

# AN ACOUSTIC STUDY OF FIRST- AND SECOND-GENERATION GUJARATI IMMIGRANTS IN WEMBLEY: EVIDENCE FOR ACCENT CONVERGENCE?

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## ABSTRACT

The present study investigated differences in the vowel production of first- and second-generation Gujarati immigrants in Wembley, north London. Subjects were recorded producing the eleven British English monophthongal vowels in the phonetic context /hVd/. F1 and F2 formant frequency values were measured and compared with existing acoustic and auditory descriptions of Standard Southern British English (SSBE). The results demonstrated that second generation immigrants had not acquired the foreign-accented vowels of their parents. Instead, these subjects produced vowels that were more similar to SSBE speakers than to those of second-generation immigrants in similar ethnic communities in London.

**Keywords:** accent variation, speech production, sociophonetics.

## 1. INTRODUCTION

One of the most powerful effects on speech today is thought to be mobility; people regularly come into contact with speakers not only from different accent backgrounds but also from different language backgrounds. This is particularly common in large urban centres where the immigrant population is high. In London, for example, people regularly come into contact with L2 English speakers whose native language is Punjabi, Gujarati or Hindi. Many immigrants settle permanently in their new country, raising their families there. Their children – second-generation immigrants – often grow up bilingually, conversing with their parents in both their parents' L1 and English; their L1 but their parents' L2. Consequently, they are frequently exposed to foreign-accented English.

This raises an interesting question regarding accent development in second-generation immigrants; given the foreign-accented speech

they regularly hear around them, what kind of accent might they acquire? At least initially, second-generation immigrants would be primarily exposed to the foreign-accented English of their parents. Consequently, one might expect that they too would acquire foreign-accented features in their own speech. However, informal accounts of the speech of second-generation immigrants have suggested that they do not typically acquire the accent features of their parents' speech, even in the early stages of language acquisition. Ethan, a son of Eastern European immigrants to Toronto who was born and raised in Canada was reported to speak English with the same accent as his native-born classmates, and even as a pre-schooler never acquired his parents' accent [2].

Whilst it seems likely then, that second-generation immigrants will speak with a native-like accent rather than one similar to their parents, it is possible that there may be fine-grained differences between their accent and that of native speakers (see also [6]). Many second-generation immigrants are raised bilingually, and studies of second-language acquisition have demonstrated that even early bilinguals behave differently in terms of their production and perception to native monolingual speakers [5]. One could also imagine that at least some second-generation immigrants might speak with a different accent to monolinguals for sociolinguistic reasons. Accent is a marker of identity and so second-generation immigrants may want to distinguish themselves from their native-born contemporaries through their speech [3]. Indeed, ethnic accents are well reported in the sociolinguistic literature [9,10], and are often claimed to be one of the sources of innovation and divergence in accent variation [9].

The present study focuses on variation in the vowel system of a group of first and second-generation immigrants in Wembley, north London. Wembley has a high Indian population with a large Gujarati-speaking community. The children of

many of the first-generation immigrants to this community are now young adults and the aim of this study was to investigate how their vowel production differed from that of their parents and native-born contemporaries. Subjects were recorded producing a set of test words. Comparisons were then made between first- and second-generation speakers, and with existing acoustic and auditory descriptions of varieties of London English.

## 2. METHOD

### 2.1. Subjects

A total of 20 subjects were tested, 10 first-generation immigrants (5 male and 5 female) and 10 second-generation immigrants (5 male, 5 female). First-generation speakers were aged 50-63 years (median 57 years) and had been resident in Wembley, London for 25 – 40 years (median 34 years). All were native Gujarati speakers who had been born and raised in India and had learned English at school. Second-generation speakers were aged 20-27 years (median = 23 years). With the exception of one subject who had moved to Wembley from India aged 2 years, all subjects had lived in Wembley for their whole lives and were resident in Wembley at the time of testing. All subjects reported that they were bilingual in both English and Gujarati.

No subjects reported any speech, hearing or language difficulties at the time of testing.

### 2.2. Stimuli

The eleven monophthongal vowels of English /i, I, e, æ, A, Q, O, U, u, 3, V/, were placed in the context /hVd/, giving the test words *heed, hid, head, had, hard, hod, hoard, hood, who'd, heard, and hud*.

All recordings were made in a quiet room using a Sony minidisc and Sony microphone. Stimuli were recorded with 44.1 kHz, 16-bit resolution and were later downsampled to 22.05 kHz.

### 2.3. Procedure

#### 2.3.1. Recording

The test words were printed on separate cards. Subjects were instructed to read each word, with a short pause between each word, and with a falling intonation. Subjects recorded four repetitions of each target word in a randomized order.

#### 2.3.2. Acoustic analysis

F1 and F2 were measured for each test word, giving four sets of measurements for each target word per speaker. For each speaker, F1 and F2 were then averaged for each word and these measurements were used in all subsequent analyses.

Acoustic measurements were made in Praat. Stimuli were located manually, and then F1 and F2 were extracted using hand-corrected LPC analyses. Formant frequencies were measured from the midpoint of the steady-state portion of the vowel, defined as the part of the vowel closest to the mid point and where the formant frequencies were most stable.

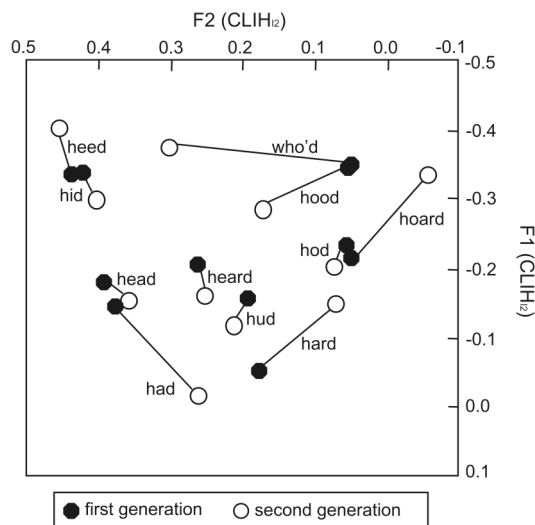
So that data from male and female speakers could be compared, a version of Nearey's individual log-mean procedure was used to normalize the data [1]. The procedure expresses each log-transformed formant frequency as a distance to a reference point, the log mean, which is calculated by averaging the log-transformed F1 and F2 values for all vowels for a given speaker. This procedure was chosen because it has been shown to be one of the most effective methods for reducing the effects of anatomical and physiological variation, while retaining the social and phonemic variation that is important for accent variation [1]. In this study the log mean was the mean F1 and F2 of all the vowels for a given speaker, averaged over the 4 repetitions.

## 3. RESULTS

### 3.1. Comparison of first and second generation immigrants

As displayed in Fig. 1, there were differences between first- and second-generation speakers. Second-generation speakers had a native-like vowel space, but first-generation speakers had a vowel space more similar to that of their L1 [7]. The differences in F1 and F2 were tested using separate repeated measures analyses with word (i.e., *heed, hid*) coded as a within-subject variable and age (i.e., first or second generation speaker) coded as a between-subject variable. There was a main effect of word for F1,  $F(10, 180)=66.2, p < 0.001$ , and F2,  $F(10,180)=80.15, p < 0.001$ , confirming that subjects were producing different words with different vowels. There was no main

**Figure 1:** Average F1 and F2 formant frequencies for words produced by first- (N=10) and second- (N=10) generation speakers.



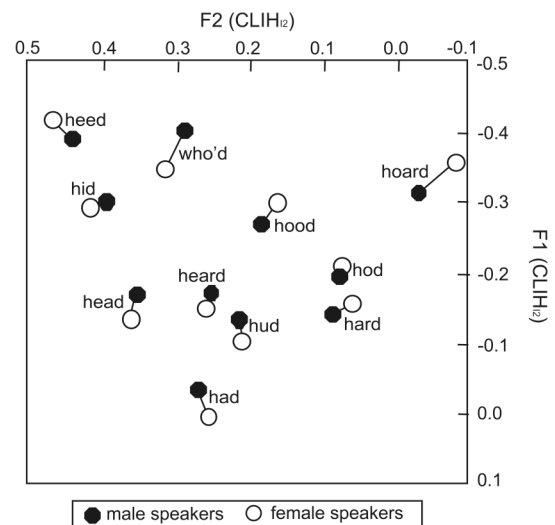
effect of age for F1 and F2,  $p > 0.05$ , but there was a significant interaction between age and word for F1,  $F(10,180)=8.72$ ,  $p < 0.001$  and F2,  $F(10,180)=12.09$ ,  $p < 0.001$ . Inspection of the data revealed that this was because first-generation speakers were producing some English vowels in the same way as second-generation speakers (i.e., *heard*, *hud*, *hod*), but that there were differences in others (i.e., *had*, *hard*, *hoard*, *hood*, and *who'd*).

### 3.2. Second generation immigrants

As displayed in Fig. 2, there appeared to be no major differences between male and female second-generation speakers. This was tested using separate repeated measures ANOVA analyses for F1 and F2, with word coded as a within-subject variable and gender as a between-subject variable. There was a significant effect of word for F1  $F(10,70)=50.41$ ,  $p < 0.001$  and F2,  $F(10,70)=109.8$ ,  $p < 0.001$ , confirming that subjects were producing different words with different vowels. There was no significant main effect of gender and no significant interaction of word and gender,  $p > 0.05$ , demonstrating that male and female talkers were producing similar vowels.

Second generation immigrants appeared to have vowel categories that were more similar to that of SSBE speakers than those of other speakers of South Asian descent in London [9]. In order to investigate this further, we compared our data with existing recordings of age-matched speakers

**Figure 2:** Average F1 and F2 formant frequencies for words produced by second-generation male (N=5) and female (N=5) speakers.

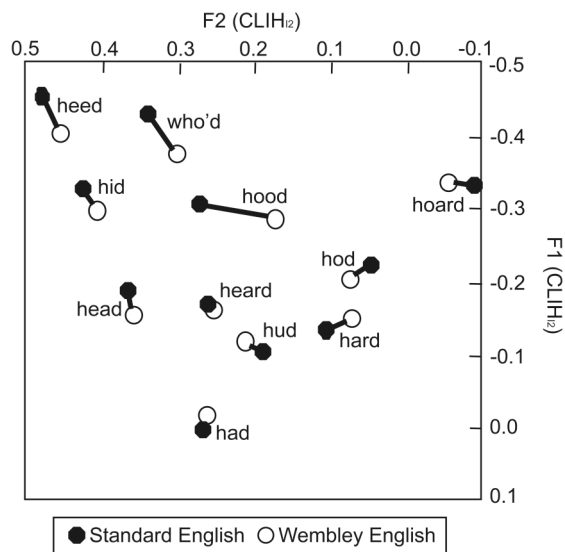


currently living in London [7]. As displayed in Fig. 3, there were few differences between our second-generation Wembley English speakers and SSBE speakers, though there appeared to be some differences for *heed* and *who'd* in the F1 dimension, and *hood* in the F2 dimension. The potential differences in F1 and F2 were tested in separate repeated measures ANOVAs with word coded as a within-subject variable and background (i.e., SSBE or Wembley) coded as a between-subjects variable. There was a significant effect of word for F1,  $F(10,120)=106.88$ ,  $p < 0.001$ , and F2  $F(10,120)=229.55$ ,  $p < 0.001$ , confirming that all subjects were producing different words with different vowels. There was no interaction between word and background for F1 or F2,  $p > 0.05$ , but there was a main effect of background for F1,  $F(1,12)=9.07$ ,  $p < 0.05$ , and F2,  $F(1,12)=9.07$ ,  $p < 0.05$ . Post-hoc testing revealed that for F1 this effect was being driven by the differences in *heed* and *who'd* (Fig. 3) and for F2 by the difference in *hood*.

## 4. GENERAL DISCUSSION

The results demonstrated that first- and second-generation immigrants in Wembley differed in their production of English vowels. The first-generation immigrants were all native speakers of Gujarati who had emigrated from India and learned English as a second language. Although they had lived in Wembley, London for between 25 and 40

**Figure 3:** Average F1 and F2 formant frequencies for second-generation Wembley English speakers (N=10) and SSBE speakers (N=5)



years and were all highly fluent English speakers, they did not produce English vowels with native-like formant frequencies. Second-generation immigrants however, produced English vowels that were predominantly more similar to those of SSBE speakers.

Chambers [2] has hypothesized that children of first-generation immigrants do not acquire aspects of their parents' foreign-accented English because they have an "innate accent-filter". That is, they hear their parents' foreign-accented pronunciations as native-like productions. However, previous research has shown that speakers are able to change their accent across their lifespan [4]. It is thus likely that these subjects, aged 20-25, had acquired aspects of their parents' accents as young language learners but had changed their accent as a result of other sociolinguistic influences (e.g., peer group).

Sociolinguistic influences might also be able to explain why these second generation immigrants produced vowels that were more similar to those of SSBE speakers than speakers from other ethnic communities in London. Previous research in Hackney, London has shown that young people are engaged in a process of innovation and divergence [9]. Indeed, immigrant communities are often leaders in sound change, and in London English, inter-ethnic contact is one of the main sources of innovation [9,10]. Although our subjects showed some similarities with the ethnic community in

Hackney – they produced *hood* with a more conservative, back vowel, unlike the fronted variant used by the SSBE speakers – they used predominantly SSBE-like vowels. SSBE is strongly associated with education and although all our subjects had lived in Wembley all their lives and were resident in Wembley at the time of testing, they were all socially mobile. That is, they had all attended or were attending university in London and worked or hoped to work in professional jobs. It is thus possible that these subjects used more conservative (i.e., SSBE) variants to fit in with this community. Indeed, informal interviews with subjects suggested that they felt it was important to use a standard rather than an 'ethnic' accent in order to be accepted in their university community or workplace.

In conclusion, whilst immigrant communities may often be sources of innovation and divergence, factors such as social mobility and identity also play an important role in determining an individual's accent within these communities.

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