

Pronunciation errors and perceptual judgements of accented speech by native speakers of English

by Hoa Phan and Sonca Vo

Abstract

Although research into second language (L2) pronunciation has tended to focus primarily on the acquisition of individual sounds, in the last two decades pronunciation teachers have increasingly emphasised suprasegmentals rather than segmentals in promoting L2 comprehensibility (Derwing & Munro, 2007). However, little research has compared the direct contribution of segmental and suprasegmental errors to listeners' judgements of language learners' speech in terms of comprehensibility and accentedness. Consequently, most teachers can only make an intuitive decision on features that have the greatest effect on those two constructs (Levis, 2005). In order to provide more empirical evidence, the current study attempted to identify both segmental and suprasegmental features which contribute to L2 comprehensibility and accentedness. In the study, 80 American university students rated Vietnamese-accented speech for comprehensibility and accentedness. The results suggest that the features identified in the listeners' judgements are also relevant for communicative situations in which learners need to function. The results are also pedagogically useful because they allow teachers to prioritise the aspects of pronunciation covered in their lessons.

Introduction

The current study investigated the direct contribution of segmental and suprasegmental errors to native listeners' judgements of accented speech in order to provide suggestions for effective pronunciation teaching. Two facets of pronunciation – segmentals and suprasegmentals – have been identified in the literature as having an influence on foreign accent in the speech of non-native speakers (NNSs) and, consequently, its comprehensibility to native speakers (NSs). Segmental features are minimal units of sound defined in phonetic terms (Pennington & Richards, 1986). For a long time, segmentals have been the focus of many traditional pronunciation programs. Firstly, phonemes are seen as the fundamental components of pronunciation, and acquisition of the target language phonological system is viewed as mastery of the phonemic distinctions embodied in its phonological inventory and of the phonetic variants of phonemes which occur in particular

environments within syllables and words (Pennington & Richards, 1986). Secondly, segmental errors are perceived as contributing greatly to a foreign accent (Flege, MacKay & Meador, 1999) and as having detrimental effects on L2 comprehension (Koster & Koet, 1993).

The most readily apparent basis for a foreign accent are mispronunciations that lead to the perception of a segmental sound substitution, such as in the French-accented ‘I sink so’ or the Arabic-accented ‘I put my car in the barking lot’ (Flege, 1981). In another study, the frequency with which segmental substitutions were identified in short excerpts of speech produced by NNSs was highly correlated with NSs’ judgements of accentedness (Brennan, Ryan & Dawson, 1975). Gimson argued that accurate production of consonants is more essential to comprehension in English than native-like production of vowels (1970), whereas Schairer came to exactly the opposite conclusion for English-speaking learners of Spanish (1992). In either case, the segmental approach has long been dominant in both English as a second language (ESL) and English as a foreign language (EFL) pronunciation programs.

However, beginning in the 1980s, the segmental approach was challenged by a suprasegmental approach, and since then empirical research has begun to confirm the importance of prosodic features in L2 learners’ perceived comprehensibility and accentedness. Suprasegmentals are referred to as prosody, which includes stress, length, tone, intonation, and rhythm and timing (Major, 2001). A speaker’s foreign accent, especially the features associated with stress, pitch, rhythm and intonation, can greatly affect the comprehensibility of what is being said (Derwing & Munro, 1997).

Many NNSs from a variety of linguistic backgrounds find the rhythm and stress patterns of English challenging. Learners often face problems such as misplacing word stress and sentence stress (Hahn, 2004). David Crystal defines *word stress* as ‘the relative emphasis that may be given to certain syllables in a word’ and *sentence stress* as the ‘relative emphasis that may be given to certain words in a phrase or sentence’ (2003: 435). Levelt notes that English speakers tend to store vocabulary based on stress patterns. If listeners misperceive the stress pattern of a speaker, they find it difficult to search for the right words, consequently causing a breakdown in communication (1989). Hahn also reports that correct sentence-level stress by an ESL or EFL speaker, compared to misplaced or omitted stress, led to improved listener comprehension and recall of content (2004).

Although numerous studies have investigated NSs’ reactions to non-native speech, little empirical evidence has been given to distinguish among the effects of deviances in specific segmental and suprasegmental features in L2 speech on listeners’ perceptual judgements. Therefore, the purpose of the present study was to investigate types of pronunciation errors that affect the degree of

comprehensibility and accentedness in L2 speech to provide more guidance to teachers about what to teach in an L2 pronunciation curriculum.

The present study addressed the following two research questions:

- 1 To what extent do segmental errors and suprasegmental errors affect listeners' judgements of comprehensibility in L2 speech?
- 2 To what extent do segmental errors and suprasegmental errors affect listeners' judgements of accentedness in L2 speech?

Method

Participants and materials

The study had 82 listeners, including two female native speakers of American English who were linguistics graduate students at Northern Arizona University (NAU) (testing the speech samples) and 80 US university freshman students at NAU with no special training in linguistics. The two testers listened to the samples to make sure they satisfactorily represented intended and incorrect sounds and stress before they were replayed to the raters. All of the participants reported having normal hearing.

The stimuli were 16 sentences with problematic consonants and vowels (in eight sentences) and misplaced word and sentence stress (in eight sentences). The speaker was asked to read the sentences with intended and incorrect sounds and stress. For example, word-final voiceless sounds /p/, /t/, /k/, /f/ were pronounced as /b/, /d/, /g/, /v/ respectively; final consonant clusters such as /st/, /ts/, /ks/, /ft/ were not pronounced; and tense vowels such as /i/, /e/, /u/, /ɔ/ were pronounced as lax vowels /ɪ/, /ɛ/, /ʊ/, /ʌ/ and vice versa. Examples of suprasegmental errors were misplaced syllables in a word and misplaced words in a sentence.

Rating instruments and procedures

The study employed Kang's instrument for the ratings (2010). The listeners were asked to listen to the sixteen sentences one after the other and to use a nine-point Likert scale to assign perceived comprehensibility (1 = *easy to understand*, 9 = *hard to understand*) and accentedness (1 = *has no accent*, 9 = *has a strong accent*). The recordings were only played once for each rating. After the listeners finished doing the ratings of comprehensibility and accentedness they were asked to listen to the whole sixteen sentences one more time and provide global comprehensibility and accentedness judgement ratings. Each listener gave one score each for global comprehensibility and global accentedness based on a similar nine-point Likert scale (1 = *easy to understand*, 9 = *hard to understand*; and 1 = *has no accent*, 9 = *has a strong accent*).

During the experiment, the authors controlled the CD player by pressing a pause button at the end of each utterance. A new stimulus was not presented until all the listeners finished assigning a rating for the previous one. After the raters finished assigning the rating scores for comprehensibility and accentedness, they listened to the whole speech stimuli again and assigned one score for global comprehensibility and one score for global accentedness. The mean values calculated for all four variables (consonant, vowel, word stress and sentence stress) were based on ratings using the nine-point scales. Higher ratings indicated listeners' perceptions of lesser degrees of comprehensibility and higher levels of accentedness.

Results

Segmental and suprasegmental errors and listeners' judgements of comprehensibility

Table 1 presents mean values (M) and standard deviations (SD) for all the variables investigated for comprehensibility ratings for the whole group ($N = 80$). As can be seen from the data, the mean for sentence stress was the highest ($M = 31.44$), followed by vowel and word stress ($M = 30.35$ and $M = 28.32$). The mean for consonant was the lowest ($M = 19.99$). This means that sentence stress contributed significantly to the ratings of comprehensibility and consonant errors did not correlate much to the L2 comprehension.

Variable	M	SD
consonant	19.99	5.53
vowel	30.35	4.08
word stress	28.32	5.23
sentence stress	31.44	4.11

Table 1 – Segmental and suprasegmental comprehensibility ratings ($N = 80$)

Multiple regression of variables on the global comprehensibility ratings is provided in Table 2. Four regression models in this analysis were significant $F(4,79) = 36.43$, $p = .00$, Adjusted $R^2 = .66$. Among the four variables, only sentence stress contributed significantly to the global comprehensibility ratings ($\beta = .24$, $p = .00$). Word stress, vowel and consonant did not contribute much to the variance of global comprehensibility ratings ($\beta = .04$, $\beta = .01$ and $\beta = .01$ respectively).

Variable	Standardised co-efficients (β)	t -value	p -value
consonant	.01	1.17	.78
vowel	.01	.28	.77
word stress	.04	.28	.24
sentence stress	.24	10.21	.00
$R^2 = .66$, $F(4,79) = 36.43$, $p = .00$, Adjusted $R^2 = .66$			

Table 2 – Multiple regression of segmental and suprasegmental variables to global comprehensibility ratings

Segmental and suprasegmental errors and listeners' judgements of accentedness

Table 3 presents mean values (M) and standard deviations (SD) for all the variables investigated for accentedness ratings for the whole group ($N = 80$). As can be seen from the data, the mean for sentence stress was the highest ($M = 30.76$), followed by word stress ($M = 29.84$). The mean for consonant was the lowest ($M = 20.93$). This means that the native speakers found the Vietnamese speech more accented when there were problems with sentence stress than when there were consonant errors.

Variable	M	SD
consonant	20.93	6.20
vowel	29.73	4.44
word stress	29.84	4.43
sentence stress	30.76	4.44

Table 3 – Segmental and suprasegmental accentedness ratings ($N = 80$)

The simultaneous multiple regression of the accentedness ratings is summarised in Table 4. The findings for the accentedness rating were similar to those for the comprehensibility rating. Sentence stress exerted statistically significant effects on the accentedness rating ($p = .00$). This means that when listeners heard stress-misplaced words in a sentence, they found that the speech had a strong accent. Vowel and consonant did not contribute much to the ratings of accentedness.

Variable	Standardised co-efficients (β)	t -value	p -value	partial correlation
consonant	.25	2.44	.02	.27
vowel	-.17	-1.64	.11	-.19
word stress	-.28	-2.67	.01	-.30
sentence stress	.47	4.20	.00	.44
$R^2 = .40$, $F(3,320) = 69.96$, $p < .000$, Adjusted $R^2 = .39$				

Table 4 – Multiple regression of segmental and suprasegmental variables on accentedness

Overall, variance of both comprehensibility and accentedness ratings was more correlated with suprasegmental errors (sentence stress) than segmental errors (consonant and vowel). Similarly, sentence stress errors contributed significantly to listeners' global comprehensibility judgements.

Discussion

Segmental and suprasegmental features and judgements of comprehensibility

In the study, incorrect placement of word stress was attributed to the comprehensibility rating outcome more than consonants but less than vowels. In the literature, suprasegmentals, especially word stress (lexical stress), are often regarded as a more important factor in L2 comprehension than

segmentals (Field, 2005). This study showed how incorrect allocation of stress could lead to the miscomprehension of the whole sentence and suggested that teaching lexical stress should be given priority over the teaching of segments and can serve as a starting point for tackling the most difficult part, intonation. However, the current study showed that the comprehensibility rating scores for word stress were lower than the rating outcome for vowels.

A multiple regression was performed to determine whether global comprehensibility was associated with the four variables. The results showed significant correlation of global comprehensibility ratings with identifications of problems in only sentence stress ($\beta = .24, p = .00$). This correlation was that a higher rating was strongly associated with an indication of a problem in this variable. The results were in line with Hahn's conclusion in that the sentence stress errors of the NNS utterances made it difficult for native listeners to comprehend NNSs' speech (2004). The more sentence stress errors produced, the worse the ratings tended to be. However, unlike other authors (e.g., Derwing & Munro, 1997; Field, 2005), the current study found that problems in consonants, vowels and word stress showed no significant association with the global comprehensibility rating. Finally, as for the comprehensibility rating, in general suprasegmentals contributed more significantly to the rating outcome than did segmentals (with sentence stress shown to be the best predictor of L2 comprehension deficit).

Segmental and suprasegmental features and judgements of accentedness

Similar to the results for the comprehensibility ratings, a strong predictor for accentedness was found for sentence stress which did receive a relatively high rating. Native listeners considered non-native speech as more accented when they listened to the speech with sentence stress errors ($p = .00$), and they found the speech less accented when hearing consonant errors.

The accent judgement results in this study lend the support to the results of empirical studies which have observed that 'accent ratings are harsher than perceived comprehensibility ratings' (e.g., Derwing & Munro, 1997: 11). They also indicate that accentedness and comprehensibility are partially independent dimensions of L2 speech. In particular, a high degree of accentedness does not necessarily predict reduced comprehensibility. The current study showed that a higher score of accentedness in word stress and consonants did not predict reduced comprehensibility. However, what is interesting from the study is that the accentedness scores of sentence stress and vowel errors strongly predicted reduced comprehensibility, suggesting that perceptions of accentedness reflect the salience of sentence stress and vowel errors to listeners. Therefore, a possible explanation for the outcome of this study is that sentence stress was the most salient feature to the listeners and caused greater perceptions of accentedness than other errors.

In conclusion, the results of the study led to an increased recognition of the role of suprasegmentals in the comprehension of non-native speech, with inappropriate sentence stress patterns shown as a major contributor to L2 comprehension deficit.

Recommendations

The findings of this study provide more support to the arguments which favour a suprasegmental focus in pronunciation teaching (Derwing & Munro, 1997; Hahn, 2004). The results are likely to be of interest to both EFL and ESL teachers and suggest that teachers focus on teaching prosodic proficiency in order to improve NNSs' comprehensibility and to reduce the negative effects of accentedness. The study also suggests that an approach to pronunciation training curriculum that includes sentence stress patterns in the learning activities, with the aim to improve sentence prosody, should be established to assist learners to function successfully in communicative situations between NSs and NNSs.

In order to help students practise sentence stress, teachers should use longer pieces of discourse because most pronunciation textbooks only provide short utterances. It is important to help students practise dialogues and passages beyond two or three sentences in length. Firstly, NNSs often put stress on old information and give stress equally to all words in a discourse which causes difficulties for NSs to understand. Key research recommends that teachers guide students on how to place stress in the right place by teaching them to keep old information at a lower pitch and showing them which words in a sentence should receive stress (Celce-Murcia, Brinton & Goodwin, 2010; Hahn, 2004). Secondly, it is suggested that teachers should use a five-stage framework for teaching sentence stress communicatively, these stages comprising description and analysis, listening discrimination, controlled practice, guided practice and communicative practice (Celce-Murcia, Brinton & Goodwin, 2010).

For description and analysis, teachers can employ activities that compare the stress pattern of multisyllabic words with utterances containing equal numbers of syllables and similar stress patterns. One example of this is to compare 'overlook' and 'Tell the cook'. For listening discrimination, teachers might use jazz chants to practise patterns of the rhythm (Graham, 1986), and ask learners to tap out the pattern while reading them aloud. For controlled practice, the card game Memory (Concentration), congruent rhythm drills or naturalistic dialogues are effective ways to practise sentence stress. For guided practice, asking students to exchange their personal information about careers or using information gap activities are effective methods of practising sentence stress. Finally, communicative practice focuses on both form and meaning that helps develop students'

conversational abilities and rhythm and stress practice through such activities as story-telling, role plays, debates or drama. Hahn also suggests using conversations and oral presentations to practise sentence stress (2004).

References

- Brennan, E., Ryan, E. & Dawson, W. (1975). Scaling of apparent accentedness by magnitude estimation and sensory modality matching. *Journal of Psycholinguistic Research* 4(1), pp. 27-36.
- Celce-Murcia, M., Brinton, D. & Goodwin, J.M. (2010). *Teaching pronunciation: A course book and reference guide*. New York: Cambridge University Press.
- Crystal, D. (2003). *A dictionary of linguistics and phonetics*. Malden, MA: Blackwell.
- Derwing, T.M. & Munro, M.J. (1997). Accent, intelligibility and comprehensibility: Evidence from four L1s. *Studies in Second Language Acquisition* 19(1), pp. 1-16.
- Field, J. (2005). Intelligibility and the listener: The role of lexical stress. *TESOL Quarterly* 39(3), pp. 399-423.
- Flege, J. (1981). The phonological basis of foreign accent: A hypothesis. *TESOL Quarterly* 15(4), pp. 443-455.
- Flege, J.E., MacKay, I.R.A. & Meador, D. (1999). Native Italian speakers' perception and production of English vowels. *Journal of the Acoustical Society of America* 106, pp. 2973-2987.
- Gimson, A.C. (1970). *An introduction to the pronunciation of English*. London: Edward Arnold.
- Graham, C. (1986). *Small talk: More jazz chants*. Oxford: Oxford University Press.
- Hahn, L.D. (2004). Primary stress and intelligibility: Research to motivate the teaching of suprasegmentals. *TESOL Quarterly* 38(2), pp. 201-223.
- Kang, O. (2010). Relative salience of suprasegmental features on judgments of L2 comprehensibility and accentedness. *System* 38, pp. 301-315.
- Koster, C.J. & Koet, T. (1993). The evaluation of accent in the English of Dutchmen. *Language Learning* 43(1), pp. 69-92.
- Levelt, W.J.M. (1989). *Speaking: From intention to articulation*. Cambridge, MA: MIT Press.
- Major, R. (2001). *Foreign accent: The ontogeny and phylogeny of second language phonology*. Mahwah, NJ: Lawrence Erlbaum.
- Pennington, M. & Richards, J. (1986). Pronunciation revisited. *TESOL Quarterly* 20(2), pp. 207-25.
- Schairer, K. (1992). Native speaker reaction to non-native speech. *Modern Language Journal* 76, pp. 309-319.

Associate Professor Hoa Phan has been a Rector of the College of Foreign Languages at the University of Danang since 2005. He has published over 40 articles in the fields of discourse analysis and linguistics in refereed professional journals. He is author of *English for energy* (Danang Publisher, 1992), *Linking words denoting semantic logic in English and Vietnamese* (Education Publisher, 2008), and co-author of *Vietnamese language practice for foreigners* (Vietnamese National University, Ho Chi Minh City, 2003).

Email: hoauni@gmail.com

Sonca Vo was a Fulbright recipient from Vietnam and received her MA in TESL from Northern Arizona University, Flagstaff, AZ, USA in 2011. She is currently a teacher of English in the College of Foreign Languages at the University of Danang, Vietnam. She is also an administrator of the E-Center for Professional Development (<http://etesol.edu.vn/>). Her research interests include curriculum and materials development, second language teaching methods, assessment and research methods.

Email: vosonca@gmail.com
