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A STRUCTURAL AND GENERATIVE STUDY
OF THE PHONEME /t/ IN SPANISH

S. Addison Everett

Ostensibly, the distribution of the phoneme /t/ should cause no problem to the linguist; however, among experts there is a marked difference of opinion concerning the systemic function of /t/.

The rule given by John Dalbor on the use of /t/ is:

$$/t/ \rightarrow \left[\begin{array}{l} \{ [t] \} \\ [d] \\ [t] \end{array} \right] \begin{array}{l} / _ / C_V / \\ \text{elsewhere} \end{array} \quad \begin{array}{l} \text{ritmo} \quad [r\acute{i}t\text{-}mo] \text{ or} \\ \text{tomar} \quad [t\acute{o}\text{-}m\acute{a}r] \end{array}$$

/C_V/ represents any voiced consonant.

This rule simply means that /t/ is realized as [t] or [d] when followed by a voiced consonant and as [t] in all other environments.

That /t/ is realized as either [t] or [d] when followed by any voiced consonant presents some interesting questions. By examining a chart of Spanish sounds it can be determined that /t/ combines with only five other phonemes to form the consonant combination /tC_V/. These five phonemes are /m/ (atmósfera, ritmo, aritmética), /n/ (étnico, etnología), /l/ (atleta, atlas, atlántico), /b/ (fútbol), and /r/ (otro, electrónico, encontrada, instrumento). According to Dalbor's rule, the preceding words could be pronounced [admósfera], [rídmo], [aridmétrica], [édnico], [ednología], [adleta], [adlas], [adlantico], [fudbol], [odro], [elecdrónico], [encontrada], and [insdrumento]. However, in examination of native speakers of Spanish, not one example of /t/ → [d]/_ /C_V/ was found. In every single case the native speaker used [t] in all environments. Since most authors declare that /t/ → [d]/_ /C_V/ occurs, the phenomenon appears to be regional, to occur in rapid speech, to be affected by education, or a combination of the three.

Something to consider at this point is the concept that /r/ and /l/ can be separately classified as liquids, but are included by Dalbor to be consonants, suggesting that they should fit into his rule.

If one divides those words containing the consonant combination /tC_V/ into syllables, it would be discovered that with /tm/, /tn/, and /tb/, the /t/ and the following /C_V/ are always in separate syllables forming what is called a consonant sequence.

at-mós-fe-ra

ét-ni-co

a-rit-mé-ti-ca

et-no-lo-gí-a

rit-mo

fút-bo

As for the combination /tɫ/ there exists some controversy as to how it syllabifies. James W. Harris states that atleta can be syllabified a-tle-ta.² However, Dalbor shows an example of /tɫ/ being divided into separate syllables (ad-lan-ti-co). Navarro Tomás and Joseph Matluck, two leading phonologists, also give examples of the combination /tɫ/ being divided into separate syllables. This indicates that /t/ is voiced in the examples used by Navarro Tomás and Matluck.

ad-las

ad-lan-ti-co³

aɫ-le-ta⁴ The first [ɫ] being a voiced allophone of /t/. The problem in Dalbor's rule that must be justified is the consonant combination /tr/. Unlike the other combinations examined the combination /tr/ cannot be divided into separate syllables and is always syllable initial, forming, therefore, what is termed a consonant cluster.

Concerning the cluster /tr/ in Mexican Spanish, Joseph Matluck stated that the /r/ sometimes becomes a voiceless fricative, but that the /t/ does not lose its articulation.⁵

It should have been considered that /tr/ is never divided and is always syllable initial. The fact that the /t/ of the cluster /tr/ does not have a voiced allophone, and therefore, does not fit into the rule given by Dalbor must also be considered. A rewrite of Dalbor's rule must contain a boundary element which would allow the rule to apply across syllable boundaries but not within the same syllable. A rewrite of Dalbor's rule could be:

$$/t/ \rightarrow \left[\begin{array}{l} \left\{ \begin{array}{l} [t] \\ [d] \end{array} \right\} / _ \$ /C_V/ \\ [t] \text{ elsewhere} \end{array} \right]$$

/C_V/ represents any voiced consonant.

\$ means across syllable boundaries.

A study of the phoneme /t/ made by James W. Harris must now be considered. Harris introduces his study by assigning the following features to the phoneme /t/.

	[t]	[t ^d]
continuant	-	-
tense	+	+
voice	-	+

[t] represents the unvoiced allophone of /t/.

[t^d] represents the voiced allophone of /t/.

Harris then refines the features, citing a study made by Liskee and Abramson to declare that the onset of voicing substantially coincides

with the stop release. This, they declare, places the Spanish /t/ in the same category as the English /d/ which is prevoiced.

Based on a study of the phoneme /t/ in Korean by a Mr. Kim, the feature [+ voice] is assigned to the "voiceless" [t]. Harris states:

I shall not summarize here the intricate argument that Chomsky and Halle give to support these specifications. The point most germane to the present discussion is the assignment of the feature [+ voice] to "voiceless" t_1 . This feature is correlated with the nonspread position of the vocal cords appropriate for voicing; but t_1 is not "voiced" because of the tenseness of the supraglottal musculature ([+ tense]) and glottal constriction. Onset of voicing of a following vowel is simultaneous with release of the glottal constriction, however, since the vocal cords are already in voicing position. In t_2 , on the other hand, there is a moderate lag in the onset of vocal vibrations since the vocal cords are not in voicing position when the stop closure is released.⁶

The feature [+ voice] is the one Harris assigns to /t/. The following set of features used by Harris is included in order to help explain his rules:

	[t]	[t ^d]
continuant	-	-
tense	+	+
voice	+	+
heightened subglottal pressure	+	-
glottal constriction	+	-

Harris gives the following rules:

- cont	- voice		
+ tense	+ h. s. press	_____ (#)	- obstr
	+ glott con		- nasal

#refers to word boundary.

(#) gives the option of applying across word boundaries or within a word.

Harris explains the rule saying:

[This rule] assigns the features [+ voice, + heightened subglottal pressure, + glottal constriction] to [p, t, k] before vowels, glides and liquids, but not before obstruents or nasal sonorants. That is, [this rule] applied to just those instances of [p, t, k] that do not become [p^b, t^d, k^g] by assimilation to a following voiced segment.⁷

Harris explains that the following rule has the purpose of voicing [t]:

$$\left[\begin{array}{l} + \text{ obstr} \\ - \text{ h.s. press} \end{array} \right] \rightarrow [\alpha \text{ voice}] \quad / \text{---} (\#) \left[\begin{array}{l} + \text{ cons} \\ \alpha \text{ voice} \end{array} \right]$$

The most important factor to consider in analyzing Harris' rule is that of syllabification. Harris, for example, syllabifies atleta as (a-tle-ta) and not (at-le-ta). As was indicated earlier in this paper Joseph Matluck in his study of Mexican Spanish divided atleta as (al-le-ta), the first [l] being a voiced allophone of /t/. As was also mentioned earlier Navarro Tomás also separated the combination /tl/ into separate syllables. The fact that /t/ are divided has a bearing on the validity of Harris' rule.

In a survey of educated native Spanish speakers at Brigham Young University, some of whom are from Mexico, in almost every case the /t/ and /l/ of the combination /tl/ were divided into separate syllables.

Harris' first rule is given here again:

$$\left[\begin{array}{l} - \text{ cont} \\ + \text{ tense} \end{array} \right] \rightarrow \left[\begin{array}{l} + \text{ voice} \\ + \text{ h.s. press} \\ + \text{ glott con} \end{array} \right] \quad / \text{---} (\#) \left[\begin{array}{l} - \text{ obstr} \\ - \text{ nasal} \end{array} \right]$$

In order to exclude /l/ from this rule the feature [- lateral] should be added after the boundary element. A rewrite would be:

$$\left[\begin{array}{l} - \text{ cont} \\ + \text{ tense} \end{array} \right] \rightarrow \left[\begin{array}{l} + \text{ voice} \\ + \text{ h.s. press} \\ + \text{ glott con} \end{array} \right] \quad / \text{---} (\#) \left[\begin{array}{l} - \text{ obstr} \\ - \text{ nasal} \\ - \text{ lateral} \end{array} \right]$$

This rule says that the phoneme /t/ will be realized as the unvoiced allophone when followed by vowels, glides, and /r/, in which case the /t/ and the following phoneme will be in the same syllable.

Harris' rule for the voicing of /t/ is also given again:

$$\left[\begin{array}{l} + \text{ obstr} \\ - \text{ h.s. press} \end{array} \right] \rightarrow [\alpha \text{ voice}] \quad / \text{---} (\#) \left[\begin{array}{l} + \text{ cons} \\ \alpha \text{ voice} \end{array} \right]$$

Since /l/ was excluded from the rewrite of Harris' first rule, and since evidence shows that the combination /tl/ is divided into separate syllables in which case the /t/ may be voiced, the phoneme /l/ must be provided for in a rewrite of Harris' second rule. A rewrite would be:

$$\left[\begin{array}{l} + \text{ obstr} \\ - \text{ h.s. press} \end{array} \right] \left[\begin{array}{l} \alpha \text{ voice} \\ \beta \text{ lateral} \end{array} \right] \quad / \text{---} (\#) \left[\begin{array}{l} + \text{ cons} \\ \alpha \text{ voice} \\ \beta \text{ lateral} \end{array} \right]$$

This rule, then, provides for the voicing of /t/ when followed by /m, n, b, l/. In such cases, the [t^d] and the following phoneme will occur in separate syllables.

FOOTNOTES

¹John B. Dalbor, Spanish Pronunciation: Theory and Practice, (New York: Holt, Rinehart and Winston, 1969), p. 53.

²James W. Harris, Spanish Phonology, (Cambridge: The M.I.T. Press, 1969), p. 45.

³T. Navarro Tomas, Manual de pronunciación española, 18th ed., (Madrid: Raycar, S.A., 1974), p. 97.

⁴Joseph Matluck, "La pronunciación del español en el Valle de México," Nueva revista de filología hispánica, 6 (1952), 116.

⁵Matluck, p. 117.

⁶Harris, p. 42.

⁷Harris, p. 44.

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