

Speech Intelligibility Improvement using Different L1 Listeners Judgment: A Longitudinal Study of Ecuadorian Learners of English

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I. INTRODUCTION

Developing a good pronunciation to communicate effectively with native English speakers (NEs) and non-native English speakers is the priority for speech communication and second language (L2) learners' desire. Acquiring a good pronunciation is challenging for L2 adult speakers [1], [2], [3] and segmental errors are very common in L2 speech [4]. Many studies on pronunciation features agree that L2 learners' problematic contrasts on vowels or consonants can vary depending on L1 learners' language background [1], [5]. At the same time, all vowel contrasts are not equally important for communication and not all of them have a big impact on intelligibility, "the extent to which a speaker's message is actually understood" [6]. For example, native (L1) Spanish speakers often pronounce the English vowel /e/ like the Spanish vowel /e/ without affecting communication [7]. Conversely, for this population, the vowel contrast /ɪ/ - /i/ has a big influence on intelligibility and their wrong pronunciation can trigger misunderstanding [8].

It is important to point out that apart from pronunciation, the role of the listener is also crucial in communication and the number of non-native L2 English listeners is more prevalent compared to NEs [9]. To date, few studies have investigated if non-native L2 English listeners can understand better utterances produced by non-native speakers who share the same L1 background compared with native English listeners [9], [10],[11], [12]. The results of these studies have been conflicting indicating that some non-native L2 listeners were more accurate on L1 speakers' speech intelligibility who share the same L1 background [10],[11], but other findings could not prove the same observation [9], [12]. This research presents the results of a longitudinal study that investigated to what extent Ecuadorian EFL speakers can improve intelligibility in the production of familiar English words containing the vowel contrasts /i/ - /ɪ/ as they advance in their English studies. We also examined the listener's language background differences on perceiving Ecuadorian EFL intelligibility and compared differences between the two vowel contrasts. Intelligibility for this paper will be understood as the frequency of correct orthographic transcription of the tested utterances.

II. METHOD

A. Stimuli

The auditory stimuli consisted of utterances produced by 16 females Ecuadorian EFL speakers with age range between 18 and 28 which were recorded a six-month interval for three semesters. They were enrolled in the First and Foreign Language Teaching program at the state university of Cuenca-Ecuador. They were in the third level in the first recording (T1), fourth level (T2) and fifth level (T3). As a control group, 3 L1 native American English speakers (NEs) were recruited in T1. All participants produced monosyllabic words containing the vowel contrasts /i/ - /ɪ/; /u/ - /ʊ/; /ɛ/ - /æ/; /ʌ/ - /ɑ/) in a cvc or cvcc context. For this study we only analyzed the English vowel contrasts /i/ - /ɪ/ which contained the following familiar words: cheap-chip, feet-fit, keys-kiss, seat-sit, sheep-ship.

B. Intelligibility task

Listeners were four Ecuadorian L1 Spanish speakers (EC), 3 females and 1 male, with a mean age of 34 years with a high English proficiency level; and two females and 1 male native English-speaking listeners (NE); 2 have lived in Ecuador for more than three years and one lived in Central America for more than six years. Intelligibility of words produced by each speaker was measured in a block of 190 trials, including control group utterances. Using a computer monitor and headphones, listeners heard the speakers' words only twice and wrote down what they thought the speaker said on Praat [13]. Before starting the intelligibility session, listeners were trained with four trials where they could also regulate the loudness of stimuli.

III. RESULTS

A visual inspection of the data indicated that Ecuadorian EFL speakers improved speech intelligibility as they advanced in their studies (Fig.1) according to the percentage of the two group of listeners. A two-way repeated measures ANOVA was performed to evaluate the effect of Listener over Time on intelligibility's percent. There was a statistically significant interaction between Listener and Time on percent, $[F(2, 30) = 7.150, p < 0.0001]$. Therefore, the effect of Listener variable was analyzed at each Time point. P-values were adjusted using the Bonferroni multiple testing correction method. The effect of Listener was significant at T3 ($p = 0.000339$) but not at the time point T1 and T2 ($p = 1$).

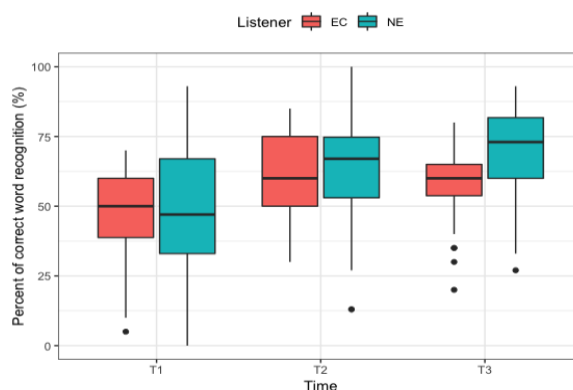


Fig. 1. Percent of speech intelligibility scores over time divided by listeners types (Ecuadorian and native American English).

To observe differences between the two vowels, we first inspected word intelligibility score, comparing the distributions of listeners' vowels results in the three different recordings (Fig.2). For words containing vowel /i/, mean intelligibility at T1 was 42%, T2 60%, T3 63%. For words containing vowel /ɪ/, mean intelligibility at T1 was 53%, T2 63%, T3 63%. A two-way repeated measures ANOVA was performed to evaluate the effect of two groups of listeners over time on speech intelligibility for each vowel (Fig.1). For vowel /i/ there was a statistically significant Time by Listener interaction $[F(2, 30) = 9.847, p < .0001]$, with EC listeners being more accurate than NE listeners on vowel /i/. For /ɪ/, there was a statistical difference only on listener group $[F(1, 15) = 24.229, p < 0.05]$ with NE listeners being more accurate than EC listeners.

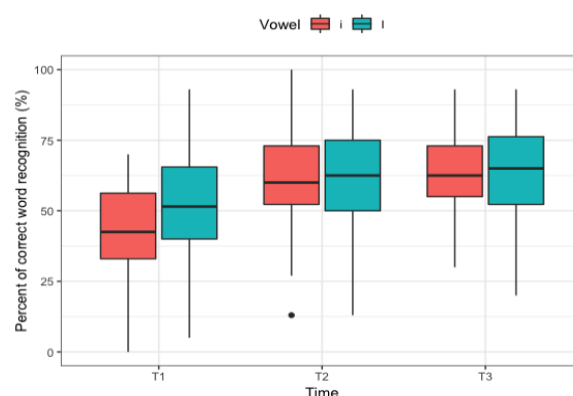


Fig. 2. Percent of speech intelligibility scores over time divided by /i/-/ɪ/ vowels.

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