REGIONAL VARIATION, ARTICULATION RATE, AND PAUSING PATTERNS IN THREE VARIETIES OF SPANISH

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ABSTRACT

This study investigates regional differences in articulation rate and pausing patterns among speakers of three regional varieties of Spanish. We elicited speech data from talkers of two varieties of European Spanish (North-Central Peninsular Spanish and Andalusian Spanish) and one variety of Latin American Spanish (Porteño Spanish). The European groups produced faster articulation rates than the Porteño group; male speakers also spoke faster than female speakers. Regarding pauses, the NCPS speakers produced shorter silent pauses than the Andalusian and Porteño speakers, while both European groups produced shorter filled pauses (e.g, *eh*, *em*) than the Porteño speakers. We additionally found an effect of speaking condition, with all groups demonstrating higher silent-pause rates in sociolinguistic interviews than in a reading passage. Taken together, the findings contribute to a literature demonstrating that regional varieties of Spanish robustly exhibit different patterns of elocution rate and pausing.

Keywords: Articulation rate, silent pauses, filled pauses, Spanish, regional variation

1. INTRODUCTION

Sociophonetic research documents the diverse ways in which temporal measures in a language can be modulated by regional origin, including cross-dialectal comparisons of articulation rate (AR), pausing rate, and pause duration [1-7]. In American English, for instance, southern speakers talk slower and produce longer and more frequent pauses than northern speakers [1, 4], which confirms the social stereotype about a southern "drawl." With respect to French, Schwab and Avanzi [3] show that Swiss-French speakers articulate speech at a slower rate than Belgian- and Parisian-French speakers. The findings of Verhoeven et al. [5] reveal that Dutch speakers from the Netherlands talk 16% faster than those from Belgium. Leeman's [6] analysis of crowdsourced data from nearly 3,000 speakers reveals a west-east divide in Swiss German, with eastern speakers having faster ARs.

In addition to regional origin, social factors such as age, sex, speaking style, and possibly the urban or rural origin of speakers, can significantly influence temporal measures of speech [7]. Many studies converge in showing that men speak more quickly than women [8, 9], as do younger speakers compared to older speakers [10, 11]. Previous work reports inconsistent results with regards to comparative speech rate between free conversation and prepared reading tasks [1, 12].

Pellegrino et al.'s [13] cross-language comparison shows that speakers of Spanish produce the highest number of syllables/second among the Romance languages, and that Spanish is one of the fastest of the world's languages. In addition to speech rate, the authors report that "information rate," which is calculated using speaking rate and information density (e.g., average bits per second of information), is stable across languages. However, in Pellegrino et al. a single regional variety of Spanish was included, and it remains uncertain whether Spanish can be considered a monolith with respect to temporal measures of speech. The findings from Dutch, English, French, and German motivate the need for new research ascertaining whether cross-dialectal variation is present among Spanish speakers' elocution and pausing patterns.

The body of work on speech rate and pausing differences across Spanish dialects is limited, although highly proficient speakers of the language tend to perceive European Spanish as spoken faster than most Latin American varieties [14]. This social stereotype is reflected in recent studies led by Schwab [15] and Santiago and Mairano [16]. The former demonstrated that speakers from Spain articulate speech at a rate 5% faster than those from Costa Rica, while the latter found Spaniards to articulate speech at a rate 9% faster than Mexicans. The results for pauses were less consistent between the two studies: [15] showed that Latin American speakers produce longer pauses than European speakers, while [16] did not find an effect of regional origin on pause usage.

The present study builds upon the previous findings by comparing three varieties of Spanish. We explore whether differences exist among two regional varieties of European Spanish and Porteño Spanish. The research question driving our analysis

is the following: How do extralinguistic variables such as dialect, speaker sex, and task affect rates of articulation and pausing in Spanish?

2. METHODS

2.1. Participants and recording protocol

We recorded speech data from 30 speakers, aged 18 to 25: ten each of North-Central Peninsular Spanish (NCPS), Andalusian Spanish, and Porteño Spanish. The speakers were university students born and raised in Salamanca (Spain), Jerez de la Frontera (Spain), or Buenos Aires (Argentina), respectively. Each group included five female and five male speakers (self-identified). All speakers read aloud the same two-paragraph passage and participated in a twenty-minute sociolinguistic interview with an experimenter, who in each case was a native speaker of the regional variety. All recordings were conducted in the participants' home cities.

2.2. Analysis

The speech from the first ten minutes of each sociolinguistic interview was first orthographically transcribed. We then performed acoustic labelling in Praat [17] which included: measuring the speaking time of all inter-pausal units (i.e., speaking time without pauses); measuring the duration of all silent pauses (SPs), defined as periods of silence longer than 100 milliseconds (ms); and measuring the duration of all filled pauses (FPs), such as *em*, *eh*, or *mm*. This labeling protocol resulted in 4,831 SPs and 768 FPs across all speakers and tasks.

We calculated five measures of speech tempo: ARTICULATION RATE (AR), FP RATE, SP RATE, MEAN FP DURATION, and MEAN SP DURATION. AR was calculated by dividing the total number of syllables produced in all inter-pausal intervals by the total speaking time of the inter-pausal units; AR thus excludes the production of FPs and hesitations. To enable comparisons with previous studies of Spanish regional variation [15-16], we counted the number of expected (or canonical) phonemes in the AR calculation. The one exception was that the word *para* "for" was considered monosyllabic for the Andalusian speakers but bisyllabic for the NCPS and Porteño speakers. We additionally calculated each speaker's mean FP and SP durations (in ms), as well as each speaker's FP RATE and SP RATE. For the last two measures, we divided the number of pauses by their total speaking time within the ten analyzed minutes.

We fitted linear mixed-effects models to the five outcomes using the *lmerTest* package [18] within the statistical software R [19], with the predictors DIALECT, SEX, TASK, and the interactions among them. We followed the top-down stepwise approach in the model-fitting procedure, meaning that we only report main effects if higher-order interactions are not significant [20]. All models included random intercept effects for SPEAKER; although we originally included by-SPEAKER random slopes for TASK, these were removed due to lack of model convergence. To facilitate model-based inference regarding the fixed effects, we computed marginal predicted means based on the fitted models using the R package *ggeffects* [21].

3. RESULTS

For the outcome AR, we uncovered significant effects of both DIALECT ($F(2,144) = 5.808$, $p = .004$) and SEX ($F(1, 144) = 16.500$, $p < .001$). Per Figure 1, we see that the Andalusian speakers produced the highest mean AR value, and that both European groups were faster than the Porteño speakers. Figure 2 shows that male speakers (7.0 syll/sec) additionally spoke faster than female speakers (6.6 syll/sec). Next, we uncovered a significant effect of TASK on SP RATE ($F(1,146) = 44.224$, $p < .001$), plotted in Figure 3. The participants produced more SPs in the sociolinguistic interview (22.4 SPs/min) than in the reading task (17.5 SPs/min). For FP RATE, however, none of the tested effects were significant (no figure is shown).

Turning to MEAN SP DURATION (Figure 4), DIALECT was a significant predictor ($F(2,144) = 8.904$, $p < .001$): the Andalusian and Porteño groups produced the longest SPs on average (559 ms and 562 ms), while the NCPS speakers produced statistically shorter SPs (500 ms). Regarding MEAN FP DURATION, the predictor DIALECT was again significant ($F(2,27) = 9.818$, $p < .001$). Per Figure 5, the Porteño speakers produced the longest FPs on average (472 ms), while the NCPS and Andalusian speakers produced shorter FPs (359 ms and 335 ms, respectively).

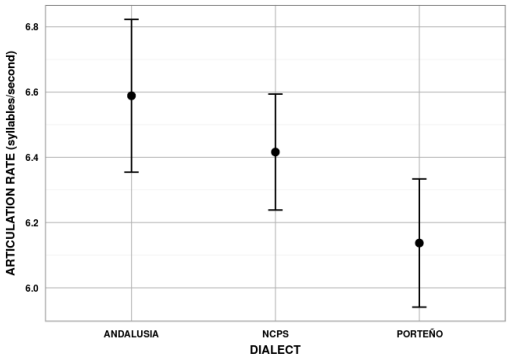

Figure 1: Effect of DIALECT on ARTICULATION RATE.

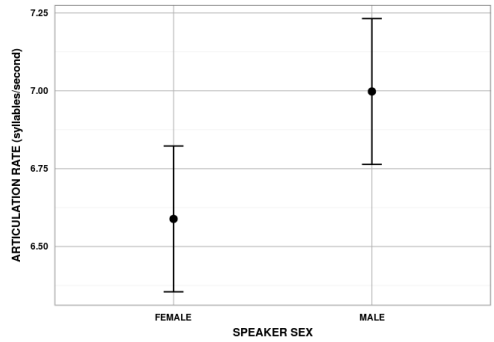

Figure 2: Effect of SEX on ARTICULATION RATE.

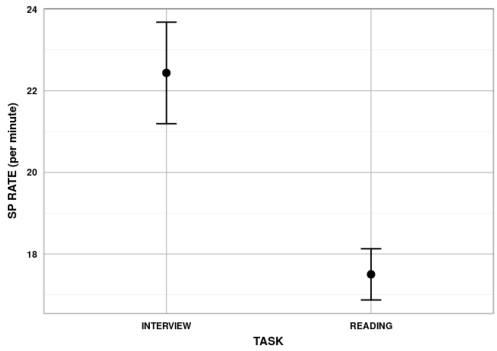

Figure 3: Effect of TASK on SP RATE.

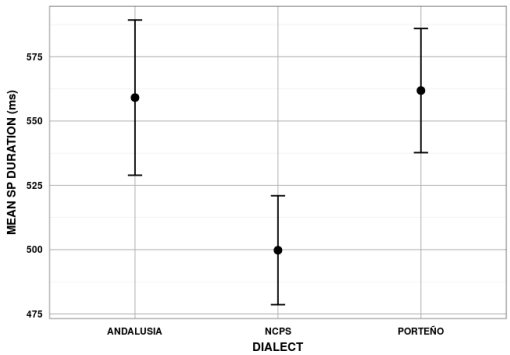

Figure 4: Effect of DIALECT on MEAN SP DURATION.

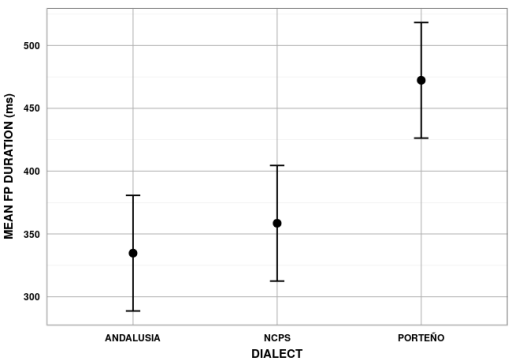

Figure 5: Effect of DIALECT on MEAN FP DURATION.

4. DISCUSSION

In response to our main research question, we found dialect, speaker sex, and task to predict elocution and pausing values in Spanish, with a speaker's dialect being the most common significant predictor. Specifically, we found that the speakers from the two European varieties produced speech using faster ARs than the Latin American speakers from Buenos Aires. Regarding the participants' pausing patterns, the NCPS speakers produced shorter SPs than both the Andalusian and Porteño speakers. The Porteño speakers additionally produced longer FPs than the two European groups (who did not differ from each other in a substantial way). The emergent finding is that the Porteño participants spoke at the slowest rate and produced the longest pauses among the three dialect groups.

These findings underscore the need to evaluate regional varieties of Spanish as separate rather than condensed into a single language (cf. 13]). Similar to Santiago and Mairano [16], while we generally confirmed the social stereotype that speakers of European Spanish have fast elocution rates, we would caution against considering Porteño Spanish as a proxy for all varieties spoken in Latin America. For example, there is a pervasive stereotype that Chilean talkers speak very quickly in comparison to other Latin American varieties [22]. However, Chilean Spanish remains under-investigated in the relevant sociophonetic literature.

It is noteworthy that the Andalusian speakers produced the fastest AR among the three groups, and it is therefore important to consider the role that local processes might play in affecting global measures of speech rate. For American English, the study by Clopper and Smiljanic [1] considered how processes of consonantal reduction contribute to the attested regional differences. For example, New England talkers deleted coda /t/ (e.g., *whi<u>t</u>e ligh<u>t</u>*) and simplified fricative-stop clusters (e.g, *lo<u>st</u>*) more commonly than talkers from other regions. Andalusian Spanish is known to lenite syllable-final /s l θ ɾ/; the deletion of such consonants in phrase-final position likely contributes to the speakers' comparably faster AR as observed in our study. Importantly, studies also demonstrate that Andalusian speakers employ compensatory-lengthening strategies upon leniting consonants in the phrase-medial position, such as post-aspirating phonological /sp st sk/ sequences (e.g., [t^h]) and geminating /ɾl ɾn/ (e.g., [ll nn]) [28]. Such compensatory lengthening strategies allow for more overt speech being produced, which may explain why the Andalusians' AR values remained close to those of the NCPS speakers.

Relatedly, the present findings prompt inquiry into why the Porteño speakers produced the slowest means for AR and the longest pause duration values. Although our study was not intended to directly answer this question — our metrics are global and do not consider the impact of local phonetic processes — [25] and [26] propose that phrase-final lengthening is present in Porteño Spanish, which leads to speakers producing long durations of vowels in the phrase-final position and, presumably, overall slower speech rates. In addition to this, Coats [4] has suggested that elocution differences in a language may reflect historical legacies of language contact. Specific to Porteño Spanish, studies have argued that contemporary prosodic patterns may result from the situation of intense language contact that arose in Argentina between immigrant languages and Spanish at the start of the twentieth century [26]. It is hence possible that the overall slower speech produced by Porteño speakers, which is attributable in part to phrase-final lengthening, was conventionalized during a period of language contact among immigrant communities in Argentina. However, additional work would be necessary to examine this hypothesis.

The findings also revealed new data with respect to cross-dialectal pausing variation. The NCPS speakers produced SPs that were on average 12% shorter than the Andalusian and Porteño speakers. More remarkably, perhaps, the Porteño speakers produced FPs that were between 30% and 35% longer than those of the European Spanish speakers. While Santiago and Mairano [16] did not find a significant effect of DIALECT on pause durations in their comparison between Spaniards and Mexicans, Schwab [15] showed that Costa Rican speakers produce longer SPs than Spaniards. To our knowledge, social stereotypes of regional variation in Spanish do not typically reference pausing patterns as they do in other languages [e.g., 1]. It is thus unclear whether listeners of Spanish are attuned to differences in FP durations along the lines of the data presented here. Note that Quené [27] showed that listeners' threshold for reliably detecting elocution differences is 10%.

This study's main effect of SEX on the speakers' AR values corroborates previous research showing that male speakers produce speech with faster elocution than female speakers [2-3, 6; cf. 1]. Here, the male speakers' mean AR values were 6% faster than those of the female speakers, which mirrors the findings of Verhoeven et al. [5]. Santiago and Mairano [16] argue that such differences are likely not attributable to physical or anatomical factors and are more likely to be rooted in sociolinguistic sources, such as the notion that female speakers are generally more careful talkers than male speakers [23]. This hyper-articulation by female speakers may result in overall slower speech.

This study found an effect of TASK on SP RATE, with speakers tending to produce more SPs in the interview than in the reading task. Combined with the Spanish-speaking participants from [16] producing longer pauses in semi-directed interviews than in a reading passage task, we suggest that speakers' tendencies to produce more and longer pauses in conversational settings may be due to the pragmatic or social functions held by pauses, such as turn-taking or floor-holding [24]. Regarding the lack of effect of TASK on AR observed here, it bears noting that some studies have reported faster AR in free conversation than in read speech [2, 3], while others report the inverse pattern [16]. Santiago and Mairano [16] suggest that these contradicting findings may be due to the use of nonstandardized elicitation methods across studies.

Finally, future research may address limitations of this study by: (i) recruiting a higher number of participants to ensure replicability; (ii) including additional varieties of Latin American Spanish, such as Chilean Spanish; and (iii) taking into account possible linguistic predictors, such as length of utterance and the AR of a preceding utterance, on elocution and pausing metrics [3].

5. CONCLUSION

The present results demonstrated cross-dialect variation with respect to AR and pausing in Spanish, consistent with those of studies from other languages [1-6]. The Andalusian dialect was characterized by the fastest AR, long SPs, and short FPs. The NCPS speakers produced AR values intermediate to the other groups, but notably produced shorter SPs than the Andalusian speakers. The Porteño participants had the overall slowest AR, as well as the highest predicted means for SP and FP duration. While the results for AR are generally consistent with social stereotypes about European Spanish speakers talking faster than Latin American speakers [24], this study revealed novel findings with respect to pausing patterns.

Additional variables such as speaker sex and task were significant in the models: male speakers produced faster AR, and all groups showed higher values for SP rate in the sociolinguistic interview than in the reading passage. Finally, future work would do well to investigate the linguistic sources of the regional differences reported here (e.g., coda-weakening processes in Andalusian Spanish, phrase-final lengthening in Porteño Spanish).

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