic overlap, this led to a facilitating effect. However, when children reached the semantic representations of those items, the

semantic discrepancy cancelled out the facilitating effect, and the null effect remained. In terms of the inhibitory effect observed for German, the language context from which the children came and the orthographic depth of both languages were mentioned as possible explanations. Since people in the relevant context spoke German, there might be more exposure. Moreover, the shallow orthography of German, unlike the deep orthography of English, might have played a role in the different effects for English and German (244-245).

Otwinowska and Szewczyk used a translation task from L2 English to L1 Polish and participants' confidence ratings for their own translations in order to compare the learnability (i.e., whether two words would be equally easier to learn if the exposure of the participants to these words were the same) of cognates, false cognates and controls (974-976). Exposure was determined based on the corpus frequencies of the relevant words. Participants' confidence ratings were also utilized to reveal whether participants used guessing strategies. The idea behind the ratings was that the participants would be less confident about the translations they produced via guessing (977). As a result, the number of correct translations was higher for the cognates and lower for the false cognates compared to controls. Furthermore, the orthographic similarity between cognate pairs, but not between the false cognates, affected the ease of learning depending on proficiency. Learners with low levels of proficiency were claimed to be affected by the orthographic dissimilarity between cognate pairs more severely compared to participants with high proficiency. Also, typological differences (either real or perceived) between languages were listed as one of the potential factors that could affect translation performance (987-988).

Using a backward lexical translation task, Janke and Kolokonte tested false cognate pairs in English (L1) and French (L2), and found that their participants were less successful in correctly translating false cognates compared to controls. Based on this result, it was claimed that there was a false cognate effect between English and French. The authors also examined whether the morphological features of the words had an impact on the false cognate effect by using simplex (i.e., monomorphemic in both English and French), complex (i.e., polymorphemic in both English and French), and mismatch items (i.e., monomorphemic in English but polymorphemic in French). Monomorphemic items consisted of stems only whereas polymorphemic items contained a stem and an affix. The results showed that more errors were produced for complex items compared to the other two conditions. It was concluded that the morphological properties of the items, namely the affix in morphologically complex condition, caused more false cognate errors, which was taken as support for the role of morphology on the false cognate effect.

The Present Study

Considering the robustness of cognate facilitation and false cognate inhibition effects for various language pairs, tasks, and participant groups, the present study first aimed to investigate whether cognate facilitation and false cognate inhibition are valid for adult Turkish L2 speakers of English using a backward lexical translation task. Second, we asked whether L2 proficiency played a role

in cognate and false cognate processing. As the results regarding the role of L2 proficiency are far from conclusive, we aimed to provide additional evidence coming from L1 Turkish speakers of L2 English. Lastly, although the role of orthography and phonology was tested from time to time in earlier studies, the role of morphology seems to be more neglected in the literature. Thus, we examined whether morphology affects cognate and false cognate processing by manipulating the morphological complexity of both cognates and false cognates.

Our research questions were the following:

1. Is there a cognate facilitation and/or false cognate inhibition effect for adult Turkish speakers of L2 English?

2. Is there an impact of L2 proficiency on cognate facilitation or false cognate inhibition effects?

3. Is there an effect of morphology on cognate facilitation or false cognate inhibition effects?

Participants

Table 1

Mean Age, Mean Length of Exposure to L2 English and Mean OPT Scores of Participants by Proficiency Groups[a]

Measures	**Groups**	
	Low Proficiency	High Proficiency
Age	19.7 (0.9)	20.4 (1.7)
Length of Exposure to English (months)	121.92 (25.4)	123.84 (34.6)
OPT Scores	36.2 (6.5)	50.8 (2)

a. Note: Standard deviations are given in parentheses.

50 undergraduate university students participated in the study on a voluntary basis. The participants were divided into two L2 English proficiency groups (low vs. high) of 25 participants each based on their Oxford Placement Test (OPT) scores (18 females in the low proficiency and 17 females in the high proficiency group). See table 1 for further details about the participants.

Pilot Studies

To determine the lexical items to be used in the experiment and to minimize the possible effects of item-related confounding factors on the results, two pilot studies were carried out. Since the main task in the experiment involved the translation of English words into Turkish, we wanted to ensure that the expected Turkish translations of the selected English words would be known by

the majority of the target population. Accordingly, 19 university students, who did not participate in the main experiment, completed a task in which they indicated whether they knew the meaning of 102 Turkish words presented to them. The participants were also given the opportunity to provide their predictions when they did not know the meaning of a word or they were unsure about their answers. The word pairs whose Turkish component was known by less than 80 percent of the participants were discarded from the main experiment. As a result, only the false cognate pair *addition-adisyon* (correct Turkish translation: *ilave* or *ek*) was removed. Further, we wanted to make sure that the cognate and false cognate pairs were perceived to be orthographically and phonologically similar by the target population. Therefore, a similarity rating task was administered as a second pilot study. Another 37 university students completed this second pilot task by indicating how similar the given English-Turkish word pairs were on a 5-point Likert scale (1: Very Dissimilar and 5: Very Similar) by taking the orthographic and the phonological similarities between the words into account. The participants were instructed to disregard semantic similarities while performing their ratings since false cognate pairs were also included in the item list. As a result, one cognate (*equipment-ekipman*) and one false cognate (*cabbage-kabak*) pair were discarded as they yielded low similarity ratings (mean ratings: 3.14 and 2.38, respectively).

Materials

Real cognate and false cognate words were used as the main experimental items in the current study. Real cognate pairs (e.g., *limit* vs. *limit*) displayed orthographic, phonological and semantic overlaps between L1 Turkish and L2 English. False cognate pairs (e.g., *pasta* vs. *pasta*, meaning *cake* in Turkish), on the other hand, shared orthographic and phonological similarities, but displayed semantic discrepancies between the two languages. Additionally, translation equivalents (e.g., *poison* vs. *zehir*), which bear no relationship to each other in terms of (false) cognateness, were included as control items. Similar to Janke and Kolokonte (2015), the morphological complexity of these three item types was manipulated. That is, for each item type, simplex and mismatch conditions were created. Simplex pairs (e.g., English *picnic* vs. Turkish *piknik*) were comprised of monomorphemic words in both languages, whereas mismatch pairs (e.g., English *lead+er* vs. Turkish *lider*) consisted of a monomorphemic word in Turkish (L1) but a polymorphemic word in English (L2). Six different item types were formed as a result of these experimental manipulations (see table 2).

Table 2

Experimental Conditions

Item Type	**Morphological Complexity**	
	Simplex	Mismatch
Cognate	limit vs. limit	lead+er vs. lider

False Cognate	pasta vs. pasta (correct translation: makarna)	person+al vs. personel (correct translation: kişisel)
Control	poison vs. zehir	account+ing vs. muhasebe

Table 3

Mean Frequency (per million) and Word Length across Conditions

Item Type	**English**		**Turkish**	
	Frequency	Length	Frequency	Length
Real Cognate Simplex	23,89	6,25	14.33	5,63
False Cognate Simplex	25,53	6	14,15	5,63
Control Simplex	23,76	6,13	14,13	5,69
Real Cognate Mismatch	24,24	7,88	14,36	7,63
False Cognate Mismatch	24,12	7,88	13,59	7,63
Control Mismatch	24,08	8,31	14,07	7,37

For each experimental condition, there were 16 items whose word length range was from 4 to 12 letters. That is, 96 English words were presented to the participants in total. The SUBTLEX-UK (van Heuven et al. 1176) corpus was used to obtain the frequency counts of English words whereas the frequencies of the expected Turkish counterparts were obtained from the Turkish National Corpus (Aksan et al. 219). The items in the six experimental conditions were matched on frequency in Turkish ($F(5,90) = 0.001$, $p = 1$) and in English ($F(5,90) = 0.003$, $p = 1$). Also, the word length of English and Turkish forms was matched among simplex ($F(2,90) = 0.089$, $p = .915$) and mismatch ($F(2,90) = 0.035$, $p = .965$) conditions. The descriptive data regarding the frequency counts and word lengths are presented in Table 3.

Procedure

The participants were tested individually in a quiet room. They initially signed an informed consent form and filled out a participant background questionnaire in which they provided information about their age, length of exposure to English etc. The participants then completed the backward lexical translation task. At the beginning of the task, the participants were provided with the instructions in English and the experimenters answered questions about the experiment. The instructions were restated in Turkish, if requested. In the task, the participants were expected to orally translate the English words that

appeared on the computer screen into Turkish by stating their answers out loud. Immediately after their verbal response, they were asked to press a prespecified button on the computer keyboard. Their reaction times were recorded by the FLXLab software (http://flxlab.sourceforge.net/). In addition, the participants' voice recordings were collected (with their consent) to be able to document the verbal responses and the accuracy data. The verbal responses were also recorded on an 'experiment follow-up chart' by the experimenters in the course of the experiment. This chart was used to avoid losing data due to technical problems with the voice recordings. Following the experiments, the voice recordings and the data from the follow-up charts were compared for triangulation.

The FLXLab software also served for the presentation of the experimental items. A Latin Square design was used to determine the presentation order of the 96 critical stimuli in order to avoid the consecutive presentation of items belonging to the same experimental condition. Further, four trial items were added to the beginning of the experiment so that the participants could get used to the procedure. To minimize the potential confounding effects of fatigue, the participants were offered two breaks. Overall, it took them approximately 10 minutes to complete the experiment.

Results

Reaction Times

Before conducting the actual reaction time analysis, three-word pairs (*manager-menajer*, *fabricator-fabrikatör* and *derby-derbi*) had to be removed as they had been incorrectly categorized as false cognate pairs although they are actually real cognates. Another word pair (*confusion-karmaşa*) had to be removed prior to the analysis because it had been miscategorized as a member of the control mismatch condition although *karmaşa* is actually polymorphemic. The word frequency and word length matching procedures were not significantly affected as a result of this removal. Moreover, all incorrect translations including false cognate errors and 'I do not know' responses were discarded together with skipped trials. The reaction times above 2 and below -2 standard deviations of the mean were also trimmed. One participants' data had to be removed from the by-participant analysis because no false cognate simplex data remained in the data set for this participant due to absence of correct translations. Similarly, one item from the false cognate mismatch list (i.e., *confection-konfeksiyon*) was not included in the by-item analysis due to the absence of data by the low proficiency group. Overall, approximately 33% of the raw data had to be discarded from the reaction time analyses.

A three-way mixed ANOVA was conducted to analyze the data. Word Type (Cognate, False Cognate and Control), Complexity (Simplex and Mismatch) and L2 Proficiency Group (High and Low) were treated as independent variables. Word Type and Complexity were within-subjects factors whereas L2 Proficiency Group was a between-subject factor in the by-participant (F_1) analysis. For the by-item (F_2) analysis, however, Word Type and Complexity were between-

subjects factors and L2 Proficiency Group was a within-subjects factor. Lastly, reaction time was treated as the dependent measure. The reaction time analysis was carried out with logarithmically transformed reaction times since the data were negatively skewed.

The mean reaction times (in milliseconds) are presented in Table 4. The results of the three-way mixed ANOVA revealed a significant main effect of Word Type (F_1(1.749, 82.224) = 37.828, p < .001, η_p^2 = .446; F_2(2, 85) = 13.104, p < .001, η_p^2= .236) and Complexity (F_1(1, 47) = 166.943, p < .001, η_p^2 = .78; F_2(1, 85) = 24.516, p < .001, η_p^2 = .224) in both the by-participant and by-item analyses. The post hoc pairwise comparisons were carried out with Bonferroni correction. Overall, for Word Type, the participants were significantly faster when translating cognates than false cognates (p < .001, d = 1.199) and controls (p < .001, d = 0.859). In addition, no reaction time differences were observed between false cognates and controls (p = .058, d = 0.34). As for Complexity, the participants were significantly faster when translating simplex than mismatch words (p < .001, d = 1.847). The main effect of Group, however, turned out to be statistically significant only in the by-item analysis (F_1(1, 47) = 1.369, p = .248, η_p^2 = .028; F_2(1, 85) = 53.098, p < .001, η_p^2 = .384). The post hoc pairwise comparison indicated that the High Proficiency participants were faster when translating the items compared to the Low Proficiency ones (p < .001, d = 0.757).

The three-way mixed ANOVA also yielded a significant interaction between Word Type and Complexity (F_1(2, 94) = 23.046, p < .001, η_p^2= .329; F_2(2, 85) = 0.882, p = .418, η_p^2 = .02) in the by-participant analysis. Follow-up t-tests were conducted using Tukey HSD test to investigate the source of this interaction. As a result, it was found that the participants showed significantly slower reaction times when translating false cognate simplex words than cognate simplex (t = 7.448, p < .001, 95% CI [0.056, 0.131]) and control simplex items (t = 5.867, p < .001, 95% CI [0.036, 0.111]). However, there was no mean reaction time difference between cognate simplex and control simplex words (t = 1.581, p = .612, 95% CI [-0.057, 0.018]). On the other hand, the results showed that the participants were significantly faster when translating cognate mismatch words than false cognate mismatch (t = 5.721, p < .001, 95% CI [0.035, 0.110]) and control mismatch words (t = 7.853, p < .001, 95% CI [0.061, 0.136]). The comparison between false cognate mismatch and control mismatch words, however, yielded a non-significant result (t = 2.133, p = .275, 95% CI [-0.011, 0.064]). No further interaction effects were found to be statistically significant.

Table 4

Mean Reaction Times (RTs in ms) and Standard Deviations across Conditions[b]

Group	**Real Cognate**		**False Cognate**		**Control**	
	Simplex	Mismatch	Simplex	Mismatch	Simplex	Mismatch
High	1757 (648)	1988 (622)	2260 (693)	2490 (795)	1865 (609)	2685 (946)

Low	1991 (810)	2274 (655)	2220 (487)	2657 (846)	1912 (370)	2797 (680)

b. Note: Standard deviations are given in parentheses.

Accuracy

The four pairs excluded in the reaction time analyses (i.e., *manager-menajer*, *fabricator-fabrikatör*, *derby-derbi* and *confusion-karmaşa*) were also discarded in the accuracy analyses. Further, only 'I do not know' responses and skipped trials were trimmed since these responses did not make any contribution to the accuracy data. No participants were excluded, but again the pair *confection-konfeksiyon* was excluded from the accuracy analysis due to the same reason mentioned in (5.1). In total, approximately 16% of the data points had to be removed. Lastly, the proportions of correct and incorrect responses were calculated. The analyses were carried out based on the correct responses.

A three-way mixed ANOVA was conducted to analyze the accuracy data. The independent variables and the dependent measure were the same as in the reaction time analyses. Similarly, in the by-participant (F_1) analysis, Group was the between-subjects factor whereas Word Type and Complexity were within-subjects factors. This pattern related to the types of the factors was, however, reversed in the by-item (F_2) analysis.

The mean proportions of correct responses are presented in Table 5. The results of the three-way mixed ANOVA revealed a significant main effect of Word Type ($F_1(1.456, 69.876) = 336.985$, $p < .001$, $\eta_p^2 = .875$; $F_2(2, 85) = 40.817$, $p < .001$, $\eta_p^2 = .49$) and Group ($F_1(1, 48) = 13.727$, $p < .001$, $\eta_p^2 = .222$; $F_2(1, 85) = 40.858$, $p < .001$, $\eta_p^2 = .325$) in both the by-participant and by-item analyses. However, the main effect of Complexity was non-significant ($F_1(1, 48) = 3.696$, $p = .06$, $\eta_p^2 = .071$; $F_2(1, 85) = 0.288$, $p = .593$, $\eta_p^2 = .003$). The post hoc pairwise comparisons with Bonferroni correction were carried out to examine these main effects. The results showed that the participants committed more errors when translating false cognates compared to cognates ($p < .001$, $d = 3.442$) and controls ($p < .001$, $d = 2.863$). Additionally, they committed more translation errors with controls than with cognates ($p < .001$, $d = 3.442$). For the main effect of Group, it was found that the Low Proficiency participants committed more translation errors compared to the High Proficiency ones ($p < .001$, $d = 0.524$).

Table 5

Mean Proportions of Correct Responses and Standard Deviations across Conditions[c]

Group	**Real Cognate**		**False Cognate**		**Control**	
	Simplex	Mismatch	Simplex	Mismatch	Simplex	Mismatch
High	98.5 (2.8)	97.8 (3.6)	61.2 (15.5)	62.6 (11)	97.1 (4.3)	92.5 (7.9)

Low	96.5 (4.9)	93.8 (8.2)	49 (20.1)	57.2 (16.2)	91.4 (10.4)	80 (16)

c. Note: Standard deviations are given in parentheses.

Moreover, the results of the three-way mixed ANOVA revealed a significant interaction between Word Type and Complexity ($F_1(1.55, 74.411) = 9.620$, $p < .001$, $\eta_p^2 = .167$; $F_2(1.55, 74.411) = 0.810$, $p = .448$, $\eta_p^2 = .019$) only in the by-participant analysis. To scrutinize the source of this interaction, follow-up t-tests were conducted using Tukey HSD test. The results indicated that the participants committed more errors when translating false cognate simplex words than cognate simplex ($t = 19.430$, $p < .001$, 95% CI [35.921, 48.899]) and control simplex words ($t = 17.958$, $p < .001$, 95% CI [32.707, 45.685]). However, the mean proportions of correct responses did not significantly differ between cognate simplex and control simplex words ($t = 1.473$, $p = .682$, 95% CI [-3.275, 9.703]). As in the case of simplex words, the participants committed more errors when translating false cognate mismatch words than cognate mismatch ($t = 16.460$, $p < .001$, 95% CI [29.437, 42.415]) and control mismatch words ($t = 12.073$, $p < .001$, 95% CI [19.863, 32.841]), but there was also a significant difference between cognate mismatch and control mismatch words ($t = 4.386$, $p < .001$, 95% CI [3.085, 16.063]). The participants committed more translation errors with control mismatch words compared to cognate mismatch ones. No further interaction effects turned out to be statistically significant.

Additionally, the interaction between Word Type and Group was statistically significant in the by-item analysis ($F_1(1.456, 69.876) = 2.275$, $p = .125$, $\eta_p^2 = .045$; $F_2(2, 85) = 3.180$, $p = .047$, $\eta_p^2 = .07$). To examine the source of this interaction, follow-up t-tests were conducted using Tukey HSD test. As a result, it was found that the low proficiency participants committed more errors than the high proficiency participants in both false cognate ($t = 4.332$, $p < .001$, 95% CI [2.602, 14.585]) and control conditions ($t = 4.979$, $p < .001$, 95% CI [3.686, 15.051]). On the other hand, the accuracy performances of these two groups were not significantly different in cognate condition ($t = 1.775$, $p = .487$, 95% CI [-2.306, 8.875]).

Discussion & Conclusion

The present study set out to investigate the processing of cognates and false cognates and the potential effects of morphology and L2 proficiency in a relatively less studied language pair (Turkish-English). To this end, adult L1 Turkish speakers of L2 English completed a backward lexical translation task (i.e., from L2 to L1) which included cognates, false cognates and control words. Participants were divided into two proficiency groups (i.e., high vs. low) depending on their L2 proficiency test results. A mismatch condition, where the word in the L2 was morphologically complex and its L1 counterpart was simplex, was also added into the design.

As a result, it was found that cognates were processed faster and with fewer errors compared to false cognates and controls with the exception of the simplex condition (no difference between cognates and controls). False cognates, on the other hand, were processed slower compared to cognates and controls only in the mismatch condition. The processing of false cognates and controls did not significantly differ elsewhere in the reaction time analysis. However, false cognates consistently revealed more translation errors than cognates and controls in the accuracy analysis. Moreover, L2 proficiency showed significant main effects (slower RTs and more errors by low-proficiency group), but L2 Proficiency did not interact with word type and complexity except in the by-item analysis of accuracy data. With increased L2 proficiency, participants showed a tendency to commit fewer false cognate errors, but the same proficiency-related difference was not observed for cognates.

The findings of the present study make it possible to refer to the discussions regarding the organization of the bilingual lexicon. The cognate facilitation and false cognate inhibition effects obtained in the present study could be taken as evidence for the language non-selective view (Dijkstra et al. 497; Brenders et al. 384) since the presence of these effects relies on the possibility of accessing two languages simultaneously while performing the translation task. The robust cognate facilitation effect found in the present study for Turkish-English is consistent with the findings for various language pairs listed in the literature. For instance, Bosma et al. found cognate facilitation in Frisian-Dutch (372) and Midgley et al. showed it for French-English (1644). Moreover, the results of the present study are in line with the findings of the studies relying specifically on the backward lexical translation task from L2 to L1. English-French and English-Polish were the previously tested L2-L1 pairs, and all provided support for cognate facilitation as in the English-Turkish language pair in the present study. Also, cognate facilitation was observed irrespective of the use of different methodologies. While some studies showed evidence of cognate facilitation by utilizing recognition tasks such as receptive vocabulary, and semantic categorization, some others provided evidence from a production task like translation. In that regard, the results of the present study, which come from a production task, are in line with the results of earlier recognition tasks.

Similar to task and language differences, testing distinct participant profiles did not modulate the presence of cognate facilitation either. For instance, similar to the findings obtained from balanced bilinguals in Schröter and Schroeder (239), the findings of the present study indicate a facilitatory effect of cognates for adult L2 speakers. This result provides an important insight in the sense that facilitation is probably not unique to balanced bilinguals since our participants had learnt their L2 in an L1-dominant context sequentially (AoA: approximately 10).

In addition to testing cognates in isolation, some earlier studies tested cognates and false cognates within the same experiment, as was done in the present study. Different results were obtained based on item list composition in other studies. Namely, the pattern of the cognate or false cognate effect changed when

both types of items were presented instead of only one in the same experiment. For example, Brenders, Van Hell, & Dijkstra obtained slower processing and more errors for both cognates and false cognates compared to controls when they were presented within the same experiment (383). However, although the item list in the current study was made up of both cognates and false cognates, we were able to observe cognate facilitation as well as false cognate inhibition effects. This difference might have resulted from the participant profile. Children might be confused more than adults when shown not only cognates and false cognates in the same experiment (Brenders, Van Hell, & Dijkstra. 393).

Regarding false cognates, the present study showed false cognate inhibition effects both in the RT (slower processing compared to cognates and controls) and accuracy analyses (more errors compared to cognates and controls). This was in line with what was found for German-English (Schröter and Schroeder 239), English-French (Janke and Kolokonte 1) and Polish-English (Otwinowska and Szewczyk 974). Both Janke and Kolokonte and Otwinowska and Szewczyk used a translation task as in the current study. Thus, the present findings could be taken as supportive evidence for the presence of false cognate inhibition in translation tasks. Also, the inhibition was not unique to the translation task since it was also observed in the German lexical decision task used by (Schröter and Schroeder 239).

Despite its limitations, the design of the current study also enabled us to touch upon the effect of morphology on the processing of cognates and false cognates. For instance, it was found that mismatch items yielded longer reaction times compared to simplex items. However, it might not be plausible to attribute this effect to morphology per se since mismatch items were longer than simplex items in length and this length difference was quite likely to modulate this result. Moreover, simplex and mismatch items revealed similar accuracy rates in the accuracy analysis. This result appears not to be surprising considering the fact that mismatch items lack affix level mapping between the translation equivalents (Janke and Kolokonte 5). It should be recalled that the direction of the translations was from L2 to L1 in the current study and the Turkish counterparts of all pairs were simplex in form. In this respect, it could be argued that simplex and mismatch items imposed similar processing loads on the participants while performing their translations even though the mismatch items had a complex form in English. Thus, to be able to test the effect of morphology directly, a complex condition (where both translation equivalents are morphologically complex) should be added to the design (as in Janke and Kolokonte 5). Despite all these limitations, in the current study, it was observed that the cognate facilitation effect was more salient in the mismatch conditions. That is, unlike simplex conditions, cognates yielded faster reaction times and fewer errors with respect to controls in mismatch conditions. Therefore, it can be claimed that the presence of morphological complexity (even in the target language to be translated) might provide a processing advantage for cognates by making them easier to translate compared to control words.

Also, in the current study, we did not observe a salient proficiency effect on the processing of false cognates with Turkish-English unbalanced bilinguals. These findings are in line with what was found for Polish-English unbalanced bilinguals by Durlik et al. (6–8). However, it should be noted that we found weak but compelling evidence supporting the idea that an increase in proficiency might cause a decrease in false cognate errors.

This finding, coupled with the absence of a robust proficiency effect, brought a valuable discussion to our attention. At this point, it is crucial to note that measuring L2 proficiency or categorizing participants based on proficiency levels is inherently difficult and has been a challenge for experimental studies testing bi/multilingual participants for decades. There are various measures listed in the literature such as standardized proficiency/placement tests and self-rating scales (Marian et al. 940–41; Tomoschuk et al. 516). The difficulty in measuring proficiency and the use of various proficiency measures in different studies might have made the findings harder to reconcile (de Bruin et al. 1). These might even overshadow a real effect of proficiency in such studies. Accordingly, the small evidence of L2 proficiency found in the accuracy analysis seemed to imply that the same issue might be valid for the current study as well. We suspect that with a measure that would enable us to make more distinct categorizations in terms of proficiency, the findings could potentially reveal a significant and robust effect of L2 proficiency. However, these are all speculations; in fact, L2 proficiency might have little or no effect on the processing of cognates and false cognates. Thus, for future studies, multiple proficiency measures could be utilized (as in Viviani and Crepaldi 5) to triangulate the proficiency data to be able to obtain more reliable and representative categorizations.

Works Cited

Aksan, Yeşim, et al. *Türkçe Ulusal Dil Derlemi Projesi Biçimbirim Çalışmalarında Belirsizliklerin Sınıflandırılması ve Dağılımı*. 2012, pp. 219–26.

Bosma, Evelyn, et al. "A Longitudinal Study on the Gradual Cognate Facilitation Effect in Bilingual Children's Frisian Receptive Vocabulary." *International Journal of Bilingual Education and Bilingualism*, vol. 22, no. 4, May 2019, pp. 371–85. *DOI.org (Crossref)*, doi:10.1080/13670050.2016.1254152.

Brenders, Pascal, et al. "Word Recognition in Child Second Language Learners: Evidence from Cognates and False Friends." *Journal of Experimental Child Psychology*, vol. 109, no. 4, Aug. 2011, pp. 383–96. *DOI.org (Crossref)*, doi:10.1016/j.jecp.2011.03.012.

Bultena, Sybrine, et al. "Cognate Effects in Sentence Context Depend on Word Class, L2 Proficiency, and Task." *Quarterly Journal of Experimental Psychology*, vol. 67, no. 6, SAGE Publications, June 2014, pp. 1214–41. *SAGE Journals*, doi:10.1080/17470218.2013.853090.

de Bruin, Angela, et al. "The BEST Dataset of Language Proficiency." *Frontiers in Psychology*, vol. 8, Apr. 2017. *DOI.org (Crossref)*, doi:10.3389/fpsyg.2017.00522.

de Groot, Annette M. B., et al. "The Processing of Interlexical Homographs in Translation Recognition and Lexical Decision: Support for Non-Selective Access

to Bilingual Memory." *The Quarterly Journal of Experimental Psychology Section A*, vol. 53, no. 2, SAGE Publications, May 2000, pp. 397–428. *SAGE Journals*, doi:10.1080/713755891.

Dijkstra, Ton, Henk Van Jaarsveld, et al. "Interlingual Homograph Recognition: Effects of Task Demands and Language Intermixing." *Bilingualism: Language and Cognition*, vol. 1, no. 1, Apr. 1998, pp. 51–66. *DOI.org (Crossref)*, doi:10.1017/S1366728998000121.

Dijkstra, Ton, Jonathan Grainger, et al. "Recognition of Cognates and Interlingual Homographs: The Neglected Role of Phonology." *Journal of Memory and Language*, vol. 41, no. 4, Nov. 1999, pp. 496–518. *DOI.org (Crossref)*, doi:10.1006/jmla.1999.2654.

Durlik, Joanna, et al. "Interference and Inhibition in Bilingual Language Comprehension: Evidence from Polish-English Interlingual Homographs." *PLOS ONE*, vol. 11, no. 3, Public Library of Science, Mar. 2016, p. e0151430. *PLoS Journals*, doi:10.1371/journal.pone.0151430.

Hoshino, Noriko, and Judith F. Kroll. "Cognate Effects in Picture Naming: Does Cross-Language Activation Survive a Change of Script?" *Cognition*, vol. 106, no. 1, Jan. 2008, pp. 501–11. *ScienceDirect*, doi:10.1016/j.cognition.2007.02.001.

Janke, Vikki, and Marina Kolokonte. "False Cognates: The Effect of Mismatch in Morphological Complexity on a Backward Lexical Translation Task." *Second Language Research*, vol. 31, no. 2, SAGE Publications Ltd, Apr. 2015, pp. 137–56. *SAGE Journals*, doi:10.1177/0267658314545836.

Lemhöfer, Kristin, and Mirjam Broersma. "Introducing LexTALE: A Quick and Valid Lexical Test for Advanced Learners of English." *Behavior Research Methods*, vol. 44, no. 2, June 2012, pp. 325–43. *DOI.org (Crossref)*, doi:10.3758/s13428-011-0146-0.

Lindgren, Josefin, and Ute Bohnacker. "Vocabulary Development in Closely-Related Languages: Age, Word Type and Cognate Facilitation Effects in Bilingual Swedish-German Preschool Children." *Linguistic Approaches to Bilingualism*, vol. 10, no. 5, John Benjamins, Oct. 2020, pp. 587–622. *www.jbe-platform.com*, doi:10.1075/lab.18041.lin.

Marian, Viorica, et al. "The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing Language Profiles in Bilinguals and Multilinguals." *Journal of Speech, Language, and Hearing Research*, vol. 50, no. 4, Aug. 2007, pp. 940–67. *DOI.org (Crossref)*, doi:10.1044/1092-4388(2007/067).

Midgley, Katherine J., et al. "Effects of Cognate Status on Word Comprehension in Second Language Learners: An ERP Investigation." *Journal of Cognitive Neuroscience*, vol. 23, no. 7, July 2011, pp. 1634–47. *DOI.org (Crossref)*, doi:10.1162/jocn.2010.21463.

Otwinowska, Agnieszka, and Jakub M. Szewczyk. "The More Similar the Better? Factors in Learning Cognates, False Cognates and Non-Cognate Words." *International Journal of Bilingual Education and Bilingualism*, vol. 22, no. 8, Nov. 2019, pp. 974–91. *DOI.org (Crossref)*, doi:10.1080/13670050.2017.1325834.

Rosselli, Mónica, et al. "Cognate Facilitation Effect in Balanced and Non-Balanced Spanish–English Bilinguals Using the Boston Naming Test." *International Journal of Bilingualism*, vol. 18, no. 6, SAGE Publications Ltd, Dec. 2014, pp. 649–62. *SAGE Journals*, doi:10.1177/1367006912466313.

Schröter, Pauline, and Sascha Schroeder. "Orthographic Processing in Balanced Bilingual Children: Cross-Language Evidence from Cognates and False Friends."

Journal of Experimental Child Psychology, vol. 141, Jan. 2016, pp. 239–46. *ScienceDirect*, doi:10.1016/j.jecp.2015.09.005.

Solak, Hilal Gulseker, and Abdulkadir Cakir. "Cognate Based Language Teaching and Material Development." *Procedia - Social and Behavioral Sciences*, vol. 46, Jan. 2012, pp. 431–34. *ScienceDirect*, doi:10.1016/j.sbspro.2012.05.136.

Sur, Shravani, and V. K. Sinha. "Event-Related Potential: An Overview." *Industrial Psychiatry Journal*, vol. 18, no. 1, Jan. 2009, pp. 70–73. *www.industrialpsychiatry.org*, doi:10.4103/0972-6748.57865.

Tomoschuk, Brendan, et al. "When a Seven Is Not a Seven: Self-Ratings of Bilingual Language Proficiency Differ between and within Language Populations." *Bilingualism: Language and Cognition*, vol. 22, no. 3, May 2019, pp. 516–36. *DOI.org (Crossref)*, doi:10.1017/S1366728918000421.

Uzun, Levent, and Umut Salihoglu. "English-Turkish Cognates and False Cognates: Compiling a Corpus and Testing How They Are Translated by Computer Programs." *Poznań Studies in Contemporary Linguistics*, vol. 45, no. 4, Versita, Dec. 2009, pp. 569–93. *www.degruyter.com*, doi:10.2478/v10010-009-0031-5.

van Heuven, Walter J. B., et al. "Subtlex-UK: A New and Improved Word Frequency Database for British English." *Quarterly Journal of Experimental Psychology*, vol. 67, no. 6, SAGE Publications, June 2014, pp. 1176–90. *SAGE Journals*, doi:10.1080/17470218.2013.850521.

Viviani, Eva, and Davide Crepaldi. *Masked Morphological Priming Tracks the Development of a Fully Mature Lexical System in L2*. preprint, Open Science Framework, 3 June 2019. *DOI.org (Crossref)*, doi:10.31219/osf.io/xdsng.

Yetkin, Nihal. "Partial false friends in English - Turkish translations: diplomatic texts." *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi*, vol. 28, no. 1, 1, June 2011, pp. 207–222.