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Mental Representation of Cognates/Noncognates in Persian-Speaking EFL Learners

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Abstract

The purpose of this study was to investigate the mental representation of cognate and noncognate translation pairs in languages with different scripts to test the prediction of dual lexicon model (Gollan, Forster, & Frost, 1997). Two groups of Persian-speaking English language learners were tested on cognate and noncognate translation pairs in Persian-English and English-Persian directions with lexical decision task through masked priming. The findings of the study showed a high level of priming only for cognates with L1 primes. This supports dual lexicon model in the sense that it confirms the role of orthography in establishing shared lexical entries for cognates. Noncognates showed a different pattern from what is predicted by this model.

Keywords: mental representation, priming effect, masked priming paradigm, cognates/noncognates, dual lexical model

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1. Introduction

One of the variables that affect the way words are represented in a bilingual memory is the characteristics of the word. One of these characteristics examined in a variety of studies and across a variety of languages is the "cognate status" of the translation pair. Some empirical studies focused on cognate and noncognate difference (Gollan et al., 1997; Lalor, & Kirsner, 2001). Noncognates are translation equivalents with different spellings and sound patterns in the two languages (e.g., the Persian word /sabz/ and its English translation *green*), whereas cognates are translation equivalents with similar orthographic or phonetic form (Kondrak, Marcu, & Knight, 2003). The similarity is usually due to either historical reasons (e.g., the Persian word /lab/and its English translation *lip*) or borrowing from one language to another (e.g., the Persian word /keyk/and its English translation *cake*).

Cross-language priming is a tool adopted by psycholinguists to investigate word representation in a bilingual memory (Basnight-Brown & Altarriba, 2007; Duyck, 2005; Duyck & Warlop, 2009; Finkbeiner, 2006; Gollan et al., 1997; Jiang & Forster, 2001). In this paradigm, cross-language word pairs (i.e., semantically related or translation equivalents) are presented to participants sequentially, and the participants are required to give a timed response (e.g., lexical decision or word naming). The analysis is based on the response time to pairs of prime-target words that differ in their semantic relatedness. A faster reaction time to related pairs across languages (e.g., prime from the L1 and target from the L2) is usually discussed in terms of facilitation caused by the implicit spreading of activation from the prime word to the target word in a bilingual mental lexicon.

However, this paradigm is questioned by those who believe that when the bilingual nature of the task is apparent, information about the prime may reach consciousness so that any observed priming effects can be a result of nonautomatic or strategic processing rather than reflecting automatic processing mechanism per se. This means that bilinguals strategically connect one language with the other by detecting the

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relationship between the prime and the target stimulus (Kirsner et al. 1984). A way to hide the bilingual nature of the task is using masked priming paradigm developed in the studies of visual word recognition (Evett & Humphreys, 1981; Forster & Davis, 1984). In this paradigm, a very briefly presented prime preceded by a forward mask (like a number of signs) is immediately followed by a given target stimulus so that the prime cannot be identified. Due to the adopted masking procedure, the prime is, for most participants, virtually invisible and cannot be identified.

Using the masked priming paradigm, some empirical studies have compared the effect of priming for cognates with noncognates (Altarriba, 1992; Chen & Ng, 1989; Cristoffanini, Kirsner, & Milech, 1986; de Groot & Nas, 1991; Gollan et al., 1997; Jin, 1990; Keatley & de Gelder, 1992; Williams, 1994). Essentially, these studies have investigated whether words sharing semantic, orthographical, and phonological representations (cognates) are processed differently from those sharing only semantic representations (noncognates) under the masked priming paradigm.

On the one hand, significant effects for both types of translation primes have been found when a relatively long (longer than 100 ms) prime exposure was used, provided that the translation prime immediately precedes the target word. On the other hand, studies using very short prime exposures (shorter than 60 ms) and the masked priming paradigm have obtained systematic facilitation from cognate translation primes as compared with noncognate translations (de Groot & Nas, 1991; Gollan et al., 1997; Sanchez-Casas, Davis, & Garcea-Albea, 1992; Williams, 1994).

Cognate words have shown easier and faster processing than noncognates in isolated word recognition tasks such as lexical decision (Dijkstra, Grainger, & van Heuven, 1999; Lemhofer & Dijkstra, 2004; Lemhofer, Dijkstra, & Michel, 2004). This task is a procedure that measures the magnitude of translation priming across different languages; it involves measuring how quickly participants classify

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stimuli as words or nonwords. This task is mostly used for identifying processing similarities and differences between the main and the control groups.

On the whole, cognate translations have been shown to be processed faster in a number of experiments as compared with noncognate translations. However, the results concerning noncognates is somewhat mixed. On the basis of these results, de Groot and Nas (1991) and Sanchez-Casas et al. (1992) suggested that cognate translations may share common representations in memory, whereas noncognate translation equivalents do not. However, de Groot (1992) changed her position regarding this issue later and suggested that noncognates may simply share fewer nodes at the conceptual level than do cognates.

Assuming that cognates share the same representations in memory, a number of studies focused on the role of orthography in establishing shared lexical entries for cognates in a bilingual memory. They investigated whether both orthographic and phonological overlaps are required for establishing such entries or whether orthography has no role in this process. In an attempt to test languages with different scripts, Bowers, Mimouni, and Arguin (2000) failed to find any priming for Arabic-English, whereas a significant priming was obtained for orthographically similar languages (e.g. de Groot & Nas, 1991; Sanchez-Casas et al, 1992). Therefore, it can be concluded that orthography plays a role in obtaining long-lag cognate priming effects. In another study by Gollan et al. (1997), four experiments were designed to examine the necessity of orthographical overlap in obtaining significant cognate effects. Both cognates and noncognates were tested in the experiments with lexical decision task for the purpose of comparison. The results of the study showed that, in contrast with Bowers et al.'s (2000) study, enhanced cognate priming was observed despite the absence of orthographical overlap. One noticeable point about this study was that, unlike previous studies, cognate priming was found only with L1 (i.e., the dominant language) but not with L2 (i.e., the nondominant language) primes. The results of the study were interpreted in terms of a dual

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lexicon model according to which both orthographical and phonological overlaps are needed to establish shared lexical entries for cognates. As there are only few studies testing cognates across languages with different scripts in both directions, it is not totally clear whether the cognate effect is purely phonological or the joint effect of both orthographical and phonological similarities. Therefore, it is important to investigate whether the predictions of dual lexicon model regarding the necessity of orthographic overlap for establishing shared lexical entries for cognates in a bilingual memory can be confirmed in more studies.

One more finding of Gollan et al.'s (1997) study was that priming was also obtained for noncognates, whereas previous studies showed unstable effects for such stimuli. Such an effect was also obtained in another study using the masked priming paradigm and the lexical decision task (Williams, 1994). To explain the reason for noncognate priming, Gollan et al. (1997) proposed that script differences facilitated rapid access by providing a cue to the lexical processor that directed access to the proper lexicon, thus producing stable noncognate priming. In other words, it was the use of languages with different scripts (Hebrew-English) that allowed significant effects of noncognate translation primes to emerge. However, Williams (1994) indicated that this is not a necessary condition, as he obtained significant noncognate translation priming across Italian-English, French-English, and German-English, which are languages with similar scripts. As the results obtained for noncognates across different experiments are also mixed, clearly further research is required to clarify this critical issue, too.

The purpose of the present study was to compare the pattern of priming for cognate and noncognate translation pairs in L1-L2 (Persian-English) and L2-L1 (English-Persian) directions across the Persian and English languages. To test for Persian-English congate-noncognate difference, it was attempted to use cognates that shared a common root due to historical reasons. Long lists of English words of Persian origin were found for this purpose. However, few of them could be used, as it was necessary to make sure that all the participants knew and hence

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recognized the chosen items as L2 words. To increase the number of cognate stimuli, a number of loan words were added to the list, too. Although such words are borrowed from English, native Persian speakers learn and use them in (in)formal settings before they know that they are very similar to their English translation equivalents.

Although both Persian and English have alphabetic scripts, they have no orthographical overlap, as each uses quite distinct characters. Moreover, Persian is written from right to left, whereas English is written in the reverse direction. Furthermore, the characters used in Persian words mostly include the consonantal information. The information related to vowels is absent in some cases.

The aforementioned differences between the two languages made the situation appropriate for the investigation of mental representation of cognate and noncognate translation pairs. Therefore, two experiments were carried out to fulfill the objectives of the study, and in each the direction of priming was reversed.

2. Method

In Experiment 1, a group of cognate-noncognate pairs were tested in forward direction (i.e., Persian-English) with lexical decision task. In this experiment, the primes (i.e., cognates-noncognates) were in L1 (i.e., Persian) and the targets were in L2 (i.e, English). In Experiment 2, the same cognate-noncognate pairs were tested in backward direction (i.e, English-Persian) with the same task.

2.1 Experiment 1 (L1-L2 Priming)

2.1.1 Participants

Twelve Persian learners of English were selected from among a pool of 30. All the participants were undergraduate students of TEFL at Islamic Azad University, Najaf Abad. They had been in a Persian-speaking environment since birth; however, they had received formal instruction in English at high school, university, and language institutes. Moreover, they had no exposure to English in natural settings.

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The grammar part of the Oxford placement test (OPT; Allan, 2004), which included 100 grammatical multiple-choice questions, was administered to homogenize the learners based on their general knowledge of English, and those whose range of scores was between 60-67 were identified as low-intermediate participants based on the test manual and were selected. The reliability index of the test estimated through Chronbach's alpha was .78.

2.1.2 Stimuli and design

The stimuli included 60 words and 60 nonwords. The items used for the analysis consisted of 30 cognate and 30 noncognate translation equivalents. In order to keep the main stimuli as homogenous as possible, cognate and noncognate targets of approximately similar frequency were chosen. The average frequency of English targets was 195.5 for the cognate group, whereas that of the noncognate group was 197.16 (per million; Kucera & Francis, 1967). This removed the effect of frequency that could influence the mental representation of words and, consequently, the magnitude of priming.

In order to make sure that the primes activated the relevant targets at the conceptual level, an attempt was made to assure that the two members of each pair were unique translation of each other. Following Finkbeiner (2006), six Persian-English L2 learners from the same pool of Experiments 1 and 2 were asked to translate a list of 120 words from English into Persian (i.e., L2-L1); another group of six was asked to translate the same words in the opposite direction (i.e., L1-L2). Only the translation pairs translated identically in each direction by all the participants were chosen as the critical stimuli.

Each of the targets was preceded once by its translation equivalent (i.e, translation prime), and the other time by a control item (i.e., control prime) matched with the translation prime on length, frequency, and concreteness as far as possible. A translation and its control prime were similar to each other regarding factors like length, frequency and concreteness yet different from each other in the sense that the translation

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prime was semantically related to the target, whereas the control prime was not. This way, one could attribute the priming obtained at the end only to the activation at the conceptual level.

The frequency of the Persian control primes was taken from Bijankhan corpus (Amiri & AleAhmad, n.d.). The Persian control primes paired with abstract targets referred to abstract concepts, whereas the ones paired with concrete targets referred to concrete objects. Sixty nonword targets were generated by the ARC nonword database (Rastle, Harrington, & Coltheart, 2002). All the nonwords were preceded by unrelated primes (see Appendix A). Two presentation lists were constructed so that if a target was paired by its translation equivalent on one list, it would be paired with its control prime on the other list and vice versa. Hence, the material was counterbalanced across the priming factor. No target or prime word was repeated within the lists.

2.1.3 Procedure

Using the DMDX software (Forster & Forster, 2003), the stimuli were presented in the center of a PC screen. Each trial consisted of the following sequence: First, a forward mask of 10 hash marks appeared for 500 ms. This forward mask was immediately followed by the prime presented for 50 ms. Finally, the target word immediately followed the prime and remained on the screen until the participants made a response. The font used for the target words was 18 pt, Times New Roman. The participants were asked to indicate whether or not the string of letters appearing on the screen was a word by pressing a yes or no button. Each participant was given a trial of 10 items before the main experiment. After each trial was completed, the participants received feedback regarding speed and accuracy.

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2.2 Experiment 2 (L2-L1 Priming)

2.2.1 Participants

In this experiment, a second group of Persian learners of English was selected from among the same pool in the same way as in Experiment 1and were tested on two English-Persian lists.

2.2.2 Stimuli and design

The lists were simply created by reversing the same Persian-English lists used in Experiment 1. The English control primes were matched with the English translation equivalent primes on length, frequency, and concreteness. The MRC psycholinguistic database (Cullings, 1988) was utilized for this purpose. The Persian nonword targets were generated by changing one or two letters of words matched in length to the targets on that list (see Appendix B).

2.2.3 Procedure

Adopting Forster and Davis's (1984) procedure, presentation of each item on the list included the following masked priming sequence: First, the participants were presented with a row of 10 hash marks for 500 ms. This forward mask made the participants aware of where the target appeared on the screen; moreover, it masked the subsequently presented prime. Second, the prime word appeared immediately for 50 ms. Then, a blank interval was presented for 150 ms. It consisted of a row of hash marks but was presented in a different font and font size from the forward mask such that the two different masks used for each item were quite distinct and different from each other. Finally, the target followed immediately after the backward mask and remained on the screen until the participants made a response. The reason for including a blank space and a backward mask in the L2-L1 direction was to increase the amount of prime processing time. Normally, when the prime is in L2, its processing is slower than when it is in L1; therefore, there would be no chance for the L2 prime to have any effect on the L1 target (see Jiang 1999, Experiment 4).

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3. Results

3.1 Cognates in L1-L2 and L2-L1 directions

Following Gollan et al. (1997) and Keatley, Spinks as well as de Gelder (1994), the incorrect responses and the scores longer than 1400 ms were excluded from the analysis (17% of the data for Experiment 1 and 12.6% of the data for Experiment 2). The descriptive statistics of the cognates' reaction times in L1-L2 direction and L2-L1 direction are shown in Table 1:

Table1. Descriptive statistics of lexical decision times (ms)

L1-L2	Mean	*N*	Std. Deviation	Std. Error Mean
Control-cognate	908.6439	233	223.39730	14.63524
Translation-cognate	774.6743	233	201.37666	13.19262
L2-L1	Mean	*N*	Std. Deviation	Std. Error Mean
Control-cognate	803.5903	256	215.30364	13.45648
Translation -cognate	789.1857	256	219.20248	13.70015

Table 1 shows that the cognate translation items were processed 133.97 ms faster in the forward and 14.41 ms faster in the backward direction.

The means of the cognate translation and the cognate control items in L1-L2 and L2-L1 directions were compared by two paired samples *t* tests. The analysis of the data showed that there was no significant difference between the cognate translation and the cognate control items' processing time in the backward direction, $t(255) = .731$, $p = .466$; however, the cognate translations were processed significantly faster than the cognate control items in the forward direction, $t(232) = 7.028$, $p = .000$.

3.2 Noncognates in L1-L2 and L2-L1 directions

Following Gollan et al. (1997) and Keatley et al. (1994), the scores over 1400 ms and the incorrect responses were excluded from the analysis (28.5 % of the data for Experiment 1and 7.5% of the data for Experiment 2). The descriptive statistics of the lexical decision times for the noncognates in L1-L2 and L2-L1 directions are provided in Table 2. The

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results showed that the noncognate translation items were responded to 36.23 ms faster in the forward and 11.73 ms faster in the backward direction than the control noncognates:

Table 2. Descriptive statistics of lexical decision times (ms)

L1-L2	Mean	*N*	Std. Deviation	Std.Error Mean
Control- noncognate	902.9946	204	225.54721	15.79146
Translation-noncognate	866.7633	204	207.76975	14.54679
L2-L1	Mean	*N*	Std. Deviation	Std.Error Mean
Control- noncognate	714.0476	275	190.37348	11.47995
Translation-noncognate	702.3168	275	195.97957	11.81801

The means of the noncognate translation and the noncognate control items in L1-L2 and L2-L1 directions were compared by two paired samples *t* tests. The results showed that the noncognate translation and the noncognate control items were processed at the same rate in L1-L2, $t(203) = 1.78$, $p = .077$ and L2-L1, $t(274) = .731$, $p = .466$ directions.

4. Discussion and Conclusion

The main objective of the experiments done in this study was to investigate whether L1-L2 priming effect reported in some of the previous studies on cognates and noncognates across languages with different scripts would be repeated across Persian and English in L1-L2 and L2-L1 directions. As mentioned earlier, Gollan et al. (1997) found a significant priming effect in L1-L2 direction for both cognates and noncognates with professional Hebrew-English participants. As for cognates, these reserarchers suggested that both orthographical and phonological overlaps are needed to establish shared lexical entries for cognates. As for the effect obtained for noncognates, Gollan et al. (1997) suggested that the change in script between the prime and the target might have caused this effect, as it provided an orthographic cue that enabled the prime to be accessed in time to facilitate the recognition of the target. However, William (1994) believed that orthographic dissimilarity was not a necessary condition, as he obtained significant

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noncognate translation priming across languages with similar orthography (i.e., Italian-English, French-English and German- English).

In the current study, two groups of Persian learners of English were tested on cognate and noncognate translation pairs in both forward and backward directions. The results showed a high level of priming for the cognates with L1 primes. This pattern supports the dual lexicon model put forward by Gollan et al. (1997) regarding mental representation of cognate translation pairs across languages with different scripts. As no priming was obtained for cognates in backward direction, it might be hypothesized that both orthographical and phonological overlaps are needed for establishing shared lexical entries for cognates. However, in case a symmetrical pattern was obtained, the necessity of orthographical overlap would be rejected. The role of orthography has also been supported in some other studies (Bowers et al., 2000).

Another justification for the emergence of this pattern for the cognates in the current study might be the proficiency level of the participants. As the participants were groups of low-intermediate learners, the enhanced effect obtained for the cognates might be attributed to the shared phonological properties of cognates in both Persian and English, which are languages with two different scripts. As suggested by Gollan et al. (1997), bilinguals rely more heavily on phonological computation of L2 words at lower levels of proficiency. As the target and the prime share phonological similarities, an enhanced cognate effect emerges. Rapid access of an L1 cognate prime whose phonological code is similar to that of the L2 target leads to rapid recovery of the phonological structure of the L2 target. In other words, the participants of the present study benefitted from the L1 primes, which were phonologically similar to the L2 target words because processing the L2 items was dependent on phonological characteristics of the words at lower levels of proficiency. However, this was not the case for the processing of L1 words; therefore, L1 words could not benefit from the L2 primes. Assuming that the processing of L1 targets did not rely on

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phonological recoding to the same extent justifies the observed asymmetrical pattern.

Similar to the following studies, the present study failed to find any priming effect for the noncognates across Persian and English. Davis, Sánchez-Casas, and García-Albea (1991) observed no priming effect for noncognates by Spanish-English participants in a lexical decision task under the masked priming paradigm. García-Albea, Sánchez-Casas, and Valero (1996) verified the insignificant effect of noncognate translations reported by Davis et al. (1991) with Spanish-English bilinguals. In both studies, cognate translations showed facilitatory effects as compared to noncognate translations. Other studies confirmed lack of significant noncognate priming (García-Albea, Sánchez-Casas, Bradley, & Forster, 1985; García-Albea, Sánchez-Casas, & Igoa, 1998; Grainger & Frenck-Mestre, 1998).

De Groot and Nas (1991) explained the phenomenon by postulating a bilingual memory with two levels of representations: a lexical representation (i.e., orthographic-phonological) and a conceptual representation (i.e, meaning). Cognate translations share representations at the conceptual level, whereas noncognates do not. The same view is confirmed by the distributed memory representation model (de Groot, 1992), according to which cognate translations could share representational nodes or features both at the lexical (i.e, form) and at the conceptual (i.e, meaning) level; however, noncognate translations might only share features at the conceptual level. This is the reason why different experiments have failed to obtain significant noncognate priming effect.

Lack of significant effect for noncognates can also be interpreted in terms of the entry opening model (Forster & Davis 1984; Forster et al., 1987). According to this hypothesis, visual word recognition can be considered as a table look-up procedure. As a stimulus is presented, it would be matched against a set of stored lexical representations by consulting a table of learned correspondences. First, a set of proper lexical candidates are selected according to some abstract representations

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of the stimuli. As some appropriate matches are found, the corresponding lexical entry opens such that its content becomes available for higher-order language processes. Having been opened, it remains in that state for a few seconds in order to allow slower processes to continue accessing the lexical database. When the presented stimuli resemble the target word sufficiently to open its entry, some processing time would be saved, as the processing of the target would be facilitated based on information stored in that entry. The reason that no facilitation happens for noncognate translations is that as these translations are listed separately, the prime and the target open separate entries.

The total pattern observed in this study is consistent with another study which included groups of Spanish unbalanced bilingual participants (i.e, low proficiency L2 participants; Davis, Sánchez-Casas, García-Albea, 1991).Cognate and noncognate stimuli were tested in both forward and backward directions. The results showed significant effects only for cognates when the prime was in L1 (i.e, Spanish) and the target in L2 (i.e, English). According to Sánchez-Casas and García-Albea (2005), this pattern of results can be interpreted in terms of the fact that some level of competence is required for noncognate priming effects to emerge. Therefore, lack of noncognate priming can be interpreted in terms of lower levels of proficiency as compared with upper-intermediate and advanced levels. Hence, other studies testing more proficient bilinguals might provide a better picture of this issue.

The present study explored the mental representation of cognate and noncognate translation pairs to improve understanding of lexical acquisition and processing in L1 and L2. Such understanding contributes to the models that explore the structure of mental cognitive structure that is responsible for the storage and processing of information at the theoretical level and the effective design and implementation of instructional materials at the pedagogical level (Brian & Eastmond, 1994). As Brunning, Schraw, and Ronning (1999) put it, “there are very few educational decisions to which the cognitive issues of memory, thinking, and problem-solving are not relevant” (p. iv).

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Appendix A
L1-L2 Priming (Cross-Language Lists)

Control	Translation	Target/ Cognate	Control	Target/ Nonword
shahr	tim	team	sard	kack
olgoo	test	test	mard	pows
jahan	film	film	talab	goll
seh	kot	coat	sarf	vope
dasht	jok	joke	aghl	kext
nafar	nam	name	aein	selp
akhz	bad	bad	ati	yoob
gorg	lamp	lamp	akhir	yush
vazneh	form	form	fesad	fape
tayer	keyk	cake	tamrin	brox
taj	moosh	mouse	ghadam	plym
janin	fizik	physics	tir	ninn
dafeh	merci	merci	gir	Wa
bazr	pari	fairy	vadeh	Av
pirahan	toorist	tourist	ghalam	dirp
zolmat	normal	normal	hamahang	crus
dolat	gorooh	group	nazd	cype
khanevade	footbal	football	in	orld
talmih	grammer	grammar	balegh	sazz
rokh	no	new	darsi	Jief
naghsheh	setareh	star	sayeh	trebe
dastam	piano	piano	mokhatab	reuth
do	dar	door	tahrim	phlurg
shaer	baradar	brother	hassas	clerps
hatta	noh	no	farar	nang
nabat	limoo	lemon	sad	sawl
fars	telefon	telephone	Amir	phuib
jadeh	madar	mother	saghf	plect
aseman	sigar	cigarette	nadarim	gwushed

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Control	Translation	Target/ Cognate	Control	Target/ Nonword
etebarat	estandard	standard	movazaf	thryles
morabba	divar	wall	vaseteh	phrewd
bacheh	atash	fire	asnad	glidge
aghvam	parandeh	bird	shoghli	knush
eta	tamiz	neat	senni	frult
shab	khat	line	pazhuheshi	thruiced
roshan	paein	low	mahalleh	blooched
monhani	ghoorbagheh	frog	hamalat	whinxed
ostan	hafteh	week	moze	gnoaped
falagh	zang	bell	sima	zens
choob	daman	skirt	shisheh	gwid
vajeb	makhloot	mixture	moshaver	nach
behtar	khoob	nice	khatir	maith
maghaleh	jayezeh	prize	noshahr	geald
pitza	ghassab	butcher	an	Plir
hayajan	hafezeh	memory	barnameh	gwux
chin	shab	night	tajamo	sprugue
partgah	goroohban	sergeant	shodim	rhoiced
hamedan	mohaghegh	scholar	be	Ot
shodan	hich	any	ra	Da
foolad	mahi	fish	maad	zepes
alyaf	goosfand	sheep	akhlagh	tinse
reiis	soorat	face	biaban	shreethed
maghazeh	roosta	village	doordast	shroursed
ya	ma	we	moras	spafts
namaz	nan	bread	ebteda	scinds
motor	mosafer	passenger	mobtani	smeighths
dastgah	khiaban	street	tazmin	traunched
enghelab	rooznameh	newspaper	voroodi	thraived
vizhegi	mogheiat	situation	hefazat	phrompts
khali	amigh	deep	haram	fafes

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Appendix B
L2-L1 Priming (Cross Language Lists)

Control	Translation	Target/ Cognate	Control	Target/ Nonword
mark	team	tim	clew	lasteh
food	test	test	clerk	sasadof
road	film	film	click	figar
nose	coat	kot	churn	samaz
ugly	joke	jok	cider	makhoor
show	name	nam	cilia	nortaghal
aid	bad	bad	and	mokhaerk
shoe	lamp	lamp	seen	fana
felt	form	form	chill	sasokh
lion	cake	keyk	used	fistem
thumb	mouse	moosh	chore	falame
deliver	physics	fizik	choke	koozak
okay	merci	merci	serif	zoshd
crawl	fairy	pari	cauls	takhghigh
prison	tourist	toorist	achill	sadaei
effort	normal	normal	achilles	niveh
white	group	gorooh	carte	azva
engineer	football	footbal	canto	naghide
beloved	grammar	gramer	ashen	tomreh
our	new	no	acheron	zereft
root	star	setareh	camp	najmoo
stick	piano	piano	cade	avaei

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Control	Translation	Target/ Cognate	Control	Target/ Nonword
body	door	dar	chapel	taghein
product	brother	baradar	achieve	khasas
if	no	noh	cabin	taskil
elbow	lemon	limoo	cacao	riba
ambulance	telephone	telefon	cafe	kasel
office	mother	madar	calf	sakheb
telephone	cigarette	sigar	carat	takhon
agreement	standard	estandard	cask	neghdar
pool	wall	divar	Apsis	narvaz
clay	fire	atash	aster	thaeid
tail	bird	parandeh	apteral	nana
calm	neat	tamiz	apron	zaana
play	line	khat	chick	nierh
try	low	paein	chap	khalghe
wool	frog	ghoorbagheh	Celt	fanabar
told	week	hafteh	cress	tooidan
rice	bell	zang	apprising	famrah
steak	skirt	daman	apprise	noze
combine	mixture	makhloot	charm	fosaat
wise	nice	khoob	chaff	fahat
beech	prize	jayezeh	yawn	favaned
pianist	butcher	ghassab	yelp	noje
wisdom	memory	hafezeh	apricot	zara
point	night	shab	approve	najzieh

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Control	Translation	Target/ Cognate	Control	Target/ Nonword
sunlight	sergeant	goroohban	apprize	marib
orderly	scholar	mohaghegh	aptly	sahaei
two	any	hich	aprons	nobarat
gift	fish	mahi	abyss	nerayesh
fruit	sheep	goosfand	approach	matabeh
land	face	soorat	approve	marayet
channel	village	roosta	blew	nokhtava
so	we	ma	accuser	tonif
brick	bread	nan	accept	azfoon
physician	passenger	mosafer	accent	naki
ground	street	khiaban	upper	meharath
breakfast	newspaper	rooznameh	abode	khaz
beginning	situation	mogheiat	arbiters	emtelal
grow	deep	amigh	arbiter	zeharat

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