

# WORDS ON THE TIP OF THE TONGUE: A STUDY OF LEXICAL RETRIEVAL FAILURES IN SPANISH-ENGLISH BILINGUALS

PETER ECKE  
*University of Arizona*

**ABSTRACT.** Cognitive diary and TOT-elicitation studies investigated whether (English-dominant) fluent bilingual Heritage Spanish speakers of the southwestern United States experienced more and different tip-of-the-tongue states (TOTs) compared to Mexican Spanish speakers from northern Mexico, who were novice-level students of English. The study also investigated whether word retrieval in the dominant and non-dominant languages differed. Compared to the Mexican Spanish speakers, Heritage Spanish speakers reported fewer TOTs in the diary, their TOTs involved target words and associates of higher word frequencies, and they were less likely to recall the grammatical gender of inaccessible Spanish nouns. In the elicitation tasks, Heritage Spanish speakers recalled fewer Spanish target words, reported more words as unknown, and had more TOTs with words of low, medium, and high frequency counts than Mexican Spanish speakers. Heritage Spanish speakers reported similar rates of TOTs after translation and definition prompts and for cognate and non-cognate targets. The discussion addresses aspects of lexical representation, retrieval, and potential attrition in the bilinguals' non-dominant language.\*

**INTRODUCTION.** Bilingualism involves both the growth and decline of language skills (Hyltenstam & Obler 1989, Herdina & Jessner 2002). Bilingual speakers who are fluent in a second language that dominates a given cultural context have been reported to experience frequent word-finding problems in their first or heritage language (Silva-Corvalan 1991, Amerlaan 1996, Levine 1996, Schmid 2002). Word

---

\*The preparation of this article was supported in part by a Faculty Small Grant from the University of Arizona Foundation and the Office of the Vice President for Research and Graduate Studies. I would like to thank three anonymous reviewers for their helpful suggestions and comments.

production failures are among the first and most obvious indicators of language attrition (Bahrick 1984, Kaufman & Aronoff 1989, Weltens & Grendel 1993, Yagmur, de Bot & Korzilius 1999). They do, at times, involve extensive, elaborate search including the retrieval of related non-target words (Cohen 1975, 1989, Olshtain & Barzilay 1991). Many of the failures to retrieve target words of a non-dominant language (potentially under attrition) resemble tip-of-the-tongue states (TOTs) (see Brown 1991, Schwartz 2002 for reviews). TOTs are temporary word retrieval failures in which the speakers are certain that they know the target word and frequently recall partial target attributes and words related to the target (called WORD ASSOCIATES or simply ASSOCIATES). TOTs are experienced by speakers of all ages (Brown 1991); however, TOT frequency increases steadily with age (Burke, MacKay, Worthley & Wade 1991, Lovelace 1991, Brown & Nix 1996) and can be particularly high in aphasic and anomic patients (Goodglass, Kaplan, Weintraube & Ackerman 1976, Henaff Gonon, Bruckert & Michel 1989, Badecker, Miozzo & Zanuttini 1995). Second language (L2) learners also experience TOTs in their L2 although less frequently than in their dominant, more frequently used first language (L1) (Ecke & Garrett 1998).

Only a few, mostly experimental, studies have investigated word finding problems in fluent bilinguals (Askari 1999, Gollan & Silverberg 2001, Gollan & Acenas 2004, Gollan, Bonanni & Montoya 2005). In TOT experiments, the participants are given word definitions or pictures and are asked to recall the corresponding (usually low-frequency) words. If recall fails, participants indicate whether they are in a TOT and provide information about the partially available target word.

Askari (1999) presented relatively balanced Farsi-English bilinguals with semantically related, phonologically related, and unrelated word primes after showing the target eliciting definition in either Farsi or English. Bilinguals correctly recalled more targets in their L1 (Farsi) than in their L2 (English), but also had more TOTs in the L1 than in the L2 in some but not in other priming conditions. The implications of this study are not clear because of the complex pattern of priming effects and the way that TOT rates were calculated and reported (Brown & Gollan 2003). Gollan and Silverberg (2001) compared the TOT rates elicited in Hebrew-English bilinguals with those in monolingual English speakers and found that the bilinguals experienced TOTs more often than the monolinguals. In another study, using pictures as stimuli to elicit TOTs, Gollan and Acenas (2004) observed that Spanish-English bilinguals and Tagalog-English bilinguals experienced more TOTs in (dominant) English compared to monolinguals unless the pictures represented cognate targets that the participants were then able to translate after the experiment. They also found that knowing the translation equivalents seemed to reduce TOTs and to increase correct target recall. In a recent study of TOTs in Spanish-English bilinguals, Gollan et al. (2005) found that bilinguals reported more TOTs than monolinguals with the exception of proper names. Gollan et al. (2005) interpreted the findings of the three studies as evidence for the transmission deficit hypotheses (Burke et al. 1991). According to this view, TOTs are the result of incomplete

activation in a two-stage process of lexical retrieval (Garrett 1975) that involves lexical selection (the specification of semantic and syntactic properties of an entry) and phonological encoding (the retrieval of word form). In a TOT, the lexical entry has been selected successfully, but phonological encoding failed (temporarily) due to a transmission deficit between the LEMMA (the semantically and syntactically specified structure) and word form. A decrease in the frequency of word use by the individual speaker can lead to a decrease of activation levels of nodes and to a weakening of connections between the semantic/syntactic and phonological levels of encoding, which make TOTs more likely to occur (Burke et al. 1991, Meyer & Bock 1992, James & Burke 2000). Using words infrequently, or not at all, over a period of time negatively affects the normally automatic retrieval of these words. Consistent with the transmission deficit hypotheses, several populations can be expected to experience above-average TOT rates: older speakers for words they have not used over a long period of time and because of aging effects (Burke et al. 1991, Heine, Ober & Shenaut 1999), immigrants with an L1 under attrition that has not been used frequently or recently (Weltens & Grendel 1993, Ecke 2004), bilingual speakers (Gollan & Silverberg 2001, Gollan & Acenas 2004), including second language learners (Ecke & Garrett 1998) who store more words in their lexicons than monolinguals. The additional representations in the bilingual's lexicon result in lower individual word frequency and activation levels in the case of limited or obsolete word use in certain domains. Word production in a non-dominant language can be expected to be particularly vulnerable to TOTs since a part of its vocabulary is likely to be used less recently and less frequently, and the connections between form and meaning are weaker compared to the vocabulary of the dominant language. Consistent with such expectations are the reported slowdown of picture naming times (Mägiste 1986) and the frequent temporary word retrieval failures in the speech of bilinguals (Merino 1983, Silva Corvalán 1991, 1994, Toribio 2001). Some of the latter studies suggest early phases of L1 attrition under the influence of the dominant L2. However, as shown by Gollan and Acenas (2004), even the dominant language of proficient bilinguals can be subject to higher rates of retrieval failure compared to the language of monolinguals.

One issue to be investigated in the present study is the frequency of TOT occurrence in the dominant and non-dominant languages of bilingual Heritage Spanish (HS) speakers of the southwestern United States and Mexican Spanish (MS) speakers from northern Mexico. In agreement with the findings of Gollan and colleagues as well as other studies that suggest some slowdown and more frequent failure of lexical processing in bilinguals, I expected higher rates of TOTs in the HS speakers compared to the MS speakers.<sup>1</sup>

---

<sup>1</sup> Although incomplete acquisition and lack of word knowledge in certain domains is a possibility in this population, it is assumed to have no direct impact on TOT incidence since in a TOT, speakers are certain to know the target word, frequently have access to parts of the word form, and in most cases recall the target in the end.

A second issue under investigation is the frequency range of words that are most likely to generate TOTs in the two groups of Spanish speakers. For monolinguals, it has been shown that TOTs usually occur with low frequency words (Brown 1991). TOT studies with L2 learners, however, suggest that even words of a relatively high frequency can generate TOTs in the L2 (Ecke & Garrett 1998, Ecke 2001). Gollan and Silverberg (2001) introduced the notion of a threshold level, a word-frequency range in which TOTs are most likely to occur in a particular population. They found that monolinguals experienced fewer TOTs in their experiment than bilinguals and suggested that the materials used in the elicitation task may have been below the critical range for monolinguals but within the frequency range that is likely to cause TOTs in bilinguals. The present study attempts to learn more about the frequency ranges in which TOTs are most likely to occur in the two groups of Spanish speakers. Since bilinguals are exposed less frequently to a major part of their vocabularies compared to monolinguals, I expected the HS speakers to experience TOTs with words of a higher mean frequency of use compared to the MS speakers who should experience TOTs with words of a lower frequency.

A third issue under investigation concerns potential differences of word retrieval failures in dominant versus non-dominant languages. There is some indication that extensive word searches in an unstable L2 differ in some aspects from word searches in a dominant L1 (Ecke & Garrett 1998, Ecke 2001). The present study examines whether word types, subject to TOTs, partial target recall, and non-target word associations differ in the HS and MS speakers and in the dominant and non-dominant languages, and if so, what these differences may suggest about the HS speakers' lexicon and their productive vocabulary in the two languages.

The following approach was taken to investigate and compare lexical retrieval failures and extended word search in HS and MS speakers and dominant and non-dominant languages. A cognitive diary study was conducted first to obtain information on the participants' TOT experiences in everyday life. Then a TOT elicitation study was conducted to further examine patterns that had been observed in the diary data. Of special interest for analysis was the speakers' access of partial target information. Also of interest were non-target word associations made during TOTs. Examples 1 and 2 are records of naturally occurring TOTs from the cognitive diaries of two bilingual Heritage Spanish speakers. They illustrate the reported word search passes, including a rough sketch of the time course of intermediate recall products until the target word was found.

- (1) TOT reported by a HS speaker with the target *mercurio* 'mercury'  
     Gender: *masculine*, syllables: 4, letters: *m*      Time:  
     *medicina* 'medicine'      2 minutes  
     *mercurio* 'mercury'      5 minutes

- (2) TOT reported by a HS speaker with the target *sábanas* 'sheets'  
 Gender: *feminine*, syllables: 3, letters: *c, s* Time:  
*las* 'article, feminine'   
*sheets* 6 minutes  
*cortinas* 'curtains' 16 minutes  
*sabio* 'name of a computer system' 41 minutes  
*sábanas* 'sheets' 4 hours, 30 minutes

1. COGNITIVE DIARY STUDY. The present study was concerned with three main research questions: (a) Do HS speakers experience more TOTs than MS speakers? (b) Do HS speakers experience TOTs with words of a lower frequency range than MS speakers? (c) Do TOTs and lexical retrieval differ for dominant versus non-dominant languages? Twenty-eight Mexican Spanish speakers from the state of Sonora in northern Mexico and 37 English-dominant bilingual Heritage Spanish speakers from southern Arizona participated in the diary study. A questionnaire was administered to gather self-reports on language acquisition history, current language use, and language proficiency. The participants' characteristics, as reported in the questionnaires, are shown in Table 1.

VARIABLES	PARTICIPANT GROUPS		DIFFERENCE BETWEEN GROUPS <i>t</i> ( <i>p</i> ) <i>df</i> = 63
	MEXICAN <sup>a</sup> <i>M</i> ( <i>SD</i> )	HERITAGE <sup>b</sup> <i>M</i> ( <i>SD</i> )	
AGE OF PARTICIPANTS	19.9 (2.84)	21.3 (3.46)	1.79 (=0.78)
AGE OF FIRST EXPOSURE TO SPANISH	1.00 (0.00)	1.19 (0.66)	1.51 (=1.35)
AGE OF FIRST EXPOSURE TO ENGLISH	14.29 (2.77)	4.43 (3.08)	13.33 (<.001)
FREQUENCY OF SPANISH USE <sup>c</sup>	5.00 (0.00)	4.70 (0.57)	2.75 (=0.08)
FREQUENCY OF ENGLISH USE <sup>c</sup>	3.61 (1.03)	4.89 (0.31)	7.17 (<.001)
OVERALL SPANISH PROFICIENCY <sup>d</sup>	4.43 (0.63)	4.00 (0.74)	2.44 (=0.17)
LISTENING IN SPANISH <sup>e</sup>	6.50 (0.74)	6.32 (0.85)	0.87 (=0.389)
SPEAKING IN SPANISH <sup>e</sup>	6.29 (0.76)	5.86 (0.95)	1.92 (=0.59)
READING IN SPANISH <sup>e</sup>	6.46 (0.74)	5.84 (0.90)	2.99 (=0.04)
WRITING IN SPANISH <sup>e</sup>	6.18 (0.77)	5.38 (1.16)	3.15 (=0.02)
OVERALL ENGLISH PROFICIENCY <sup>d</sup>	2.25 (0.93)	4.40 (0.50)	12.00 (<.001)
LISTENING IN ENGLISH <sup>e</sup>	3.36 (1.73)	6.32 (0.58)	9.77 (<.001)
SPEAKING IN ENGLISH <sup>e</sup>	3.25 (1.40)	6.08 (0.59)	11.04 (<.001)
READING IN ENGLISH <sup>e</sup>	4.04 (1.69)	6.40 (0.60)	7.92 (<.001)
WRITING IN ENGLISH <sup>e</sup>	3.61 (1.47)	6.08 (0.59)	9.27 (<.001)

<sup>a</sup>Mexican Spanish speakers (*N* = 28)

<sup>b</sup>Heritage Spanish speakers (*N* = 37)

<sup>c</sup>Rated on a five-point scale from 1 (never) to 5 (very frequently)

<sup>d</sup>Rated on a five-point scale from 1 (none) to 5 (perfect)

<sup>e</sup>Rated on a seven-point scale from 1 (very basic) to 7 (perfect)

TABLE 1. *Characteristics of Participants in the Diary Studies*

All participants were undergraduate college students. The HS participants were enrolled in two courses for native speakers of Spanish at the University of Arizona. They were fluent in English and Spanish and began learning the two languages no later than age nine. Paired *t*-tests were used to test the HS speakers' proficiency in the two languages for differences. Although the HS speakers reported using English and Spanish with similar frequency [ $t(36) = 1.53, p = 0.07$ ], they rated themselves overall more proficient in English compared to Spanish [ $t(36) = 3.09, p < 0.004$ ] on a five-point scale (Table 1). However, when asked to rate their proficiency specifically in listening and speaking in both languages, the differences disappeared [ $t(36) = 0, p = 1$  and  $t(36) = 1.21, p = 0.233$  respectively]. The HS speakers essentially perceived the difference in language proficiency or dominance to lie in higher reading skills [ $t(36) = 3.98, p < 0.001$ ] and writing skills [ $t(36) = 3.43, p < 0.001$ ] in English compared to Spanish. The change of language dominance seems to have occurred after entrance to school with literacy development, a pattern frequently reported for Latino and immigrant children in the United States (Silva-Corvalán 1994, Hernandez & Charney 1998, Smith 2002).

The MS participants were enrolled in beginners' courses of EFL at the Universidad de Sonora. They will not be named bilinguals here to avoid terminological confusion although they were, strictly speaking, bilinguals at the novice level of proficiency in EFL. Two-tailed *t*-tests were conducted to compare the MS speakers' characteristics with those of the HS speakers. Compared to the HS speakers, the MS speakers used Spanish more frequently, were more proficient in reading and writing Spanish, but far less proficient in English, which they started to learn at a later age and which they used less frequently. MS speakers and HS speakers differed only marginally in their age, in the age of first exposure to Spanish, and in their ratings of listening and speaking skills in Spanish.

In group sessions, the participants were given written explanations of and instructions for the diary study, which included a description of the TOT phenomenon: 'Sometimes, we look for a certain word or phrase (which we feel we know), but at the time we cannot find and articulate it. The word we are looking for (the target) seems to be on the tip of the tongue'. The participants were asked to monitor their everyday life over a period of four weeks for TOTs, and while searching for a TOT word, record any partial target word information and association. After the four weeks, the researcher collected the diaries and paid the participants a small fee for participation.

The diary package consisted of one page with instructions and eight double-sided response sheets for TOT recordings. Participants were instructed to fill in one sheet for each occurring TOT. The sheets contained short questions/key words to prompt as much information about the TOT as possible. The following information was sought from the participants while they were in a TOT: (a) the language of the target, (b) how well the target was known, rated on a scale from 1 (not very well) to 5 (sure, I know it), (c) a definition of the target's meaning and a

sentence in which it could or was intended to be used, (d) any attributes known about the target (grammatical gender/article, number of syllables, letters/sounds) and (e) other words that came to mind during the target word search.

The TOT targets were categorized into TOTs with proper name targets and TOTs with targets that were not proper names. The latter were classified into nouns, verbs/participles, adjectives/adverbs and other targets. The coding of fragmentary target information included whether participants knew the correct number of syllables, the initial letters/sounds, middle letters/sounds, and the final letters/sounds of the target. Known middle letters included only letters that were neither part of an initial or final syllable, nor part of a prefix or suffix. For example, the *e* in the recorded prefix *re-* of the target *reproduce*, and the letters *t-i-o* of the recorded suffix *-tion* of the target *dehydration* were not coded as middle letters because of their syllabic attachment to the primary or final word constituents.

Another attribute coded as fragmentary information was grammatical gender knowledge. Only Spanish nouns with grammatical gender that could not be derived from conceptual knowledge were included in the analysis. Excluded were proper names whose grammatical gender corresponded to the natural gender (e.g. *la sirena* 'mermaid'), personal names (*Rita*), nouns that can be masculine or feminine (*el/la intérprete* 'translator'), and nominalized adjectives (*el asalariado/la asalariada* 'employee'). Since speakers' correct gender guesses might also be attributed to inferential processes based on access of the nouns' final segments (Teschner 1987), the rate of final letter reports was examined for all cases of correct gender guesses.

Related words associated during TOT word search were analyzed with respect to their language. They were coded as intralingual if they were of the same language as the target word (*golpe-guerra*, *cortinas-sábanas*) and as interlingual if they were of a language other than the target (e.g. *grass-grasa*, *harassment-hostigamiento*). Word frequencies per million were obtained from Alameda and Cuetos (1995) for Spanish associates and targets and from the CELEX database (Baayen, Piepenbrock & Gulikers, 1995) for English associates and targets.<sup>2</sup> I examined whether the mean word frequency of associates differed from the mean frequency of targets and whether associates' and targets' frequencies differed between dominant and non-dominant languages. Finally the cognate status of all interlingual associates was examined by determining whether they were phonologically/orthographically and semantically similar to the target word (e.g. *harmony-harmónico*, *initiate-iniciar*).

1.1. TOT INCIDENCE, LANGUAGE OF TARGETS, AND TOT RESOLUTION. Table 2 displays the mean numbers of TOTs reported per participant in the MS and HS

<sup>2</sup>The mean word frequencies obtained from the two dictionaries can be seen as only an approximation to objective word frequencies in speech since both sources are based primarily on written corpora.

groups in the cognitive diary study. For all statistical analyses, an alpha level of  $p < 0.05$  was adopted. Two-tailed  $t$ -tests were applied for between-group analyses, and paired  $t$ -tests for comparisons of dominant and non-dominant languages within participant groups. Note that proper name TOTs are listed separately from Spanish and English TOTs since most of their forms are similar or identical in both languages.

TOT TYPE/LANGUAGE	PARTICIPANT GROUPS		DIFFERENCE BETWEEN GROUPS $t(p)$ $df = 63$
	MEXICAN <sup>a</sup> $n; M(SD)$	HERITAGE <sup>b</sup> $n; M(SD)$	
ALL TOTs	165; 5.89 (2.33)	165; 4.46 (1.66)	2.9 (= .005)
PROPER NAME TOTs <sup>c</sup>	56; 2.00 (1.78)	31; 0.84 (0.96)	3.4 (<.001)
SPANISH TOTs	84; 3.00 (2.04)	76; 2.05 (1.76)	2.0 (= .050)
ENGLISH TOTs	25; 0.89 (1.42)	53; 1.43 (1.44)	1.5 (= .138)
OTHER L2 TOTs	0	05; 0.13 (0.35)	2.1 (= .044)

<sup>a</sup>Mexican Spanish speakers ( $N = 28$ )  
<sup>b</sup>Heritage Spanish speakers ( $N = 37$ )  
<sup>c</sup>Proper names independent of language  
 $n$  = total number of TOTs  
 $M$  = mean number of TOTs per participant

TABLE 2. *TOTs Reported during the 4-Week Period*

Contrary to expectation, the Spanish-dominant MS speakers reported more TOTs overall than the English-dominant bilingual HS speakers. This fails to confirm the prediction that the HS speakers experience more word retrieval failures than the MS speakers. However, the HS speakers tended to have more TOTs in the less dominant (Spanish) language than in the dominant (English) language [ $t(36) = 1.35, p = 0.18$ ], even though they reported using both languages equally often. In contrast, the MS speakers reported fewer TOTs in the less dominant L2 (English) [ $t(27) = 4.1, p < 0.001$ ] compared to the dominant L1 (Spanish) probably because they used English less frequently than Spanish.

Finally, the more bilingual HS speakers reported fewer TOTs with proper names compared to the more monolingual MS speakers, a finding that is consistent with other studies (Gollan et al. 2005). The difference in the frequencies of proper name TOTs is the largest difference between MS and HS groups. It contributed substantially to the high overall TOT rate in the MS speakers.

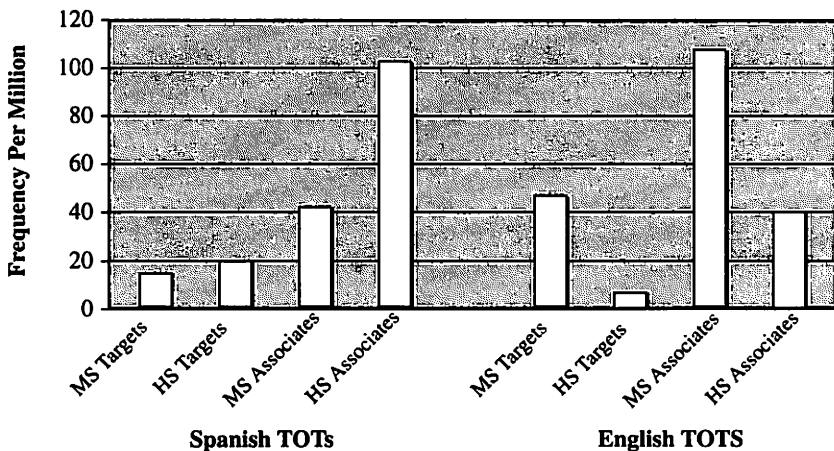
The participants rated their familiarity with the target words on a five-point scale. The mean familiarity ratings were high for the Spanish targets ( $M = 4.44, SD = 0.94$ ) and English targets ( $M = 4.2, SD = 1$ ) of the MS group, as were the Spanish targets ( $M = 4.39, SD = 0.97$ ) and English targets ( $M = 4.31, SD = 0.98$ ) of the HS group. The MS speakers resolved 96.2% of the Spanish TOTs, and 100% of the English L2 TOTs. The HS speakers resolved 100% of the TOTs with Spanish words



and 92.9% of the TOTs with English words. The expressed high degree of familiarity with the targets and the high TOT resolution rates (especially in the non-dominant language) suggest that the participants were experiencing genuine TOTs and not some other lexical production problem due to incomplete acquisition.

**1.2. FREQUENCY OF TARGETS AND ASSOCIATES.** Figure 1 illustrates the mean word frequencies of TOT targets and their associates for the two groups and the two languages. HS speakers experienced TOTs with higher-frequency words in the non-dominant Spanish language (20.4/million,  $SD = 50.4$ ) compared to Spanish-dominant MS speakers who experienced TOTs with lower-frequency words (12.3/million,  $SD = 21$ ) in dominant Spanish [ $t(137) = 1.24$ ,  $p = 0.21$ ]. MS speakers reported TOTs with L2 English words that were more frequent (47.6/million,  $SD = 80.7$ ) compared to the HS speakers' TOTs with English words, which were less frequent (6.9/million,  $SD = 10.8$ ) [ $t(67) = 3.31$ ,  $p < 0.001$ ]. Importantly, the HS speakers recalled Spanish non-target words of a higher frequency (103.5/million,  $SD = 233$ ) compared to the MS speakers whose word associations were of a lower frequency (44/million,  $SD = 94.3$ ) [ $t(327) = 3.21$ ,  $p < 0.001$ ]. Conversely, the English word associates in the TOTs of the MS speakers were of a higher frequency (107/million,  $SD = 171.8$ ) than the English associates in the TOTs of the English-dominant HS speakers (40.9/million,  $SD = 84.7$ ) [ $t(143) = 3.03$ ,  $p < 0.003$ ].

Word associates' frequencies were generally higher compared to the frequencies of targets. The differences were significant for Spanish targets and associates in the MS group [ $t(261) = 2.74$ ,  $p < 0.006$ ] and the HS group [ $t(203) = 2.96$ ,  $p < 0.003$ ] and for English targets and associates in the HS group [ $t(152) = 2.65$ ,  $p < 0.004$ ]. The difference between English targets and associates in the MS group



MS = Mexican Spanish speakers; HS = Heritage Spanish speakers

FIGURE 1. Mean Frequency of Targets and Associates in Spanish and English TOTs

was marginally significant [ $t(58) = 1.59, p = 0.117$ ]. In sum, participants reported TOTs with less frequent targets and associates in their dominant language and TOTs with more frequent words and associates in their non-dominant language. Example 3 is a diary record of a HS speaker's search for a frequent word in her non-dominant language.

- (3) TOT reported by a HS speaker with  
the high frequency target *tarea* 'task/homework'  
Familiarity: 5, gender: *masculine*, syllables: 3      Time:  
*mucha* 'much'        
*traer* 'bring'      1 minute  
*trotar* 'trot'      7 minutes  
*homework*      13 minutes  
*tarea* 'homework'      15 minutes  
*Utilizo mucho esta palabra pero no me podía acordar.*  
'I use this word a lot, but I could not remember it.'

1.3. TARGET WORD TYPES. The TOT targets were categorized into proper names (across languages), nouns, verbs/participles, adjectives/adverbs, and other targets for TOTs in Spanish and TOTs in English. Examples of the target word types are displayed in Table 3. The HS speakers experienced TOTs less frequently with proper names than the MS speakers (see Table 2). The total and mean numbers of TOTs with nouns, verbs and adjectives reported by MS and HS speakers are given in Table 4.

WORD TYPE	EXAMPLES
PROPER NAME	<i>La Ley</i> 'The Law' (name of a band), <i>Datsun</i> 'car type'
NOUN	<i>tesis</i> 'thesis', <i>adicción</i> 'addiction'
VERB/PARTICLE	<i>erase</i> (English verb), <i>hervir</i> 'to boil'
ADJECTIVE/ADVERB	<i>temperamental</i> 'temperamental', <i>lírico</i> 'lyrical'
OTHER	<i>prueba estadística</i> 'statistical test'

TABLE 3. *Target Word Types*

HS speakers reported more TOTs with verbs and adjectives and fewer TOTs with nouns in their non-dominant Spanish language compared to the MS speakers. Rates of target word types were similar for English in both groups. A comparison of dominant and non-dominant languages within each group yielded the following results: MS speakers had more TOTs in non-dominant English with verbs [ $t(27) = 2.71, p < 0.011$ ], but fewer TOTs with nouns [ $t(27) = 4.12, p < 0.001$ ] and adjectives [ $t(27) = 2.82, p < 0.009$ ] compared to their dominant Spanish language. HS speakers had similar rates of TOTs for nouns [ $t(36) < 1$ ], adjectives [ $t(36) < 1$ ] and verbs [ $t(36) = 1.43, p < 0.160$ ] in dominant English compared to non-dominant Spanish. Nouns composed the largest proportion of TOT targets across groups and languages. Verbs

	PARTICIPANT GROUPS		DIFFERENCE BETWEEN GROUPS
	MEXICAN <sup>a</sup> <i>n</i> ; <i>M</i> ( <i>SD</i> )	HERITAGE <sup>b</sup> <i>n</i> ; <i>M</i> ( <i>SD</i> )	<i>t</i> ( <i>p</i> ) <i>df</i> = 63
TOT TYPE/LANGUAGE			
SPANISH NOUNS	68; 2.43 (1.64)	43; 1.16 (1.44)	3.30 (= .002)
ENGLISH NOUNS	19; 0.68 (1.19)	33; 0.89 (1.02)	<1 (= .440)
SPANISH VERBS	0	20; 0.54 (0.96)	2.97 (= .004)
ENGLISH VERBS	06; 0.21 (0.42)	10; 0.27 (0.56)	<1 (= .659)
SPANISH ADJECTIVES	11; 0.39 (0.74)	13; 0.35 (0.72)	<1 (= .820)
ENGLISH ADJECTIVES	0	10; 0.27 (0.56)	2.55 (= .013)
SPANISH OTHER	05; 0.18 (0.77)	0	1.41 (= .163)
ENGLISH OTHER	0	01; 0.03 (0.16)	<1 (= .389)

<sup>a</sup>Mexican Spanish speakers (*N* = 28)

<sup>b</sup>Heritage Spanish speakers (*N* = 37)

*n* = total number of TOTs

*M* = mean number of TOTs per participant

TABLE 4. *Target Word Types Reported during the 4-Week Period*

appeared to be more frequent in TOTs of the non-dominant languages.

1.4. FRAGMENTARY TARGET INFORMATION. Table 5 illustrates the percentages of fragmentary information reported correctly for target words in TOTs experienced by the MS and HS speakers. The number of syllables and the initial letter/sound were correctly reported most frequently as partially available target information in both groups and languages.

	<i>N</i>	FRAGMENTARY INFORMATION			
		SYLLABLES <sup>a</sup>	INITIAL <sup>b</sup>	MIDDLE <sup>c</sup>	FINAL <sup>d</sup>
MEXICAN <sup>e</sup>					
SPANISH TARGETS	120	60%	27%	12%	13%
ENGLISH TARGETS	32	56%	28%	09%	16%
HERITAGE <sup>f</sup>					
SPANISH TARGETS	88	68%	47%	15%	16%
ENGLISH TARGETS	60	55%	32%	05%	12%

<sup>a</sup>number of syllables

<sup>b</sup>initial letter/sound

<sup>c</sup>middle letter/sound

<sup>d</sup>final letter/sound

<sup>e</sup>Mexican Spanish speakers

<sup>f</sup>Heritage Spanish speakers

TABLE 5. *Fragmentary Target Information Reported Correctly*

1.5. ACCESS OF GRAMMATICAL GENDER. Based on findings of TOT studies with Italian speakers (Badecker et al. 1995, Vigliocco, Antonini & Garrett 1997) it was predicted that participants could access the grammatical gender of temporarily

unavailable nouns in Spanish. It was assumed that gender information was available if participants reported the target's gender correctly and/or provided a correct article for the noun target. Table 6 presents the numbers and percentages of correct and incorrect reports of gender information as well as the numbers and percentages of TOTs for which no gender information was provided.

	N <sup>a</sup>	GENDER GUESSES		
		CORRECT	WRONG	NO GUESS
		<i>n</i> ; <i>M%</i> ( <i>SD</i> )	<i>n</i> ; <i>M%</i> ( <i>SD</i> )	<i>n</i> ; <i>M%</i> ( <i>SD</i> )
MEXICAN <sup>b</sup>	26	53; 85% (.27)	1; 01% (.05)	10; 14% (.27)
HERITAGE <sup>c</sup>	22	21; 60% (.46)	3; 06% (.22)	13; 34% (.45)

<sup>a</sup>participants reporting TOTs with Spanish noun targets that met the criteria for analysis

<sup>b</sup>Mexican Spanish speakers

<sup>c</sup>Heritage Spanish speakers

TABLE 6. *Grammatical Gender Reports for Spanish Noun Targets*

MS speakers successfully predicted the grammatical gender. For few target nouns, no information on gender was given, and only a very small proportion of gender guesses were incorrect. HS speakers were less successful in correctly reporting the target's gender. Incorrect guesses were low, but no-guess reports on gender information were relatively high compared to the MS group. The difference in the percentages of correct gender recall responses between the MS group and HS group was significant [ $t(46) = 2.38, p < 0.021$ ]. Notice that only 20.8% of the MS speakers and 12.5% of the HS participants correctly reported the final letter or sound of the targets whose gender was predicted. The infrequent reports of final segments suggest that inference based on the correlation between morphological regularities and grammatical gender in Spanish nouns (Teschner 1987) was not a major determinant of correct gender reports.

1.6. WORD ASSOCIATES. The TOTs frequently involved non-target words that came to the speakers' minds while they were searching for the targets (i.e. word associates). MS speakers reported a total of 303 associates for the TOTs that they resolved. This corresponds to  $M = 1.88$  associates per TOT. HS speakers reported 294 associates overall,  $M = 1.78$  associates per TOT. In the HS group, Spanish TOTs involved somewhat more associates ( $M = 2.04$ ) than English TOTs ( $M = 1.72$ ) and proper name TOTs ( $M = 1.55$ ). In the MS group Spanish TOTs involved  $M = 2.08$  associates, English TOTs included  $M = 1.16$  associates and proper name TOTs had  $M = 1.71$  associates. The associate-target pairs were analyzed with respect to word frequency (as reported above), language, and cognate status.

Associations from within the targets' language were the most frequent type of non-target word recalled across groups and languages. The Spanish TOTs of the MS speakers involved only intralingual associates. In the English TOTs, 68.8% of 32 associates were from within the target's language. Intralingual associations also dominated TOT word search in HS speakers' associations overall (72.8% of

246). It is interesting to note, however, that HS speakers' TOTs for Spanish targets generated higher rates of interlingual associates ( $M = 0.33$ ,  $SD = 0.47$  of  $N = 155$  associates,) compared to TOTs with English targets ( $M = 0.16$ ,  $SD = 0.37$  of  $N = 91$  associates), [ $t(244) = 2.94$ ,  $p < 0.004$ ].

The analysis of cognate status of associates revealed that in the Spanish TOTs of the HS group, 24.5% of the interlingual associates ( $N = 49$ ) were cognates; in the English TOTs, 33.3% of the interlingual associates ( $N = 18$ ) were cognates, that is, they were related phonologically and semantically to the target.

**2. THE TOT ELICITATION STUDY.** In this study, TOTs were elicited in word recall tasks prompted by definitions and/or translations. The purpose of the study was to validate the results obtained from the diary study by using a more controlled methodology, in particular (a) to compare TOT incidence in the HS speakers with TOT incidence in the MS speakers, including with respect to the frequency ranges of targets, (b) to evaluate the suitability of the translation task for TOT elicitation studies with bilinguals, and (c) to investigate the effect of cognate status of Spanish-English translation equivalents upon TOT elicitation and target recall.

### 2.1. HYPOTHESES.

**2.1.1. TOT INCIDENCE AND TARGET FREQUENCY.** The assumption that HS speakers were more vulnerable to word finding problems, in particular in non-dominant Spanish compared to MS speakers, was not supported in the diary study. The lower than expected rates of TOTs reported by the HS group, however, could have been a consequence of frequently used compensatory strategies, such as codeswitching or appeal for translation through which the HS speakers may avoid or solve word finding problems before they convert into TOTs. An advantage of TOT elicitation tasks is that compensatory strategies cannot be used by participants since only particular targets are acceptable for recall. Therefore, it was expected that the elicitation tasks would generate higher rates of TOTs and lower rates of correct target recall in the HS speakers compared to the MS speakers. Based on the previously observed trend in target word frequencies, it was further expected that the elicitation task would yield more TOTs with medium and high frequency words in the HS group compared to the MS group.

**2.1.2. TRANSLATION PROMPTS VERSUS DEFINITION PROMPTS.** A methodological issue under investigation concerned the question whether translation tasks could be used successfully to elicit TOTs in experiments with bilingual speakers. In the traditional experimental paradigm, introduced by Brown and McNeill (1966), word definitions are presented to the participants who are instructed to think of the target words that best match the definitions. A common problem of definitions is that they sometimes are ambiguous and elicit so-called negative TOTs (-TOTs). In a -TOT, the speaker searches for a word form that is different from the one the experimenter intended to induce. The analysis of -TOTs is often considered impossible since fragmentary information and associates cannot be compared reli-

ably to the target. Translation equivalents as stimuli could have the advantage of being shorter, more precise, and less ambiguous than word definitions. They may be easier for speakers to specify at the conceptual/semantic level. Henceforth, it was hypothesized that (a) translation primes elicit higher rates of +TOTs and higher rates of correctly recalled targets than definition prompts and (b) lower rates of -TOTs, non-target recall, and target unknown responses compared to elicitation tasks with word definition prompts.

2.1.3. COGNATE STATUS OF TARGETS. Another question of interest was whether translation- and definition-prompted tasks could elicit TOTs for cognate targets. Cognates are defined for the purpose of this study as rough translation equivalents that are similar in phonological/orthographic form (Hall 2002). Cognate status was reported to be a factor that facilitates correct word retrieval in a TOT elicitation task with bilinguals (Gollan & Acenas 2004) as well as successful word translation (de Groot 1992). Gollan and Acenas (2004) suggested that bilinguals are less likely to experience TOTs and more likely to recall cognate targets correctly compared to non-cognate targets. De Groot (1992) reported that Dutch speakers with English as an L2 were more successful in translating cognates than non-cognates into the L2. Taking into account these findings, it was hypothesized that (a) in a translation task, cognate stimuli elicit lower rates of positive and negative TOTs and target unknown responses, but higher rates of correct target recall compared to non-cognate prompts. (b) Higher rates of target recall and lower rates of positive and negative TOTs and target unknown responses were also expected for cognate words after definition primes since it is possible that HS speakers, who cannot recall the Spanish target immediately, could recall the English cognate equivalent and use it as a cue to retrieve the target.

2.2. METHOD. Participants were 35 Mexican Spanish speakers from northern Mexico and 34 Heritage Spanish speakers from the southwestern United States, with English as a dominant language. The participants were not part of the previously conducted diary study, but were drawn from similar populations. The MS speakers were enrolled in elementary classes of English as an L2 at the Universidad de Sonora. The HS speakers were students enrolled in courses for Spanish native speakers at the University of Arizona. The characteristics of the participants are given in Table 7. The HS speakers reported being equally fluent in speaking Spanish and English [ $r(33) = 0.62, p = 0.540$ ] and estimated using both languages with similar frequency [ $r(33) = 0.63, p = 0.535$ ].<sup>3</sup> Most participants started learning English when they entered school at age six or seven.

All 23 to-be-elicited target words were Spanish nouns. Five words were of high frequency (with  $\geq 25$  occurrences per million in Alameda & Cuetos 1995,  $M = 88$ ), eight of moderate frequency (5 to 24 per million,  $M = 10.5$ ), and 10 words were of

---

<sup>3</sup>For participants in the experiment, a shorter version of the language background questionnaire was used. Participants did not rate their listening, reading and writing skills.

VARIABLES	PARTICIPANT GROUPS		DIFFERENCE BETWEEN GROUPS
	MEXICAN <sup>a</sup> <i>M (SD)</i>	HERITAGE <sup>b</sup> <i>M (SD)</i>	<i>t (p)</i> <i>df = 67</i>
AGE OF PARTICIPANTS	20.7 (3.01)	21.2 (2.37)	0.80 (= .428)
AGE OF FIRST EXPOSURE TO SPANISH	1.00 (0.00)	1.12 (0.54)	1.29 (= .200)
AGE OF FIRST EXPOSURE TO ENGLISH	14.51 (2.64)	6.68 (5.28)	7.83 (< .001)
FREQUENCY OF SPANISH USE <sup>c</sup>	5.00 (0.00)	4.79 (0.41)	2.97 (= .004)
FREQUENCY OF ENGLISH USE <sup>c</sup>	3.43 (1.09)	4.73 (0.51)	6.33 (< .001)
SPEAKING IN SPANISH <sup>d</sup>	6.17 (0.66)	5.56 (0.99)	3.03 (= .003)
SPEAKING IN ENGLISH <sup>d</sup>	3.06 (1.26)	5.73 (0.90)	10.15 (< .001)

<sup>a</sup>Mexican Spanish speakers ( $N = 35$ )

<sup>b</sup>Heritage Spanish speakers ( $N = 34$ )

<sup>c</sup>Rated on a five-point scale from 1 (never) to 5 (very frequently)

<sup>d</sup>Rated on a seven-point scale from 1 (very basic) to 7 (perfect)

TABLE 7. *Characteristics of Participants in the Experimental Study*

relatively low frequency (less than 5 per million,  $M = 2.2$ ). The definition stimuli were initially derived from Spanish dictionaries, then altered and simplified by four Spanish native speakers. The definitions, targets, and translation equivalents of the elicitation task are given in the Appendix. Six target items were cognates of the corresponding English translation equivalents. The first 11 items of the target list included the cognates *el mercurio* 'mercury', *la depresión* 'depression', and *la enciclopedia* 'encyclopedia'. The second part of the list of 12 items contained the cognates *la pipa* 'pipe', *la simbiosis* 'symbiosis', and *el climax* 'climax'.

All TOT elicitation tasks were conducted as group sessions. Participants received a 30-page booklet with instructions, 28 response sheets, and a questionnaire to report on their language acquisition history and proficiency. In the instructions, 'TOT' was defined, the elicitation procedure was described, and directions for response sheet completion were given. After the instructions were read, participants were given the opportunity to ask questions. Then the experimenter filled in one response sheet as an example on an overhead transparency and presented three trial stimuli so that participants could become familiar with the recall and recording tasks.

To ensure that TOT rates would not be confounded with stimulus type, all target words were prompted with a definition or with a translation equivalent using a between-participant design. Sixteen participants of the HS group received word definitions as stimuli for the first 11 targets and English translation equivalents as stimuli for targets 12-23. Eighteen participants of the HS group received translation equivalents for the first 11 targets and word definitions for targets 12-23. The MS group ( $N = 35$ ) received only definition prompts for targets 1-23. They were not given translation prompts because of their low proficiency in English. The defi-

inition and translation prompts were read aloud by the experimenter. Participants were given one minute for recall and response sheet completion. If the participants recalled the target immediately, they marked 'no TOT' and wrote down the target. If they did not know the word that matched the stimulus, they also marked 'no TOT', but did not provide any words. If the participants felt that the word was on the tip-of-the-tongue, they marked 'yes TOT', rated their familiarity with the target on a five-point scale, and recorded any association and partial target information. After one minute, the experimenter asked participants to stop writing, named the target, and participants indicated whether they knew the target and whether they were searching for it. Positive replies were used to classify a TOT as +TOT, negative responses indicated that speakers experienced a -TOT, which is to say, they were searching for a target different from the one the experimenter intended to induce.

2.3. TOT INCIDENCE. Table 8 illustrates the percentages of recall response types for the MS group and the HS group. For the HS group, the results for definition-prompted recall tasks and translation-prompted tasks are given separately.

RESPONSE TYPE	PARTICIPANT GROUPS			DIFFERENCE BETWEEN GROUPS <sup>c</sup> <i>t</i> ( <i>p</i> ) <i>df</i> = 67
	MEXICAN <sup>a</sup>	HERITAGE <sup>b</sup>		
	<i>n</i> ; <i>M</i> % ( <i>SD</i> )	<i>n</i> ; <i>M</i> % ( <i>SD</i> )		
	DEF <sup>c</sup>	TRANS <sup>d</sup>	DEF <sup>c</sup>	
+TOT	46; 06% (.08)	74; 19% (.16)	66; 17% (.13)	4.33 (<.001)
-TOT	70; 09% (.07)	55; 14% (.10)	54; 14% (.13)	1.92 (= .006)
TARGET RECALL	445; 55% (.12)	193; 50% (.23)	115; 30% (.19)	6.76 (<.001)
NON-TARGET				
RECALL	166; 21% (.11)	32; 08% (.08)	68; 17% (.12)	1.27 (= .207)
UNKNOWN				
TARGET	78; 10% (.11)	36; 09% (.10)	89; 22% (.18)	3.66 (<.001)
TOTAL	805; 100%	390; 100%	392; 100%	

<sup>a</sup>Mexican Spanish speakers (*N* = 35)

<sup>b</sup>Heritage Spanish speakers (*N* = 34)

<sup>c</sup>Definition Prompt

<sup>d</sup>Translation Prompt

<sup>e</sup>For Definition Prompts only

TABLE 8. *Recall Response Types for Translation-Prompt and Definition-Prompt Tasks*

In the definition-prompted task, 17% of the HS speakers' responses were +TOTs, that is, they involved search for the target the experimenter attempted to elicit, and 14% were -TOTs in which the speakers experienced TOTs with different words. MS speakers reported +TOTs in 6% and -TOTs in 9% of the recall tasks. Com-



parisons of the proportions of response types produced by the MS and HS groups in the definition-prompted task yielded significant differences; HS speakers experienced higher rates of +TOTs, -TOTs, and target unknown responses and lower rates of correct target recall compared to the MS speakers. Non-target recall responses in HS and MS groups were not significantly different from each other.

2.4. TARGET FREQUENCY. An item analysis was carried out to test whether target words of three different frequency ranges (high, medium, low) would generate different rates of TOTs and other responses in the MS and HS speakers. Based on the diary study results, it was predicted that HS speakers compared to MS speakers would experience higher rates of TOTs, not only with low frequency targets, but also with medium and high frequency targets, some of which would be too easy for the MS speakers to result in word finding problems in the elicitation task. Table 9 illustrates the percentages of response types that were elicited for the target words of the three frequency ranges in the definition-prompted tasks in the MS and HS groups.

RESPONSE TYPE	TARGET FREQUENCY								
	LOW <sup>a</sup>		DIFF <sup>b</sup> <i>t</i> ( <i>p</i> ) <i>df</i> = 18	MEDIUM <sup>c</sup>		DIFF <sup>b</sup> <i>t</i> ( <i>p</i> ) <i>df</i> = 14	HIGH <sup>d</sup>		DIFF <sup>b</sup> <i>t</i> ( <i>p</i> ) <i>df</i> = 08
	M%	SD		M%	SD		M%	SD	
	M <sup>e</sup>	H <sup>f</sup>		M <sup>e</sup>	H <sup>f</sup>		M <sup>e</sup>	H <sup>f</sup>	
+TOT	08%	20%		04%	14%		04%	15%	
	.06	.19	1.87 (.077)	.03	.11	2.60 (.020)	.03	.09	2.63 (.030)
-TOT	12%	15%		07%	11%		05%	15%	
	.11	.11	<1 (.465)	.08	.08	<1 (.362)	.05	.13	1.66 (.135)
TARGET RECALL	45%	24%		64%	37%		63%	28%	
	.29	.26	1.67 (.112)	.30	.24	1.96 (.070)	.31	.25	1.91 (.090)
NON-TARGET RECALL	24%	19%		18%	17%		17%	15%	
	.21	.15	0.69 (.501)	.22	.14	0.16 (.874)	.15	.13	0.23 (.827)
UNKNOWN TARGET	11%	23%		07%	21%		11%	25%	
	.09	.16	2.00 (.061)	.07	.20	1.87 (.083)	.15	.18	1.32 (.224)

<sup>a</sup>*N* = 10, *M* frequency = 2.2/million (Alameda & Cuetos 1995)

<sup>b</sup>Difference between groups

<sup>c</sup>*N* = 8, *M* frequency = 10.5/million (Alameda & Cuetos 1995)

<sup>d</sup>*N* = 5, *M* frequency = 88/million (Alameda & Cuetos 1995)

<sup>e</sup>Mexican Spanish speakers (*N* = 35)

<sup>f</sup>Heritage Spanish speakers (*N* = 34)

TABLE 9. *Response Types for Targets of Three Frequency Ranges in the Definition-Prompt Task*

The most important finding of this analysis is that HS speakers experienced significantly more +TOTs with high frequency and medium frequency words compared to the MS speakers who had few TOTs with words of the two higher frequency ranges. HS speakers had also more TOTs with low frequency targets than

the MS speakers, but the difference was only marginally significant. There were marginal differences between the two groups in target recall for all frequency ranges and for target unknown responses with low frequency words. HS speakers less often recalled targets, and they tended to report more unknown words for low-frequency targets. The latter two findings suggest that HS speakers' receptive vocabulary in Spanish is also smaller than the vocabulary of the MS speakers. In sum, HS speakers experienced more TOTs overall (with words of all three frequency ranges) than MS speakers, whose TOTs were limited mostly to the low-frequency range.

**2.5. TRANSLATION VERSUS DEFINITION PROMPTS.** A methodological issue under investigation was whether translation could be used as an effective task to elicit TOTs in bilinguals. Higher rates of +TOTs and correct target recall, and lower rates of non-target recall, -TOTs, and target unknown responses were predicted for the translation task compared to the recall tasks with definition primes. Table 8 illustrates the percentages of response types in the two tasks.

Similarly high rates of +TOTs were elicited after definition and translation stimuli [ $t(33) < 1$ ]. Proportions of -TOTs were also very similar in both conditions [ $t(33) < 1$ ]. Significant differences were found for the three non-TOT responses: Translation stimuli prompted a higher rate of target recall [ $t(33) = 4.19$ ,  $p < 0.001$ ], a lower rate of non-target recall [ $t(33) = 3.48$ ,  $p = 0.001$ ], and a lower rate of target unknown responses [ $t(33) = 4.28$ ,  $p < 0.001$ ]. The results are consistent with most predictions of the hypotheses. Translation equivalents appear to be more precise and less ambiguous stimuli than definitions. They seem well suited as stimuli for TOT elicitation tasks with bilingual speakers. The prediction that the translation task would substantially reduce the rate of -TOTs was not confirmed. This suggests that translation prompts, although more precise than definitions, do not guarantee a perfectly unambiguous specification of the targets' meanings.

**2.6. COGNATE STATUS OF TARGETS.** To investigate the effect of cognate status on TOT generation and recall, the elicitation task included six targets that were cognates of the corresponding English translation equivalent. Since the number of cognates included in the stimulus material was very small, the results of this analysis must be viewed as tentative and should be interpreted with caution. Hypothesis (a) in Section 2.1.3. predicted an elevated number of correct target recall and a reduction of + and -TOT rates, incorrect target recall, and target unknown responses for cognate targets in the translation tasks. The mean percentages of response types for cognate targets and non-cognate targets are shown in Table 10.

Due to the low number of cognate items included in the analysis and the lack of statistical power, none of the predicted differences between cognate and non-cognate condition reached significance. The following trends, however, are consistent with the predictions. In the translation task, correct target recall was more frequent for cognates compared to non-cognates. Non-target and -TOT responses were less frequent in the cognate condition compared to the non-cognate condi-

RESPONSE TYPE	TRANSLATION PROMPT		STIMULUS TYPE DIFF <i>t</i> ( <i>p</i> ) <i>df</i> = 21		DEFINITION PROMPT		DIFF <i>t</i> ( <i>p</i> ) <i>df</i> = 21
	+COG <sup>a</sup>	-COG <sup>b</sup>			+COG <sup>a</sup>	-COG <sup>b</sup>	
	<i>M</i> %	<i>M</i> %			<i>M</i> %	<i>M</i> %	
	<i>SD</i>	<i>SD</i>			<i>SD</i>	<i>SD</i>	
+TOT	23%	18%	1.12 (.277)		09%	20%	1.70 (.104)
	.11	.09			.05	.15	
-TOT	06%	17%	1.37 (.185)		12%	14%	<1 (.750)
	.10	.19			.10	.11	
TARGET RECALL	59%	45%	<1 (.391)		40%	26%	1.15 (.261)
	.31	.33			.35	.21	
NON-TARGET RECALL	00%	11%	2.31 (.032)		18%	17%	<1 (.773)
	.00	.12			.20	.12	
UNKNOWN TARGET	12%	09%	<1 (.650)		20%	23%	<1 (.685)
	.31	.11			.18	.16	
TOTAL RESPONSES	102	288			102	290	
<sup>a</sup> Cognate Targets ( <i>n</i> = 6)							
<sup>b</sup> Non-Cognate Targets ( <i>n</i> = 17)							

TABLE 10. *Response-Type Frequencies for Heritage Spanish Speakers for Cognate and Non-Cognate Targets after Definition and Translation Prompts*

tion. These differences reflect the expected facilitating effect of translation prompt-target similarity upon cognate recall. Contrary to expectation, the rates of +TOTs and target unknown responses were not found to be reduced for cognates compared to non-cognates.

Hypothesis (b) in Section 2.1.3. predicted that definition prompts for cognate targets would also result in higher rates of target recall and fewer positive and negative TOTs because of possible mediation through the potentially activated English equivalent. The observed trends are consistent with (though not direct evidence for) the possibility of recall facilitation through activated English cognates. The rate of correct target recall after definition primes is higher for cognates than for non-cognates and the rate of +TOTs is lower for cognates compared to non-cognates. The proportions of -TOTs, non-target recall and target unknown responses are very similar for cognates and non-cognates.

### 3. DISCUSSION.

3.1. TOT INCIDENCE. A cognitive diary study and an experimental elicitation study were conducted to ascertain similarities and differences in tip-of-the-tongue

states (TOTs) in Mexican Spanish speakers and bilingual speakers of Heritage Spanish and English. Whereas the diary study did not show higher rates of TOT occurrence in the HS speakers, the TOT elicitation task demonstrated more frequent word retrieval failures in Spanish in the HS group compared to the MS group. The high overall rate of TOTs elicited in the HS speakers suggests that these participants are highly susceptible to word finding problems with these words. Unlike the diary study, the recall elicitation task revealed a higher vulnerability of HS speakers to word retrieval failure in non-dominant Spanish compared to the MS speakers' TOTs in dominant Spanish. This vulnerability could reflect weakened form-meaning connections for words that are relatively less frequently used by the bilinguals compared to relatively monolingual speakers (Gollan & Acenas 2004). The retrieval failures may even indicate lexical attrition at its earliest stage (Weltens & Grendel 1993). HS speakers also differed from MS speakers in higher rates of unknown targets and lower rates of target recall responses in the TOT elicitation experiment with Spanish words. The latter findings suggest that the MS speakers do not only experience more temporary word retrieval failures in (non-dominant) Spanish, they also have a smaller Spanish vocabulary compared to the MS speakers (for similar findings see Valdés & Geoffrion-Vinci 1998, Gollan et al. 2005).

The different (and apparently contradicting) rates of naturally occurring TOTs and experimentally elicited TOTs may be due to the HS speakers' frequent use of compensatory strategies in normal speech, such as codeswitching, appeal for translation, paraphrasing, and using more general high-frequency words instead of specific low-frequency words. These strategies, some of which are exclusively used by bilinguals, are employed when the speaker is in need of lexical resources for immediate communication. They can resolve lexical production failures before they convert into TOTs. Numerous studies of L1 and L2 attrition (e.g. Cohen 1989, Olshtain & Barzilay 1991, Silva-Corvalán 1991, Saville Troike, Pan & Dutkova 1995) and of L2 learning (Færch & Kasper 1983, Bialystok 1990, Poullisse 1993, Dörnyei & Scott 1997) have documented the importance of compensatory strategy use for speakers with deficits in lexical production. Through the application of such strategies, the bilinguals' speech remains fluent and temporary lapses are largely avoided.

3.2. FREQUENCY OF TARGETS AND ASSOCIATES. The diary study found that on average HS speakers' Spanish targets and associates were of higher word frequencies than the targets and associates of the MS speakers. The TOT elicitation study confirmed this finding. Whereas MS speakers experienced most TOTs with low frequency words in the dominant Spanish language, HS speakers experienced substantial and higher rates of TOTs with low, medium, and high frequency words in their non-dominant Spanish language. These findings are consistent with the hypothesis that bilinguals are more likely to have TOTs for words with relatively high frequency counts compared to monolinguals (Gollan & Silverberg 2001,

Gollan & Acenas 2004). The data also suggest that the frequency range of words susceptible to TOTs in the non-dominant language of proficient bilinguals is wider compared to the range of TOT candidates in the dominant language, which appears to be more restricted to lower frequency counts. Brown and Gollan (2003) argued that monolinguals' susceptibility to TOTs also varies depending on the speakers' vocabulary size. They found that participants with larger vocabularies had more TOTs with difficult words than participants with smaller vocabularies who had TOTs with relatively easy words. (Participants' vocabulary knowledge and word difficulty were determined through word recognition rates in their study.) The bilingual HS speakers of the present study have an overall larger vocabulary (with words of both languages) compared to the MS speakers. However, their Spanish vocabulary is smaller compared to the vocabulary of MS speakers (see the lower rates of target recall and higher rates of unknown words in Table 8). As in the Brown and Gollan (2003) study, the smaller vocabulary (here of a non-dominant language) seems to be related to more TOTs with relatively easy, higher frequency words.

**3.3. TARGET WORD TYPES.** The noun was the most frequent word category of TOT targets in HS and MS speakers. Nouns composed the largest proportion of targets across groups and languages. This is a remarkable finding since most studies of naturally occurring TOTs have shown proper names to be the most frequently reported targets (e.g. Brown 1991, Schwartz 2002). Nouns and noun morphology were also reported to be particularly permeable to attrition and cross-language influence (Kaufman & Aronoff 1989, Kravin 1992, Saville-Troike et al. 1995, Levine 1996, Isurin 2000), and they represent the majority of targets (about 50%) in TOTs with foreign language words (Ecke & Garrett 1998). TOTs in the non-dominant languages of both groups involved more verbs than TOTs of the dominant language. The latter finding may have nothing to do with the status of the word class, verb, it may rather be a consequence of the higher vulnerability of a wider range of words and word classes to retrieval failure in the non-dominant language. An important finding concerns the rate of TOTs with proper names. HS speakers experienced less frequently TOTs with proper names compared to MS speakers. This finding is in agreement with the results reported in a study of proper name TOTs (Gollan et al. 2005). The study showed that bilinguals experienced fewer TOTs for proper names and more TOTs for words other than proper names compared to monolinguals. Gollan and colleagues explained the relatively low rate of proper name TOTs in bilinguals by suggesting that proper names are stored as only single entries in the lexicon whereas regular words have two entries, which increases the bilingual's burden to select the items for retrieval. The selection of proper names, which is usually a more difficult task in monolinguals than retrieving regular words (Burke et al. 1991), seems to be a relatively easier task for the bilinguals.

**3.4. TARGET WORD ATTRIBUTES AND GENDER.** The diary study showed that the TOTs of the MS and HS speakers were generally similar with respect to most

partially accessed target attributes. Speakers frequently recalled the number of syllables and the initial letter/sound of the unavailable target. This finding is consistent with other studies of TOT target attributes in bilinguals (Gollan & Silverberg 2001) and monolinguals (e.g. Brown & McNeill 1966) and with speech error data (Fay & Cutler 1977) that suggest the initial sound segment and the overall syllabic structure to be salient aspects of phonological encoding (e.g. Levelt 1989, Garrett 1993).

HS speakers' TOTs differed from MS speakers' TOTs in a less frequent access to grammatical gender information of Spanish noun targets. The high rate of correct gender reports provided by the MS speakers is consistent with two-stage models of lexical production (e.g. Garrett 1975) and the notion of a transmission deficit (Burke et al. 1991): In TOTs, the first step of lexical selection, in which a semantically and syntactically specified structure, a lemma, is retrieved, has been completed whereas the second step (phonological encoding) is obstructed. The frequently accessed grammatical gender suggests that a syntactically specified entry was selected, and that the process of phonological encoding is dissociated and temporarily impaired in TOTs. Findings of gender access in TOTs were also reported in Badecker et al. (1995), Miozzo and Caramazza (1997), and Vigliocco et al. (1997) with Italian speakers. The low rate of gender access in the bilingual HS speakers of this study resembles the results reported by Gollan and Silverberg (2001) on TOTs in Hebrew-English bilinguals. Their participants correctly guessed the gender of Hebrew nouns in only 65% of self-resolved TOTs and 51% of TOTs resolved with a phonemic cue. The authors attributed the low rate of gender reports to the absence of pre-nominal gender markers in Hebrew, that is, articles and adjectives preceding the noun do not have to be marked for gender (see also Friedmann & Biran 2003). Articles in Spanish are pre-nominal, most adjectives are post-nominal, but both have to agree in grammatical gender with the noun. One possible explanation for the lower rate of correct gender reports provided by HS speakers is that the English-dominant bilinguals are losing their sensitivity towards gender. Grammatical gender as part of the syntactic specification of lexical entries could be permeable to attrition as a consequence of cross-language influence from the dominant use of English. In English, nouns are not marked for grammatical gender, and gender is often not needed for communicating a message. The loss of sensitivity for and access to gender may be a distinctive attribute reflecting early lexical attrition. Alternatively it could be possible that bilinguals activate lemmas that belong to the dominant language (or fused common lemmas) that are linked to the phonological forms of both languages (de Bot 1992, Hall 1996). Such syntactic frames may not only serve as mediating links between concept and form in early stages of lexical acquisition (Kroll & Stewart 1994, Jiang 2000, Hall & Ecke 2003), they could also serve as mediators in access routes under attrition. Various studies reported that speakers of L1 under attrition experience problems with gender assignment and agreement (Kaufman & Aronoff 1989,

Saville-Troike et al. 1995, Levine 1996, Buenrostro 1998, Vargas Monroy 1998, Toribio 2001, Lestrade 2002) although in most cases it is unclear if the reported deficits are (partially) the result of incomplete acquisition (and the instability of grammatical gender) or mere loss. It also remains an open question whether productive deficits in gender assignment and agreement reflect competence or performance problems. Levine (1996) argues that it is primarily a processing problem. Since nominal morphology is not a priority for communication, the speaker may focus cognitive resources on the difficult-to-access phonology of the word.

### 3.5. ASSOCIATES.

3.5.1. LANGUAGE. The extensive word searches by both HS and MS speakers frequently involved non-target word associations. The HS speakers' TOTs generated mostly intralingual associates, which suggests that the bilingual speakers' word searches were relatively little affected by cross-linguistic influence (see Ecke 2001 for similar findings from TOTs with L2 words). While interlingual associates were relatively rare in general, the search for Spanish targets involved more English associates. This seems to imply that the HS speakers' retrieval of words in the non-dominant Spanish language is affected more heavily by cross-linguistic influence than the production of words in the dominant English language.

3.5.2. COGNATE STATUS. It is quite remarkable that the diary reports included TOTs with cognates and that associated translation equivalents did not necessarily help to resolve the TOTs. In the experiment, cognates tended to produce higher rates of correct target recall compared to non-cognate prompts in the HS group. The latter finding is consistent with the results reported by Gollan and Acenas (2004), who found increased recall rates for cognate targets in a TOT elicitation experiment with two groups of bilinguals. It is also consistent with de Groot (1992), who reported increased recall rates of cognate targets in a translation task with advanced L2 learners. Contrary to expectation, however, cognate search in this study produced similar rates of -TOTs in the definition prompt condition and similar rates of +TOTs in the translation task compared to non-cognate searches. The occurrence of TOTs with Spanish-English cognates could indicate that the bilingual HS speakers have developed relatively independent representations and processing routes for the lexical items of each language and that lexical mediation seems to have limits. While cognate status normally facilitates the recall of translation equivalents because of potential cross-lexical connections or form overlap (Hall 2002), there is no guarantee that it will do so in all bilinguals and for all cognates. The HS speakers may be unaware of the cognate status of some translation equivalents and may be unable to use the cross-language similarity as a cue for target recall. This implies that in a TOT the bilinguals cannot use direct links between the two lexical entries or that mediated access through the shared conceptual representation is blocked temporarily (Kroll & Stewart 1994). Taking into account the HS speakers' acquisition history and proficiency, the second possibility seems more likely. The HS speakers may be close to what Weinreich (1953) named co-

ORDINATE BILINGUALS. Having learned the two languages in different contexts (home vs. school) and having achieved a high proficiency in both languages may have led to processing routes that have overcome or bypassed (perhaps initially established) lexical links between translation equivalents of the two languages (Kroll & Stewart 1994, Hall & Ecke 2003). The detection of cross-linguistic similarity by the bilingual speakers cannot be taken for granted. Spanish-English cognates can be very similar in script, but may differ considerably in pronunciation (e.g. *pipa-pipe*). Metalinguistic insight into such structural similarities may be minimal too if literacy development is restricted to English (Smith 2002).

3.6. TOTs THROUGH DEFINITION AND TRANSLATION TASKS. A methodological issue under investigation was the comparison of a definition-prompted task with a translation-prompted task for TOT elicitation in the bilingual HS group. Translating words from English to Spanish elicited as many TOTs in the HS speakers as retrieving words based on definition prompts. Word translation turned out to be an effective task to elicit TOTs in the bilingual HS speakers. The translation task was found superior over the definition-prompted task in that it reduced target ambiguity, which was reflected in lower rates of target unknown and non-target responses and higher rates of correctly recalled targets.

4. CONCLUSION. Several findings of the present study point to a more pronounced vulnerability of HS speakers' word retrieval to TOTs in the non-dominant Spanish language compared to word retrieval in the dominant languages of the MS and HS speakers: (a) In the experiment, HS speakers reported more TOTs and more unknown targets and recalled fewer targets in Spanish compared to the MS speakers, (b) in the diary study, Spanish targets and associates in the TOTs of the HS speakers were of higher mean frequencies compared to the targets and associates in the TOTs of the MS speakers, (c) HS speakers were less successful in reporting the grammatical gender of Spanish noun targets during TOTs compared to the MS speakers, and (d) HS speakers reported higher rates of interlingual associations in TOTs with Spanish targets compared to TOTs with English targets.

These findings are consistent with other TOT studies that show that bilinguals are generally more prone to TOTs than monolinguals (Gollan & Silverberg 2001, Gollan & Acenas 2004, Gollan et al. 2005). The word production deficits revealed here are not necessarily noticeable in the overt speech of the fluent bilingual HS speakers, as the diary study has shown and as the HS speakers' self-estimates of their speaking skills and (frequent) language use suggest. However, word finding problems do become visible in lexical production tasks that require the speaker to recall a specific and unique target word. Reduced frequency and recency of word use (due to the shift in language dominance) appear to be factors that contribute to lexical retrieval failure in the non-dominant language. When a native/Heritage language is used less frequently because another language takes its place in certain domains, even high-frequency words (as listed in frequency dictionaries) can



become rarely used by the individual speaker. The lack of word use will lead to a weakening of form-meaning connections and result in transmission deficits and more frequent TOTs (Burke et al. 1991).

While this study found that bilingual HS speakers experience more TOTs in non-dominant Spanish than dominant Spanish speakers when asked to recall specific target words, they did not report more TOTs in everyday speech. It is quite remarkable that the cost of fluent bilingualism (in this case the more frequent rate of word retrieval failure) is so low given the number of extra representations in the speakers' lexicons and the immense gain in communicative competence in comparison to monolingualism. It seems that the Spanish-English bilinguals of this study cope very well in everyday conversation and that they avoid or bypass overt word finding problems through the use of bilingual-specific compensatory strategies, such as code-switching. While the effectiveness of such strategies for communication is uncontroversial, it remains an open question whether they may contribute to the reduction of individual word frequencies in the non-dominant language and lead to the attrition of lexical production skills (Bolonyai 1998). Future research needs to address this question.

#### REFERENCES

- ALAMEDA, JOSÉ RAMÓN, and FERNANDO CUETOS. 1995. *Diccionario de frecuencias de las unidades lingüísticas del castellano*. Oviedo, Spain: Universidad de Oviedo.
- AMMERLAAN, ANTONIUS A. 1996. 'You get a bit wobbly ...': *Exploring bilingual lexical retrieval in the context of first language attrition*. Nijmegen, Nijmegen University dissertation.
- ASKARI, NUSHA. 1999. Priming effects on tip-of-the-tongue states in Farsi-English bilinguals. *Journal of Psycholinguistic Research* 28.197-212.
- BAAYEN, R. HARALD; RICHARD PIEPENBROCK; and LÉON GULIKERS. 1995. The CELEX lexical database (release 2) CD-ROM. Philadelphia, PA: University of Pennsylvania Linguistic Data Consortium.
- BADECKER, WILLIAM; MICHELE MIOZZO; and RAFFAELLA ZANUTTINI. 1995. The two-stage model of lexical retrieval: Evidence from a case of anomia with selective preservation of grammatical gender. *Cognition* 57.193-216.
- BAHRICK, HARRY P. 1984. Fifty years of language attrition: Implications for programmatic research. *Modern Language Journal* 68.105-18.
- BIALYSTOK, ELLEN. 1990. *Communication strategies: A psychological analysis of second language use*. Oxford: Basil Blackwell.
- BOLONYAI, AGNES. 1998. In-between languages: Language shift/maintenance in childhood bilingualism. *The International Journal of Bilingualism* 2.21-43.
- BROWN, ALAN S. 1991. A review of the tip-of-the-tongue experience. *Psychological Bulletin* 109.202-23.

- BROWN, ALAN S., and TAMAR H. GOLLAN. 2003. Does aging really increase TOTs? It depends on the measure. Poster presented at the 44th annual meeting of the Psychonomics Society, Vancouver, Canada.
- BROWN, ALAN S., and LORI A. NIX. 1996. Age-related changes in the tip-of-the-tongue experience. *American Journal of Psychology* 109.79-91.
- BROWN, ROGER, and DAVID MCNEILL. 1966. The 'tip of the tongue' phenomenon. *Journal of Verbal Learning and Verbal Behavior* 5.325-37.
- BUENROSTRO, CRISTINA. 1998. Interferencias en el español hablado por los chujes. In Calvo, 145-58.
- BURKE, DEBORAH M.; DONALD G. MACKEY; JOANNA S. WORTHLEY; and ELIZABETH WADE. 1991. On the tip of the tongue: What causes word finding failures in young and older adults? *Journal of Memory and Language* 30.542-79.
- CALVO, J. (ed.) 1998. *Jornadas internacionales de lengua y cultura amerindias II*. Valencia: Universidad de Valencia.
- COHEN, ANDREW D. 1975. Forgetting a foreign language. *Language Learning* 25.127-38.
- COHEN, ANDREW D. 1989. Attrition in the productive lexicon of two Portuguese third language speakers. *Studies in Second Language Acquisition* 11.135-50.
- DE BOT, KEES. 1992. A bilingual production model: Levelt's speaking model adapted. *Applied Linguistics* 13.1-24.
- DE GROOT, ANNETTE M. B. 1992. Determinants of word translation. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 18.1001-18.
- DÖRNYEI, ZOLTÁN, and MARY LEE SCOTT. 1997. Communication strategies in a second language: Definitions and taxonomies. *Language Learning* 47.173-210.
- ECKE, PETER. 2001. Lexical retrieval in a third language: Evidence from errors and tip-of-the-tongue states. *Cross-linguistic influence in third language acquisition*, ed. by Jazone Cenoz, Britta Hufeisen and Ulrike Jessner, 90-114. Cleveland: Multilingual Matters.
- ECKE, PETER. 2004. Language attrition and theories of forgetting: A cross-disciplinary review. *International Journal of Bilingualism* 8.321-54.
- ECKE, PETER, and MERRILL F. GARRETT. 1998. Lexical retrieval stages of momentarily inaccessible foreign language words. *Ilha do Desterro: Cognitive Perspectives on the Acquisition/Learning of Second/Foreign Languages* 35.157-83.
- FÆRCH, CLAUS, and GABRIELE KASPER. (eds.) 1983. *Strategies in interlanguage communication*. London: Longman.
- FAY, DAVID, and ANNE CUTLER. 1977. Malapropisms and the structure of the mental lexicon. *Linguistic Inquiry* 8.505-20.
- FRIEDMANN, NAAMA, and MICHAEL BIRAN. 2003. When is gender accessed? A study of paraphasias in Hebrew anomia. *Cortex* 39.441-63.
- GARRETT, MERRILL F. 1975. The analysis of sentence production. *Psychology of learning and motivation*, vol. 9, ed. by Gordon Bower, 133-75. New York: Academic Press.

- GARRETT, MERRILL F. 1993. Errors and their relevance for models of language production. *Linguistic disorders and pathologies*, ed. by Gerhard Blanken, Jürgen Dittmann, Hannelore Grimm, John C. Marshall and Claus W. Wallesch, 72-92. Berlin: Walter de Gruyter.
- GOLLAN, TAMAR H., and LORI-ANN R. ACENAS. 2004. What is a TOT? Cognate and translation effects on tip-of-the-tongue states in Spanish-English and Tagalog-English bilinguals. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 30.246-69.
- GOLLAN, TAMAR H., and NINA B. SILVERBERG. 2001. Tip-of-the-tongue states in Hebrew-English Bilinguals. *Bilingualism: Language and Cognition* 4.63-83.
- GOLLAN, TAMAR H.; MARINA P. BONANNI; and ROSA MONTOYA. 2005. Proper names get stuck on bilingual and monolingual speakers' tip-of-the-tongue equally often. *Neuropsychology*, to appear.
- GOODGLASS, H.; E. KAPLAN; S. WEINTRAUB; and N. ACKERMAN. 1976. The 'tip of the tongue' phenomenon in aphasia. *Cortex* 12.145-53.
- HALL, CHRISTOPHER J. 1996. La estrategia parasítica: Un modelo psicolingüístico del aprendizaje de vocabulario. La imaginación y la inteligencia en el lenguaje: *Homenaje a Roman Jakobson*, ed. by Susana Cuevas and Julieta Haidar, 229-38. Mexico DF: Instituto Nacional de Antropología e Historia.
- HALL, CHRISTOPHER J. 2002. The automatic cognate form assumption: Evidence for the Parasitic Model of vocabulary development. *International Review of Applied Linguistics in Language Teaching* 40.69-87.
- HALL, CHRISTOPHER J., and PETER ECKE. 2003. Parasitism as a default mechanism in L3 vocabulary acquisition. *The multilingual lexicon*, ed. by Jazone Cenoz, Britta Hufeisen and Ulrike Jessner, 71-85. Dordrecht: Kluwer Academic Publishers.
- HEINE, MARILYN K.; BETH A. OBER; and GREGORY K. SHENAUT. 1999. Naturally occurring and experimentally induced tip-of-the-tongue experiences in three adult age groups. *Psychology and Aging* 14.445-57.
- HENAFF GONON, M. A.; R. BRUCKERT; and F. MICHEL. 1989. Lexicalization in an amomic patient. *Neuropsychologia* 24.391-407.
- HERDINA, PHILIP, and ULRIKE JESSNER. 2002. *A dynamic model of multilingualism: Perspectives of change in psycholinguistics*. Clevedon: Multilingual Matters.
- HERNANDEZ, DONALD J., and EVAN CHARNEY (eds.) 1998. *From generation to generation: The health and well-being of children in immigrant families*. Washington, D.C.: National Academy of Sciences.
- HYLTENSTAM, KENNETH, and LORAIN K. OBLER (eds.) 1989. *Bilingualism across the lifespan: Aspects of acquisition, maturity, and loss*. Cambridge: Cambridge University Press.
- ISURIN, LUDMILA. 2000. Deserted island or a child's first language forgetting. *Bilingualism: Language and Cognition* 3.151-66.

- JAMES, LORI E., and DEBORAH M. BURKE. 2000. Phonological priming effects on word retrieval and tip-of-the-tongue experiences in young and older adults. *Journal of Experimental Psychology: Learning, Memory and Cognition* 26.1378-91.
- JIANG, NAN. 2000. Lexical representation and development in a second language. *Applied Linguistics* 21.47-77.
- KAUFMAN, DORIT, and MARK ARONOFF. 1989. Morphological interaction between L1 and L2 in language attrition. *Variation in second language acquisition*, vol. 2. *Psycholinguistic issues*, ed. by Susan Gass, Carolyn Madden, Dennis Preston and Larry Selinker, 202-15. Clevedon: Multilingual Matters.
- KRAVIN, HANNE. 1992. Erosion of a language in bilingual development. *Journal of Multilingual and Multicultural Development* 13.307-25.
- KROLL, JUDITH F., and ERIKA STEWART. 1994. Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language* 33.149-74.
- LESTRADE, PATRICIA M. 2002. The continuing decline of Isleño Spanish in Louisiana. *Southwest Journal of Linguistics* 21.99-117.
- LEVELT, WILLIAM J. M. 1989. *Speaking: From intention to articulation*. Cambridge, MA: MIT Press.
- LEVINE, GLENN S. 1996. Elderly second-generation speakers of Yiddish: Toward a model of L1 loss, incomplete L1 acquisition, competence, and control. *Southwest Journal of Linguistics* 15.109-20.
- LOVELACE, EUGENE. 1991. Aging and word finding: Reverse vocabulary and close tests. *Bulletin of the Psychonomic Society* 29.33-35.
- MÄGISTE, EDITH. 1986. Selected issues in second and third language learning. *Language processing in bilinguals: Psycholinguistic and neuropsychological perspectives*, ed. by Jyotsna Vaid, 97-122. Hillsdale, NJ: Lawrence Erlbaum.
- MERINO, BARBARA J. 1983. Language loss in bilingual Chicano children. *Journal of Applied Developmental Psychology* 4.277-94.
- MEYER, ANTJE S., and KATHRYN BOCK. 1992. The tip-of-the-tongue phenomenon: Do experimenter-presented interlopers have an effect? *Cognition* 45.55-75.
- MIOZZO, MICHELE, and ALFONSO CARAMAZZA. 1997. The retrieval of lexical-syntactic features in tip-of-the-tongue states. *Journal of Experimental Psychology: Learning, Memory and Cognition* 23.1410-23.
- OLSHTAIN, ELITE, and MARGARET BARZILAY. 1991. Lexical retrieval difficulties in adult language attrition. In Seliger & Vago, 139-50.
- POULISSE, NANDA. 1993. A theoretical account of lexical communication strategies. In Schreuder & Weltens, 157-89.
- SAVILLE-TROIKE, MURIEL; JUNLIN PAN; and LUDMILA DUTKOVA. 1995. Differential effects of L2 on children's L1 development/attrition. *Southwest Journal of Linguistics* 14.125-49.

- SCHMID, MONIKA S. 2002. *First language attrition, use and maintenance: The case of German Jews in Anglophone countries*. Amsterdam: John Benjamins.
- SCHREUDER, ROBERT, and BERT WELTENS (eds.) 1993 *The bilingual lexicon*. Amsterdam: John Benjamins.
- SCHWARTZ, BENNETT L. 2002. *Tip-of-the-tongue states: Phenomenology, mechanism, and lexical retrieval*. Mahwah, NJ: Lawrence Erlbaum.
- SELIGER, HERBERT W., and ROBERT M. VAGO (eds.) 1991. *First language attrition*. Cambridge: Cambridge University Press.
- SILVA-CORVALÁN, CARMEN. 1991. Spanish language attrition in a contact situation with English. In Seliger & Vago, 151-71.
- SILVA-CORVALÁN, CARMEN. 1994. *Language contact and change: Spanish in Los Angeles*. Oxford: Clarendon Press.
- SMITH, PATRICK. 2002. 'Ni a pocha va a llegar': Minority language loss and dual language schooling in the U.S.-Mexico Borderlands. *Southwest Journal of Linguistics* 21.165-83.
- TESCHNER, RICHARD V. 1987. Noun gender categories in Spanish and French: Form-based analyses and comparisons. *Current trends and issues in Hispanic linguistics*, ed. by Leonard Studerus, 81-109. Arlington, TX: The Summer Institute of Linguistics and the University of Texas at Arlington.
- TORIBIO, ALMEIDA JAQUELINE. 2001. On Spanish language decline. *Proceedings of the 25th Boston University conference on language development*, ed. by Anna H.-J. Do, Laura Dominguez, and Aimee Johansen, 768-79. Sommerville, MA: Cascadilla.
- VALDÉS, GUADALUPE, and MICHELLE GEOFFRION-VINCI. 1998. Chicano Spanish: The problem of 'underdeveloped' code in bilingual repertoires. *The Modern Language Journal* 82.473-501.
- VARGAS MONROY, MA. AIDÉE. 1998. San Mateo del Mar: Un caso de bilingüismo. In Calvo, 159-68.
- VIGLIOCCO, GABRIELLA; TIZIANA ANTONINI; and MERRILL F. GARRETT. 1997. Grammatical gender is on the tip of Italian tongues. *Psychological Science* 8.314-17.
- WEINREICH, URIEL. 1953. *Languages in contact*. The Hague: Mouton.
- WELTENS, BERT, and MARJON GRENDL. 1993. Attrition of vocabulary knowledge. In Schreuder & Weltens, 135-56.
- YAGMUR, KUTLAY; KEES DE BOT; and HUBERT KORZILIUS. 1999. Language attrition, language shift and ethnolinguistic vitality of Turkish in Australia. *Journal of Multilingual and Multicultural Development* 20.51-69.

APPENDIX. *Targets and Word Definition Prompts of the TOT Elicitation Task Trial*

1. *Porvenir*: otra palabra para 'el futuro'  
'Future: another word for "future"'
2. *Egolatría*: culto, adoración, amor excesivo de sí mismo  
'Self-worship: cult, worship, excessive love of oneself'
3. *Guerra*: lucha armada entre dos o más países (o partidos)  
'War: armed fight between two or more countries or parties'

Experiment

1. *Avión*: algo que vuela en el aire, con motores, alas, es más pesado que el aire  
'Airplane: something that flies in the air, with engines, wings, is heavier than air'
2. *Sirena*: ninfa marina con busto de mujer y parte inferior del cuerpo de pez  
'Mermaid: marine nymph with chest of a woman and lower body of a fish'
3. *Caza*: la acción de perseguir y matar animales  
'Hunt: the action of chasing and killing animals'
4. *Girasol*: tipo de flor, grande, amarilla, que se cultiva por el valor alimenticio de sus semillas  
'Sunflower: type of big, yellow flower that is cultivated for the nutritious value of its seeds'
5. *Algodón*: una planta, cuyas fibras se usan en la industria textil  
'Cotton: a plant whose fibers are used in the textile industry'
6. *Confianza*: esperanza o fe firme que se tiene en una persona o cosa  
'Trust: strong hope or faith that one has in another person or thing'
7. *Mercurio*: metal de color de plata que se emplea en los termómetros por ser muy líquido  
'Mercury: metal of silver color which is used in thermometers for its liquidity'
8. *Depresión*: estado emocional de melancolía que hace perder el ánimo  
'Depression: emotional state of melancholy that makes one lose animation'
9. *Pronóstico*: predicción del tiempo o de la temperatura  
'Forecast: the prediction of the weather or temperature'
10. *Enciclopedia*: libro que como un diccionario ordena y clasifica de A a Z todos los conocimientos humanos de una época  
'Encyclopedia: book that, similar to a dictionary, orders and classifies from A to Z all human knowledge of an epoch'
11. *Arroyo*: Pequeño río, rillito  
'Stream: small river, little river'
12. *Pipa*: Utensilio de uso común para fumar tabaco picado  
'Pipe: instrument of common use to smoke tobacco'
13. *Sábana*: la pieza más elemental que se usa para cubrir el colchón de una cama  
'Sheet: general piece used to cover the mattress of a bed'

14. *Chicharrón*: tira de carne o grasa de cerdo que se fríe  
'Crackling of pork: piece of pork meat or fat that is fried'
15. *Obra*: cosa hecha por alguien, producción artística, literaria, científica que contiene un trabajo literario completo  
'Piece of work/art: something made by someone; artistic, literary or scientific production containing a complete work'
16. *Crucigrama*: juego/pasatiempo que consiste en buscar sinónimos o palabras y escribirlas en casillas libres de un dibujo  
'Crossword puzzle: a game/play in which one searches for synonyms or words which are to be written in blank boxes of a drawing'
17. *Simbiosis*: asociación entre organismos vegetales o animales, en la que ambos se benefician mutuamente  
'Symbiosis: the association between organisms, plants or animals, in which both benefit from each other'
18. *Cumbre*: reunión oficial de jefes de estado  
'Summit: official meeting of heads of state'
19. *Sabor*: propiedad de las comidas que afecta al paladar  
'Taste: the property of food that affects the palate'
20. *Lombriz*: gusano alargado de color rojizo que vive en la tierra húmeda  
'Earth worm: longish worm of reddish color that lives in the humid earth'
21. *Venado*: animal mamífero, tiene cuernos retorcidos, patas largas y vive en el bosque  
'Deer: mammal with twisted horns, long legs, lives in the forest'
22. *Herramienta*: palabra general para instrumentos que se usa en la construcción o la mecánica  
'Tool: general word for instruments used in construction and mechanics'
23. *Clímax*: momento de mayor grandeza o intensidad de algo  
'Climax: moment of major grandness or intensity of something'