Searching for Foreign Accent ———————————

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Abstract

Native speakers of English can identify non-native English speakers with relatively little difficulty. Further, they are able to identify the native language of non-native speakers, as suggested by such terms as French or Arabic accent, implying that non-native English carries properties which are characteristic of native languages. In four experiments, we investigated whether English listeners can match an unknown foreign language with a foreign accent. In the first two experiments, listeners heard a sample of accented English and were asked to select the native language of the speakers from a series of competitors. Listener performance did not exceed chance. In the third experiment, listeners made 'yes-no' responses to accented English matched with foreign languages, including the native language of the speaker. Although listeners thought some languages were more likely to be the source of the foreign accent than others, they did not identify the target language correctly. In the fourth experiment, listeners supplied ratings about the similarity of accented English and various foreign languages, with results very similar to those of Experiment 3.

Introduction

What speech characteristics lead listeners to judge that they are hearing a non-native speaker? This question has lead to an extensive literature in which researchers have employed various methodologies to investigate the phonetic and phonological properties of utterances which make them sound non-native. Two conclusions may be drawn from this literature. First, native listeners are extremely accurate in discriminating between native and non-native speech even from minimal information. Second, native listeners employ multiple sources of information, from paralinguistic to phonetic, in making foreign accent judgments.

For example, Flege, Frieda and Nozawa (1997) found that native listeners were consistent in their judgments and extremely sensitive to traces of foreign accent when presented with sentences. Scovel (1995) reported greater than 95% accuracy in distinguishing native from non-native speech samples. Flege (1984) has reported that listeners were able to recognize accented spoken samples of their native language within 30 ms, basing their judgments on phonetic cues

present in fragments of syllables. In a similar study which examined minimal segmental cues, Major (1987) found that native speakers could distinguish Brazilian Portuguese accented English from American English using pronunciations of the contrasting vowels /e/ and /æ/.

When researchers have examined various sources of information about foreign accent judgments, they have found that listeners are able to employ almost any source of information available to them. Cunningham-Andersson and Engstrand (1989) investigated the role of segmental features in the identification of Finnish accent in spoken Swedish. They used speech in which a talker deliberately introduced one or more deviations from normal Swedish which are characteristic of a Finnish accent. Although some features were more effective in suggesting an accent than others, in general, the more deviations, the more likely listeners identified the speech as accented. Magen (1989) presented computer-edited and natural versions of sentences produced in Spanish-accented English; she found that listeners were sensitive to a variety of segmental and also suprasegmental factors such as syllable structure, vowel and consonant quality, and stress placement. Munro (1995) presented filtered versions of sentences produced by non-native talkers. He found that listeners were able to identify foreign-accented speech even without clear information about segmentals. Presumably, the listeners were relying on intonation patterns, timing and speaking rate for accentedness judgments. Munro and Derwing (2001) extended this line of investigation by examining the contribution of speaking rate to accentedness judgments. They employed both naturally produced and computer-manipulated sentences and found that listeners could make reliable judgments of accentedness based on speaking rate alone.

Phonetic and phonological investigations of second-language pronunciation have found that non-native and native pronunciations differ on the dimensions which listeners seem to employ for making accentedness judgments. Flege and Bohn (1989) compared the acoustic-phonetic structure of native English and Spanish accented vowels, finding that producing appropriately reduced English vowels presented particular difficulties for learners. These findings are consistent with Bond and Fokes (1985), who reported that vowel reduction was challenging for non-native talkers from different language backgrounds. Flege, Munro and MacKay (1995) found persistent stop and fricative errors in the English produced by native speakers of Italian, even after many years residence in an English-speaking country. Guion, Flege, Liu and Yeni-Komshian (2000) found systematic differences in the durations of sentences produced in a second language. Ling, Grabe and Nolan (2000) examined the rhythm of English as produced by British speakers and English speakers in Singapore, reporting that Singapore English exhibited characteristics associated with syllable rhythm rather than the stress-based rhythm characteristic of British English. Theoretical perspectives

concerning second language phonology are extensively discussed in Ioup and Weinberger (1987).

There is an emerging consensus that talkers' native languages influence the phonological characteristics with which they produce a second language (see Scovel, 1988). Spanish learners of English frequently employ epenthetic vowels, fail to reduce unstressed vowels, and make predictable consonantal substitutions (Magen, 1998). American English listeners classify these patterns as speaking with a 'Spanish accent.' Many other languages are associated with specific foreign accent characteristics which listeners claim to be able to identify and even imitate (see Cunningham-Andersson and Engstrand, 1989). However, identifying specific accents may be a cognitively more complex task than identifying speech samples as native or non-native (Scovel, 1995). Listeners are also able to recognize spoken samples of foreign languages even when they neither speak nor understand them, suggesting that they are able to employ phonological representations of the 'sound' or 'acoustic signature' of languages (see Bond, Stockmal and Muljani, 1998; Bond and Stockmal, 2002).

To what extent are listeners able to generalize the 'acoustic signature' of a language to accentedness judgments? It is possible that knowledge of foreign accents comes from external information in that listeners require both previous knowledge of a specific foreign accent and of the 'sound' of a language in order to relate the one with the other. Alternatively, listeners may be able to employ language-internal characteristics, relating an unknown foreign language and accented speech on the basis of the phonetic and phonological patterns evident in both.

Experiment 1

The first experiment examined listener abilities to match accented speech to a native language. After hearing a recording of accented English, listeners were asked to select the native language of the talker from a series of competitors.

METHOD

Participants. Twenty-nine American college students with self-reported normal speech and hearing served as listeners.

Materials. A female native speaker of Japanese read a short passage in English. Her knowledge of English and her English pronunciation were excellent, appropriate for an instructor at an American university. This passage served as the material for exposure. In the test, listeners heard five 6-second excerpts per language from read speech produced by female native speakers of Arabic,

Chinese, Indonesian, Japanese and Russian. The Japanese samples on the test were produced by a different talker than the exposure passage but from the same dialect area in Japan.

Procedure. The listeners were tested in small groups in a quiet classroom. They first heard a recording of an English passage read by the female talker. The listeners were instructed to attend to the phonological characteristics of her pronunciation which made it sound non-native. After listening to the exposure passage, the listeners heard the test recording and were asked to select the native language of the speaker in the exposure passage from these competitors. For each language sample, they responded 'yes' if they thought the language was the native language of the talker; they responded 'no' if they thought the language was not the native language of the talker. At the end of the test, listeners were asked to identify the native language of the talker.

RESULTS

Correct identification. In the task of identifying a language as a source of foreign accent, listeners can make four kinds of responses. They can identify the target language and reject competitors correctly; they can err by incorrectly rejecting the target language or by accepting a competitor. In this kind of task, it is common to use A', a measure of sensitivity, to evaluate performance. A' is calculated from 'hits' here defined as correct identification of Japanese as the source of foreign accent and 'false alarms,' selection of a competitor as the source of the foreign accent (see Grier, 1971). The values of A' range from 0 to 1, which indicates perfect identification of the target as well as perfect rejection of competitors; .5 represents chance performance.

A' was calculated for each listener. The mean correct identification, A' =.55, SD = .22, was not significantly different from chance, (t = .009, n.s.). Listeners were unable to select Japanese as the source of foreign accent from competitor languages.

When identifying the native language of the talker, 22 of the listeners named an Asian language ('Asian', Chinese, Korean, Malay). Four named a European language (Italian, Spanish, Russian). One listener identified the source language as Hindi. Seven listeners identified the native language correctly as Japanese but these listeners were no better than the other listeners at selecting samples of Japanese from the competitor languages.

Error patterns. The listeners rejected Russian and Arabic as the native language at relatively high rates. They tended to identify the native language as a language spoken in Asia: Chinese, Indonesian or Japanese. These response patterns are given in Figure 1.

Fig. 1. Listeners correctly rejected both Arabic and Russian as sources of the foreign accent. They failed to correctly identify the target language, Japanese, as the source.

From Japanese-Accented English
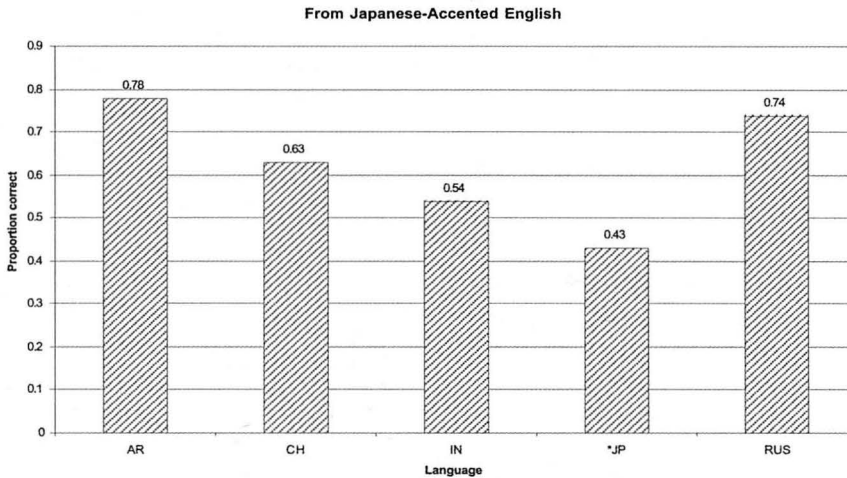
CONCLUSION

The conclusion is very clear. Listeners tended to locate the accented English in Asia, both by selecting Asian languages and by naming them, but the listeners could not identify samples of spoken Japanese as the native language of the talker. The listeners must have had some kind of phonetic or phonological representation of English as spoken with an 'Asian' accent but could not employ the representation to identify Japanese.

Perhaps the Japanese talker spoke English with so little trace of Japanese accent that listeners could not detect the phonetic and phonological similarities between the English sample and the Japanese samples.

Experiment 2

The second experiment replicated the first experiment with two modifications: the talker spoke with a noticeable foreign accent and, because listeners seemed to be sensitive to Asia as a geographical area, both the target language and the competitor languages were European.

METHOD

Participants. Twenty-two American college students with self-reported normal speech and hearing served as listeners.

Materials. A female speaker of Latvian read a short English passage with accented pronunciation. This passage served as the exposure material. The test materials consisted of five 6-second samples per language, excerpted from fluent reading by female native speakers of Finnish, German, Greek, Latvian and Russian.

Procedure. Listeners first heard a recording of the exposure passage read in accented English. They then heard the test recording and were asked to select the native language of the talker from these competitors. The listeners responded 'yes' if they thought a language sample represented the native language of the talker; otherwise, they responded 'no.'

RESULTS

Correct identification. A' was calculated for each listener from 'hits' and 'false alarms,' as in the first experiment. The mean A' = .32, SD = .32 indicated that listeners were responding below chance (t = 2.638, p < .02), completely unable to select Latvian as the source of the foreign accent.

Error patterns. Listeners correctly rejected Finnish as the native language. They rejected Greek, German and Russian at approximately equal rates. They were least accurate in identifying Latvian as the source of the foreign accent. These response patterns are given in Fig. 2.

Fig. 2. Listeners correctly rejected Finnish as the source of the foreign accent. They failed to identify the target language, Latvian, as the source.
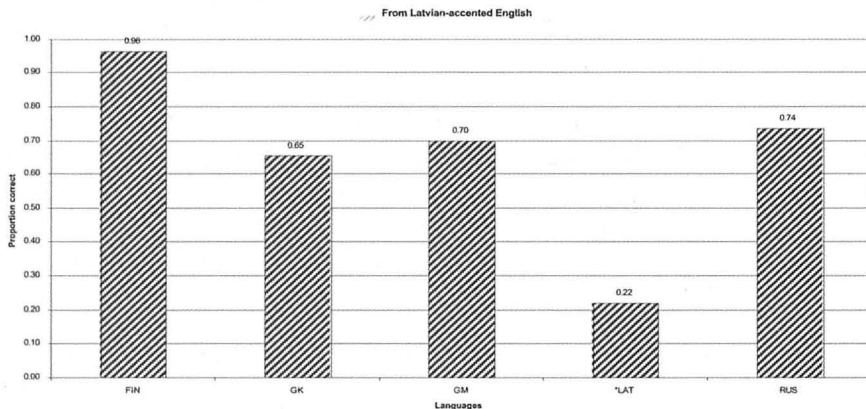
CONCLUSION

Although listeners correctly rejected Finnish, they failed to identify Latvian as the native language responsible for the accented English. Listeners were also not particularly sensitive to the geographic area of the target language.

Experiment 3

The task of building a representation of the 'sound' of a language from a sample of accented English may have been too difficult, requiring listeners to develop and remember a phonetic representation of an accent and apply it to foreign languages. The third experiment employed a task not quite as dependent on memory for identifying the 'sound' of a foreign language suggested by a foreign accent.

METHOD

Participants. Eighteen participants, drawn from the same population as the participants in the first two experiments, served as listeners.

Materials. The language samples employed in the second experiment served in the listening test for the third experiment but were rearranged to minimize reliance on memory. The test recording contained 6-second samples of Latvian-accented English, each sample paired with both Latvian and the four competitor languages. Latvian and each competitor language appeared five times.

Procedure. The listeners heard the test recording in a quiet classroom. For each pair of language samples (accented English and foreign language), listeners responded 'yes' if they thought the foreign language could be the native language of the speaker providing the English sample. Otherwise, listeners responded 'no.'

RESULTS

Correct identification. A' was calculated for each listener, using correct identifications of Latvian as 'hits' and identification of another language as the native language as 'false alarms.' The mean A'=.40, SD=.27, indicated that listeners were not responding significantly differently from chance (t = 1.57 n.s.).

Error patterns. For almost all language pairs, listeners were responding at close to chance levels. These response patterns are given in Fig. 3.

Fig. 3. In making 'Yes-No' judgments, listener responses to pairings of accented English and foreign languages did not differ from chance.

Correct YES-NO Judgments
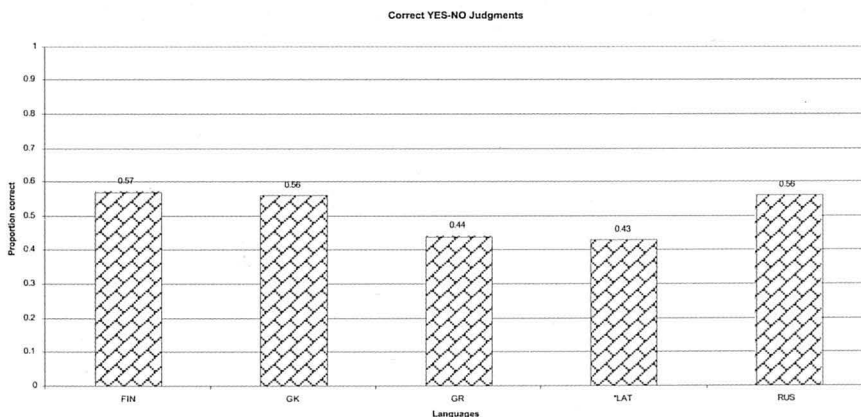
CONCLUSION

Listeners were unable to identify the native language of the talker correctly even when they heard both the accented English and the native language side by side. Simplifying the memory requirements of the task was not sufficient to enable listeners to identify a language as a source of foreign accent in English.

Experiment 4

Experiment 3 demanded categorical 'yes-no' responses from the listeners. It is possible that listeners had different evaluations of the likelihood that a particular language sample represented the talker's native language but that they could not express these differences using only two categories. In Experiment 4, listeners were asked to respond on a scale so that they would have the opportunity to show sensitivity to any foreign accent cues they detected.

METHOD

Participants. Thirty-one listeners, selected from the same population as in the previous experiments, participated in the study.

Materials. The same test recording was employed as in Experiment 3, samples of Latvian-accented English paired with both Latvian and competitor languages.

Procedure. For each language pair, listeners responded on a 7-point scale, indicating their judgment of whether the language might be the native language of the talker's accented English.

RESULTS

Mean ratings for each language indicate that listeners were most inclined to judge German as the source of the foreign accent, mean rating 4.97. They did not judge Latvian to be a particularly likely source of the foreign accent, mean rating 3.78, somewhat less than Greek, mean rating 3.97, and almost equal to Russian, mean rating 3.54. The listener responses are given in Fig. 4.

Fig. 4. In providing rating judgments, listeners responded with values in the middle of the scale and did not find Latvian most similar to Latvian-accented English.
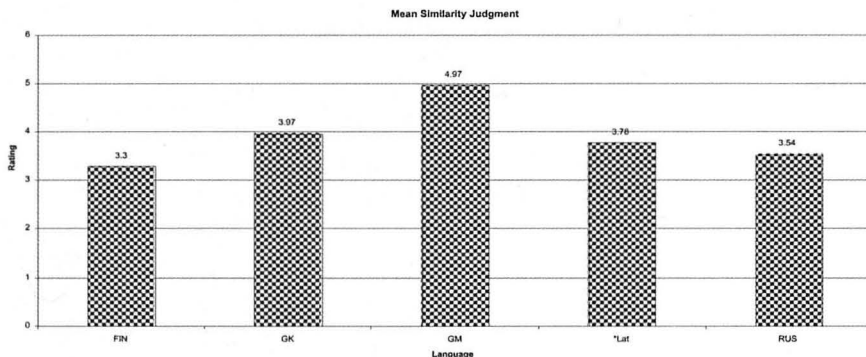
CONCLUSION

Even when able to respond on a scale, which might allow listeners to indicate various levels of sensitivity in their judgments, listeners failed to judge Latvian as the most probable source of the accented English.

General Discussion

In searching for foreign accent, monolingual listeners failed to find phonological commonalties between accented English and the target foreign language in all four experiments; that is, the listeners were not able to identify a foreign language based on the phonological patterns evident in unfamiliar accented speech. Without previous knowledge of both the acoustic signature of the language and the specific accented English, listeners were not able to match the accent with the language.

Even familiarity with a particular foreign accent did not enable listeners to identify the 'acoustic signature' or phonological pattern of the target language. In experiment 1, listeners claimed to recognize the talker's speech as 'Asian' 76% of the time, and 24% of the listeners correctly identified the talker's native language as Japanese, indicating that they were able to identify the foreign accent. However, despite this knowledge, they were not able to identify the language itself. In previous studies by Bond, Stockmal and Muljani (1998) and Lorch and Meara (1989), listeners were often able to locate a language within a geographic region. The error patterns suggest that the listeners did have some impression of 'Asian language' because they correctly rejected both of the non-Asian languages, Arabic and Russian, but had difficulty distinguishing Chinese, Japanese and Indonesian from each other.

Results from the second experiment are consistent with the first experiment. Listeners reported that they recognized the accented speech as 'European'. They correctly rejected Finnish but were unable to distinguish between the other four languages. These listeners reported no previous exposure to Latvian and so had no phonologcal representation of the target language available to them. The listeners may have been somewhat familiar with the 'sound' of Russian, German and, to some extent, Greek; consequently, they may have been willing to accept them as the target. Although these languages are commonly taught in universities, the listeners were not sufficiently proficient in any of them to evaluate their phonological commonalities with the accented speech. When listeners were asked to evaluate the similarity of the languages with the accented speech, they assigned similarity ratings in the middle of the scale to Greek, Latvian and Russian. Only Finnish, which was correctly rejected in the previous

experiments, was rated very dissimilar. German was rated most similar to the accented speech but may also be the language most familiar to the listeners.

Taken at face value, the results suggest that, without external knowledge of both the language and the resulting accented English, listeners are unable to match an accent with a language. When listeners identify a speaker as exhibiting a particular foreign accent, they must be doing this from external knowledge, from learning what that foreign accent 'sounds' like. Familiarity with a particular foreign accent does not necessarily transfer to knowledge about the 'acoustic signature' or phonetic patterns of the foreign language which is the source of the foreign accent.

Alternatively, there may be technical explanations for the results. It is possible that the listeners, young monolingual Midwestern Americans, have had so little experience with foreign accents that they were unable to form generalizations about their phonology. They may also have reacted differently to languages which are commonly studied, Russian and German, than to less commonly studied languages because the 'acoustic signature' of these languages was somewhat familiar. The listeners may have been distracted by talker voice quality, age, affect, speech rate, or other paralinguistic factors from attending to phonological properties. For example, the Latvian talker who provided the accented speech was almost 25 years older than the talker who provided the target language samples, while the German talker was about the same age. The accented English samples may have been untypical: either too good or too hesitant to allow listeners to interpret the phonology at the appropriate level of abstractness for making language identification judgments. Finally, listeners may not have had adequate samples of either the accented English or the foreign languages.

Several technical improvements should be incorporated into future studies including:

- Longer samples of accented speech, the target language, and competitor languages.

- Similar age and voice quality of talkers.

- Listeners who are somewhat familiar with accented speech and other languages.

Because these studies are quite preliminary and because it is very difficult to prove a negative conclusion conclusively, the question motivating this investigation, Are listeners able to use the 'sound' of a foreign accent to identify a corresponding foreign language? remains open.

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