

Phonetic Realizations of the New Zealand *KIT* Vowel in Relation to Two Social Variables

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ABSTRACT

This study investigates the extent to which two interviewers vary the articulation of the *KIT* vowel in a single lexical item in rapid survey recording. On account of the ritualistic nature of the speech act -- brief encounters, consisting of four questions, each requiring a one-word response -- variation was expected to be minimal. The results, however, point to the need not only to recognize the different phonetic realizations of the vowel, but also to acknowledge that the variation is systematic. In identifying and quantifying the relationship between the spectral properties of this vowel and the variations evident in the speech of the two interviewers, it will be argued that these variations coincide with recognized patterns in the speech community associated with age, and to a lesser degree with gender.

1. INTRODUCTION

Interviewer accommodation has been the subject of a number of studies, among others [1], [2] and [3], whose findings have been based on data obtained from a single speaker. This paper will present an acoustic analysis of data obtained from two interviewers in a non-laboratory setting with the objective of examining the relationship between phonetic realizations of the *KIT* vowel and variations associated with two social factors, gender and age. By studying the similarities and differences evident in the phonetic realizations of the target vowel in the speech of more than one interviewer it may prove possible to identify individual variation on the one hand and variation attributable to accommodating interlocutors on the other.

There exists a significant volume of research on the *KIT* vowel in New Zealand English, for example [4], [5], [6], [7]. In the course of studying the phonetic realizations of this vowel, it has been acknowledged, for example in [8], [4], [5], [9], and [7], that its quality varies, ranging from a high front vowel to a mid-central to mid-back vowel. How the vowel's phonetic realizations may be related to social variables is discussed in [9] and [10]. Their findings point to differences apparent between younger and older speakers, and claim that those in the latter group pronounce this vowel with a lesser degree of centralization

than younger speakers. The role of gender as a variable is considered in the works of [9], where it is claimed that there is a tendency towards a greater degree of centralization in the pronunciation of younger female speakers.

There has been little research on the acoustic characteristics of variation due to efforts to accommodate at the level of the individual, and none for more than one speaker. In attempting to fill this gap the present study investigates the extent to which two speakers vary the articulation of the *KIT* vowel in a single lexical item.

2. THE EXPERIMENT

Two female speakers of New Zealand English (similar in age, educational background, ethnicity and socio-economic status interviewed 332 and 521 people respectively in public places in Auckland, New Zealand. The technique used was the Taped Rapid and Anonymous Survey [11], [12], [3]. Those interviewed were approached using intercept or opportunistic sampling.

The interview consisted of four questions, each requiring a one-word response. The target of this study (unknown to the interviewers at the time of the study) was the *KIT* vowel in their speech. It occurs in the second of the four questions in the (stressed) vowel *this*: "What is *THIS* part of your body called"? (The interviewer held up a hand pointing to her ear.) That the same word occurred in the same position ensured control of the context, thus providing an ideal data base for examining accommodation in brief encounters. There was only one variable: the addressee, a stranger to the interviewer. First and second formant frequencies were measured and analyzed relating to two variables, gender and age.

3. RESULTS

The results obtained from the data of the first interviewer were discussed in [3]. What follows is an analysis of the second interviewer's data. After presenting the tendencies observed in the pronunciation of the *KIT* vowel in the speech of the second interviewer, a comparison will be made between the patterns of variation evident in the phonetic realization of that vowel for the two interviewers.

3.1 OVERALL VARIATION

The mean formant frequency values of the interviewer

indicate the pronunciation of the neutral vowel: F1= 530 Hz (SD: 83) and F2=1726 Hz (SD: 102). There is, however, noticeable variability in connection with both formant frequency realizations. The overall variations are summarized in Figure 1.

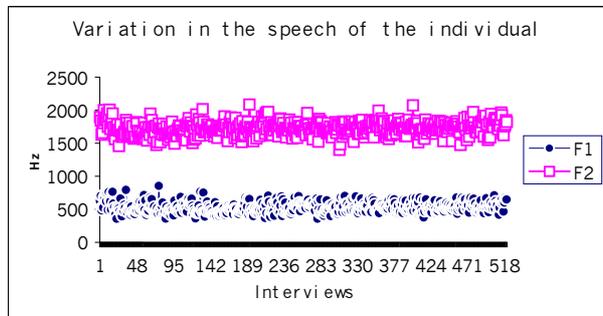


Figure 1. F1 and F2 values of the KIT vowel

The next step in the analysis was to determine whether the variations observed could be considered systematic. Thus, in order to identify possible patterns of variation, the measurement values of both formant frequencies were subjected to frequency distribution analysis. The distribution pattern as shown in Figure 2 attest to systematicity in variation: i.e., the interviewer may be aiming at a target.

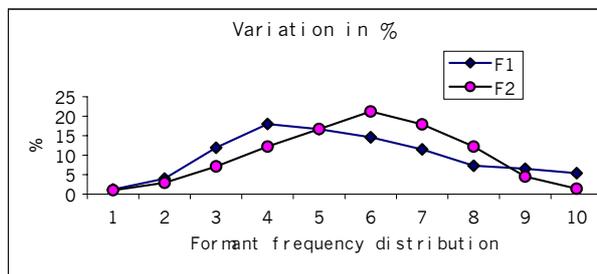


Figure 2. Overall variation in percentages.

3.2 VARIATION IN RELATION TO GENDER

The pattern observed in the phonetic realization of the KIT vowel does not indicate accommodation on the part of the interviewer with regard to gender. Table 1 presents the percentages of the formant values (extreme values that occurred less than 10% of cases were removed) targeted by the interviewer. There were 278 female and 243 male interlocutors in the corpus.

Frequency intervals	Percentages	
	Female	Male
F1 435 Hz - 595 Hz	70.9%	66.7%
F2 1600 Hz -1800 Hz	79.2%	78.6%

Table 1. Formant frequency distribution in relation to gender

The results presented in Table 1 suggest that there is very little evidence of attempting to accommodate either with regard to tongue height or to tongue backing. However, in examining the frequency intervals that F1 and F2 values

are concentrated around, there is a difference with regard to the gender of the interlocutors. This difference becomes evident when considering the peak frequency values relating to the responses to interlocutors in the respective gender group, as may be seen in Figures 3 and 4.

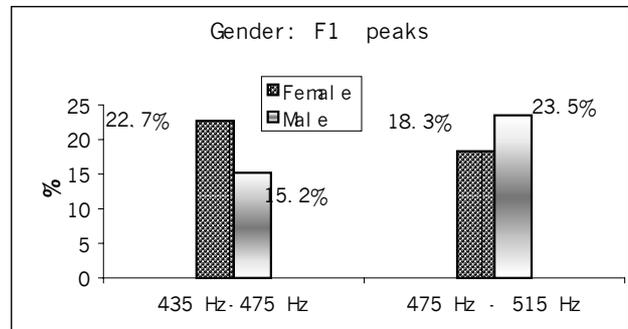


Figure 3. Peak value % in relation to gender:F1

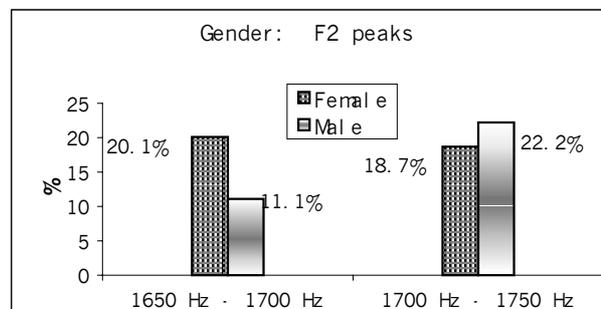


Figure 4. Peak value % in relation to gender:F2

The above two figures attest to different peak values in relation to gender. The interviewer has lower F1 and F2 frequency peaks when responding to female interlocutors.

3.3 VARIATION IN RELATION TO AGE

Impressionistic analysis by [3] argues for the need to distinguish between two age groups: 15-24 years and 25-34 years. Accordingly, working with this continuous variable, the same division -- younger speakers (YS) and older speakers (OS) -- was employed in the present study and in [3]. There were 112 younger speakers and 212 older speakers in the corpus. In Table 2 the formant frequency distribution in relation to age is shown:

Frequency intervals	Percentages	
	YS	OS
F1 430 Hz - 605 Hz	75.9%	68.6%
F2 1600 Hz -1850 Hz	77.7%	79.3%

Table 2. Formant frequency distribution in relation to age

The percentages corresponding to the range of F1 and F2 frequencies show that there exists some differentiation with regard to the realization of F1 frequencies, but little differentiation is evident in connection with F2 frequencies. By narrowing down the range of target frequencies, the peaks for both F1 and F2 were examined in relation to the two age groups.

Peak values indicating tongue height position differ in the two age groups; the direction of accommodation as shown in the higher F1 values attests to lower tongue position, as may be seen in Figure 5. There is no difference between the peaks for F2 with regard to younger vs. older speakers, implying that the interviewer does not aim at a different target for each of the two groups in respect of tongue backing.

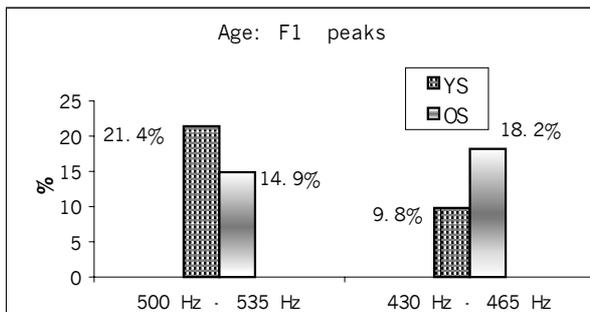


Figure 5. Peak value % in relation to age

3.4 VARIATION IN RELATION TO AGE AND GENDER

The different patterns evident in phonetic realizations with regard to the two age groups were further examined by dividing the data according to four cohorts based on combining age and gender. Thus, variations in relation to younger female, older female, younger male and older male interlocutor groups were analyzed in order to identify potential differences in accommodation effort on the part of the interviewer. There were 64 younger female, 64 older female, 49 younger male and 56 older male speakers in the corpus. That there is variation attributable to the interaction of age and gender variables may be seen in Table 3.

Frequency intervals	Percentages			
	Female		Male	
	YS	OS	YS	OS
F1 450 Hz- 590 Hz	66.9%	60.9%	60.4%	46.5%
F2 1600 Hz -1850Hz	78.1%	79.7%	77.6%	78%

Table 3. Formant frequency distribution in relation to age and gender

The distribution and wide range of formant frequency values for F1 indicate a considerable degree of variability. Indications of accommodating to a particular cohort may be seen only in connection with F1 where the interviewer's responses appear to differ when addressing younger or older male speakers.

In examining the peaks indicating F1 and F2 value concentration, it may be seen that the realizations of F1 targets evidence efforts to accommodate differently to members of the four cohort groups. With the exception of the realizations of F2 peaks, that are the same in the interviewer's responses to both younger and older female interlocutors, the tendency to differentiate can clearly be identified. Figures 6 and 7 present the peak values in

relation to the combined age and gender variables.

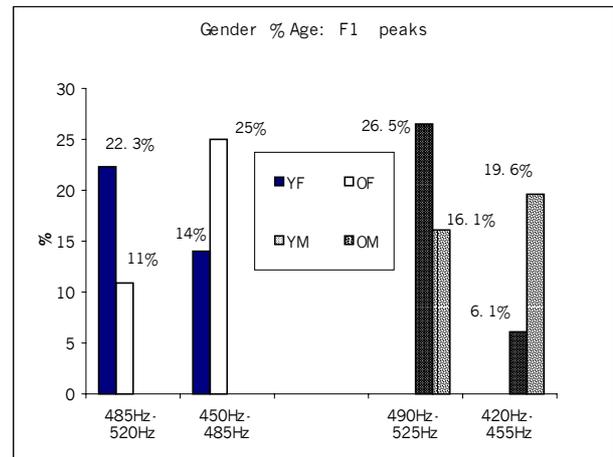


Figure 6. Peak value % in relation to gender and age

4. DISCUSSION

The results presented above suggest the need to recognize systematic variation in the speech of the interviewer. Systematicity is confirmed by correlating the apparent target frequency values to the two variables examined above. The tendencies revealed through identifying variation in the phonetic realizations of the KIT vowel in the speech of the interviewer point to accommodation with regard to both gender and age. As far as gender is concerned, the following tendencies exist: (i) variation associated with F1 shows little variation when responding to female vs. male speakers (435 Hz – 475 Hz vs. 475 Hz – 515 Hz), (ii) variation associated with F2 shows more back tongue position target in responding to female speakers (see Figures 3 and 4). As far as age is concerned,

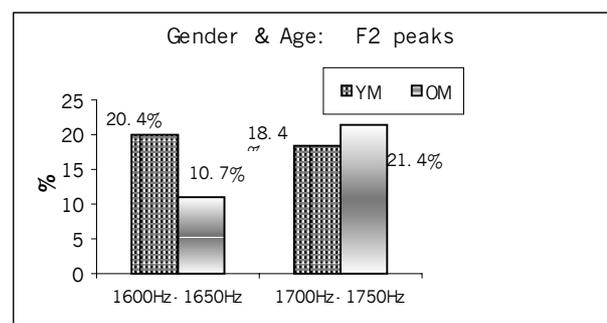


Figure 7. Peak value % in relation to gender and age

overall variation is evident only in connection with F1, the interviewer aiming at a higher vowel when responding to older speakers. When examining the variation in relation to both gender and age, the tendencies point to (i) distinguishing between younger and older female speakers, with greater degree of tongue lowering when responding to younger females, and (ii) distinguishing between younger and older male speakers by tongue lowering that is reflected in higher F1 values when responding to younger male speakers (see Figure 6 for comparing F1 peaks).

In [3] the tendencies observed in the variations of another interviewer are somewhat different from the results presented above for the second individual, in that there is more variation in the responses of the former with regard to F2 (i.e., tongue backing). The variations of the second interviewer are more pronounced with regard to tongue lowering. What this implies is that in the process of centralization two different strategies are employed by the two interviewers in the experiments: in one strategy, centralization is achieved with a greater degree of tongue backing, in the other there is a greater degree of tongue lowering. This contrast may be considered as the manifesting of individual differences. The results of the two experiments show, with regard to accommodation to the two variables examined, that there is considerable agreement inasmuch as there are (i) different patterns with regard to younger and older speakers, implying that a more advanced degree of centralization is associated with the younger age group, and (ii) different response patterns to younger and older male speakers indicating that the former group is also associated with a greater degree of centralization of the KIT vowel. Further, in comparing peak frequency values associated with younger female and male speakers on the one hand and older female and male speakers on the other, the tendencies evident point to efforts by both interviewers to distinguish between the two age groups regardless of gender. Evidence of attempts at such accommodation is shown in Table 4 where one of the interviewer's effort is manifested in the F1 peak and the other's in the F2 peak. These tendencies point to recognizing (i) the importance of individual differences between the two interviewers, and (ii) that age is the primary factor relevant in the process of centralization.

Frequency intervals	Percentages			
	Interviewer #1		Interviewer #2	
	YF	YM	YF	YM
F1 485 Hz- 520Hz	28%	16%	22%	27%
F2 1611 Hz-1661Hz	19%	19%	12%	20%

Table 4. F1 and F2 peaks relating to the YS group

4. CONCLUSIONS

The findings of the two experiments show that both interviewers produced a neutral vowel with varying realizations of F1 and F2 (see discussion in Section 3). This variation is systematic and appears to be conditioned by both the age and gender of the addressee. The responses of both interviewers to younger female speakers with a greater degree of centralization of the KIT vowel corresponds to results attested in the literature: i.e., younger female speakers produce more centralized vowels than older speakers. The consistency of the pattern evident in the responses of both interviewers in their aiming at a more centralized KIT vowel to younger male speakers may indicate a possible incipient change in progress not yet sufficiently discussed in ongoing research.

Analysis of the phonetic realizations of the KIT vowel in the two experiments suggests that the variation observed

in the speech of both interviewers is systematic, but also that these variations coincide with recognized patterns in the speech community with regard to age and gender.

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