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1 Introduction

Over the past several decades, interest in second language acquisition (SLA) has steadily increased, in part due to a new wave of immigration that has reshaped the linguistic landscape of many parts of the United States. The demographic and resulting linguistic changes have provided a very clear research exigency. At the same time, an array of linguistic subfields have begun to recognize the importance of SLA in the overall description of language, allowing for new models of language acquisition as well as a cross-fertilization of theoretical perspectives and research methodologies. Few of these linguistic subfields have contributed to our understanding of second language acquisition more than variationist sociolinguistics. SLA studies born in the variationist tradition have shown that interlanguage varieties are worthy of study by demonstrating time and again that L2 variation is not the result of imperfect, flawed, or incomplete language learning, but rather that L2 variation, like variation in L1, is governed by system-internal constraints as well as by external social ones (Tarone 1985).

Wolfram's (1985) seminal study of Vietnamese English showed that systematic past-tense unmarking was regulated by a complex system of internal constraints including phonological context and verb regularity. These findings set the stage for other important studies on interlanguage variation, such as Tarone (1985), Young (1991) and Bayley (1994), among others. Despite these advances in the examination of interlanguage variation, however, the overwhelming majority of studies has focused on the adaptation of morphosyntactic and phonological segmental structures. Accordingly, work on the acquisition and variation of suprasegmental features has been vastly underrepresented in the SLA literature.

This study addresses this understudied area by examining the acquisition and variation of rhythm in the speech of young, native Spanish-speaking immigrants living in an exclusively Hispanic community in the city of Raleigh, North Carolina. Unlike the Southwest, where stable Spanish-speaking

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communities have existed for nearly four centuries, states in the Mid-Atlantic South have only recently witnessed the development of core Hispanic communities. In the past decade, North Carolina experienced a higher percentage of growth in its Hispanic population than any other state, and currently has the largest percentage of monolingual Spanish speakers of any state in the U.S.

North Carolina's changing linguistic situation provides a unique opportunity to examine an array of interlanguage features, including prosody, as literally thousands of native Spanish-speakers approach the English language for the first time. This situation raises a number of important research questions for sociolinguists working with second language acquisition data. First, since morphosyntactic features are typically thought to be more salient markers of identity and vernacularity, where do less salient prosodic features such as speech rhythm fall on the acquisitional hierarchy? Must L2 English speakers approach native-like phonology before acquisition of prosody is possible, or can the two be acquired concurrently? Is the acquisition of higher-order phonetic features even important to L2 speakers given the overwhelming number of obstacles in the acquisition of standard English phonology and morphosyntax? And finally, is rhythm a variable phenomenon like so many of the features found in interlanguage or second language varieties? In other words, might a speaker sound very syllable-timed in some contexts, and very stress-timed in others, or is rhythm more of an immutable trait that is more impervious to variation?

2 Rhythm

Early studies on rhythm, particularly Pike (1945) and Abercrombie (1967), stressed a strict dichotomy between languages that were considered stress-timed, which included Germanic and Slavic languages and those considered syllable-timed, which included the Romance languages. Syllable-timed languages were reported to have syllables of nearly equal duration that occurred at regular intervals, while stress-timed languages exhibited a wider range of syllable durations, with syllables recurring at irregular intervals.

Since the 1980s, more rigorous analyses of speech rhythm have revealed that a continuum model more accurately represents the rhythmic production of the world's languages than the earlier dichotomous model. In the continuum model, stress- and syllable-timed languages are situated at opposite poles, thus allowing for infinite gradation of rhythm across linguistic systems. This model seems to be more adequate in accounting for the so called "intermediate languages" (Ramus, Nespov and Mehler 1999) such as Catalan and Polish. These languages may exhibit syllable structures characteristic of

either stress- or syllable- timed languages, but may also display segmental phenomena such as vowel reduction which are typically associated with either one rhythmic variety or the other. Additional contributions to our understanding of the gradient nature of rhythm come from Borzone de Manrique and Signorini (1983) who found unequal syllable duration in Spanish despite its more syllable-timed characteristics. We should also consider Dasher and Bolinger (1982), who showed that features of segmental phonology, such as consonant-vowel distribution, lexical stress, and syllable reduction also contribute to rhythm production. In sum, comparative work on rhythm from the past two decades has shown that speech rhythm is best conceived of as being "more or less" syllable-timed or "more or less" stress timed instead of being taxonomized into a simple binary distinction.

3 Methodology

In addition to a lack of understanding of the nature of prosodic features in general, researchers may also have shied away from considering rhythm in studies of SLA because of the absence of standard, widely used methodologies. This is certainly the case for rhythm, where a workable, straightforward methodology has been elusive until very recently. Despite the challenges in quantifying rhythm, Low and Grabe (1995) introduced the Pairwise Variability Index (PVI) that compares pairs of adjacent syllables while controlling for speaking rate. The PVI formula used in this study is found in Fig. 1.

$$\text{PVI} = \frac{\frac{|\text{abs syllableA} - \text{syllableB}|}{\text{syllableA} + \text{syllableB}}}{2} \quad \frac{\text{absolute value of adjacent syllables}}{\text{average of adjacent syllables}}$$

Figure 1: PVI Equation

The result of the application of PVI is an index of scores that indicate the degree of syllable or stress timing found in examined varieties. High scores indicate more stress-timed rhythm while lower scores indicate more syllable-timed rhythm.

Since its introduction in 1995, a number of studies have used PVI to elucidate cross-linguistic and cross-dialectal differences. For instance, Gut (2001) used PVI to examine differences among West African languages, Low and Grabe (2001) used it to explore rhythm differences between Singapore English and Standard British English, and Fought and Fought (2003) used it in their study of California Chicano English. Thomas and Carter (2003a, b) used the PVI formula to illuminate differences between Southern European American and African American speech and are currently using

the formula to trace changes in rhythm throughout the development of African American English (AAE).

For the current study, data were collected from both Spanish monolinguals as well as Spanish-English bilinguals. As a baseline for comparison, these data are compared to the corpus of native English-speaking North Carolinians provided by Thomas and Carter (2003). All of the participants in this study reside in the same exclusively Hispanic neighborhood in the capital city of Raleigh, North Carolina, the location of which can be found in Figure 2. This community is unique because, although located in a metropolitan area, it is relatively insular in that community members interact socially and recreationally primarily with other community members. Contact occurs with extra-community members primarily via institutional affiliations such as work or school.

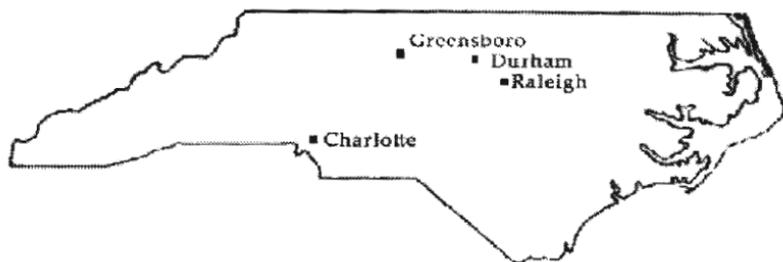


Figure 2: Location of Raleigh, NC

Correspondingly, a clear ethnolinguistic boundary demarcates this community from the surrounding, mostly European-American, English-speaking community. Field recordings were used to collect data obtained from sociolinguistic interviews which lasted from 60 to 90 minutes. One-on-one interviews were conducted in English, Spanish, or both, though code-switched data were not analyzed for this study. A demographic profile of the speakers considered in the study can be found in Table 1.

Speaker	Age	Sex	Length of Res.	Lang. Status
AG	11	female	3.5 years	bilingual
MB	11	male	8 years	bilingual
LB	15	female	8 years	bilingual
CB	19	male	8 years	bilingual
BG	18	female	3 months	monolingual
FG	18	female	3 months	monolingual
JV	27	male	6 years	monolingual
CA	30	female	4 years	monolingual

Table 1: Demographic Profile of Speaker Sample

Following Low and Grabe (1995) as well as the Thomas and Carter (2003) work, this study adapts the PVI methodology for use in this description of Hispanic English. Field recordings from the Raleigh sample were digitized and spectrograms were analyzed using PRAAT phonetics software. Duration measurements were taken at the onset and offset of the vocalic nucleus of the syllable. For each speaker, over 200 syllable-to-syllable comparisons were made in each language, yielding over 2,500 measurements for this study.

For the English data, all cases of the canonical diphthongs /ai/, /oi/, and /aw/ were considered as one measurement and for ease of measurement, adjacent /r/ and /l/ were measured with the syllabic nucleus. For the Spanish data, all 14 diphthong combinations were considered as one measurement, except when split in lexical items where an orthographic accent would be needed. The issue of the *sinalefa*, or the natural combination of vowels across word boundaries, for the Spanish data was addressed on a case-by-case basis. Where clear diphthongization occurred across word boundaries, one measurement was taken, but when spectral cues indicated separate monophthongs, two measurements were taken. In cases of syllable deletion as in *mija* for *mi hija* and *lamburguesa* for *la hamburguesa*, the chain of comparison was not broken and no zero value was assigned in the PVI tabulation. For both languages, the pre-pausal syllable was omitted from analysis because of the effects of pre-pausal lengthening. When the pre-pausal syllable was unstressed, the entire syllabic foot was omitted.

4 Results

Figure 3 provides a scatter plot of the PVI results by birth year for each individual from the respective groups considered in this study including Spanish monolingual, Spanish bilingual, and English bilingual, as well as native English speaking African American and European American North Carolinians. Keep in mind that each point represents a speaker and that higher PVI scores indicate more stress-timing, while lower scores indicate more syllable-timing. The points labeled “Spanish” in this plot include both the bilinguals and the monolinguals, all of whom are originally from Mexico City. As is clear from the scatter plot, the mean PVI scores for the Hispanic English speakers and Spanish speakers fall well below those for the native English speaking North Carolinians, indicating some difference in rhythmic production among the different varieties. Clearly, the English rhythm for the native Spanish speakers is more syllable timed than the English rhythm for the native English speakers. Figure 4 provides the mean PVI group scores for each of the groups, including the benchmark African American and European American North Carolinians. The raw scores are presented in Table 2.

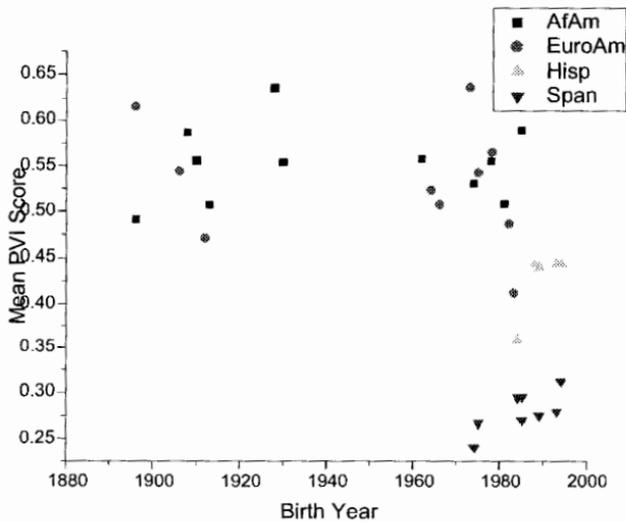


Figure 3: Mean PVI results for all speakers

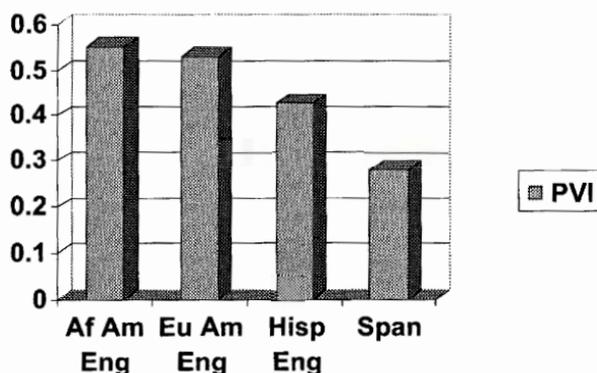


Figure 4: Mean PVI group scores

	Af Amer	Euro Amer	Hispanic (Eng)	All Spanish
Group PVI	.5515	.5304	.4264	.2798

Table 2: Mean Group Scores

Although the group scores are instructive, attention should also be given to the individual speakers examined in the study thus far. Figure 5 provides the mean PVI scores in each language for each of the four bilinguals considered in the study thus far. The raw scores, total number of comparisons, and the standard deviations are found in Table 3. Though the sample size is relatively small, some instructive points about the acquisition of rhythm can be made. First, we see that each of the speakers has different rhythmic productions for each of his/her two languages, though to somewhat varying degrees. Second, there is much more uniformity across the English set than across the Spanish set. For example, AG, MB, and LB have nearly identical PVI scores in English but exhibit more variation in their Spanish productions.

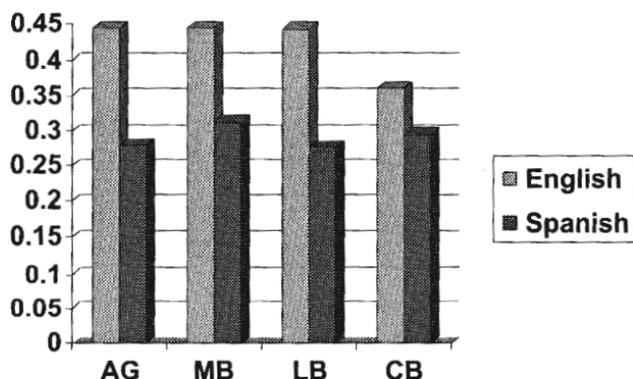


Figure 5: Mean PVI scores for individual bilinguals

Speaker	N= (Eng)	PVI (Eng)	Std.Dev. (Eng)	N= (Span)	PVI (Span)	Std. Dev. (Span)
AG	213	.4447	.3262	201	.2797	.2348
MB	236	.4440	.3415	205	.3127	.2601
LB	226	.4438	.3163	206	.2762	.2477
CB	216	.3596	.2533	238	.2953	.2422

Table 3: Statistical information for bilingual speakers

5 Targets of Acquisition

These results raise the question of the target in the acquisition of English rhythm. A couple of possibilities are represented graphically in Figures 6 and 7. The mean PVI scores are provided beneath each group label. Figure six shows a community-based target where the emerging Hispanic English dialect is the basis for acquisition. This possibility seems to be evidenced by MB, an eleven-year old male who has lived in the community for 8 years. Of all the speakers, it seems he would have had the most opportunity to acquire native-like English prosody because of his relatively long length of residency and early age of arrival, but his PVI score is in line with that of LB, his older sister who received more schooling in Mexico, and with the score of AG, who moved to the community just three years ago.

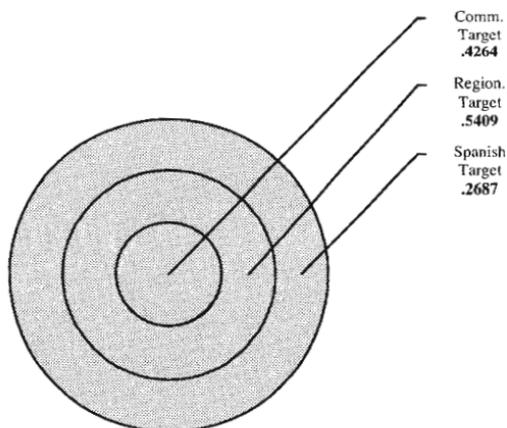


Figure 6: Community-Based Target

Figure 7 shows a regionally-based target, where the rhythm of native English-speaking North Carolinians is the basis for acquisition. For this target, L2 speakers attempt the stress-timing heard at school, on the job, and in the ESL classroom but barely miss the target because of the typological dissimilarity between the rhythm of Spanish and the rhythm of English. In other words, the rhythmic differences between Spanish and English are too great for L2 English speakers to immediately overcome. Though some studies, such as Wolfram (1985), speculate that typological similarity is not the most important factor for interlanguage patterning for morphosyntax, it seems more than likely that typological similarity between the source and target codes is important for the acquisition of prosody.

Both the community-based target and the regional target align with the findings of Wolfram, Carter and Moriello (2004) who examined the /ai/ diphthong as produced by speakers from the same Raleigh community as well as Siler City, a more rural community. We found no wholesale accommodation to the local vernacular unglided variant of /ai/ in either community, indicating more alignment with a standard classroom or supra-regional variety than a regional variant. The Raleigh community, in particular, was quite uniform in its production of the fully glided variant and we concluded that the speech community was probably too incipient to participate in the unglided norm. At the same time, we also concluded that both communities

were in the early stages of developing their own sociolinguistic identities. In this regard, it is possible that intra-community norms are already emerging in the Raleigh Hispanic community. In other words, the uniformity of English rhythm production across the Raleigh sample could be explained by either target. In one scenario, community cohorts are modelling each other and rhythmic patterning emerges from within the community. In the other scenario, speakers model the classroom variety and rhythmic patterning emerges from outside the community. Still, we should not discount the possibility of multiple targets, as represented graphically in Figure 8. As individual L2 English speakers secure their own sociolinguistic identities, they may make use of multiple norms; for instance, one for L1 use, one for in-group use, etc. In this case, rhythm can be seen as a sociolinguistic interlanguage variable. Further investigation is needed to determine which target is most salient to L2 English speakers in their acquisition of rhythm.

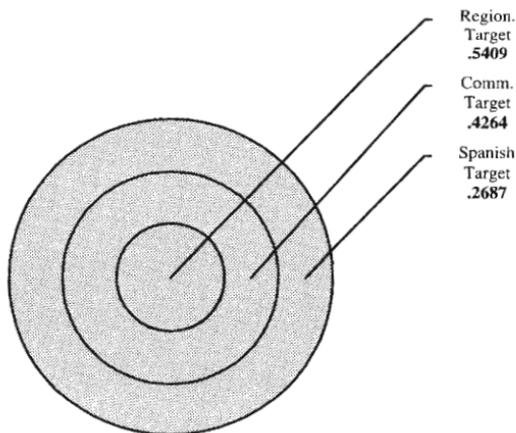


Figure 7: Regionally-Based Target

Finally, we should consider the possibility that some speakers may align with different norms as a stylistic device or one connected to identity. For instance, consider CB, the 18 year-old brother of MB and LB whose data were included earlier in Table 3. CB's Spanish production is in line with the other bilinguals, but his English production is much lower. Of all the bilinguals, CB received the greatest part of his compulsory education in Mexico

and because of intra- and inter-ethnic conflict at his North Carolina high school, dropped out at the age of 16. In the past two years, he has worked alongside other Hispanics in construction, and though his peer group is exclusively Hispanic and is characterized by frequent code switching to English, the dominant language is Spanish. It is impossible to say at this point if the more marked pattern is the result of not mastering the English pattern even at the level of his community cohorts, or if the marked pattern is an assertion of his Hispanic identity. Syllable-timed rhythm has been a part of caricatures of Hispanic English in the mainstream media, so some speakers, particularly older teenagers like CB, may be sensitive to its use.

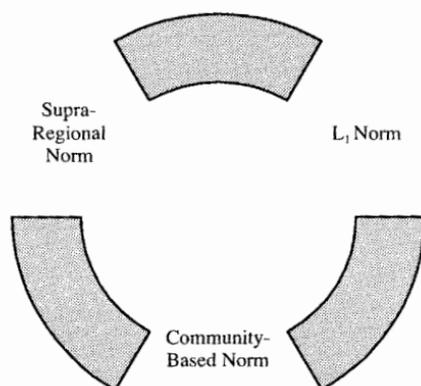


Figure 8: Multiple Targets

6 Conclusions

Although this study is still preliminary, several points about the acquisition and variation of rhythm production by L2 English speakers are emerging. First, it seems as though the acquisition of morphosyntax and phonology supersedes the acquisition of prosody. While most of the speakers have relative classroom mastery of English grammar and phonology, their rhythm production is still quite marked. This markedness is indicated not only through the instrumental techniques used in this study, but also by impressionistic accounts. Explanations of why speakers may maintain marked prosodic features in the face of widespread accommodation to target morpho-

syntax and phonological norms are quite varied. Perhaps English learners don't learn stylistic variation at the prosodic level because acquiring the formal structures of the language is already challenging enough. Moreover, competing models may be at work as an individual speaker may acquire prosody through the constant rejection and acceptance of competing norms.

Additionally, more work is needed in order to explore how multiple targets for a array of linguistic features are used. For instance, might an individual L2 speaker engage a community-based target for the acquisition of morphosyntax while at the same time rely on a supra-regional target for the acquisition of prosody? Finally, further research is needed to determine if rhythm as well as other second language prosodic features will undergo a process of nativization for subsequent generations. If so, will these features follow the generational patterning found for segmental structures in other immigrant communities, or conversely, should we expect to find assimilation at the prosodic level for communities undergoing language shift? Longitudinal studies will be needed to determine the impact of this current interlanguage variety on future generations of Hispanics, especially on those born in the US.

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