

# Language Contact in Kera (Chadic)

Mary Pearce

SIL International and University College London

## 1. Introduction

This paper examines the effect on Kera speakers of contact with French, Tupuri, and Arabic. Kera is an Eastern Chadic language spoken by 50,000 speakers in Chad and Cameroon. (Ebert 1979, Pearce 2005, 2006a,b, 2008, 2009). The main areas of interest are the effects of French voicing on the Voice Onset Time (VOT) and tone, the phonological structure changes that occur between town speakers and village speakers, using evidence from production and perception experiments, the changes from a 3-way tonal contrast to a 2-tone and voicing contrast, gender differences, and loss of tone.

We will consider phonological issues such as the point along the phonetic continuum from village to town at which the phonological grammar changes, and what grammar is used by those who move to town as teenagers. We will also look at sociolinguistic issues such as the fact that village women are more conservative than village men, while the women in town are the most ready to accept the changes arising from language contact. We will consider the evidence from acoustic phonetics, which shows that both languages (L1 and L2) are affected by the language contact. Although Chadian French has a VOT contrast and no tonal contrast, the VOT and pitch in Chadian French, when spoken by a Kera speaker, vary according to Kera values. And yet Kera speakers maintain distinct phonetic settings for the two languages. When Kera speakers speak French, they use Kera phonetic vowels.

The duration of the vowel, the amount of reduction and the orthography all play a role on the vowel quality produced by the Kera speaker. Finally, in loan words, the tone patterns, voicing and vowel quality of Tupuri, Arabic and French all have an influence.

## 2. Tone

### 2.1. Kera Tone Facts

Any linguist encountering Kera is likely to notice both voiced and voiceless obstruents in contrast and contrastive tone. They may also observe that Kera consonants interact with tone. In the following examples, there is a correlation of L tone with the apparent voiced obstruent.

(1)	[H]	káasáw	‘millet’	[L]	ḍàagà	‘mat’
	[M]	pāatāl	‘needle’	[HL]	táaḅùl	‘table’
	[HM]	táasā	‘cup’	[LH]	ḍàktóláw	‘bird’
	[MH]	tāatá	‘big jar’			

In fact, the situation is more complicated than this, as seen from the perception test described in the following section.

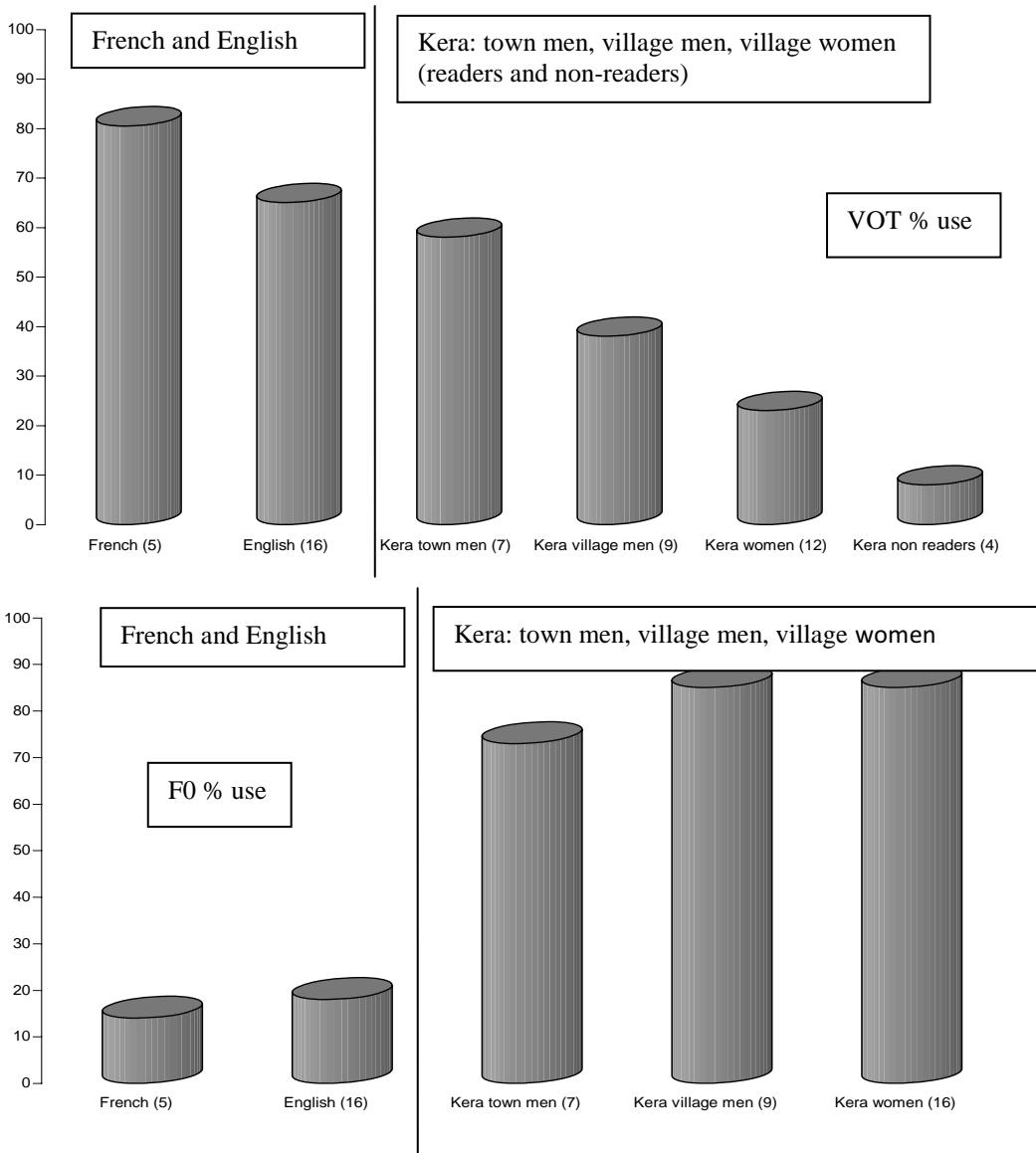
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\* Most of the data in this paper have been included in my doctoral thesis, Pearce (2007) and in other papers by Pearce. The value of this paper is that it is a concise collection of these facts with the focus on the effects of language contact. I would like to thank the Kera speakers who worked with me during 1992-2002, 1994, and 1996, the linguistic department of UCL, the members of the London Phonology Seminar and particularly Moira Yip.

2.2. Perception test

In a perception test, described in detail in Pearce (2007), 200 tokens of the words *ta*, *da*, *ke*, *ge*, *pi*, and *bi* were played to each of 32 Kera subjects. The tokens differed in VOT and in pitch (manipulated in PRAAT) and each subject was asked to circle the word *ke* or *ge* etc. to indicate whether they had heard voicing. Similar tests were run involving French and English subjects. These words all have meaning in Kera (with minimal pairs for tone and/or voicing), so the task was understood in terms of which word they had heard. The results show that the Kera subjects use voice onset time a lot less than English and French subjects. This is to be expected, as tone plays a more important role for them. But between Kera subjects, there is quite a range of results, depending on whether the subject comes from a rural or urban setting and according to their gender. The main influence is likely to be how much contact they have had with French. The use of pitch (F0) also differs between these populations, but to a lesser extent. Tone is still of major importance to all Kera speakers. The numbers in brackets indicate the number of participants in each category.

(2) Use of VOT and F0 in voicing judgements (as a percentage)



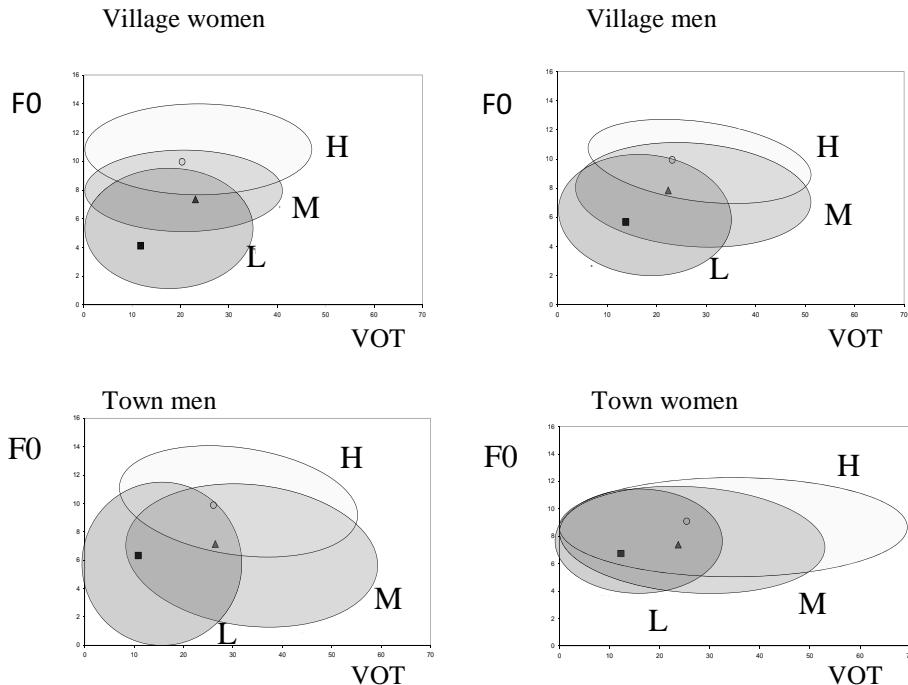
### 2.3. Production test

Although the perception test gives us the idea that there is a change in the use of tone and voicing due to language contact, it is production data that gives us greater detail in how this is occurring. We will be considering the four populations which result from splitting the Kera up according to location (rural or urban) and gender. The following graphs are based on measurements which were taken of the voice onset time of obstruents and the pitch of the following syllable in natural speech. They show an F0/VOT plot for five people in each category. The points indicate the mean values of L, M, and H for each speaker. The circles give some indication of the spread of the tones. Even though the contrast is not tonal in some cases, the labels of L, M and H are still used to indicate the same groups of words.

In the following graphs we can observe the following:

- (i) For village women, VOT is clearly not contrastive and plays a minor role, whereas there is a 3-way tonal contrast.
- (ii) For town men, the grammar appears to be changing to a 2-way tonal contrast and a 2-way VOT contrast (still with 3 contrasts overall). Town men are the most influenced by French.
- (iii) The situation for town women is not considered phonologically viable as a 3-way contrast between positive VOT is not attested in other languages and the circles are largely overlapping. I assume that this pattern has emerged because the speakers are in the process of changing their grammar. It would be interesting to see similar results in say five years time.
- (iv) Even though village Kera has probably developed (through tonogenesis) into a tone contrast with no voicing contrast, the process seems to be acting in reverse through French contact. (See Pearce (2007) for a discussion as to why the analysis cannot be the reverse where village women are gaining a tone. Pearce (2007) also gives more insight into the various theories of tonogenesis).
- (v) The VOT value is never negative so the so called voicing is not true voicing. As in English, optional voicing is allowed when the target is a short VOT, but on average, this is not the norm.

#### (3) Changes in contrast across populations



The most likely explanation for these changes is French contact combined with gender differences. The gender issue is discussed briefly later on, but the main focus of this paper is on the effects of language contact.

## 2.4. Is the tonal contrast maintained in sonorant words?

In the data above, words of all kinds were measured for pitch while words with obstruents were measured for the VOT results. But the question remains whether the same tendencies occur in words with only sonorants. In these words, there is no VOT value to suggest contrast, so the question needs to be asked whether town dialects retain a tone contrast in these words. Approximately 120 words containing no obstruents were used in the graph below. That is not a large enough sample to give a basis for any certain claims, but it does give us some indication of what is happening. The graph shows the mean value of each of the tones for each category of speaker. There seems to be a certain resistance to change in sonorant words, even in town speakers. But many say differences of one semitone are not robust for establishing a tonal difference<sup>1</sup>. We can therefore say that there is probably some phonetic reluctance to lose tones when there is no other difference, but tones are being lost all the same. In minimal pairs, where the tone is the only difference, more of a contrast is maintained in all of the groups.

### (4) Contrast in tone in sonorant words

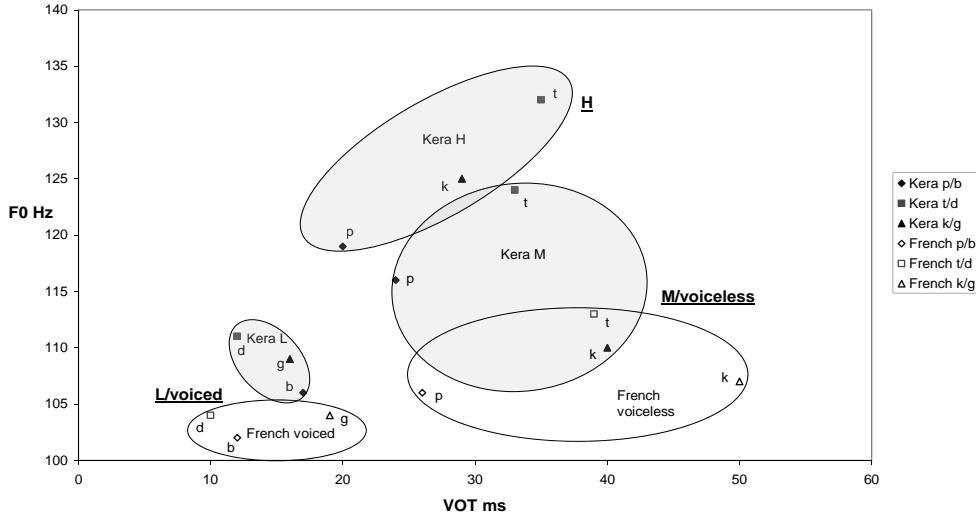


## 2.5. Is French pronunciation affected in Kera speakers?

So far we have seen that Kera is affected by French contact. But we would also expect the French of Kera speakers to be affected by Kera. So in general: We know that L1 is affected by L2. Is L2 also affected by L1? We now look at the French of a Kera speaker and compare it to French of a non-Kera speaker. We also compare his Kera to the Kera of a non-French speaker. First of all, we consider the Kera and French consonants for a Town speaker. Note that the voiced French consonants take up nearly the same phonetic space as the Kera L tone consonants. The same can be said for the voiceless French consonants and the Kera M consonants. The phonetic spaces are close, but not precisely the same. The H tone set in Kera has no corresponding consonant set in French. It seems the phonetic space is close but not identical for the two languages. Obviously for a complete study of this kind, we would need many speakers, but it seems clear that both languages are affected by each other.

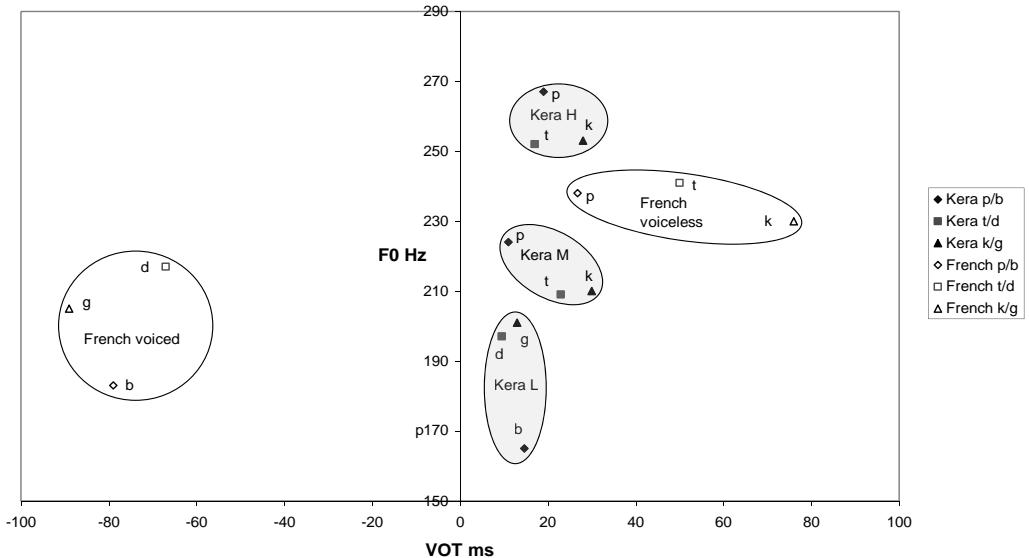
<sup>1</sup> Thanks to a reviewer who points out that a difference of one semitone is robust in some four tone languages including Mambila.

(5) *Kera and French comparison for a Kera speaker*



We now compare this with the results for a Belgian woman (with no Kera) and a Kera Village Woman (with no French). The graph below shows the situation (superimposed) when there is no contact between the two languages. The French and Kera consonants are nowhere near each other. If the Kera Town speaker was not affected by French contact, his graph would presumably be like this. But we can see from (5) that his results are completely different. Clearly the contact is affecting both languages. (Though it should be noted that Chadian French is not identical to Belgian French, particularly when it comes to voicing).

(6) *Comparison of French and Kera with no contact between them*

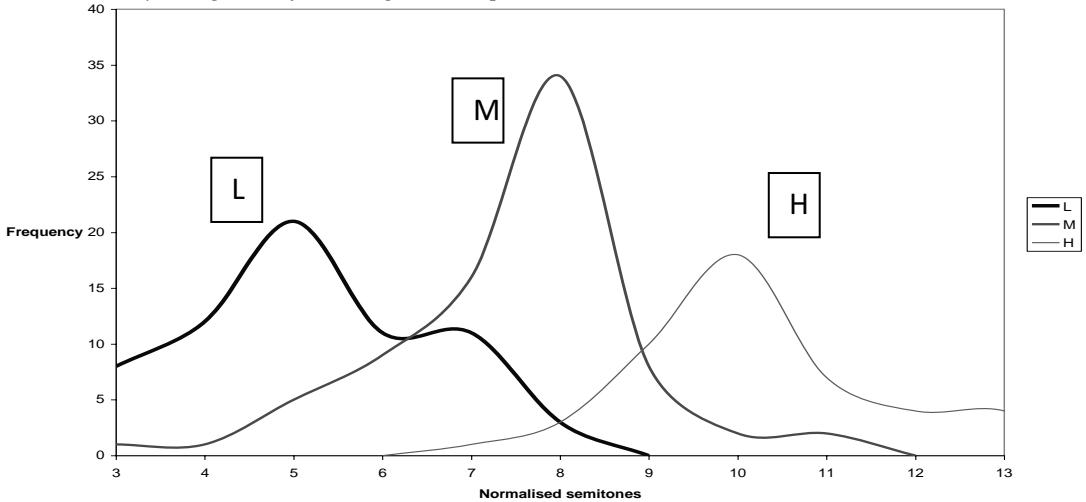


What can we conclude? The contact with French has had a clear effect on both languages. We might expect the two languages to be stored separately, but it seems that there is interference. This may imply that they are storing L1 and L2 phonetic data in the same phonetic space. This is a claim made by Flege (1987, 1995) and Best (1995). But we can see that the overlap is not 100% for the speaker above. And we would expect that the best bilingual speakers would keep the phonetic space of the two languages separate at least to some extent. Clearly there is more scope for more research in this area.

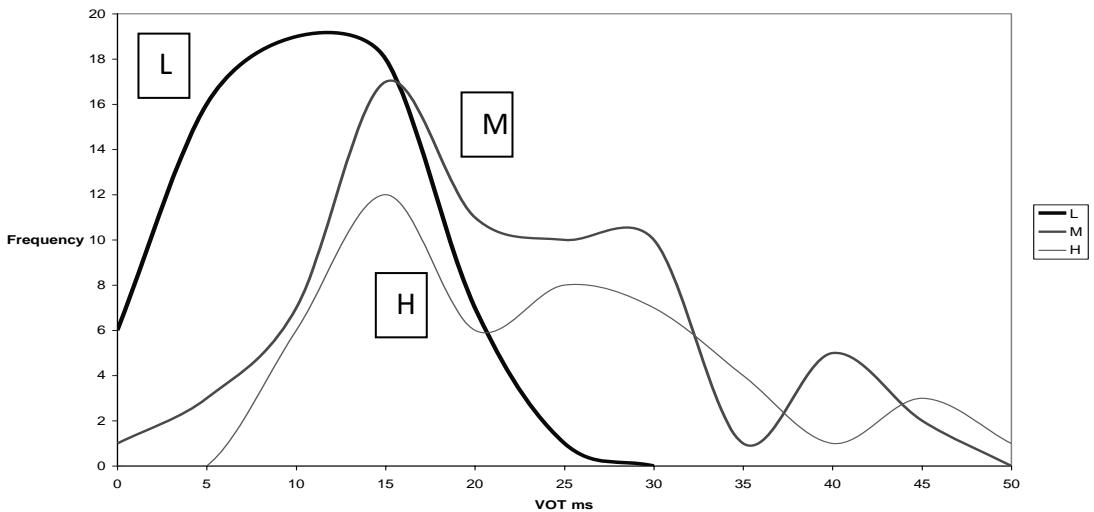
## 2.6. Village/Town speakers: categorical or phonetic?

We have looked so far at Kera speakers from urban and rural settings. Now we consider those who were born in a village, but who moved to town while still children. The question is whether they follow the village pattern of a 3-way tonal contrast, or the town pattern of a VOT contrast and one less tonal contrast. The graphs below show that the pitch cue is more contrastive than the VOT cue.

(7) *F0 is clearly categorical for Village/Town speakers*



(8) *VOT distinctions are much less clear for Village/Town speakers*



If we ask the question as to at what point the phonological grammar changes so that VOT is contrastive rather than tone, we must conclude that Village/Town speakers still have a village grammar. In (8), the differences between the L and M groups are not significant, so VOT is probably not contrastive. This means that Village/Town speakers probably still retain the grammar from the village, with a 3-tone contrast. But Town speakers have a different grammar, with VOT contrastive. That implies that speakers do not change their grammar in later life, but they do adjust the phonetics to match the dialect that they have moved to.

## 2.7. What difference does gender make?

The gender issue is not in focus here, and more details can be found in Pearce (forthcoming), but I will briefly mention the main issues. Wolfram and Schilling-Estes (1998) state that ‘Women appear to be more conservative than men, in that they use more standard variants...At the same time, women appear to be more progressive than men, because they adopt new variants more quickly.’ Similar claims are made by Wolfram (1969), Labov (1972, 1990), Trudgill (1983), Haeri (1987, 1996) and Chambers (2003). Labov and others observe that the tendency is for rural women to be the most conservative while urban women are the most progressive.

If their claims are correct, then the conservativeness of Kera village women comes from the fact that traditional 3-tone Kera is more prestigious. This is presumably how the village elders (male and female) speak and speaking like the elders gives them more status. However, it could just be that village women have less contact with French.

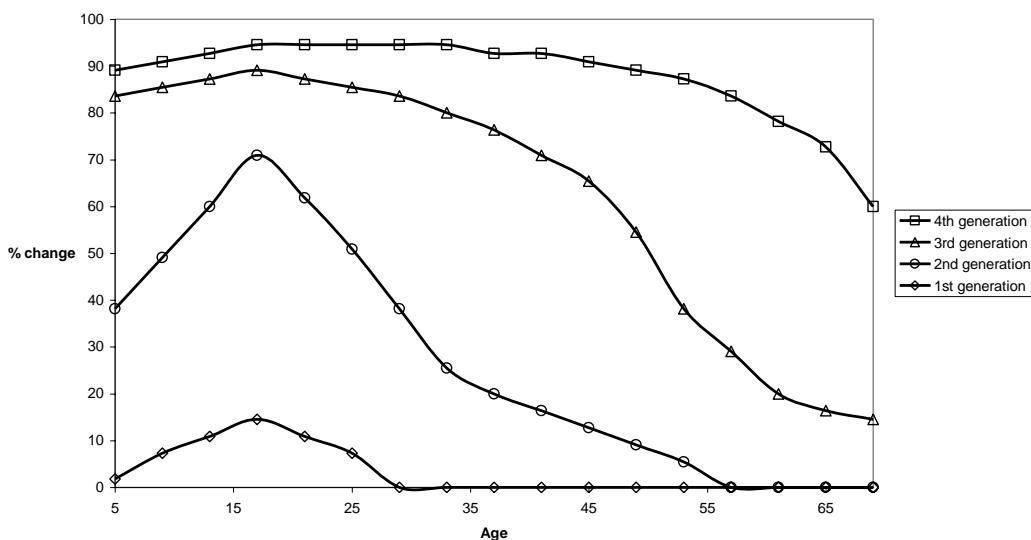
In town the French influence encourages the loss of tone and the reintroduction of VOT differences. French is prestigious, so the women are quick to change their language in the direction of French (even though the men have more French contact than the women).

This is not the only possibility for explaining these results. For other explanations, see Cheshire (2002), Woods (1997), and Pearce (forthcoming). For example, some claim that it is all explained by contact with French or by the female tendency to be more verbal. But the argument that best accounts for all the facts seems to be the prestigious idea.

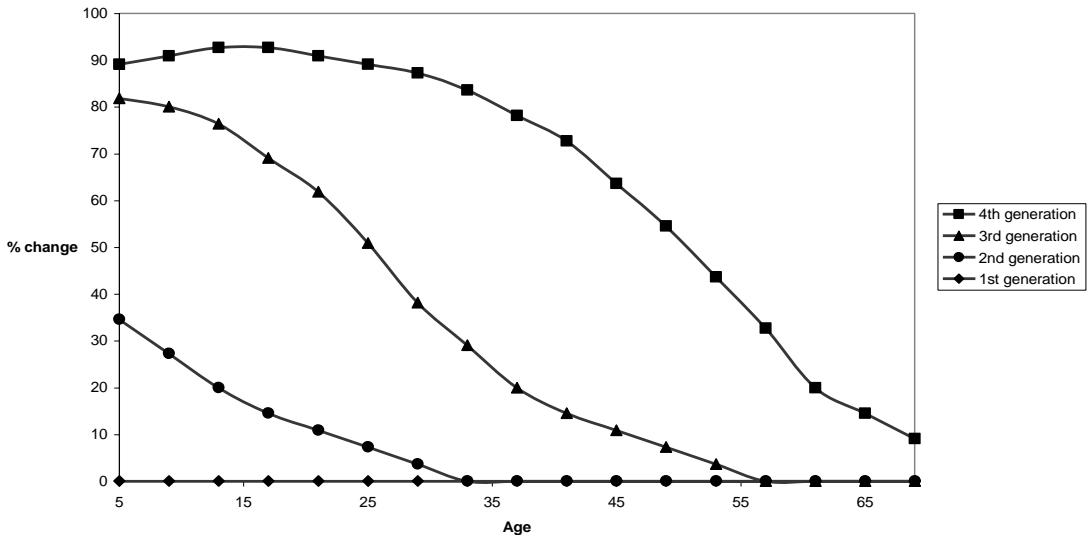
## 2.8. Can we model the changes taking place in Kera?

Labov (2001) gives a model for urban language change split according to gender, and covering 4 generations of change. The graphs below are a redrawing of his data.

(9) Age profiles for females of a linguistic change in progress with logistic incrementation of the change (Based on Labov 2001)



(10) Age profiles for males of a linguistic change in progress with logistic incrementation of the change (Based on Labov 2001)

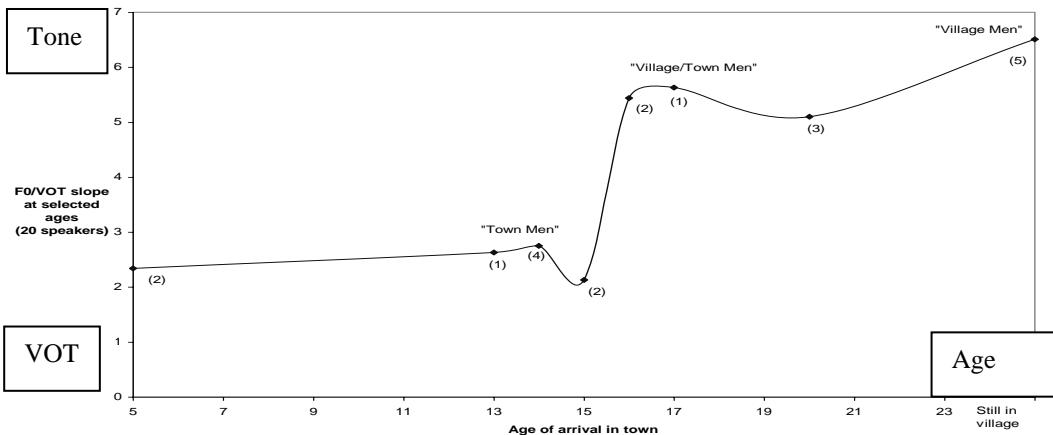


Labov’s model is based on a generation of 28 years and a critical age set at 17. If this is adjusted to the Kera situation with a generation being more like 20 years, the model does seem to fit quite well given about three generations of change. Three generations is probably about right given the history of when Kera speakers started to travel to urban areas and have contact with French. But it is hard to find criteria for measuring this scientifically, especially as the end point of the phonological changes is not known. It would be interesting to observe if the next generation also follows the model.

2.9. Is there a critical age below which it is possible to change grammars?

Not all linguists believe that there is a critical age beyond which it is harder to learn a new dialect or language. The graph below suggests that there might be a critical age for the Kera. Those that move to town before the age of 16 seem to take on characteristics of the town grammar quite well, but those who move after this age do not.

(11) Critical age in Kera speakers, F0/VOT plotted against age.



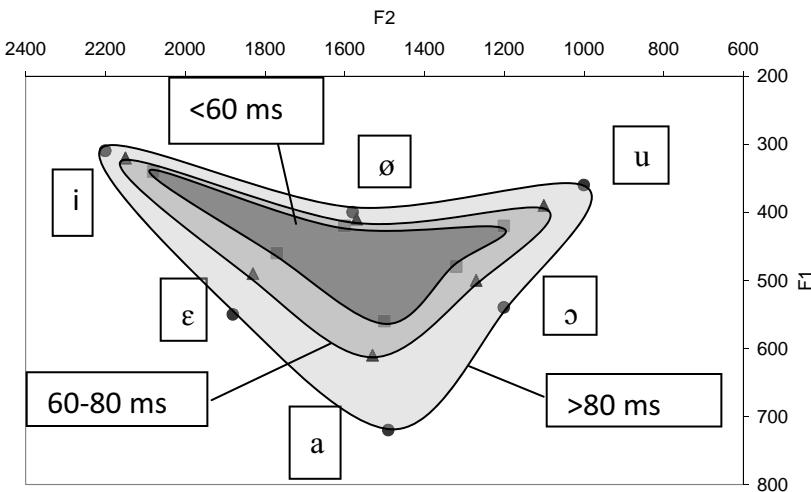
The perception graph above suggests that the Kera may have a critical age of around 16 (or at least between 14 and 17). The sample is too small to make any solid claims, but it suggests that it would be worth pursuing this further. Best (1995) and Flege (1999) suggest that the ability to perceive new

categories may be lost if not used for a while. A person who continues to learn new languages through childhood keeps the ability longer. But someone who only learnt their own tongue in childhood may have more trouble in learning new languages in adulthood. So the Kera, who tend to learn other languages for use in the market, would be expected to have an older 'critical age' than others. This could explain the 'age 16' result in the graph above. (For English, a critical age of 13 has been suggested in the literature).

### 3. Contact in vowel quality

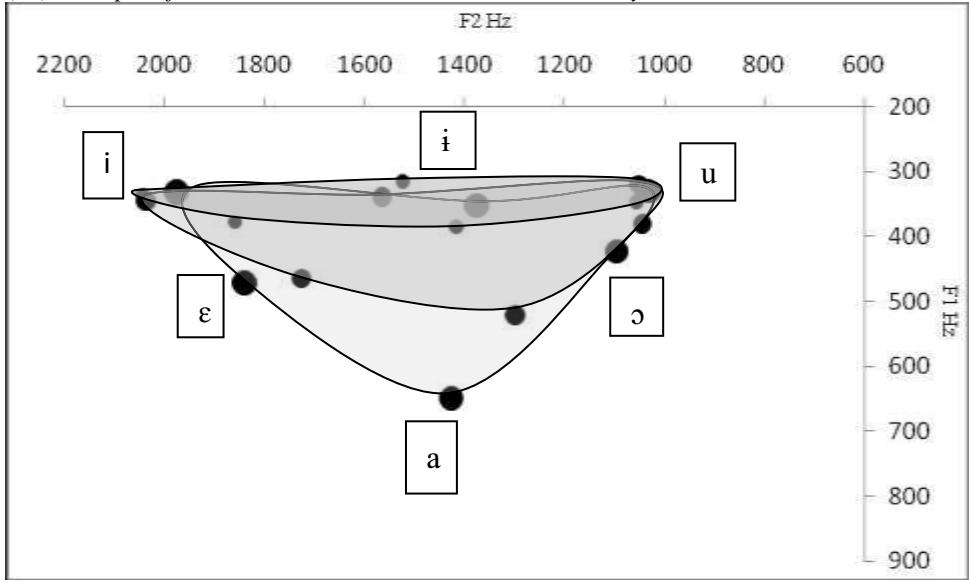
Tone is not the only thing to be affected by contact with French. Kera vowel quality is not noticeably affected by French, but when a Kera speaker speaks French, there is a very obvious influence from French. Gendrot and Adda-Decker (2006) have studied a number of European languages and they have concluded that the shorter the vowel, the more schwa-like it is. To come to this conclusion, they did acoustic measurements on a large corpus. They split the vowels according to duration (short, medium, long). This was a phonetic measurement, not necessarily linked to phonological length. They then measured the first two formants and plotted the vowels in each durational group. The vowels in each durational group are linked in a polygon so that the reduction towards schwa in shorter vowels is easy to spot. They measured all of the vowels in each language, but on the diagram below, I have selected certain vowels only to aid comparison with Kera. All of the vowels behave in the same way. We can see that in French, vowels become more schwa like when of short duration.

(12) *Measured mean average values of F1 and F2 for French vowels according to duration. Data from Gendrot and Adda-Decker (2006), selected vowels only.*



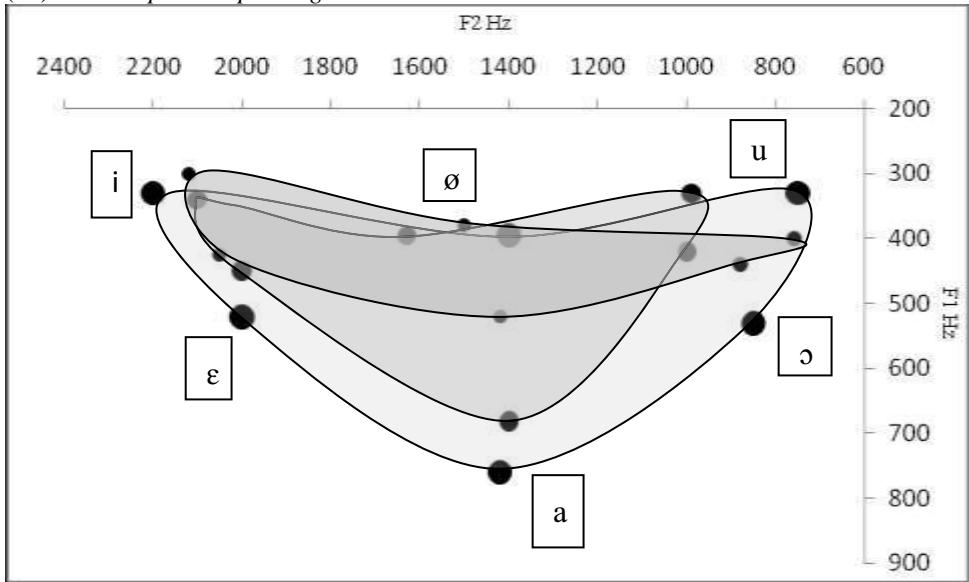
I have done the same measurements for Kera. In Kera, the story is a little different. The reduction is only in the F1 dimension. So the graph in (13) shows a reduction upwards, but no reduction in width. I claim elsewhere (Pearce 2008) that this is due to the vowel harmony system, but that is not relevant here. In the diagrams below, the division between durational groups is <50, 50-70, and 70+ ms.

(13) Example of Vowel reduction in Kera in vowel harmony vowels



Now if we consider a Kera speaker talking French, we see quite a mixture of the two systems.

(14) A Kera speaker speaking French



For medium length vowels, the speaker reduces the quality as is normal in French and in Kera (for non-harmonic vowels), but the short vowels in French come in places where a harmonic vowel would be expected in Kera, eg *CYCVC*, so the Kera speaker would not normally reduce the F2 value for this vowel. This explains the unusual shape of the darkest polygon. Words starting with *re-* [rɛ] in French are often pronounced as a very fronted [rɛ] for this reason (though the orthography may also have an influence). There is no space to discuss these results in detail, but it is clear that the Kera phonetic settings are forcing changes on the French of Kera speakers even when they have a high level of French.

## 4. Loans

Finally, loans provide another source of comparison concerning the effects of language contact. For this study, My data include 400 words, which are loans from six languages. Four of these are included here. The list below gives the main observations that can be made from loans.

### (i) Structure changes:

Kera does not permit a CVCV sequence, or CC at edge. There is a preference for (CVC), (CV:), (CVCVC), (CVCV:). Not only is CVCV not found, but changes in structure confirm this constraint. Examples of this are seen below.

### (ii) Epenthesis:

Epenthesis occurs at the right edge - to make a well-formed syllable.

(15) French:	la pɔrt >	(ləpɔr)tɛ́	'door'
	mars >	(mar)sɛ́	'March'

Epenthesis also occurs internally - to avoid CC clusters in the syllable margin.

(16)	frigo >	(firi:)(gɔŋ)	'fridge'
	sātr afrik >	(sɔn)(təraf)(riki:)	'Central Africa'
	la klɛ >	la kɔle (Chadian French) > (ləkɛr)lɛ́	'key' *lakle:

-i is added following a word final obstruent.

(17)	kaset >	(ka:)(sɛti:)	'cassette'
	brik >	(biri:)ki	'brick'

### (iii) Deletion:

Deletion occurs internally to discard non-footed material.

(18) French:	la misjɔ̃ >	(lam)(sɔŋ)	'church'
	telefɔ̃n >	(tɛl)(fɔ̃n)	'telephone'

Deletion occurs at the right edge following a sonorant

(19) Arabic/Fula:	nasaara >	(məsar)	'European/American'
Fula:	maskore >	(mas)(kɔr)	'millet'
	deftere >	(kɛf)(tɛr)	'book'
	(The reason for d>k is unclear)		

Note that Kera prefers to repair situations like these by vowel deletion if possible. The preference is clear here. We do not get \*(la:)(misɔŋ) or \*(ləmi:)(sɔŋ).

### (iv) Lengthening:

Lengthening avoids the (CVCV) foot.

(20) Arabic:	tomatim >	(tomɑ:)(tum)	'tomato'
French:	prefɛ >	(perɛ:)(fɛŋ)	'county chief administrator'
compare:	suprefɛ >	(sup)(réfɛŋ)	'chief administrator in sub-county town'

Note that the final -ŋ is the definite article, but in some cases, it has become part of the lexical entry. In these cases, deletion is not used as a repair strategy. In [toma:tum], this form comes about because /ɑ/ is perceived as a head vowel and therefore gains length.

**(v) Nasal vowels:**

Nasal vowels are kept as nasal vowels. Loans may be the only source of nasalized vowels in Kera.

(21) Tupuri: balhê: > (abàl)(hê:) 'donkey'

However, French nasalized vowels tend to be changed to VN, probably because of French orthography.

(22) French: lāp > (lām)(pá:) 'lamp' <lampe>  
pā > (pɛŋ) 'bread' <pain>

**(vi) Vowel quality:**

As already stated, short vowels are more schwa like in most languages.

(23) French:	Barnabas >	(bàr)(nə̀bàs)i	'Barnabas'
	kōte >	(kón)(té:)	'to count'
	fōto >	(fótó:)	'photo'
	letr >	(lé́tér)	'letter'
	frê >	(fé́rén)	'breaks'
Tupuri:	kayje >	(keje:)	'to help'
Arabic:	gameh >	(gèè)(mè:)	'wheat flour'
	tabag >	(tə̀bàg)i	'tray'
Fula:	seleere >	(celeè)(re:)	'commerce'
	mahol >	(moŋol)	'wall'

These examples point to certain conclusions for Kera loans: The Kera grammar controls the adaptation of loan words. The source grammar is not kept if it conflicts with Kera. The perception of the Kera speaker must be taken into account. There are some degrees of freedom in the choice of strategies such as lengthening and epenthesis. Epenthesis is caused by the syllable structure. The deletion and lengthening are caused by the foot structure. The vowel quality depends on the duration. The tones are often mid-tone except for the final foot in French loans where the perceived stress is often realized as a high-tone.

So we can see that the adaptations of loans show us where there is productivity, and which phonological rules are important. They therefore contribute to the study of language contact.

**5. Conclusion**

We have seen that Kera phonology is influenced by contact, particularly for tone and voicing. French voicing affects the Voice Onset Time and the fundamental frequency in Kera. Production and perception experiments show that there are phonological differences according to location and gender. Village speakers maintain a 3-way tonal contrast while town speakers have 2 tones and a VOT contrast. The differences are probably largely due to the amount of French contact. The contact influences both L1 and L2. Yet speakers seem to maintain a distinct phonetic space for the two languages. In tone production, village women are more conservative than village men, while the women in town are the least conservative with almost total loss of tone. The contact between languages also affects vowel quality in L2. Other effects of contact can be seen in loan words from Tupuri, Arabic and French.

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