LEXICAL FREQUENCY AND VOICED LABIODENTAL-BILABIAL VARIATION IN NEW MEXICAN SPANISH

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ABSTRACT. In this paper we look at word frequency effects on variation between voiced labiodentals and voiced bilabials in New Mexican Spanish. We find that the occurrence of labiodentals is significantly higher in words of high frequency than those of low frequency. In high frequency words, neither orthography nor English cognate status constrains the variation, which supports the view that voiced labiodentals represent the retention of an old dialect feature. An internal origin for these labiodentals is further supported by their distribution on the social variables of age, proficiency, and formal Spanish instruction. At the same time, the pattern of variation in low frequency words suggests that a contact-induced change is underway, where bilabials are favored when the English cognate of a Spanish word has a bilabial. Contact-induced sound change thus seems to pattern like analogical changes, in support of the Frequency-Implementation Hypothesis (B. Phillips 2001) and more generally a usage-based model of phonological representation (Bybee 2001).*

1. KINDS OF [V] IN SPANISH. A widely accepted generalization about the distribution of voiced bilabial stops and fricatives in Spanish is shown in 1 (after D'Introno, del Teso & Weston 1995:274).

(1) In syllable onset position, voiced bilabials are realized as stops after a pause and after a nasal, and as fricatives in all other cases.
Examples: ¡[b]*amos!* 'Let's go', *a*[mb]*os* 'both', but *ha*[ß]*ía* 'there was'

In short, [b] and [ß] are said to be allophones in complementary distribution of a phoneme /b/, orthographically *b* or *v*. The difference between *b* and *v* in modern Spanish is supposed to be orthographic, not phonetic, much less phonemic (cf. Stockwell & Bowen 1965:48, Barrutia & Schwegler 1994:59). Labiodental [v] is said to occur when *f* is voiced, as in *Afganistán* (Harris 1969:37, note 22), or when *b* or *v*

* *A todos que participaron en el estudio: gracias.*

follows /s/-aspiration, as in *desbaratar* 'to wreck' or *las vacas* 'the cows' (Lope Blanch 1988:160, cf. Salvador 1987). Nevertheless, voiced labiodentals that cannot be attributed to assimilation or another articulatorily motivated process do occur in Spanish.

A useful point of departure is provided by Lope Blanch's classification of non-assimilation [v] into the three kinds shown in 2 (adapted from Lope Blanch 1988:160-1).

(2) Classes of [v]
  a. Archaic [v], as in varieties of Judeo-Spanish
  b. Language contact [v], as with bilinguals who speak a language that has a /v/ phoneme, such as Catalan or English
  c. Hypercorrect [v], as in certain reading styles

The clearest cases of archaic [v] are the labiodentals of Judeo-Spanish varieties, which are considered conservative or archaic (Zamora Vicente 1970:354). It is generally assumed that Old Spanish had labiodentals, especially in southern peninsular dialects (A. Alonso 1955, D. Alonso 1962, Penny 1976, but see Ariza 1994:47ff.). These old voiced labiodentals continued into the 16th century in Andalusia and were carried over to early Latin American Spanish (Lapesa 1981:370, Lloyd 1993:519-20). Today, an etymological distinction between /b/ and /v/ is maintained in Portuguese and in certain Catalan dialects (Parkinson 1988:139, Wheeler 1988:170), though apparently not in any modern variety of Spanish (Fernández 1982:129).

On the other hand, the labiodentals in varieties of Spanish spoken in the United States Southwest have been found to be a function of language contact. Both R. Phillips (1982) in East Los Angeles and Timm (1976) among California college students adduced a relation between frequency of labiodentals and degree of bilingualism or English dominance (cf. Post 1934). Merz (1980) in Tucson, Arizona also observed a slight tendency toward a correspondence between pronunciation and spelling, although she found that [v] was the most frequent variant overall, for both orthographic *v* and *b*. All scholars cited concurred that the least likely phonetic environment for a labiodental [v] is post-nasal, where the occurrence of a bilabial stop is categorical for all intents. In any other environment a fricative variant is most likely, but among fricatives, labiodentals are more frequent.

In contrast, labiodentals in varieties of Mexican Spanish are a clear case of hypercorrect [v]. Mexican PEDANTIC [v], as Lope Blanch (1988) refers to the phenomenon, occurs in formal or emphatic speech, especially in reading style. These labiodentals appear not only in environments assigned to the bilabial fricative, but just as often in post-nasal position, as in the word *convocar* 'to convoke', or in absolute initial position. Notice that pedantic [v] is not constrained by the same phonetic environment as the Southwest labiodentals described above, which were found to be in variation with bilabial fricatives rather than stops. This difference in distribution suggests that these Southwest Spanish labiodentals do not belong

to the class of hypercorrect [v]. Furthermore, an account of hypercorrection based on orthographic representation would be incongruent with the fact that Southwest Spanish varieties are overwhelmingly oral.

This brings us back to the two most plausible candidates for New Mexican Spanish labiodentals: archaic [v] and language-contact [v].

2. PREDICTIONS AND METHODS. Language contact phenomena are usually evaluated by showing some kind of correlation between the linguistic variant of interest and extralinguistic factors related to parameters of bilingualism. For example, Silva-Corvalán (1994) uses generational distance from immigrant monolingualism in describing broad tendencies of change in verbal categories in the Spanish spoken in Los Angeles. Generational groupings of this kind, however, would be inappropriate for New Mexican Spanish, which has been spoken in the region in relative isolation for over three hundred years, although there is increasing contact with immigrant varieties. The Spanish spoken in Northern New Mexico and southern Colorado, with features dating to the late 16th century, differs noticeably from the more modern Spanish varieties spoken in other parts of the Southwest (Lipski 1994:281, cf. Canfield 1981:80-1, Espinosa 1930). For the present study, then, we operationalized degree of contact with English by considering the independent variables of age, Spanish proficiency and use, and formal instruction in Spanish (cf. Bernal-Enríquez 2000). If voiced labiodentals represent a contact-induced change, we would expect a higher rate of occurrence among younger and less proficient speakers. Later, in Table 2, we present a summary of the distribution of speakers by these social factors.

Another way to test the hypothesis that labiodentals in New Mexican Spanish are the result of contact with English is to look at their occurrence in cognates, that is, Spanish words with an English translation-counterpart similar in orthographic representation and phonetic shape. If labiodentals occur more frequently in cognates than in non-cognates, we have support for the hypothesis that there is an active process of transfer from English to Spanish in the pronunciation of [v] among bilinguals. Thus, in addition to orthographic representations (*v* and *b*), we considered the cognate status of the word and whether the English cognate has a labiodental /v/ or a bilabial /b/ phoneme.

Finally, we considered the token frequency of the word in which the variable occurs as a possible conditioning factor. A growing body of usage-based functionalist work demonstrates that linguistic structure is emergent from patterns of language use (e.g. Givón 1979, Hopper 1987). In a usage-based model of phonology, Bybee (1995, 2001) argues that the basic unit of mental storage is the word, defined as a processing unit based on categorizations of actual tokens. In this model, words and frequent constructions or phrases are the domain of application for sound change.

As in morphosyntactic variation and change (Bybee & Thompson 2000), Bybee (2001) shows that token frequency—the frequency of occurrence in running text—

has two very different effects in phonology. On the one hand, high frequency units undergo articulatorily motivated changes more rapidly than low frequency units. This type of change is the most common and involves assimilation or reduction. On the other hand, high frequency items are more resistant to non-articulatorily motivated change, that is, analogical change based on the analysis of other forms. This is an ENTRENCHMENT effect, as frequency of use results in a high level of lexical strength and resistance to general changes occurring elsewhere in the language. For example, while *wept* and other English past tense forms tend to regularize (*weeped*), high frequency verbs such as *keep/kept* do not (Bybee 1985, 1995). Of particular interest for our purposes is the proposal that lexical diffusion patterns can provide a way to determine the mechanism of change (Bybee 2001). B. Phillips (1984, 2001) formulates the Frequency-Implementation Hypothesis, given in 3.

(3) Changes that require analysis—whether syntactic, morphological, or phonological—during their implementation affect the least frequent words first; others affect the most frequent words first.

This is because frequent words are processed as automatized units, while less frequent words are more likely to be analyzed into constituent morphemes and phonemes.

In the case of the New Mexican labiodental–bilabial variation studied here, the change does not seem to have an articulatory motivation, whether the direction of change is from labiodental to bilabial fricative or the reverse. It would not be assimilatory, since both variants occur in intervocalic position. Nor does it appear to be reductive: While bilabial fricatives could be viewed as a weakening with respect to labiodentals (contact between upper teeth and lower lip is lost), they are typologically more rare, at least in Romance (e.g. Portuguese, Catalan, French, Italian have [v] rather than [ß]). The change, then, should pattern like non-articulatorily motivated changes, that is, it should affect low frequency before high frequency items.

Thus, we can formulate the two sets of predictions about labiodental-bilabial variation in New Mexican Spanish given in 4.

(4) a. If the change is from (standard) Spanish bilabials to contact-induced labiodentals, we would expect more labiodentals in low-frequency words.

b. If the change involves loss of (archaic) Spanish labiodentals, we would expect more labiodentals in high frequency words.

The prediction in 4a is based on our proposal that change due to language contact has a different lexical diffusion pattern than regular sound changes resulting from articulatory reduction. Contact-induced change diffuses through the lexicon like changes requiring analysis based on other linguistic forms. Low frequency words are affected first because bilingual speakers are more likely to analyze these words at some level, as being similar or different from those in the other language.

The prediction in 4b is based on an extension of the entrenchment effect to bilingual situations: Since higher frequency items have strong, independent representations they are less likely to be analyzed and compared or categorized with items in the other language. So, frequency-based differences should allow us to describe the direction of change. Is it in favor of labiodentals—due to transfer of English labiodentals? Or is to the detriment of labiodentals—due to language loss in the contact situation?

The instrument used to elicit data was a list of 48 words distributed over eight cells based on word frequency, cognate status, and orthography. The first cell includes high frequency words that are cognates and that have an orthographic *v*, for example, *(mucho) valor* 'much value'; the second cell includes words meeting the same criteria except that they have an orthographic *b*, for example, *recibir* 'receive'; the third cell includes high frequency non-cognates that have an orthographic *v*, for example *vivo* 'I live'; and the fourth cell includes words meeting the same criteria except that they have an orthographic *b*, for example, *había* 'there was/there were'. The same is repeated for low frequency words. Thus, for example, *devoción* 'devotion' is in the cell of low frequency cognates with orthographic *v*, *abuso* 'abuse' is in the cell of low frequency cognates with orthographic *b*, *la vaca* 'the cow' is in the cell of low frequency non-cognates with orthographic *v*, and *cebolla* 'onion' is in the cell of low frequency non-cognates with orthographic *b*. We limited the list to *v* or *b* in intervocalic position in order to have enough tokens per cell without ending up with an unacceptably long list.[1]

The frequency counts used are from Juilland and Chang-Rodríguez (1964), a frequency dictionary based on a written corpus. We adjusted the coding of words based on the number of responses elicited by creating a mid category for 10 words with an average frequency of 66.[2] We ended up with 13 high frequency words and 25 low frequency words. More words were included in the low frequency category to compensate for the low number of responses, since many of these words were unknown to speakers, in either language.[3] What is important is that the high token frequency group, with an average frequency of 318, is sharply demarcated from the low frequency group, with an average frequency of 9.

[1] In hindsight, we should have limited the list to word-internal occurrences and avoided alternating environments at word boundaries (e.g. *ella va*) and also controlled for word class (verbs vs. nouns, and lexical vs. grammatical morphemes, as in *estaba*); see Phillips (2001).

[2] For example, we recoded as MID frequency *(tele)novela* even though it is listed as high in Juilland and Chang-Rodríguez (*novela* = 160), since only 12 speakers had a translation for 'soap opera'. On the other hand, we coded *sabor* as mid frequency even though its frequency is listed as 11, since it was elicited from a relatively high percentage of speakers (16/18) and can be considered more frequent in the spoken language.

[3] Twenty-five low frequency words elicited 258 tokens, while 13 high frequency words gave 209 tokens, nearly the same number.

We obtained data by asking speakers to translate English words or phrases, the technique used by Merz (1980) and R. Phillips (1974). This was a way to avoid having speakers read words, as in Timm (1976). Although we would have preferred to use recordings of sociolinguistic interviews, we found it difficult to distinguish a labiodental from a bilabial fricative acoustically. Therefore, we watched speakers' mouths and used visual criteria to decide which variant had been produced. For nearly all interviews, two colleagues evaluated the variant. We counted only cases where both raters' evaluations coincided.

A total of 599 tokens from 18 speakers were coded.[4] The average occurrence of labiodentals was 61%. Bilabial fricatives occurred in 30% and bilabial stops in 9% of all tokens. These tokens were submitted to variable rule analysis using VARBRUL2S (Pintzuk 1988), a type of multivariate analysis that considers factors simultaneously and selects those that contribute a statistically significant effect to the choice of variants. While individual speaker differences were found to be significant for all words, cognate status and orthographic representation turned out to be significant conditioning factors in low frequency words only. We first discuss social variables and then return to frequency effects.

3. Speaker Differences and Extralinguistic Factors. Table 1 presents labiodental frequencies and VARBRUL weights by speaker. Individual frequencies of [v] range from 31% to 94% and weights range from .10 to .92. In this study VARBRUL weights above .5 are interpreted as favoring the occurrence of the labiodental variant, while figures below .5 disfavor it.

Table 2 shows the distribution of speakers and frequencies of [v] by groupings of age, proficiency in Spanish, level of Spanish use, and formal Spanish instruction. We are cautious about drawing firm conclusions from these results because the sample is small and biased toward speakers who prefer to use English. With one exception, all speakers indicated that they speak English as well as, or better than, Spanish. Nevertheless, certain interesting patterns emerge with respect to the role played by formal instruction and contact with other varieties of Spanish.

Let us look first at the average occurrence of [v] by age grouping. There are ten speakers in the 18-25 group, five in the 40-55 group, and three in the over 65 years old group. The [v] frequencies are 57% for the younger age group, 69% for the middle age group, and 65% for the older age group. The only statistically significant difference found was that between the younger and the middle age group.[5]

[4]The number of actual tokens is about 25% less than the possible number (18 speakers x 48 words = 864), partly because of non-responses and partly because of indeterminate variants. We would like to thank Robin Fetters, Antonio Grau Sempere, and Devin Jenkins for help in coding the variants.

[5]The difference between the younger and middle age group in Table 2 is significant at $p < .05$ but not at $p < .01$, which is probably a more acceptable level of significance given the small sample size.

Spkr.	Age	Origin*	Spanish Classes	Use	Prof.**	Freq.	VARBRUL Weight***
b	18-25	San Luis, CO	High School	Almost Never	3,x	94%	.92
h	40-55	Chama	None	Some	x,4	93%	.91
c	18-25	Las Vegas	High School	Almost Never	2,x	85%	.94
n	18-25	Albuquerque	University	Almost Never	2,3	82%	.89
q	40-55	Chimayó	High School	Daily	x,5	82%	.84
i	18-25	Española	University	Almost Never	3,2	82%	.83
g	40-55	El Rito	High School	Some	x,4	81%	.87
l	60+	Springer	None	Some	x,5	79%	.88
a	18-25	Mora	University	Daily	5,5	63%	.48
r	40-55	Mora	None	Daily	x,5	62%	.37
p	18-25	Albuquerque	University	Some	4,3	61%	.44
f	60+	Carmel	None	Daily	x,5	61%	.30
o	60+	Cuba	None	Some	x,5	55%	.23
k	18-25	Taos	University	Almost Never	3,2	45%	.19
e	18-25	Santa Fe	High School	Almost Never	3,2	33%	.12
m	40-55	Springer	University	Some	5,5	31%	.11
j	18-25	Tierra Amarilla	University	Daily	4,5	31%	.11
d	18-25	Albuquerque	None	Some	3,3	31%	.10
$N = 18$						61%	

*Except for San Luis, Colorado, all places listed are in northern New Mexico.

**The first number under Proficiency Scale is a self-rating for Spanish proficiency, the second is the interviewer's rating, both on a scale of 1 to 5. x = not available.

***From VARBRUL2S, N = 599, Input probability = .67, p = 000. Other factor groups in run: word frequency, cognate status and orthographic representation.

Table 1. *Labiodental Frequencies and VARBRUL Weights by Speaker (In Descending Order of Frequency)*

Notice that the younger speakers have the LOWEST [v] frequency overall. This is the opposite of what we would expect if labiodentals were the result of contact with English.

Second, we considered Spanish proficiency, based on self-rating and interviewer rating. We grouped together seven speakers who scored 5 on a scale of 1 to 5 and seven speakers who scored 3 or less. The high proficiency group shows an overall [v] frequency of 56% (154 of 277 tokens), while the lowest proficiency group has

	Speakers	Frequency of [v]
Age		
18-25	10	57%
40-55	5	67%
65+	3	65%
Spanish Proficiency (max = 5)		
3 or less	9	60%
5	7	56%
Current Level of Spanish Use		
Almost Never	6	66%
Some (w/ Relatives)	7	59%
Regular, Daily	5	58%
Formal Spanish Instruction		
None	6	62%
1-3 Years, Including High School	5	72%
4 + Years, Including University	7	54%
	$N = 18$	Overall = 61%

For 40-55 and 18-25 groups: χ^2 (1, N = 15) = 4.95, p = .0261;
For university group and all others: χ^2 (1, N = 18) = 8.84, p = .003;
Other differences not significant

Table 2. *Distribution of Speakers and Frequencies of [v] by Extralinguistic Factors*

an overall [v] frequency of 60% (133/221). The difference is not statistically significant. We also divided speakers into three groups based on their current level of Spanish use: five who use Spanish regularly, seven who use it sometimes, primarily with older relatives, and six who hardly use Spanish at all, except in Spanish class. Average [v] frequencies are 58%, 59% and 66%, respectively. The differences are not significant here either. This pair of results, then, also fails to provide evidence that New Mexican labiodental [v] is derived from contact.

However, we did find that speakers who have studied Spanish at the university level present a significantly lower [v] frequency, at 54%, than speakers who have received no formal instruction in Spanish or have taken classes at the high-school level only, with a combined [v] frequency of 66%, χ^2 (1, N = 18) = 8.84, p = .003. This result should not be surprising, since more often than not labiodental pronunciation is censured or at least explicitly taught to be foreign in Spanish-language classes.

Support for the hypothesis that formal Spanish instruction disfavors labiodentals is provided by the results for the word *rubio* 'blond'. This word was assigned to

the low frequency, non-cognate, orthographic *b* cell. Surprisingly, all speakers who pronounced this word did so with a bilabial fricative. In contrast, all other words in this cell had more than half their tokens with a labiodental. *Cebolla* 'onion' and *sábana* 'sheet' averaged 52% [v], while mid-level frequency words meeting the same criteria *nube* 'cloud', *caballo* 'horse', and *abierto* 'open-Adj.' averaged 71% [v]. We explain this unexpected behavior of *rubio* by its status as a learned word in New Mexican Spanish, that is, a word learned in Spanish class. Indeed, most speakers translated *blond* as *güero*, the preferred lexical variant in the region.

Another factor that seems to disfavor labiodentals is contact with other varieties of Spanish. The lowest individual [v] frequency is 31%, for speakers *m*, *j*, and *d* (See Table 1.). While *m* and *j* have studied Spanish at the university level, we cannot attribute speaker *d*'s low [v] frequency to formal Spanish instruction. This speaker has far fewer labiodentals than his grandmother, speaker *f*, whose [v] average is 61%. A combination of circumstances might have contributed to *d*'s low [v] frequency: that he grew up in the urban center of Albuquerque, where immigrant Spanish varieties are more prominent than in other parts of northern New Mexico; that he was in contact with other varieties of Spanish in the Army; and that he mostly speaks Spanish with Mexican coworkers. Taken together, these biographical facts point to early and intense contact with non-local varieties. The case of speaker *e*, who has the next lowest [v] frequency at 33%, points in the same direction. This speaker told us that she mainly speaks Spanish with her Mexican cousins (on her father's side—her mother is New Mexican).

In summary, several extralinguistic factors seem to interact in the occurrence of labiodentals. No significant differences based on age or proficiency groupings were found. On the other hand, speakers who have received formal instruction in Spanish present a lower frequency of labiodentals. These results suggest that early or intense contact with non-native varieties of Spanish, whether standard varieties in school or immigrant varieties among peers, reduces the occurrence of labiodentals.

4. Differences Between High and Low Frequency Words. A comparison of average [v] frequencies verifies that there is a lexical frequency effect on labiodental-bilabial variation, as predicted by the theory of gradual lexical diffusion (cf. Bybee 2001). As shown in Table 3, high frequency words overall average 73% labiodentals, while low frequency words have 48%, χ^2 (1, N = 467) = 29.06, p = .000. The higher proportion of labiodentals in entrenched high frequency items supports the hypothesis that (at least some) voiced labiodentals are archaic [v], or retentions of a dialect feature of New Mexican Spanish.

For the VARBRUL analysis, three independent variables or factor groups were considered: individual speaker differences (discussed in Section 3), word frequency, and orthographic representation of cognates and non-cognates. For cognates, two possibilities were distinguished: cases in which orthographic represen-

	HIGH FREQUENCY*	LOW FREQUENCY**
LABIODENTAL [v]	152 (73%)	124 (48%)
BILABIAL [β] OR [B]	57 (27%)	134 (52%)
TOTAL *N*	209	258

χ^2 (1, N = 467) = 29.06, p = .000
* 13 words, average frequency = 318 (Juilland & Chang-Rodríguez 1964)
** 25 words, average frequency = 9 (Juilland & Chang-Rodríguez 1964)

TABLE 3. *Rate of Labiodentals According to Token Frequency*

tation in Spanish and English coincide, as in ***valor-value***, and cases in which the orthography is different, as in ***recibir-receive***. We combined cognate status and orthography since separate factor groups would not have been orthogonal and independent: Orthographic *v* in Spanish obviously cannot co-occur with cognates that have a *b* in both languages (cf. Guy 1993:241). We thus coded for the five factors in this group shown in 5.

(5) a. Cognate, Spanish *v* and English *v* (***valor-value***)
b. Cognate, Spanish *b* and English *b* (***abuso-abuse***)
c. Cognate, Spanish *b* and English *v* (***recibir-receive***)
d. Non-cognate, Spanish *v* (*vivo* 'I live')
e. Non-cognate, Spanish *b* (*trabajo* 'I work')

In an initial VARBRUL run with all words, frequency was not selected as a significant contributing factor. However, the results indicated interacting factor groups.

It turns out that linguistic reality is skewed: We could not find any high frequency Spanish words having an English cognate with /b/. Among the first 500 words in the frequency dictionary there are none with orthographic *b* having an English cognate also written with a *b*. Words like *labor* and *libertad*, which fulfill these conditions, both have a frequency of less than 100. This means that all high frequency Spanish words with orthographic *b* are of the ***recibir-receive*** type. Thus 5b can apply only to low and mid frequency items. Also absent from 5 is Cognate, Spanish *v*-English *b*. We could develop only a small list of words, all of low frequency, some of dubious cognate status: ***vasco-Basque*** and their derivatives, ***venda-bandage***, ***vacuno-bovine***.[6] Given this uneven distribution of high frequency words with respect to English cognates, a second VARBRUL run was done, this time including as factor groups only speakers, word frequency, and orthographic representation, that is, without including cognate status. This time, frequency was selected.

Based on this linguistic skewing and the difference between high and low frequency words shown by the Chi-square test (Table 3), we ran separate VARBRUL

[6]Thanks are due to John Bergen for coming up with these.

analyses, for high frequency words apart, and for low and mid-level frequency words apart. The results for high frequency words are summarized in Table 4. The only factor group selected was that of individual speaker differences; cognate status–orthography was not. Chi-square tests confirmed that the difference in the proportion of labiodentals between words with an orthographic *v* and words with an orthographic *b* is not significant. This is in stark contrast with labiodentals in Mexico and among Spanish-language instructors in the U.S, which overwhelmingly correspond to orthographic *v* (Lope Blanch 1988:164-5, Stevens 2000:142). Nor are there significant differences between cognates of any kind and non-cognates. In short, neither orthography nor cognate status is a significant factor in the occurrence of labiodentals in high frequency words.

	NUMBER	PERCENT [v]*
COGNATE STATUS		
Cognate, Eng. *v* & Span. *v*	47	81%
Cognate, Eng. *v* & Span. *b*	33	73%
Non-cognate, Spanish *v*	75	72%
Non-cognate, Spanish *b*	54	67%
ORTHOGRAPHY		
Orthographic *v*	122	75%
Orthographic *b*	87	69%

*None of the differences is significant.

TABLE 4. *Frequencies of Labiodentals in High Frequency Words By Cognate Status and Orthography*

In contrast, cognate status and orthographic representation turns out to be a significant constraining factor in mid and low frequency words, as shown in Table 5. Labiodentals are most likely to appear in cognates with an orthographic *v* in both languages (.92) or non-cognates with a Spanish orthographic *v* (.91). Labiodentals are highly unlikely in cognates with an orthographic *b* in both Spanish and English (.03). However, labiodentals are about as equally likely to occur as bilabials in non-cognates with an orthographic *b* (.53).[7]

Table 6 confirms that the difference in the proportion of labiodentals between words with an orthographic *v* and words with an orthographic *b* is significant for low and mid frequency words. Both this result and the results for cognate status in Table 5 contrast with our findings for high frequency words, where neither orthography nor cognate status were significant factors (Table 4).

In summary, we have found that labiodentals occur more in high than low frequency words and do so independently of orthography or cognate status. At the

[7]In Table 5, the 14 tokens of Cognate, Eng. *v* & Span. *b* are for *sabor - savor*, which is not really a cognate, since it was elicited by 'taste' or 'flavor'.

FACTOR GROUP	FACTOR	*N*	% [v]	VARBRUL WEIGHT
COGNATE STATUS/ ORTHOGRAPHY	Cognate, Eng. *v* & Span. *v*	86	84%	.92
	Cognate, Eng. *b* & Span. *b*	123	10%	.03
	Cognate, Eng. *v* & Span. *b*	14	71%	.64
	Non-cognate, Spanish *v*	81	84%	.91
	Non-cognate, Spanish *b*	86	58%	.53
WORD FREQUENCY	Mid (mean frequency = 63)	132	67%	.63
	Low (mean frequency = 9)	258	48%	.43

N = 390, Input probability = .56, p = 0.033,
Application value = labiodental [v];
Other factors in run: Individual speaker differences (selected)

TABLE 5. *Voiced Labiodental–Bilabial Variation in Low and Mid Frequency Words*

	NUMBER	PERCENT [v]
ORTHOGRAPHY		
Orthographic *v*	167	84%
Orthographic *b*	223	32%

χ^2 (1, *N* = 390) = 102.26, p = .000

TABLE 6. *Frequencies of Labiodentals in Low and Mid Frequency Words by Orthography*

same time, labiodentals are also favored to occur in low frequency words with an orthographic *v* in English and/or Spanish. This pair of results suggests that labiodentals in New Mexican Spanish are of two kinds, archaic [v] and language-contact [v]. Two distinct phenomena are represented in the same sound: the retention of an old dialect feature, on the one hand, and an active process of English-to-Spanish transfer, on the other.

The high frequency of labiodentals in highly entrenched, high frequency words for both orthographic *v* and orthographic *b*, and independent of cognate status, points to an archaic [v] as in varieties of Judeo-Spanish. High frequency words such as *había* 'there was/there were' were written with a *u* or a *v* in Old Spanish texts and colonial Mexican texts (Lope Blanch 1985:46). It is likely that these voiced labiodentals spread to other words, regardless of etymology. This seems to have occurred in Bucharest Judeo-Spanish, where [v] has extended to cases of intervocalic *b* originating in Latin *p*, for example *recibir* [risivir] (Sala 1971). In our sample, the same word *recibir* was pronounced with a labiodental in 70% of

all tokens. Although it is likely that contact with English has favored [v], its origin in New Mexico appears to be the Old Spanish labiodental.[8]

Two additional sets of facts from the data support the hypothesis that New Mexico labiodentals are a dialect feature originating in Spanish. First, labiodentals occurred in traditional New Mexican forms. All three speakers who used the archaic form *vide* 'I saw', which has been transmitted in New Mexican Spanish since before English was ever heard in the region, pronounced it with a labiodental. Overall *la vi(de)* presented a [v] frequency of 87%. Similarly, the form *sabore* 'taste, flavor' with the paragogic [e] typical of New Mexican Spanish (Hernández Chávez 1990) was pronounced with a labiodental by the speaker who used it. This word had an overall [v] frequency of 71%.

A second, initially unexpected, set of facts also supports our hypothesis. Labiodentals were high in certain low and mid-level frequency words written with a *b*, such as *caballo* 'horse', with 69% [v], and *nube* 'cloud', with 87% [v]. This is the opposite of the results for *rubio* 'blond', which was assigned to the same non-cognate, orthographic *b* cell and which had no labiodental tokens at all. Why might this be? We suggest that certain nouns for everyday things, such as *caballo*, may be of relatively higher frequency in child language than in adult language as reflected in frequency dictionaries. Words learned from grandma would be highly entrenched, especially so in cases of incomplete acquisition where speakers never acquire adult varieties and vocabulary remains limited to those early language words. One speaker told us that the only Spanish she spoke as a child were single words referring to animals and other commonplace objects. She subsequently took Spanish at the university. Her overall [v] frequency was 45%, which is lower than the average (speaker *k*, Table 1), yet she used [v] for all nouns in this cell (*nube, sábana, cebolla,* and *caballo*). The one exception was school-learned *rubio* (see Section 3).

What about the language-contact [v]? In low frequency words, the variation between labiodentals and bilabials follows the pattern of English cognates. As we saw in Table 5, labiodentals are most likely to occur in cognates with an English /v/ and bilabials are most favored in cognates with an English /b/.

Let us take a closer look at the bilabial variants. Despite the fact that stops are said not to occur in intervocalic position, as in example (1), there was a total of 55 such cases (9% of all tokens). Table 7 shows that stops are most favored in cognates with an English orthographic *b* (.96) and somewhat less favored in non-cog-

[8]Early studies of New Mexican Spanish (e.g. Espinosa 1930, Hills 1938) either do not mention or deny the occurrence of labiodentals, except among bilinguals. This might be because Spanish labiodentals are not quite the same as English labiodentals. Canfield (1962:69, note 14) disagrees with Post (1934) that labiodentals occur (only) among bilinguals and states that labiodentals in Spanish and English are different, the Spanish being more post-dental and therefore more prone to becoming bilabial.

nates with a Spanish orthographic *b* (.64). There were no stop occurrences at all in cognates with an English *v*. Overall, 69% of these bilabial stops occurred in cognates with an English /b/, such as *abuso, habitantes, atributo*. These results suggest a change in progress (at least among some speakers) to the detriment of labiodentals, toward a sound-spelling correspondence under English influence.[9] It is important, however, that 80% of all stop tokens occurred in low frequency words and that there were no occurrences at all in high frequency words. This distribution pattern further supports the hypothesis that English-to-Spanish transfer is limited to low frequency words.

FACTOR GROUP	FACTOR	*N*	%[b]	VARBRUL WEIGHT
COGNATE STATUS/ ORTHOGRAPHY	Cognate, Eng. *v* & Span. *v*	133	0%	
	Cognate, Eng. *b* & Span. *b*	123	38%	.96
	Cognate, Eng. *v* & Span. *b*	47	0%	
	Non-cognate, Spanish *v*	156	1%	.19
	Non-cognate, Spanish *b*	134	4%	.64
WORD FREQUENCY	High		0%	Not
	Mid		8%	Selected
	Low		17%	

N = 544, Input probability = .03, p = .000, Application value = bilabial stop [b]

TABLE 7. *Bilabial Stop - Bilabial and Labiodental Fricative Variation*

5. CONCLUSION. We have shown a lexical frequency effect on voiced labiodental-bilabial variation in New Mexican Spanish. Based on the differences between high and low token frequency words, we may distinguish two kinds of labiodentals: ARCHAIC [v] and LANGUAGE-CONTACT [v]. Labiodentals in high frequency words represent the retention of an old dialect feature, while low frequency words show a tendency to follow English patterns of distribution of /b/ and /v/. More generally, we propose that change due to language contact has a lexical diffusion pattern like analogical changes. Unlike regular sound change, contact-induced change affects low frequency items first.

[9]Transfer of English patterns might imply loss of bilabial fricative variants. One way to check this is to compare high and low proficiency speakers (or high and low Spanish use speakers) with respect to the occurrence not only of [v] but also of [ß].

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