On the Presence of Both the Voiceless Velar [x] and Glottal [h] Fricatives in the Spanish of Taos, New Mexico ¹

Donny Vigil
Purdue University

INTRODUCTION

Traditional New Mexico Spanish (TNMS) is a unique variety of Spanish spoken in northern New Mexico. Due to the history of the region it was originally isolated. Research on this variety of Spanish has linguistic relevance within the fields of Spanish and sociolinguistics. TNMS has had contact with indigenous languages, Mexican Spanish and English. Indeed, this contact, along with other factors, is what causes TNMS to be in danger of dialect death. The aims of this study are to do phonetic and phonological analyses of the speech in Taos, New Mexico. The specific elements investigated will be the phonetic characteristics of /s/, /ɾ/, and (/x, h/). They are analyzed auditorily and the (/x, h/) will be analyzed acoustically.

REVIEW OF LITERATURE

One of the most comprehensive and recent studies done which analyzes TNMS is the New Mexico-Colorado Spanish Survey (NMCSS), (Bills and Vigil 1999). It was carried out in the 1990s, and funded by the National Endowment for the Humanities. It involved 355 recorded interviews of 3½ hours each and included linguistic elicitation and spontaneous conversation elements from 63 localities in New Mexico and southern Colorado. In each area the participants included 1 male and 1 female from each age group; 18 to 39, 40 to 60, 61 and older. Many of the features they discuss

¹ I would like to thank Robert M. Hammond for his feedback on this project. I would also like to express my appreciation to John Lipski, David Pharies and others present at the 3rd Interdisciplinary Colloquium on Hispanic/Latin American Literatures, Linguistics and Cultures, October 13, 2007 who offered helpful comments. All errors are, of course, my own.

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are archaic or date back to fifteenth and sixteenth century Spanish. Some examples include lexical items such as *túnico* instead of *vestido* for ‘dress’, morphological items such as *vide* instead of *vi* for ‘I saw’, and phonological items such as the pronunciation of the grapheme $h \rightarrow [h]$ or $[x]$.

There were early external influences from indigenous American languages that may be attested by lexical borrowings. Some of the internal innovations include the aspiration of /s/ in onset position (syllable or word initial) and the addition of an epenthetic (inserted) /i/ mostly in phrase-final position. English and Mexican Spanish have modern external influences on TNMS which are significant given their powerful nature and the possible long-term effects they may cause. These effects may include language death among others as noted by Bills (1997) who states that, “Traditional New Mexican Spanish is caught between two powerful linguistic forces, English on one side and Mexican Spanish on the other, and the prospects for its survival are slim at best. The loss of this unique variety of Spanish is linked to the mixed emotional reactions that hispanos have toward the ethnic mother tongue” (p. 169).

This linguistic context indeed results in another observable instance of language shift. “The rapidity with which Southwest hispanos in the last half of the twentieth century are shifting to English and abandoning Spanish rivals the loss of the ethnic mother tongue by practically any ethnic group in documented history”, stated Bills (1997, p. 155).

Code-switching and borrowing are other results of the language contact present in New Mexico and are phenomena that have been widely researched in the United States (Clegg 2000; Roca & Jensen 1996; Smead & Clegg 1996; Yavas 1996; Silva-Corvalán 1982; D’Introno 1996; Toribio and Ruben 1996). Clegg (2000) pointed out that, “the borrowings in the Southwest have largely entered through oral sources and gone into a community with no effective filter since the Hispanics in the Southwest have little or no education in Spanish. As a result a borrowing from English is a more logical alternative for them than a learned Spanish form” (Clegg, 2000, p. 157).
He likewise points out that English is dominant in the society of the Southwest and borrowing is more likely because it allows a more semantically precise loanword to be used for a concept in place of a linguistically imposed approximation (Clegg, 2000, p. 157).

However, borrowings are not the only mechanisms utilized. Innovations are also employed because, “the lack of continuous, day-to-day contact with the people of Mexico throughout the seventeenth, eighteenth, and nineteenth centuries, together with a dearth of books, dictionaries and other reading material, stagnated and impoverished the Spanish of the colonists. Many times these people could not recall the name of a particular article and had no recourse but to coin a new term” (Cobos 1983, p. XIV)

The language shift mentioned above is unfortunately giving way to language or dialect death in the case of TNMS. Bernal-Enríquez’s (2002) study “found that the Spanish language of la Nueva México is being lost, […] that there is a relationship between proficiency and use in childhood and that of adulthood, and that early bilingualism is detrimental to the attainment of adult full bilingualism” (p. vi). It should be noted that linguistic diversity is a benchmark of cultural diversity and language death is symptomatic of cultural death. Language shift and death occur as a response to pressure—social, cultural, economic, etc. These conditions are present in New Mexico. Death occurs when one language replaces another and when parents no longer transmit it to their children. Linguists estimate that there are approximately 6,000 languages and that at least half if not more will become extinct in the next century. The case of TNMS is no different:

The future of New Mexican Spanish seems clear. The social forces that will shape this language change are now set firmly in place. We have every reason to expect that within fifty to one hundred years, the Traditional Spanish of New Mexico will undergo the dialect extinction that has already befallen the Traditional Spanish of other Southwestern states.

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Within another couple of generations, the unique New Mexican Spanish will have fully blended back into its ‘mother tongue,’ Mexican Spanish. (Bills and Vigil, 1999, p. 58)

Turning now to the specifics and scope of this project, an examination of Spanish Pronunciation in the Americas, (Canfield 1981) reveals some phonetic and phonological conclusions and comparisons of TNMS within a structuralist framework. These conclusions are now reviewed and will re-examined further below. Canfield (1981) states that, “the Spanish of the northern New Mexico/southern Colorado dialect area resembles that of Guatemala and Costa Rica more than that of neighboring Mexico because it represents a similar stage in the evolution of Andalusian Castilian” (p. 80). Canfield (1981) continues by stating that “/x/ is [h] : paja [páha], gente [hénte], and like salvadoreños, the New Mexican often aspirates /s/ syllable final” (p. 80).

As indicated above, Canfield (1981) uses American Structuralist phonology in his description of deriving [h] from /x/ in New Mexico. However, it is important to note that, as Hammond (2001) states, the segments /h/, /x/, and /X/ occur in mutually exclusive Spanish dialects. “This analysis of the phones [h], [x], and [X] in Spanish as separate phonemes that occur in mutually exclusive dialects is very different from traditional descriptions of these segments” (Hammond, 2001, p. 223), and solves the problem of phonological absolute neutralization that is violated in phonological systems like Caribbean Spanish which, from a traditional perspective, would derive the allophone [h] from /x/, a voiceless velar fricative which itself never surfaces. In Caribbean Spanish the phone [h] may also surface as an allophone of the phoneme /s/—a phenomenon which likewise occurs in traditional New Mexico Spanish not only in syllable final position but syllable initial. As will be detailed below, auditory and acoustic analyses of six speakers (3 female, 3 male) from Taos, a northern city of New Mexico, show that, unlike Canfield (1981) states, /x/ is not categorically [h], indeed, it is realized as at least [x] and [h] in Taos, New Sin Frontera 3 (Mayo 2008)
Mexico. That is to say some speakers have [x], others have [h] and yet others have both in their phonetic inventories.

METHODOLOGY

The participants for this study were speakers of Spanish from Taos, New Mexico. They were selected using a Snowball (Chain) and Convenience method. The 29 speakers ranged in age from 36 to 87 and were predominantly born and raised in Taos, N. M. Participants 1, 3, 8 and 9 were born and raised in Taos, Co, while participants 2 and 14 were born in Mora, Co., a neighboring county, but have lived in Taos 52 and 61 years respectively. Their previous experience with Spanish comes from the home and community. Of the 29, 13 are male and 16 are female. Most were bilingual in English and Spanish and the majority belongs to middle or lower class. Of the 29, six were selected for this study which is a preliminary portion of a doctoral dissertation. All six a bilinguals, have learned Spanish first in the home and English second in school. See Table 1.

<table>
<thead>
<tr>
<th>Number</th>
<th>Gender</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>F</td>
<td>58</td>
</tr>
<tr>
<td>1</td>
<td>F</td>
<td>65</td>
</tr>
<tr>
<td>9</td>
<td>F</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>54</td>
</tr>
<tr>
<td>14</td>
<td>M</td>
<td>64</td>
</tr>
<tr>
<td>8</td>
<td>M</td>
<td>69</td>
</tr>
</tbody>
</table>

After an orientation detailing the nature and purpose of the study, the speakers who gave informed consent filled out a socio-demographic questionnaire and then read a text, although not all participants were able to. Participants 1 and 3 were not able to read in Spanish and participant 8 was not able to due to difficulties with her vision. The oral interview included elicited material and spontaneous conversation with the researcher and with other speakers from Taos, once again, not all Sin Frontera 3 (Mayo 2008)
participants did this because some of the interviews took place while no other speakers were present. The interviews were audio-recorded using a Marantz PMD660 digital recorder.

**ANALYSIS**

The audio .wav recordings were analyzed auditorily and using PRAAT speech analysis software. This program was chosen because of the author’s familiarity with it. Table 2 offers a summary of the phonetic realizations for the segments mentioned above.

### Table 2: Summary of phonetic realizations per participant

<table>
<thead>
<tr>
<th>Num.</th>
<th>initial /s/</th>
<th>final /s/</th>
<th>final /r/</th>
<th>initial /r/</th>
<th>[rr]</th>
<th>/x or h/</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[s,h]</td>
<td>[s,h, ø]</td>
<td>[r, R]</td>
<td>[r, R]</td>
<td>[r, ̃r, ̂r]</td>
<td>[x,h]</td>
</tr>
<tr>
<td>2</td>
<td>[s,h]</td>
<td>[s,h, ø]</td>
<td>[r, R, ø]</td>
<td>[r, R]</td>
<td>[r, ̃r, ̂r]</td>
<td>[x,h]</td>
</tr>
<tr>
<td>3</td>
<td>[s,h]</td>
<td>[s,h, ø]</td>
<td>[r, R, ø]</td>
<td>[r, R]</td>
<td>[r, ̃r]</td>
<td>[x,h]</td>
</tr>
<tr>
<td>8</td>
<td>[s,h]</td>
<td>[s,h, ø]</td>
<td>[r]</td>
<td>[r, R]</td>
<td>[r, ̃r, ̂r]</td>
<td>[x,h]</td>
</tr>
<tr>
<td>9</td>
<td>[s,h]</td>
<td>[s,h, ø]</td>
<td>[r]</td>
<td>[r, R]</td>
<td>[r, ̃r, ̂r]</td>
<td>[x,h]</td>
</tr>
<tr>
<td>14</td>
<td>[s,h]</td>
<td>[s,h]</td>
<td>[r, R]</td>
<td>[r, R]</td>
<td>[r, ̃r, ̂r]</td>
<td>[x,h]</td>
</tr>
</tbody>
</table>

Table 3 provides acoustic measurements for each allophone of the fricatives corresponding to the spectrograms and spectral slices that appear below. The measurements were made with the left edge beginning after the end of the preceding strong or dark vowel formants and beginning with the high frequency spectral energy. The right edge ended with the high frequency spectral energy and before the following strong or dark vowel formants. In the case of word-final or initial fricatives the end and beginning respectively of the high frequency spectral energy were used as the boundaries of measurement. Measurements for F1 through F4 were provided because they were present. They do not necessarily appear to reflect the vowel formants of the adjacent segments, however, these are not symmetrical environments.

Following Table 3 are descriptive charts and below them appear spectrograms for the segments and words in question. The charts organize some of the information found in Table 3. Charts 1 and two Sin Frontera 3 (Mayo 2008)
organize the formant frequencies, the segmental durations, and spectral properties for the [x] and [h] allophones respectively of each speaker.

Table 3: Acoustic measurements of the participants’ fricatives

<table>
<thead>
<tr>
<th>Num.</th>
<th>F1 Hz</th>
<th>F2 Hz</th>
<th>F3 Hz</th>
<th>F4 Hz</th>
<th>F0 Hz</th>
<th>Int. dB</th>
<th>Dur. s</th>
<th>Spectrum dB</th>
<th>F1 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 [x]</td>
<td>1221</td>
<td>1854</td>
<td>2931</td>
<td>3871</td>
<td>174</td>
<td>64.9</td>
<td>0.150</td>
<td>23.8</td>
<td>1687</td>
</tr>
<tr>
<td>1 [h]</td>
<td>951</td>
<td>1969</td>
<td>3385</td>
<td>4550</td>
<td>203</td>
<td>66.0</td>
<td>0.079</td>
<td>31.6</td>
<td>67</td>
</tr>
<tr>
<td>2 [x]</td>
<td>689</td>
<td>1333</td>
<td>3057</td>
<td>4193</td>
<td>236</td>
<td>67.9</td>
<td>0.171</td>
<td>31.4</td>
<td>282</td>
</tr>
<tr>
<td>2 [h]</td>
<td>1000</td>
<td>2087</td>
<td>3139</td>
<td>4252</td>
<td>254</td>
<td>69.2</td>
<td>0.165</td>
<td>38.7</td>
<td>1568</td>
</tr>
<tr>
<td>3 [x]</td>
<td>687</td>
<td>1231</td>
<td>3137</td>
<td>3605</td>
<td>126</td>
<td>65.9</td>
<td>0.119</td>
<td>25.6</td>
<td>110.6</td>
</tr>
<tr>
<td>3 [h]</td>
<td>482</td>
<td>1587</td>
<td>2913</td>
<td>4036</td>
<td>435</td>
<td>65.3</td>
<td>0.123</td>
<td>31.4</td>
<td>260.7</td>
</tr>
<tr>
<td>8 [x]</td>
<td>1050</td>
<td>2197</td>
<td>3380</td>
<td>4777</td>
<td>Undefined</td>
<td>72.2</td>
<td>0.089</td>
<td>24.9</td>
<td>24.9</td>
</tr>
<tr>
<td>8 [h]</td>
<td>544</td>
<td>2023</td>
<td>3346</td>
<td>4415</td>
<td>Undefined</td>
<td>Undefined</td>
<td>0.020</td>
<td>27.8</td>
<td>24.9</td>
</tr>
<tr>
<td>9 [x]</td>
<td>915</td>
<td>1617</td>
<td>3210</td>
<td>4407</td>
<td>155.9</td>
<td>69.8</td>
<td>0.135</td>
<td>29.0</td>
<td>3.47</td>
</tr>
<tr>
<td>9 [h]</td>
<td>880</td>
<td>1944</td>
<td>3307</td>
<td>4459</td>
<td>180.3</td>
<td>67.2</td>
<td>0.132</td>
<td>29.0</td>
<td>3.47</td>
</tr>
<tr>
<td>14 [x]</td>
<td>728</td>
<td>1691</td>
<td>3083</td>
<td>3856</td>
<td>146.4</td>
<td>72.0</td>
<td>0.115</td>
<td>34.3</td>
<td>46.35</td>
</tr>
<tr>
<td>14 [h]</td>
<td>846</td>
<td>2065</td>
<td>3442</td>
<td>4402</td>
<td>118</td>
<td>66.0</td>
<td>0.150</td>
<td>42.5</td>
<td>24.9</td>
</tr>
</tbody>
</table>

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Charts 2, 4 and 6 six show that [h], in general has comparatively higher frequencies, durations, and spectral intensities. Chart 2, however, needs to be considered with the surrounding vowels and their formant frequencies. What follows are the spectrograms which help reveal and characterize the information found in Charts 1 through 4, namely the energy present in terms of frequency (Hz) and durations of the segments. In general, it may be observed that [x] is characterized by a wider, darker image at higher frequencies than the [h], which is shorter and not quite as dark—especially in the higher frequencies. One concern, however, must be how to distinguish weak [h] from very weak [x]. These might involve velarization of [h] or pharyngealization of [x], not to say that an articulatory continuum exists between these segments, although acoustically one may be possible. To date the author is not aware of research done in order to figure out a way to distinguish those types of secondary articulations spectrographically.
Participant 1

Sin Frontera 3 (Mayo 2008)
Participant 2

Sin Frontera 3 (Mayo 2008)
Participant 3

Sin Frontera 3 (Mayo 2008)
Participant 8

Sin Frontera 3 (Mayo 2008)
Participant 9

Sin Frontera 3 (Mayo 2008)
Participant 14

Sin Frontera 3 (Mayo 2008)
DISCUSSION

Concerning the procedure, one element that should be considered while evaluating the data is the homogeneity of participants given selection, i.e. snowball (chain) and connection to researcher or contacts of the researcher. Likewise, it should be noted that the participants are bilingual and these results should be considered in light of this fact and should not be generalized in any way to monolingual speakers of Spanish. Also, for future research the fluency in Spanish of the speakers needs to be evaluated.

CONCLUSION

The statement by Canfield that, “The Spanish of the northern New Mexico/southern Colorado dialect area resembles that of Guatemala and Costa Rica more than that of neighboring Mexico because it represents a similar stage in the evolution of Andalusian Castilian”(80) may have been true at some point but is no longer applicable. It is proposed that the high level of borrowing, innovation including aspiration of initial /s/ and the fact that TNMS indeed has both [x] and [h], all contradict the affirmation that TNMS resemble the Spanish of Guatemala and Costa Rica. The theoretical implications for the presence of both [x] and [h] must be resolved by either (1) or (2) below.

\[
\begin{align*}
(1) & \quad /x/ \\
& \quad [x] \\
(2) & \quad /h/ \\
& \quad [h]
\end{align*}
\]

More research needs to be done on this phenomenon, and more targeted data with the segments in all environments needs to be elicited and collected. Although presently it appears that there is no conditioning environment for either segment, the presence of one cannot be completely
ruled out. Preliminarily, (2) may be espoused given the higher frequency of occurrence for the [h].

In conclusion, TNMS is a unique variety of Spanish that has changed much since analyses as recent as 1981 (Canfield). Conclusions made by previous researchers need to be further reevaluated in light of these changes due to the language contact circumstances in which TNMS is found and by which it is influenced, and given the dim prospects for its future.

* Donny Vigil is a Ph.D. candidate in the Dept. of Foreign Languages and Literatures at Purdue University. His areas of interest include Spanish Language and Linguistics; Phonetics, Phonology and Dialectology of Spanish; Traditional New Mexico Spanish; Language Contact; Language Variation and Change; Phonetics, Phonology of Portuguese; Technology Assisted Language Learning, Computer-mediated Communication; Applied Linguistics and Second Language Acquisition.
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Publishing.

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