THE *KIT* VOWEL IN NEW ZEALAND ENGLISH: IMPLICATIONS OF VARIATION IN THE SPEECH OF AN INTERVIEWER IN RAPID SURVEYS

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1. Introduction

It has been well established (i) that individuals are able to recognize features of language and associate these features with speaker characteristics with a high degree of accuracy (Purnell *et al.* 1999, Willemyns *et al.* 1997), (ii) that speakers use different percentages of features with different types of interlocutors (Bell and Johnson 1997, Rickford and McNair-Fox 1994), and (iii) that speakers modify their speech in the direction of their interlocutors during encounters when there is sufficient time to process multiple instances of salient features in each other's speech (Coupland 1984, 1980, Trudgill 1986). In such encounters, variation is explained on the basis of linguistic input from the addressee. But what happens in short encounters? Do speakers attempt to accommodate? This paper discusses linguistic variation in the speech of an interviewer in brief encounters where variation is expected to be minimal due to the ritualistic nature of the speech act.

The paper focuses on the vowel in words such as *kit, this, fish,* labelled by Wells (1982) as the KIT vowel. There are three reasons why this vowel was chosen for study:

(i) The saliency of the variable: Trudgill (1986) argues that salient variables are more subject to accommodation than non-salient ones.
(ii) The quality of the KIT vowel: the phonetic realizations of this vowel range from a high front vowel to a mid-central vowel (Bauer 1994, 1992, Bell 1999, 1997, Trudgill *et al*. 1997, Maclagan *et al.* 1999).
(iii) The apparent correlation between social and/or linguistic variables and the phonetic realizations of the KIT vowel (Allan and Starks 2000, Batterham 1995, Bell 1999, 1997, Trudgill *et al.* 1997, Maclagan *et al.* 1999).

The KIT vowel has been the subject of extensive study (Bauer 1994, 1992, Bell 1999, 1997, Maclagan 1982, Trudgill *et al.* 1997, Watson *et al.* 1998, Wells 1982, among others). Trudgill *et al*. (1997), Batterham (1995), Allan and Starks (2000) report on apparent differences between younger and older speakers in the realization of this vowel, asserting that older speakers have less centralization or lowering of the KIT vowel than younger speakers. Maclagan *et al*. (1999) and Bell (1997) point to gender as a sociolinguistic variable, arguing that younger female speakers have a greater tendency to produce centralized vowels. In the present study it is hypothesized that both gender and age play a role in the variation evident in the production of this vowel by the individual interviewer.

There has been little if any acoustic study of variation at the level of the individual. Thus the present paper aims at filling this gap by examining the realizations of one vowel in the speech of one individual in one particular setting. The findings show that variations coincide with patterns observed in the speech

community associated with age (Batterham 1995, Allan and Starks 2000) and to, a lesser extent, with gender (Maclagan *et al.* 1999, Bell 1997).

2. The experiment

The data was collected using the technique of the Taped Rapid and Anonymous Survey (Starks 1998, Starks and McRobbie-Utasi, to appear. McRobbie-Utasi and Starks 1999). The survey was conducted in public places throughout the city of Auckland, New Zealand. Those interviewed were approached using intercept or opportunistic sampling, i.e., any individual who passed by the interviewer was asked to participate (Cooper and Emory 1995). The interview consisted of four questions, each requiring a one-word response. The KIT vowel in the speech of the interviewer (the target of this study) occurs in the second of these questions in the (stressed) word *this*: *What is THIS part of your body called*? (She held up her hand pointing to her ear).

After the respondents answered the four questions, the interviewer collated the information concerning age, gender, and ethnicity. In all, 1243 surveys were completed, 433 by the first interviewer whose speech is being analyzed in this study.

The context in which the vowel occurred was controlled: the same word occurred repeatedly in the same position. The responses thus provide an ideal data base for examining accommodation in brief encounters. The only variable that changed was the addressee (a stranger to the interviewer).

Out of the 433 interviews, 361 were deemed suitable for acoustic analysis. The mean duration of the interviews is 51 seconds; the mean duration of the KIT vowel is 49 msec. First and second formant values were obtained, using the Praat software, version 3.9.13 (Boersma and Weenink 1992-2001). The method of measuring the formant frequencies was the same as employed by Watson *et al*. 2000. The point of duration where formant frequency values were obtained averaged 31 msec into the articulation of the vowel. Formant frequency measurement values were subsequently related to two variables: gender and age.

3. Results

3.1 Overall variation

The measurements of the first and second formants of the KIT vowel in the speech of the interviewer indicate that the pronunciation of the vowel is within the parameter of the neutral vowel articulation as presented by Maclagan *et al.* 1999. The mean frequency value of F1 is 479 Hz (SD: 46.8), and of F2 1591 Hz (SD: 95.2). *Figure 1* summarizes the overall variation by the interviewer. The extent of this variation appears to be less than that presented in the acoustic analysis of Watson *et al.* 1998.

In order to examine whether there is a pattern in overall variation in the speech of the interviewer, the F1 and F2 values were divided into ten steps on the basis of the formant measurements obtained (i.e., the measurement values were normalized on the scale of ten). Each of the F1 intervals contained values within a 30Hz range, and each of the F2 intervals contained values within a 50 Hz range. The distribution pattern thus presented in *Figure 2* shows that the variation is systematic: i.e., the interviewer may be aiming at a target value. Of the F1 values 84.8% fall between 416 Hz – 556 Hz; of the F2 values 72.2% fall between 1461 Hz – 1661 Hz. The tendencies observed suggest that there is a lesser degree

of variation in connection with the realization of the first formant; the greater degree of variation in F2 values corresponds to differing degrees of centralization.

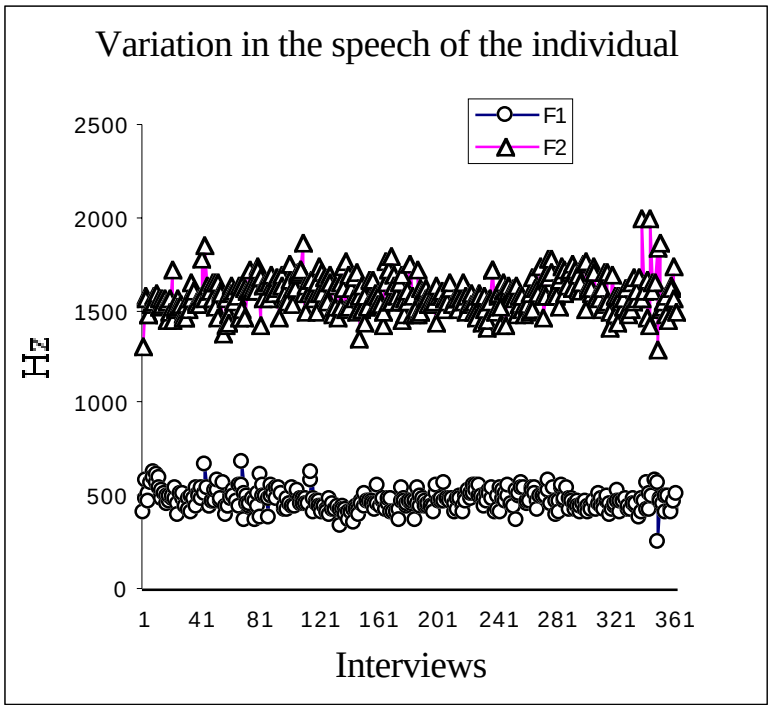

Figure 1. F1 and F2 values of the KIT vowel of the interviewer

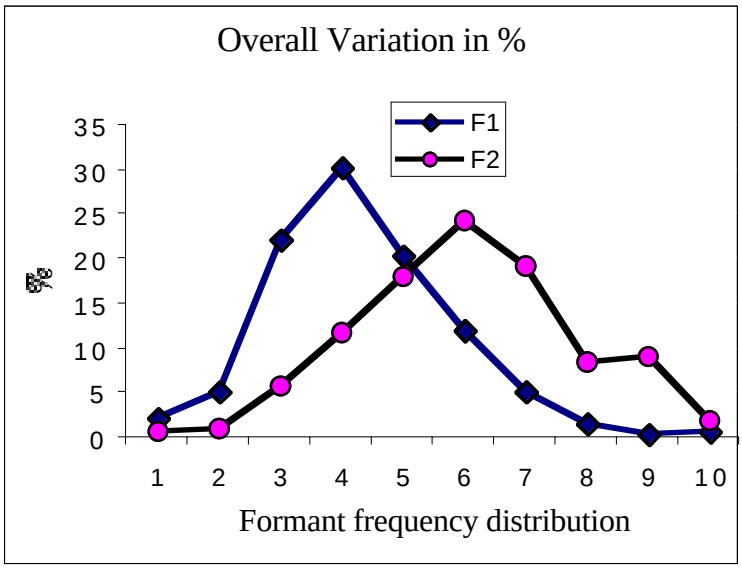

Figure 2. Overall variation in percentages

3. 2 Variation in relation to gender

In examining the variation in relation to gender the following pattern may be observed: (i) F1 measurements have similar values in the speech of the interviewer when questioning male and female speakers, thus there is no evidence of accommodation in this regard, (ii) there is more variation with regard to F2 values. This pattern is substantiated by the following measurement results (Table 1):

Table 1. Formant frequency distribution in relation to gender

	Frequency values	Percentages	
		FEMALE	MALE
F1	416 Hz – 556 Hz	82.5%	88%
F2	1461 Hz – 1611 Hz	75.6%	68.3%

The distribution of formant frequency realizations as presented in Table 1 suggests that vowel lowering does not play a role in the accommodation of the interviewer to her respondents. In connection with the F2 values, although a greater degree of variation with regard to tongue backing may be observed, the difference does not reach statistical significance.

For both genders there is a peak indicating where F1 and F2 frequency values are concentrated. Peak value percentage differences do not reveal any attempt by the interviewer to accommodate.

F1 peak:	451 Hz – 486 Hz	29.9% (FEMALE), 31% (MALE)
F2 peak:	1561 Hz – 1611 Hz	24.9% (FEMALE), 23.2% (MALE)

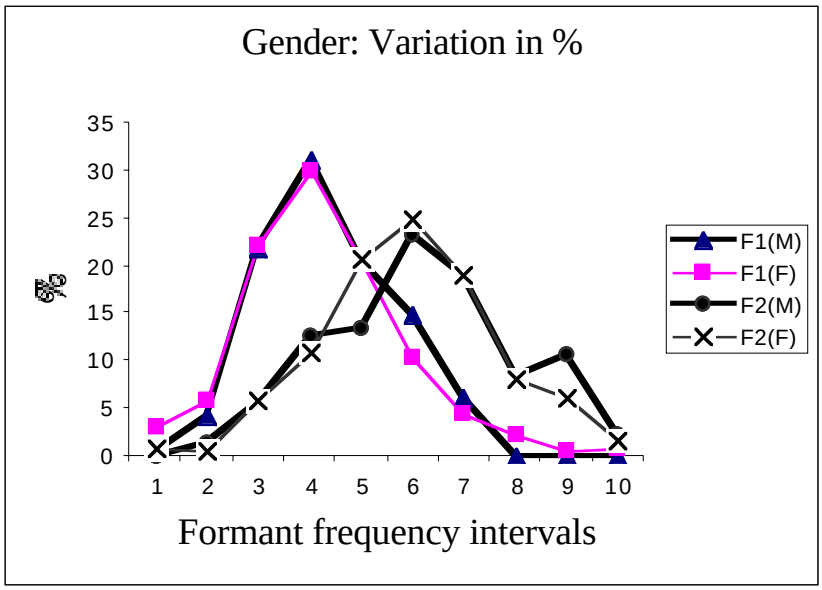

Figure 3. Gender: variation in percentages

The above figure summarizes the variation in percentages in relation to gender. It can clearly be seen from the graph that F1 values almost completely overlap, and that F2 values reflect little difference.

Consequently, it may be stated that variation in the speech of the interviewer cannot be accounted for on the basis of gender alone. .

3.3 Variation in relation to age

Impressionistic analysis of the respondents' KIT vowel when occurring later in the interview (reported in Allan and Starks 2000) indicates that realizations of the vowel differ most noticeably between two age groups: 15-24 years and 25-34 years. Accordingly, in working with age -- a continuous variable -- this division is

employed in the present study. The assumed difference is substantiated by the measurement values suggesting attempts to accommodate by the interviewer. Table 2 summarizes the distribution of the formant frequency realizations in relation to these two age groups.

Table 2. Formant frequency distribution in relation to age

	Frequency values	Percentages	
		YS	OS[1]
F1	416 Hz – 556 Hz	76.8%	85.3%
F2	1461 Hz – 1611 Hz	70.1%	66.6%

For both age groups there are peaks indicating where F1 and F2 frequency values are concentrated. *Figure 4* summarizes the variation in relation to age.

F1 peak:	451 Hz – 486 Hz	34.1% (YS), 22.1% (OS)
F2 peak:	1561 Hz – 1611 Hz	20.4% (YS), 26.5% (OS)

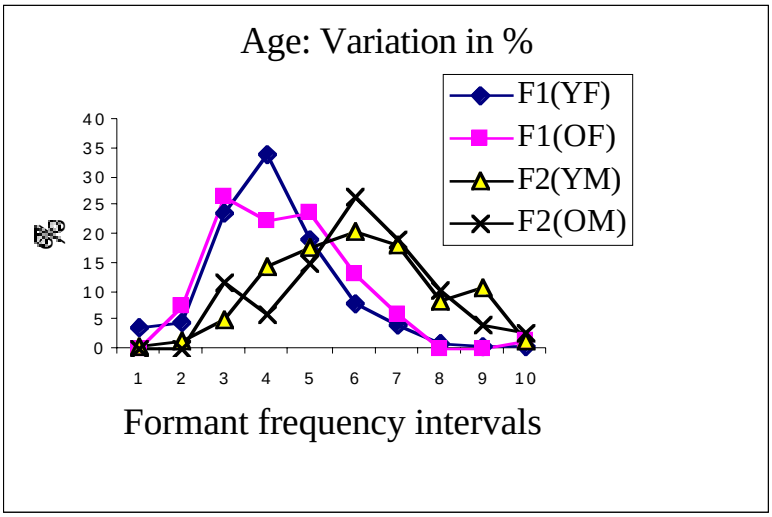

Figure 4. Age: variation in percentages

The pattern presented above suggests that the interviewer may be targeting a less centralized vowel when addressing speakers in the second group, i.e., those between the ages of 25-34 years. The realizations of peak frequency appear to be in conformity with this pattern of accommodation.

The differences observed with regard to age were examined further in relation to gender, in order to establish whether they may be attributed to age alone, or to differences in connection with one and not the other gender. Accordingly, formant frequency realizations by the two age cohorts (YF-OF and YM-OM) were compared. *Figures 5, 6, 7 and 8* [2] show the interaction of these two variables in relation to F1 and F2. For female speakers there appears to be a difference between the realizations of both F1 and F2 for younger and older speakers; for male speakers the difference is more evident with regard to F2. Implications of these patterns are discussed in Section 4.

[1] YS (Younger Speakers: 15-24ys.), OS (Older Speakers: 25-34 ys.).
[2] YF (Younger Female), OF (Older female); YM (Younger Male), OM (Older Male).

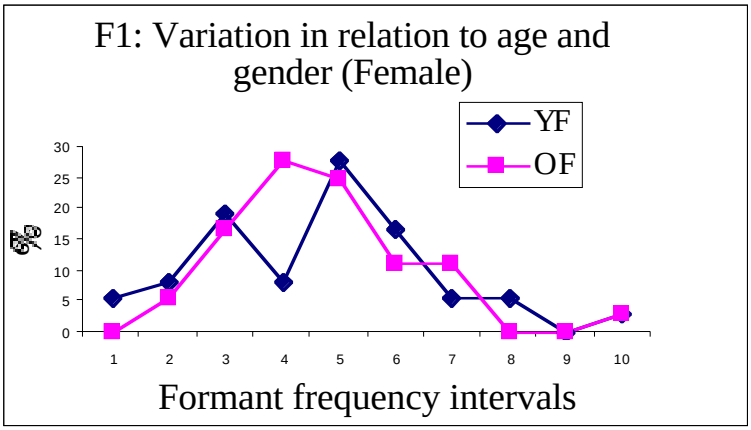

Figure 5. F1 variation in % in relation to age and gender (female)

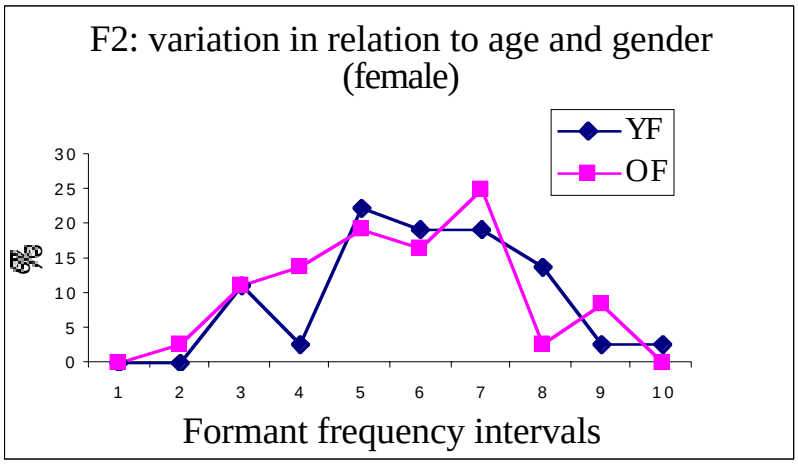

Figure 6. F1 variation in % in relation to age and gender (male)

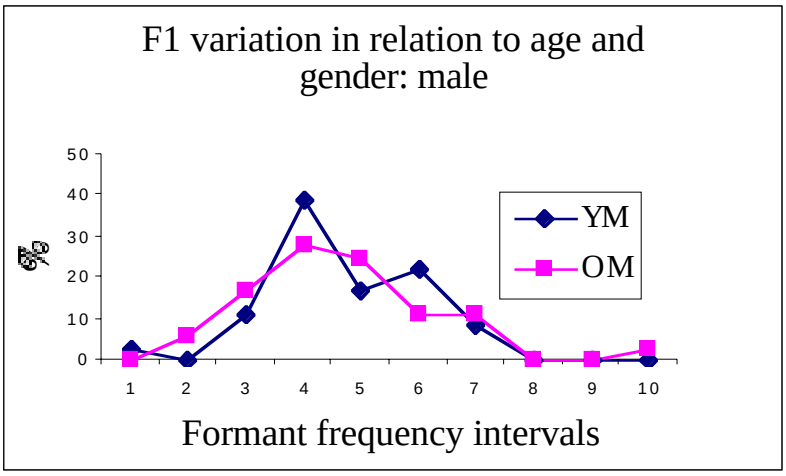

Figure 7. F2 variation in % in relation to age and gender (female)

The formant frequency measurement values in relation to both variables -- gender and age -- are summarized in the two tables below. Table 3 presents an overview of formant frequency peaks in percentages in relation to (overall) age and gender; the overview presented in Table 4 summarizes the realization of peak values with the two age groups in relation to gender.

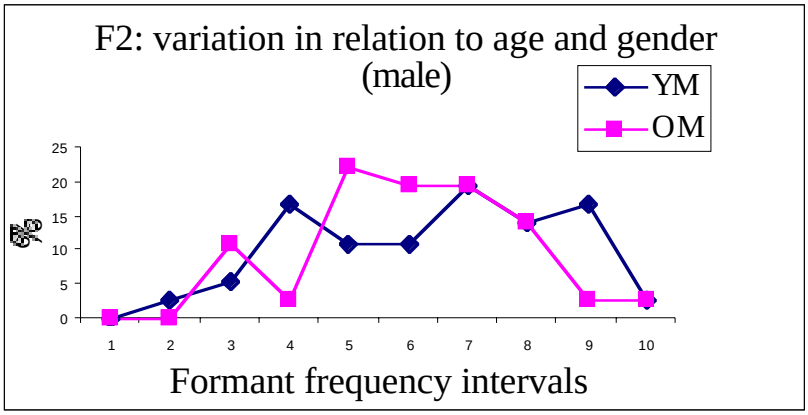

Figure 8. F2 variation in % relation to age and gender (male)

Table 3. Overview of formant peaks and percentage of variance: gender and age (overall)

	F1 Peak	% of variance	F2 Peak	% of variance
Female	451 Hz - 486 Hz	29.9%	1561 Hz – 1611 Hz	24.9 %
Male	451 Hz – 486 Hz	31%	1561 Hz – 1611 Hz	23.2%
YS	451 Hz – 486 Hz	34.1%	1561 Hz – 1611 Hz	20.4%
OS	451 Hz – 486 Hz	22.1%	1561 Hz – 1611 Hz	26.5 %

F1 range: 416 Hz – 556 Hz; F2 range: 1461 Hz – 1711 Hz

Table 4. Overview of formant peaks and percentage of variance: gender and age (combined)

	F1 Peak	% of variance	F2 Peak	% of variance
YF	486 Hz - 521 Hz	27.8%	1561 Hz – 1611 Hz	22.2 %
OF	451 Hz – 486 Hz	27.8%	1611 Hz – 1661 Hz	25 %

YM	451 Hz – 486 Hz	38.9%	1561 Hz – 1611 Hz 1661 Hz – 1761 Hz	50%
OM	451 Hz – 486 Hz	27.8%	1611 Hz – 1711 Hz	52.7 %

F1 range: 416 Hz – 556 Hz; F2 range: 1461 Hz – 1761 Hz

4. Discussion

The variation in the speech of the interviewer is similar to that found in other studies which consider more speakers and more lexical items (Watson *et al*. 1998, Maclagan 1982.).[3]

The pattern presented above reveals greater variation with regard to F2 than F1, implying that there is little variation in vowel height though there is considerable variation with regard to centralization.

The variation is systematic, i.e., there is evidence that accommodation occurs on the part of the interviewer with regard to the two variables examined above. The results of the experiment suggest that the quality of the KIT vowel produced in brief encounters almost certainly depends on the gender and/or age of the addressee. In particular, the vowel quality will differ (i) for respondents under and over 25 years, (ii) for younger males and younger females, and (iii) for older females and younger females.

It was pointed out above (Section 3) that peak frequency values were studied in order to examine whether there is a systematic attempt by the interviewer to approximate a certain target when addressing respondents of a different age and/or gender. The tendencies revealed by the distribution of percentages in relation to peak frequency values point to the relevance of age group (i.e., younger vs. older speakers) and more specifically, the gender of the respondents belonging to one or the other age group. The patterns emerging on the basis of these variables were further tested by way of examining the differences in the mean frequency values pertaining to F1 and F2 realizations by speakers. Table 6 summarizes those variables in connection of which significant statistical differences were found.[4]

Table 6. Summary of the results of t-tests: age (overall), gender and age (overall), gender and age (female)

Age (overall)	Gender and age (overall)	Gender and age (female)
M F2(YS) 1585 Hz (SD: 87)	*M* F1 (YM) 421 Hz (SD: 53)	*M* F1 (YF) 554 Hz (SD: 87)

[3] A greater disparity in the F1 and F2 values in Watson *et al*. (1998) was to be expected as their study included 10 speakers and focused on four words, while in the present study the KIT vowel was examined in one word only spoken by one speaker.

[4] Formant frequency differences with regard to (i) gender, (ii) F1 for (overall) M,F, (iii) F2 for YS (M,F) and OS (M,F), (iv) F2 for (female) age, and (v) F1 and F2 for (male) age are statistically not significant, $p < .05$.

*M*F2(OS) 1711 Hz (SD: 78)	*M* F1(YF) 554 Hz (SD: 87)	*M* F1(OF) 460 Hz (SD: 87)
$p < .05$	$p < .05$	$p < .05$

In interpreting the results presented in this study, the following patterns emerge with regard to the issue of accommodation by the interviewer to her respondents in brief encounters:

(i) Gender: it appears that in considering gender alone the stereotypes suggested in the literature do not play a role in the realization of the KIT vowel by the interviewer (but see below!)

(ii) Age: there are different patterns for respondents under and over 25 years, implying that a more advanced degree of centralization is associated with the younger age group.

(iii) The different response patterns observed with regard to younger vs. older male interlocutors indicate that younger males are also associated with a greater degree of centralization of the KIT vowel than older male speakers.

(iv) The patterns evident in relation to both variables lead to the conclusion that the interviewer may be aware of the stereotyping of younger female which leads to the process of centralization.

5. Conclusion

The findings show that the interviewer produced a neutral vowel with some minor variation. This variation appears to be conditioned by the age, and, to a certain extent, gender of the addressee. The interviewer produced a less centralized KIT vowel when the respondent was older or male (although as indicated above, there appears to be a pattern present in connection with younger male respondents approximating to that of the younger female respondents).

In New Zealand English, older speakers produce a less centralized KIT vowel than do younger female speakers (Maclagan *et al.* 1999). Although the phonetic targets of the interviewer are fewer than those in the broader community, the direction of the changes in her speech mirrors those observed in the wider community. The variation attested in the speech of the interviewer could result from linguistic input from the interviewee and/or recognition of stereotypes. Purnell *et al.* (1999) have shown that speakers can identify the ethnicity of an addressee on the basis of a single lexical item. Thus, because the KIT vowel in the speech of the interviewer occurred on average 31 sec into the survey, there would have been sufficient time for her to attempt to accommodate. It is, however, more likely that the interviewer is using her knowledge of the speech community as a basis for modifying her own pronunciation of the KIT vowel. There are two arguments in support of this assumption: (i) it is usually the oldest members of the community who produce less centralized KIT vowels (Maclagan 1982); but in the present study the oldest speakers were well below the age where the front variant of the KIT vowel is likely to occur, and (ii) the modifications in the interviewer's speech fall within a relatively limited range, whereas innovative and conservative forms of the New Zealand

English KIT vowel (Maclagan 1999 and Bell 1997) fall outside those attested by the interviewer.

The present study is part of a pilot project aimed at examining the extent of accommodation by the individual in brief encounters with respondents differing in gender and age. While it does appear that stereotypes may play more of a role -- due to the minimum linguistic input in the type of data collection employed -- given the fact that the speech of only one individual was analyzed, and inasmuch as the possible impact of the minimum linguistic impact was not considered, further studies are needed to confirm the degree of accommodation expected with regard to the variables examined.

Implications of the acoustic analysis confirm assumptions stated in previous studies with regard to the role of gender and age in the different realizations of the KIT vowel (Batterham 1995, Allan and Starks 2000), concerning age) and Maclagan *et al.* 1999, Bell 1997, concerning gender. One of the tendencies that became apparent in the present study has not yet been discussed in the literature: accommodating to younger male speakers appears to be similar to the accommodation to younger female speakers, implying that age is the most relevant factor when considering the process of centralization.[5]

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[5] Analysis of two additional individuals participating in the same experiment is in progress. Further, an additional variable, ethnicity, is also included in the next stage of the project that will examines accommodation by the individual in relation to social variables.

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