**Perception of Latino Varieties of English:**

**Auditory Semantic Priming**

**Introduction**

*Theoretical Background*. It’s commonly thought that accented speech is harder to understand than standard speech. In line with this belief, previous work on foreign accented speech has concluded that native English listeners’ lower scores on explicit comprehensibility ratings, intelligibility ratings, and vowel and word identification tasks (Lane, 1963; Munro & Derwing, 1995a; Van Wijngaarden, 2001) as well as increased sentence processing time (Munro & Derwing, 1995b) results from processing difficulty associated with foreign accents (Clarke & Garrett, 2004; Lev-Ari & Keysar, 2010). Implicit in these scholars’ work is that slow, clear, Standard English is the easiest to process—these assumptions end up explicit in Applied Linguistics books like Brown (2017).

However, it’s possible that there are deeper root causes for the results cited above and that the acoustic variation present in foreign accents is not inherently harder to process. Other potential factors affecting lower comprehensibility ratings, lower word-identification accuracy, and increased processing time for non-standard speech include little or no prior exposure to the accented speech (Clopper & Pisoni, 2004), social othering based on the identities indexed by the accent (Dixon et al., 2002), and the fact that the foreign accent is different than one’s native variety. Given how quickly listeners adapt to non-native speakers’ accents and unfamiliar accents (Nygaard & Pisoni, 1998; Norris, McQueen, & Cutler, 2003; Kraljik & Samuel, 2006; Bradlow & Bent, 2008; Dahan & Mead, 2010), it’s not unreasonable to question whether processing accented speech is as inhibitory as scholars have previously assumed.

*Research Question & Latino Varieties of English*. To probe whether processing of accented speech is affected by the listeners’ exposure to that accent, the listeners’ social evaluation of that accent, or the listeners’ home variety, I will study two listener population’s processing of two Latino varieties of English, which are spoken natively by Hispanic/ Latinx English L1 speakers (Fought, 2003; Slomanson & Newman, 2010). Latino varieties of English are particularly well suited to investigate whether exposure to a variety, social evaluation of a variety, and home variety affects processing because these heterogeneous varieties (Wolfram, 2007) are spoken across the country by groups of people with distinct histories, cultures, and relationships with one another. Their status as regional Hisanic/ Latinx varieties (as opposed to foreign accents) that include substrate Spanish features (Santa Ana, 1991) situates Latino varieties of English at the crossroads of American identity, Hispanic/ Latinx identity, regional identity, and notions of standardness.

While features of different Latino varieties of English have been documented across the US (Wolfram, 1974; Polack, 1978; Santa Ana, 1991; Fought, 2003; Slomanson & Newman, 2004; Wolfram, Carter and Moriello, 2004; Mendoza-Denton, 2008; Newman, 2010; Thomas, 2019; Carter & Valdez, 2020), little work has studied processing of Latino varieties of English (potentially Carter & Lynch, forthcoming). This study will not only expand our knowledge of Latino varieties of English, an understudied set of American English varieties, but also our understanding of variation in speech processing, since prior studies in this area have used either foreign accented talkers or white American regionally accented talkers.

*Predictions*. Through a semantic priming lexical decision task with three talker conditions (Northeast White American English and two varieties of Latino English) and two listener populations (General English vs. Latino English listeners), this study sets out to test whether listeners’ exposure to, social evaluations of, and native variety of Latino varieties of English affects processing of these varieties (as would be expected if variation in speech is useful and informative), or whether processing of Latino varieties of English is inhibited across the board compared to Standard American English (as would be expected if any variation from the standard is noise).

**Methods**

*Experimental Design*. Instead of relying on subjective and explicit comprehensibility, intelligibility, and accentedness ratings like previous studies, this experiment was designed as a lexical decision task embedded in an auditory semantic priming paradigm to measure response times for lexical decisions. Preregistration for this study can be viewed at osf.io/puj29. While the study instructions asked participants to decide whether targets were real or made-up, this design allowed for response time comparison between real-word targets after semantically related primes vs. real-word targets following semantically unrelated primes. Embedding the lexical decision task within the semantic priming paradigm meant results would measure processing at a cognitively deeper level than mere surface form recognition.

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| --- | --- | --- | --- | --- | --- |
| Counterbalance List #1 1\_CE | Prime | Target | Counterbalance List #2 2\_CE | Prime | Target |
| Critical Trial - Semantically Related | album | music | Control Trial - Semantically Unrelated | ice cream | music |

*Stimuli*. In the table above, the semantically related prime-target pairs are called critical trials, and the semantically unrelated pairs are called control trials. Within each talker condition (more on the talker conditions below), there are 40 critical trials and 40 control trials in counterbalance list #1 and 40 critical trials and 40 control trials in counterbalance list #2 for a total of 80 critical and control trials per talker condition. The rest of the trials, including all the pairs with pseudo-word targets, are fillers.

In the graphic below, each flow chart represents one counterbalanced list. If the top right boxes of each counterbalanced list are compared, the way the stimuli examples used in the table above fit into the experimental design should become apparent. Likewise, reviewing the rightmost bottom boxes should clarify how each counterbalanced list contains both critical and control trials that later are collapsed to yield 80 critical (semantically related) prime-target pair responses and 80 control (semantically unrelated, but same target) prime-target pair responses. Finally, the other boxes in the graphic contain the remaining filler trials. 160 of these fillers contain pseudoword targets, and another 80 contain semantically unrelated real-word targets. The fillers remain the same across counterbalanced lists.

*Talker Conditions*. As mentioned earlier, there are three talker conditions, and each talker condition consists of two counterbalanced list, as can be seen in the above section. The three talker conditions are Cuban American talkers from Miami, Mexican American talkers from LA, and White talkers from the Northeast. In each condition, speaker A states all the prime words, and speaker B states all the target words. In the table below, the speakers for each prime and target audio clip are laid out for the three talker conditions. So far, the GE-LE1 condition has been run and the LE1- LE1 condition is in the process of being run.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Listeners** | **Audio Prime** | **Audio Target** |
| **Experiment 1** |  |  |  |
| **GE-LE1 condition** | General English | Miami Cuban English a | Miami Cuban English b |
| **GE-LE2 condition** | General English | LA Mexican English a | LA Mexican English b |
| **GE-GE condition** | General English | Northeast White English a | Northeast White English b |
| **Experiment 2** |  |  |  |
| **LE1-LE1 condition** | Mexican English | Miami Cuban English a | Miami Cuban English b |
| **LE1-LE2 condition** | Mexican English | LA Mexican English a | LA Mexican English b |
| **LE1-GE condition** | Mexican English | Northeast White English a | Northeast White English b |

* *Miami Cuban American Talkers*: Speaker A is a 24-year-old male who lived in Miami, FL until after college graduation. He reports to have learned English between two and three years old, alongside Spanish. He identifies his ethnicity has Hispanic/ Latinx and his heritage country as Cuba. Speaker B is a 47-year-old male who also grew up in Miami, FL and still lives there. He reports to have learned English between three and four years old, along with Spanish. Speaker B also identifies as a Hispanic/ Latinx individual with Cuban heritage.
* *Northeast White American Talkers*: Speaker A is a 72-year-old male who has lived in multiple states in the Northeast. He is a white monolingual English speaker. Speaker B …
* *Los Angeles Mexican American Talkers*:

*Participants*. For Experiment 1, where the participants are General English speakers, the participants were recruited from Mechanical Turk. All participants were native English speakers. For Experiment 2, participants were recruited from university listservs (including Stanford), word of mouth, and community colleges in the LA area.

*Hypotheses*. In the Introduction, two schools of thought that would predict different results were discussed. While the *Variation (from standard) is Noise* camp would predict reduced or no facilitation in all speaker conditions except the White Northeast talker condition independent of listener group, the *Variation is Informative* camp would predict facilitation in talker conditions other than the White Northeast talker condition, dependent on listener condition. Below the hypotheses are laid out in more detail.

|  |  |  |
| --- | --- | --- |
| **Main effects** | **If variation (from standard) is noise:** | **If variation is informative:** |
| Main effects for GE listeners | ↑ RT for CE and ME compared to GE  Strongest facilitation for GE compared to CE and ME | Possible ↑ RT for CE and ME compared to GE  Facilitation for CE, ME, and GE |
| Main effects for ME listeners | ↑ RT for CE and ME compared to GE  Strongest facilitation for GE compared to CE and ME | Possible ↓ RT for ME compared to CE and GE  Facilitation for (1) ME, (2), ME and GE, or (3) ME, CE, and GE |
| Summary | **GE shows strongest facilitation, independent of listener population** | **Facilitation in conditions other than just GE, dependent on listener population** |
| Key: CE = Miami Cuban American; ME = LA Mexican American; GE = Northeast White American | | |

There are many potential patterns of results that are consistent with the *Variation is Informative* view, which is evident from the many possibilities in the main effects for LA Mexican American listener box. These options will be addressed one by one below:

1. If response time for semantically related critical targets is reduced (facilitation) for LA Mexican American listeners in the LA Mexican American talker condition, then it can be concluded that variation in speech actually improves processing if that variation is **familiar**—that of the **home variety**.

2. If facilitation for LA Mexican American listeners exists both in the LA Mexican American talker condition and the Northeast White American condition, then it can be concluded that processing of speech variation is affected by **standardness**. As members of both the Mexican American community and US culture, LA based Mexican American listeners are familiar with and a Standard American English variety as well as the home LA Mexican American English variety. This pattern of results would lead the researchers to conclude that standardness should be additionally situated as the listener’s home variety, not just the abstract notion of clear, careful, Standard American English.

3. If facilitation for LA Mexican American listeners is found across all talker conditions, this would leave the researchers to believe that variation across varieties of English are not more difficult to process, but rather that the variation is used by listeners to understand something about the talkers.

4. Additionally (not mentioned in the table above), the facilitation effects for the Miami Cuban American talker condition could pattern in a couple ways, all of which highlight the **intersectional social identities** of these talker groups. One, there could be facilitation in both the Miami Cuban American talker condition and the LA Mexican American talker condition, which would indicate a formulation of a pan-ethnic label in the minds of the listeners (both LA Mexican American listeners and General English listeners). Two, there could be facilitation for both the Miami Cuban American talker condition and the Northeast White American talker condition, which would indicate a formulation of a white racial label in the minds of the listeners (we expect this would only happen with LA Mexican American listeners and not General English listeners).

*Procedure (so far)*. To make headway on testing these hypotheses, one talker condition (Miami Cuban American talkers) was run on MTurk for General English listeners. In addition, this talker condition was also run on some, but not all the necessary LA-based Mexican American listeners. Each counterbalanced list was run on 50 participants for a total of 100 participants per talker condition. Each participant read the legal information and general study information slide, tested their audio in the subsequent slide, participated in two practice trials to learn to make a decision about whether the *second* word in the auditory pair was a pseudoword or a real word, and then listened to and made lexical decisions for 320 prime-target word pairs in the main experiment. After the main experiment, participants listened to each speaker (talker condition speaker A and B) recite words and sentences and were asked questions about the speaker, such as their race/ ethnicity, their accentedness level, and their overall impressions. Finally, participants filled out a demographics survey, where they answered questions like their exposure to the Hispanic/Latinx community and their first language. Then the experiment concluded.

**Results**

*Exclusions*. Before analyzing the data, exclusions were made according to the criteria logged in the preregistration. Participants who were not native English speakers were excluded, along with participants who scored less than a 90% accuracy for lexical decisions and participants who took longer than 2.5 standard deviations from the mean amount of time to complete the experiment. Individual responses were excluded if lexical decisions were made faster than 500ms or if lexical decisions took longer than 3 standard deviations from the average response time.

In addition, for the LA-based Mexican American listener group, participants were excluded if Los Angeles was not listed as one of their current or previous regions, if Mexico was not listed as a heritage country, or if English acquisition occurred later than age 7.

*Data*. Since response times were measured from the onset of the target words (as oppose to the conclusion of the target word), target word durations (mean 557ms) were subtracted from recorded response times to yield the calculated response times found in the graph below. The y-axis represents the mean of these calculated response times (from the conclusion of the target word to the lexical decision), and the x-axis splits response times of semantically unrelated targets (like ice cream – music) from response times of semantically related targets (like album – music).

A mixed effect linear regression model predicting response time from the fixed effect of priming condition (semantically related vs. semantically unrelated) and random by-subject and by-item intercepts and slopes revealed a main effect of priming condition (). Response times for semantically related targets were significantly faster than response times for semantically unrelated targets.

Chart

Description automatically generated

**Discussion**

From running one talker condition (Miami Cuban Americans) on one listener population (General English), there is evidence for priming facilitation even for non-standard varieties of English. From running the same talker condition on 35 LA-based Mexican Americans so far, there is some evidence of continued facilitation for this other listener population, but results are inconclusive as the sample size is too small. The results for General English listeners discussed above and the trends for LA Mexican Americans mentioned here that show facilitation for non-standard varieties of English so far support the *Variation is Informative* view, but running the Northeast White American English talker condition will illuminate how the facilitation for the Miami Cuban American talkers compares to the facilitation for a more standard variety of English. This condition will be run in the coming weeks, since recording for speaker B is wrapping up.

The experimental results that will perhaps tease apart these two theories of variation the most clearly will be those conditions run on the Mexican Americans from LA. So far, recruiting LA-based Mexican-American listeners has proven challenging, but hopefully connecting with a local community college will increase access to the target population.

Other directions that promise to be interesting include an investigation of listeners’ explicit reactions to the voices at hand (like their evaluation of the speakers’ race/ ethnicity, accentedness, and the speakers themselves) as well as an investigation of the phonetic features present in the speakers’ words and sentences. This research might uncover the indexical fields of understudied variables and how listeners use these variables to understand something social about the speaker. In addition, once this processing experiment has concluded, it would be interesting to study how these Latino varieties of English affect credibility judgements, and what exactly about the varieties affect credibility judgements (besides the current de facto explanation—processing difficulty).

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