

Variable Production of the Trill in Spontaneous Speech: Sociolinguistic Implications

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1. Introduction

Acoustic descriptions of the Spanish voiced alveolar trill /r/ reveal that native speakers do not always produce the expected variant containing at least two closures (Hammond 1999, Willis 2006, Bradley 2006, Colantoni 2006). Hammond presents speaker data from Argentina, Chile, Peru, and Puerto Rico indicating that spirant or sibilant variants are the common norm. Willis (2006) reports data collected in the Dominican Republic where he finds that the predominant variant is a pre-aspirated tap. Colantoni (2006) studies the trill in Argentinean Spanish revealing that variants range from fricatives to approximants. She describes fricative variants as acoustically similar to a post-alveolar sibilant, while approximants are acoustically similar to trill productions due to their degree of periodicity. Bradley (2006:12) also finds evidence revealing that “prescriptive three-contact trills were virtually unattested for the Latin American informants consulted, and shorter trills were quite infrequent in comparison to non-trilled rhotics”. The fact that speakers from different regions are variably producing the trill raises the question as to the sociolinguistic implications of this sound change. The evidence coming from the corpus of Caracas reveals that variability is predominant, particularly in the younger generation which can be considered enough to describe this phenomenon as a sound change. Recent investigations have explored sociolinguistic implications of trill productions in Costa Rican and Peruvian varieties of Spanish where sibilant variants are common (Diez-Canseco 1997, Adams 2002). To my knowledge, no variationist study of this phenomenon has been done on Venezuelan Spanish. The present investigation provides both an acoustic and multivariate analysis that contributes to understanding the status of this variable phenomenon in Venezuelan Spanish. In other words, the present paper examines trill productions in the spontaneous speech of Venezuelan Spanish speakers including linguistic and extra-linguistic factors to determine the social source of variation. Specifically, an acoustical analysis of the data is performed in order to define the variants of /r/ in this variety of Spanish as well as the role of age, gender, and socioeconomic background in the production of the trill. The analysis of the extra-linguistic factors is a key step in determining the stage and nature of this socio-phonological change.

2. Previous literature

Traditional articulatory descriptions of the Spanish trill (Navarro- Tomás 1999) point out that the main characteristic of this segment is that it is produced with three closures. According to Navarro-Tomás (1999:122), the distribution of the trill is as follows: word-initial position (e.g. *roca* ‘rock’), syllable-initial position preceded by [l], [n] or [s] (e.g. *alrededor* ‘around’, *honrado* ‘honest’, *Israel* ‘Israel’), syllable-initial in intervocalic position (e.g. *perro* ‘dog’). Only in intervocalic position does the trill contrast with the tap (e.g. *perro* ‘dog’, *pero* ‘but’). More recently, Hualde (2005:181) proposes the following: “the tap is produced with a single rapid contact of the tip of the tongue against the alveolar ridge. The trill is produced with several such rapid contacts, generally two or three. It is not completely accurate, however, to define a trill as a sequence of taps, since the articulation is somewhat different”. Hualde (2005) also points out the existence of dialectal variants of the trill produced without occlusions that he describes as approximants or fricatives. Specifically, he mentions assibilated variants found in parts of Central America, the Andean region, Paraguay, and Northern Argentina. Hualde maintains that the trill also has dorsal and pre-aspirated variants. Dorsal variants are

found in certain areas of Puerto Rico, while pre-aspirated variants can be found in areas of Cuba, the Dominican Republic, and Puerto Rico.

Beyond descriptive material regarding the trill in Spanish, Hammond (1999) presents experimental data from 229 subjects representing different dialectal areas of Latin America and Spain. Subjects were recorded performing a read-aloud task containing seven occurrences of the target trill segment. Hammond's findings reveal that of the 1,603 tokens obtained only 16 tokens were trill variants with three closures. In the analysis of his data, he reports the following realizations: 1) a voiceless velar or uvular fricative, 2) a retroflex, 3) a pre-aspirated flap, 4) a partially devoiced flap, and 5) a voiced flap. Hammond (1999:147) concludes that the "typical" trill is "absent in the normal discourse of the vast majority of native speakers."

Relevant to our discussion on the production of trills is Recasens and Pallares' (1999) study in which they characterize the articulatory aspects of the tap and trill in Catalan. Phonologically, the trill and the tap in both Spanish and Catalan have the same distribution. The most important findings for the purpose of our paper are coarticulatory effects these scholars report in the case of the trill. Particularly, they find that trills are produced with a stable apico-alveolar closure. The evidence of F1 coarticulation reveals that the trill is more sensitive to vowel-dependent changes in oral opening degree than the tap. They further discuss that trill and taps are the product of different lingual gestures. The trill is produced with more apical retraction and more predorsum lowering than the tap. This phonetic study reveals the coarticulatory sources of internal variation.

Solé (2002) examines the aerodynamic characteristics of trills and their phonological patterning. Solé's paper focuses on the study of aerodynamic conditions necessary for tongue-tip trilling. The findings reveal that higher pressure build-up, greater magnitude of linguo-palatal contact and longer duration of the first closure are required for tongue-tip trilling. Small variations in oral pressure lead to no trilling or devoicing. Solé (2002:686) claims that the preference for voiced trills in certain phonological systems reflects a tendency for "preserving maximum auditory distinctiveness in a narrow range of aerodynamic conditions." This study has implications for an interpretation of the acoustic variants found in the speech samples of the present investigation.

Lewis (2004) studies the coarticulatory effects on the production of the trill according to the preceding phonetic environment. The findings of Lewis's investigation reveal a pattern of variation according to which speakers produce voiced and voiceless trills as well as approximant variants. He also explains that relative intensity values in the pre-consonantal context predict voiced trill variants. Specifically, Lewis (2004: 127) states: "large differences in intensity reflect an abrupt decline in acoustic energy resulting from a highly constricted articulatory gesture which allows sufficient oropharyngeal pressure to build behind the point of stricture to initiate the vibratory state of the tongue apex resulting in a trilled phone." Lewis also finds more canonical trill productions post-vocally and in absolute initial position.

More evidence of the pattern of variation found in the production of the trill in different dialects of Spanish is presented by Willis (2006). Willis presents data from urban middle class speakers from the Dominican Republic. Data elicitation was performed using a picture book activity entitled *Frog, where are you?* (Mayer 1969). According to Willis, the most common variants found in the Dominican Republic data he analyzed were: 1) a pre-breathy voice followed by a single tap, and 2) a pre-breathy voice followed by multiple closures. These results have implications for the study of other Caribbean varieties, where variants with similar features can potentially be identified. Particularly, this paper analyzes variable production in Venezuelan Spanish, a Caribbean variety that shares patterns with Dominican Spanish.

The production of trills in Argentinean Spanish is described in experimental research carried out by Colantoni (2006). She presents an acoustic characterization of rhotics as well as an acoustic account of the process of loss of assibilation. The data of Colantoni's investigation comes from 8 male speakers elicited via traditional dialectological and sociolinguistic techniques. The findings of her research demonstrate that trills in Corrientes and San Juan range from fricatives to approximants. This is consistent with many of the patterns of variation reported above. More importantly, Colantoni states that approximant variants might be acoustically and perceptually similar to the standard trill in terms of degree of periodicity. Once again, previous research reveals that what is considered "the standard

variant of the trill” in Spanish does not seem to be the common pattern found even in semi-formal styles.

Another recent investigation providing acoustical data of trills is presented by Bradley (2006). Specifically, Bradley examines /sr/ clusters in Latin American Spanish and compares /sr/ clusters with other syllable-initial contexts. The data for the analysis comes from recordings obtained from 24 speakers from different dialectal areas including Bolivia, Colombia, Costa Rica and Ecuador. Bradley (2006:12) finds evidence in his results revealing that “prescriptive three-contact trills were virtually unattested for the Latin American informants consulted, and shorter trills were quite infrequent in comparison to non-trilled rhotics”. These findings are consistent with the pattern of variation reported above in the descriptive and experimental work concerning the Spanish trill.

Concerning sociolinguistic studies on trill variants, Diez-Canseco (1997) studies assimilated productions of the trill in Peruvian Spanish. In her dissertation, she combines social network methodology with attitudinal analyses in order to determine the role of gender in the use of assimilated variants of the trill. Her findings reveal that gender needs to be combined with other factors to observe significant effects. Furthermore, socioeconomic background is the most important factor for predicting variation patterns. She also shows that dense network links determine the use of non-standard variants. Another investigation of assimilated variants of the trill is Adams (2002). Specifically, Adams examines the sociolinguistic factors conditioning assimilation in Costa Rican Spanish. Her results show that assimilation marks identity ties with the local community and this is particularly the case in rural areas where assimilation is more common than in urban areas. She also finds that speakers with high-school or lesser education tend to favor the assimilated variant.

Previous research indicates that trill-like variants (produced with two or more closures) are not the common norm across Spanish dialects. As can be seen above, the range of variation is great revealing productions that contain occlusions as well as variants that can be characterized as approximants. Furthermore, sociolinguistic analyses of innovative variants of the trill in Peruvian and Costa Rican Spanish show social conditioning. Given this state of affairs the present paper focuses on the following research questions: 1) how can trill production be acoustically characterized in Caracas Spanish? 2) Which linguistic and social variables predict trill variants?

3. Methodology

3.1. Participants

The speech samples of the present investigation come from the corpus *Estudio sociolingüístico de Caracas* ‘Sociolinguistic study of Caracas’ (1987). Thirty-six speakers were selected from the corpus with equal representation of socioeconomic levels (upper class, middle class, and working class), ages (14-29, 30-45, and 61 and older), and gender (male and female). This corpus is composed of half-hour interviews, conducted in 1987 and 1988. The speakers were born and raised in Caracas, and their parents were also from Caracas. The interview topics included holiday traditions, participants’ occupation, academic studies, religious beliefs, current education, and the political situation in Venezuela. The protocols of the sociolinguistic interview were followed for the collection of the data. Participants completed a background questionnaire after the interview providing information concerning their occupation as well as the profession of their parents, education, living conditions, total family income, and total and average family income. With the information gathered from the background questionnaires participants were classified into different socioeconomic background groups following criteria relevant for the social conditions of Venezuelans (Contasti1980).

3.2. Statistical analysis and coding

The analysis of the data was performed using the Goldvarb version of VARBRUL, which is a statistical program specially designed to study sociolinguistic variation (for more details on the application of this type of analysis to Spanish data see Diaz-Campos 2005, 2006). The program determines how a group of internal and external constraints is related to the dependent variable. All of the factor groups are submitted to a logistic regression analysis and the results reveal which group

factors are predictive of the application value as well as the probabilistic weight of each of the factors within each factor group. A weight above .5 favors the application of the rule, while a weight below .5 disfavors it. The application value selected for the present analysis is the production of a trill-like variant, which we have defined as variants produced with two closures or more as observed in the acoustical analysis. In order to submit the data to the quantitative analysis with VARBRUL, we identified all trill cases in the speech samples and proceeded with the following coding protocol, which includes eleven factor groups. The first factor group is the dependent variable and integrates four different variants found in the speech samples. Factor groups 2 to 9 are linguistic independent variables, while factor groups 10 to 12 are sociolinguistic independent variables. A summary of the factor groups and each of their factors is presented in Table 1.

Factor groups	Factors	
1. Variants of the trill	trill - three or more occlusions trill - two occlusions approximant - one occlusion approximant - without occlusions	
2. Manner of the preceding segment	stop	vibrant
	affricate	high vowel
	fricative	mid vowel
	nasal	low vowel
	lateral	
3. Manner of the following segment	high vowel	
	mid vowel	
	low vowel	
4. Place of the preceding segment	bilabial	velar
	labiodental	glottal
	dental	front vowel
	alveolar	central vowel
	palatal	back vowel
5. Place of the following segment	front vowel	
	central vowel	
	back vowel	
6. Position within the word	word initial	
	word medial	
7. Stress	tonic	
	pre-tonic	
	post-tonic	
8. Number of syllables	1; 2-3; 4+	
9. Grammatical category	noun	verb
	adjective	pronoun
	adverb	conjunction
	preposition	
10. Age	14 – 29	
	30 – 45	
	61+	
11. Sex	male	
	female	
12. Socioeconomic class	upper	
	middle	
	lower	

Table 1. Factor groups included in the analysis of the trill.

4. Results

This section presents the findings of the statistical analysis. We begin by providing a description of the tendencies found in the data. First, the distribution of the variants of the trill is presented. Second, the results of the statistical analysis are described. Third, we discuss the results in order to interpret the sociolinguistic implications of our findings.

4.1. Distribution of variants

The present analysis is based on 2,369 tokens. The data show 36.2% production of standard variants, and 63.8% of innovative variants. This distribution of variants indicates a pattern of variation that seems to be consistent with the previous literature regarding other varieties of Spanish where non-standard variants are found. (Hammond 1999, Lewis 2004, Willis 2006, Bradley 2006, Colantoni 2006).

Figure 1 shows the distribution of the variants of /r/ in Caracas Spanish.

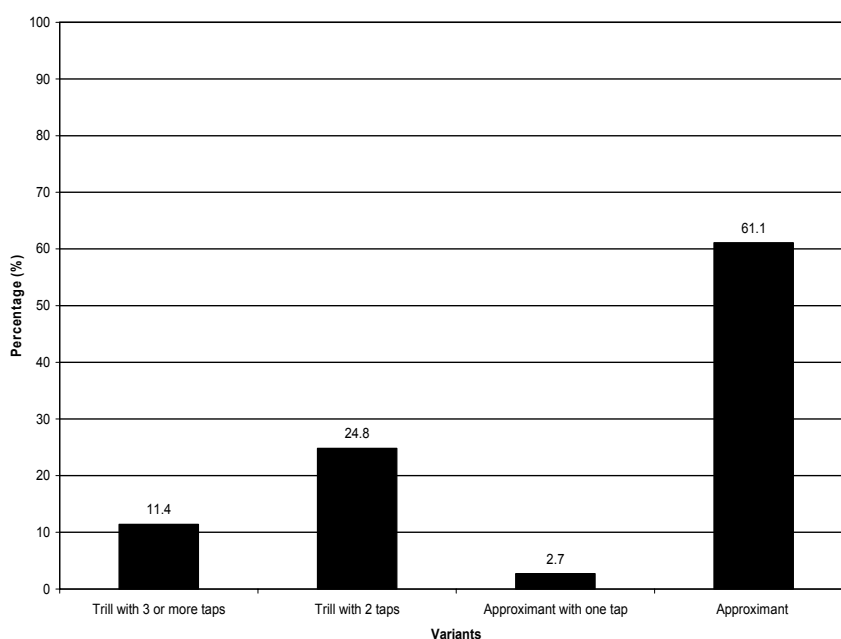


Figure 1. Distribution of variants of /r/ in the oral samples.

The sample analyzed shows a distribution in which 61.1% of the variants were classified as approximants produced without occlusions. It might be the case that changes in oral pressure such as the ones described by Solé (2002) facilitate non-trilled variants in the present speech samples. As presented below, the statistical analysis does not reveal an effect for phonetic context as defined in factor groups 2 to 5. In other words, the phonetic context does not predict trill variants in the speech samples analyzed. However, a closer examination using acoustic measurement could reveal patterns of coarticulation as the ones described by Recasens and Pallares (1999). They found effects from surrounding vowels in their data. Future studies could focus on the effect of the immediate phonetic context in the production of the trill to describe more specific patterns in the data. The next most common variant at 24.8% is the trill-like realization with two closures. Trill-like productions that fit the traditional description with three closures or more only reached 11.4% in our sample. Productions containing just one closure were uncommon at 2.7%. The kinds of variants produced by Caracas speakers reveals four types that range from what can be described as trill-like productions (two or more closures) to more innovative variants that can be categorized as approximants following Hualde's (2005) description of the Spanish trill.

4.2. Results of the statistical analysis

In this section, we present the results of the multivariate analysis carried out by means of a logistic regression analysis. As explained in the methodology Section, we have included in the model the following linguistic and extra-linguistic factors: 1) manner of the preceding segment, 2) manner of the following segment, 4) place of the preceding segment, 5) place of the following segment, 6) position within the word, 7) stress, 8) number of syllables, 9) grammatical category, 10) age, 11) sex, and 12) socioeconomic class. The 2,369 coded tokens were submitted to a binomial up and down analysis, which determines the factor groups affecting the dependent variable. For the present paper, the application value selected is trill-like production (variants with two or more closures). In order to perform the analysis, the four types of variants found had to be collapsed into a binary dependent variable. For this purpose, a division between trill-like variants (produced with two or more closures) and non-trill variants (one or no closures) was created.

The statistical model selected the following factors as relevant for explaining standard production of /r/: 1) Position within the word, 2) Number of syllables, 3) Grammatical category, 4) Age, 5) Gender, 6) Socioeconomic class. The rest of the factor groups included were not found to be significant for predicting trill production in our analysis.

Figure 2 presents the results for the factor group –position within the word–.

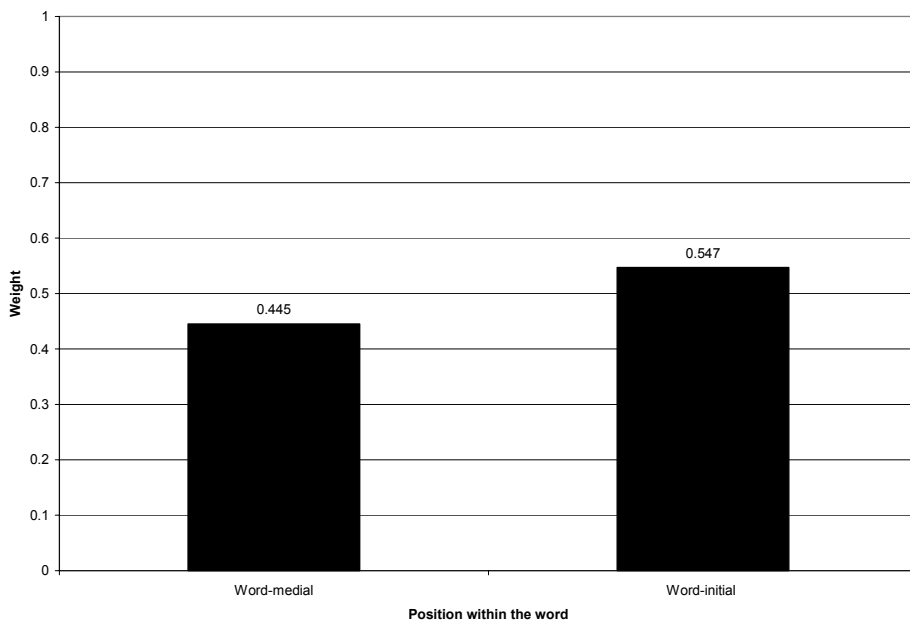


Figure 2. Use of trilled variants according to position within the word.

The results in Figure 2 reveal that trill-like productions (produced with two or more closures) are favored in word-initial position, whereas non-trilled production are more-likely to be found in word-medial position.

Figure 3 shows the results for the factor group –number of syllables–.

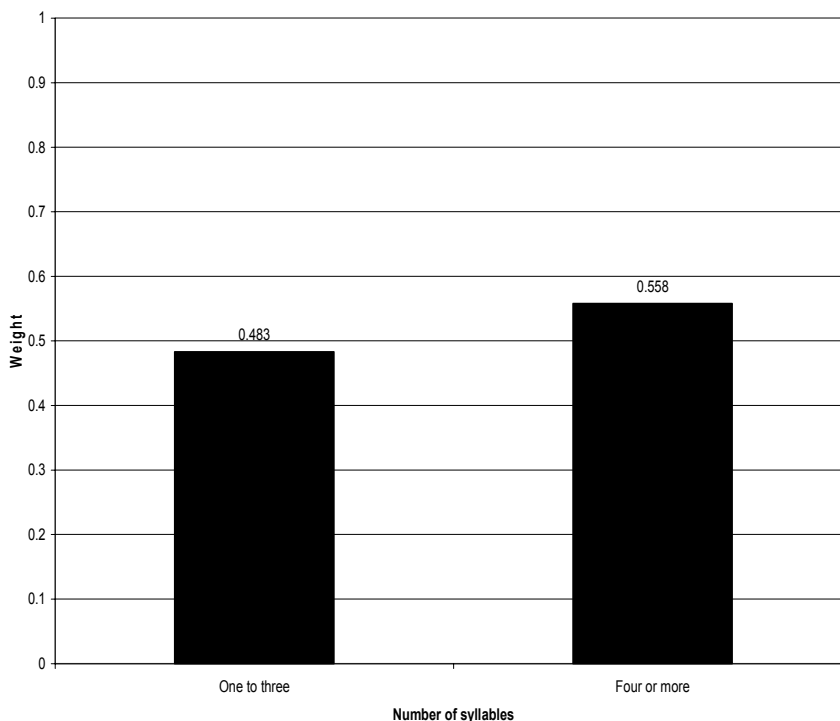


Figure 3. Use of trilled variants according to number of syllables.

Figure 3 shows that words containing four or more syllables favor trill-like productions, whereas one to three syllable-words disfavor such variants. In the discussion section, we will review these findings and provide a potential interpretation as well as directions for future research.

Figure 4 presents the results for the factor group –grammatical category–.

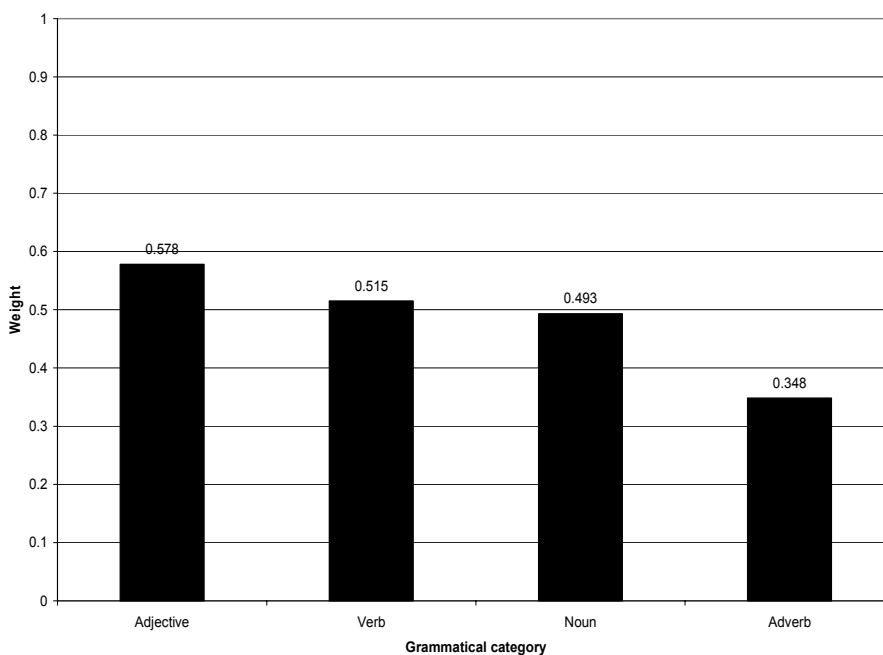


Figure 4. Use of trilled variants according to grammatical category.

These tendencies reveal that trill-like variants are more likely to be found in adjectives and verbs, while they are disfavored in nouns and adverbs. Since the trill does not have any morphemic status¹ this pattern of distribution might be related to patterns of usage that need to be explored in future research in order to corroborate our hypotheses.

Figure 5 shows the results according to the factor group –age-. As can be seen, older speakers tend to favor trill-like variants, while younger groups tend to favor the production of innovative variants. This is an interesting pattern of distribution that we will further comment in the discussion Section.

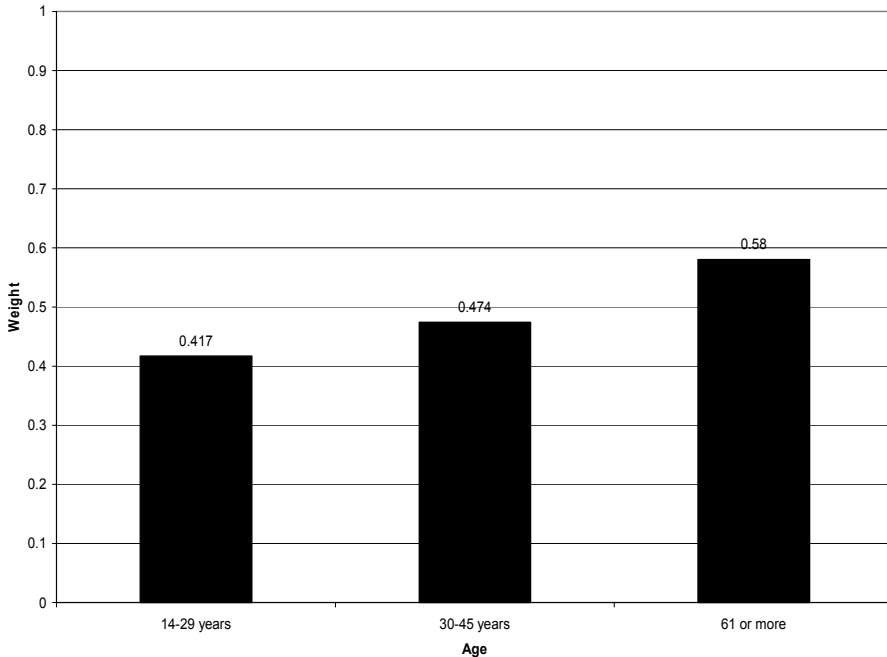


Figure 5. Use of trilled variants according to age.

Figure 6 shows the results for the factor group –sex-. The results presented in Figure 6 indicate that female speakers strongly favored the production of trill-like variants, while male speakers disfavored them. Females have a favoring weight of 0.885, while males have a disfavoring weight of 0.15.

¹ The term morphemic status is used to indicate that trills are not grammatical or derivational morphemes. For example, syllable-final taps in Spanish verbs mark the infinitive (e.g. *cantar* ‘to sing’). The tap in this case is a bound morpheme.

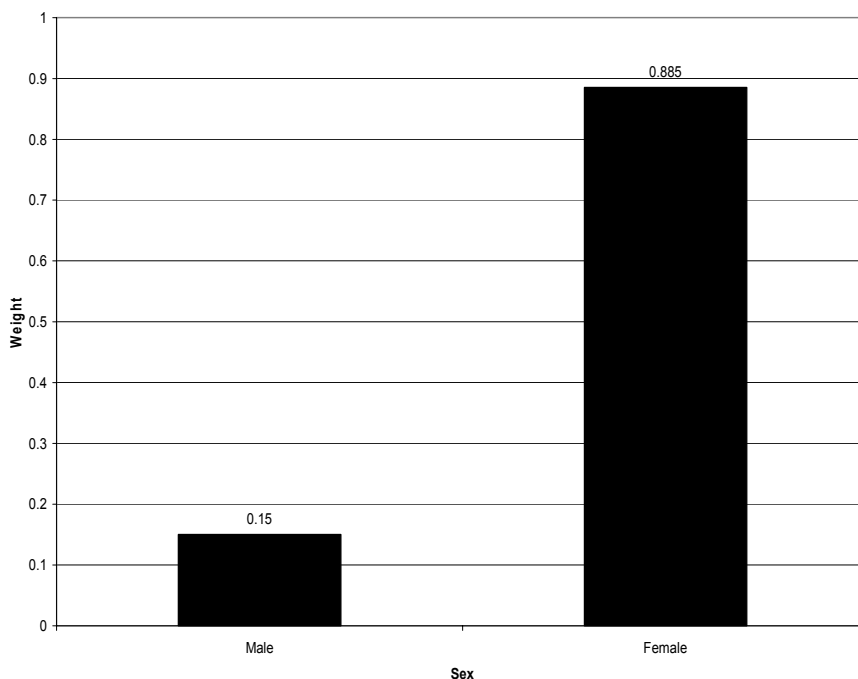


Figure 6. Use of trilled variants according to sex.

Figure 7 presents the results for the factor group –socioeconomic class–.

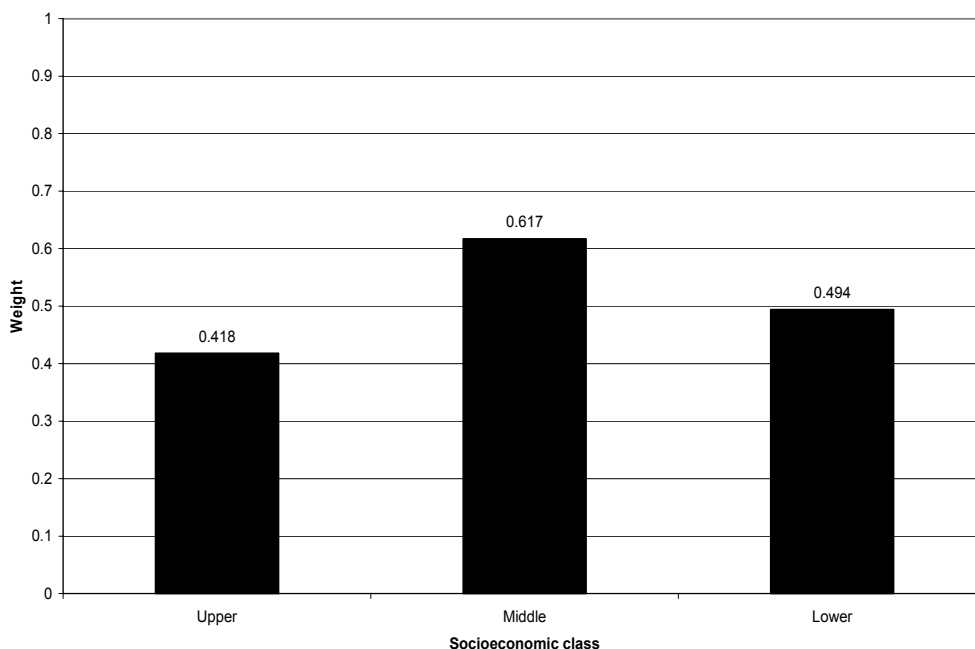


Figure 7. Use of trilled variants according to socioeconomic class.

Figure 7 shows that middle-class speakers favor the production of trill-like variants with a weight of .617. Lower and upper class speakers show probabilistic weights that disfavor trill-like variants. The fact that middle class individuals show conservative tendencies in our analysis deserves further exploration to determine the social status of innovative variants. In the following Section, we discuss all the tendencies found and presented above.

5. Discussion

The acoustic analysis of the data revealed that approximant variants are more common than the typical trill in Venezuelan Spanish. This is consistent with variation reported for other varieties of Spanish (Hammond 1999, Willis 2006, Bradley 2006, Colantoni 2006). Our analysis also reveals a pattern of socio-phonetic variation according to which certain groups in the speech community favor the production of some variants over others. Since this is the first time that a variationist analysis of this phenomenon is carried out in Venezuelan Spanish, future studies should include factors such as style and attitude questionnaires in order to determine whether speakers relate some sociolinguistic meaning with the usage of the different variants identified in our analysis. Aside from the sociolinguistic analysis, it is also important to further explore the acoustic analysis and include factors such as degree of periodicity not only to provide a more accurate description of the variants, but also to perform perceptual analysis to better understand if approximant variants are similar to the standard trill as proposed by Colantoni (2006).

Regarding the linguistic factor groups, the multivariate analysis reveals that position within the word, number of syllables, and grammatical category are selected by the statistical model. We want to suggest that these tendencies demonstrate a pattern of lexical diffusion. In other words, one way to explain the uneven distribution of variants across linguistic factor groups might be related to frequency and usage. Future research needs to investigate the data in terms of lexical frequency, context frequency, and recurrent patterns in order to determine if the findings can be explained in this fashion. The trill presents an interesting case since it seems the case that this might be a change in progress that might be spreading from frequent units to less frequent ones as described by exemplar modeling (see Bybee 2002, 2003, Diaz-Campos 2006). We have evidence that this might be the case since preliminary analysis revealed tendencies that indicate that innovative variants are more predominant in commonly used words in the corpus. In other words, further analysis could explore the role of lexical frequency in adjectives and verbs to determine whether the diffusion of the change is advancing from the more frequent to the less frequent tokens. According to the results regarding grammatical category, it could be expected that innovative variants are more likely to be found in frequent adjectives and verbs. However, since providing a usage-based analysis of the data is beyond of the scope of the present paper, we leave this issue for future research.

The main focus of this paper has been not only to provide a multivariate analysis of trill variation in Venezuelan Spanish, but also to explore the sociolinguistic implications found in the data. The three sociolinguistic variables included in our analysis were also found to be significant via the statistical analysis. We want to suggest that the results concerning extra-linguistic variables such as age might be revealing a change in progress since younger speakers favored innovative variants, while older speakers favored trill-like variants. We need to further explore the data in terms of style and attitudes in order to explain gender and socioeconomic class differences. We think this data would be crucial to understand why women and middle class speakers favored trill-like variants instead of assuming conservatism as a potential explanation. However, we might suggest that style and attitudes could potentially show that innovative variants do not show any negative value. This lack of consciousness concerning this pattern of variation might reveal a change from below the level of social awareness. We based this suggestion on the fact that the upper class group as well as the young generation actually favor innovative variants. A future study will have to pursue this issue.

6. Conclusions

The present paper reveals that same pattern of variation characteristic of other dialects is also present in Caracas Spanish. The most common variants in this dialect are the approximant with no occlusion and the trill with 2 closures.

We have also found that trill-production in this dialect is predicted by a combination of linguistic and extra-linguistic factors. Specifically, the multivariate analysis based on 2,369 tokens shows that the factors –position within the word, number of syllables, grammatical category, age, gender, socioeconomic class– have an effect on the production of trill-like variants. Regarding the pattern

found in the factor group –grammatical category– it might be an indication of the role of frequency and usage in the spreading of this change in this variety of Spanish. Further research needs to investigate the role of frequency in explaining the variable production of the trill in Caracas Spanish. If usage plays an important role in variable production of the trill, we would expect to find a pattern according to which more frequent lexical items show more innovative variants than less frequent ones. On the other hand, the extra-linguistic factors seem to reveal that the use of the trill variants is favored by certain societal groups. For instance, innovative variants are more likely to be found with younger speakers than older ones. This might be evidence to propose that trill variation is a change in progress. Further research is needed in order to provide a more accurate analysis of the patterns found. We need to include style as a factor and attitudinal questionnaires to determine whether speakers assigned sociolinguistic value to trill variants.

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