ATR allophones or undershoot in Kera

Kera has been analysed in the literature (Ebert 1979…) as having 6 vowels, 3 of which have +/-ATR allophones based on the position of the syllable in the iambic foot. [+ATR] vowels appear in non-heads of feet and [-ATR] vowels in heads and elsewhere. Up to now this binary classification has been generally accepted. However, a closer inspection using acoustic measurements of F1, F2 and duration reveals that the variation in quality may be due principally to duration rather than foot structure (although the foot structure affects duration). This would lead us to suppose that rather than a categorical distinction between the allophones associated with head and non-head syllables, we may have a gradient relationship between the F1 value and the duration. Both increase together until the target F1 value is reached, at which point a further increase in duration no longer affects the quality. The key data for this claim come from vowels in non-footed syllables at the right edges of phrases and vowel initial syllables. In both of these cases, the duration of the vowel is longer than a non-head vowel, but shorter than a head vowel. The F1 value for these vowels is equally between the average head and non-head values. Neither of these cases fits neatly into a binary division of allophones.

A useful comparison can be made with French. Gendrot and Adda-Decker (2005) have measured F1, F2 and duration in French and German corpuses and conclude that in both languages the F1 and F2 values appear to vary with duration in a gradient relationship, particularly in non-high vowels. They observe that the polygons made by the vowel space in an F1/F2 plot converge as the duration decreases towards a schwa like vowel (see fig. 1). The equivalent diagram in Kera (fig. 2) shows a similar convergence, but towards a horizontal line rather than a point. The variation is most striking for the /a/ vowel. As with French, high vowels are relatively unaffected by duration. But unlike French, the F2 value is also unaffected by duration. Gendrot and Adda-Decker suggest that the explanation for the convergence effect might be partly articulatory. The differences between French, German and Kera would suggest that this cannot be the full explanation. On the other hand, a categorical phonological explanation does not appear to fit the facts. For a full understanding of the Kera facts, we need to combine an undershoot account with a consideration of the effects of the metrical structure on duration and the contribution made by the rich vowel harmony system, which may be constraining the variation in F1 and F2.

Fig. 1. *Measured mean average values of F1 and F2 for French vowels according to duration, data from Gendrot and Adda-Decker (2005), (selected vowels only for comparison with Kera)*
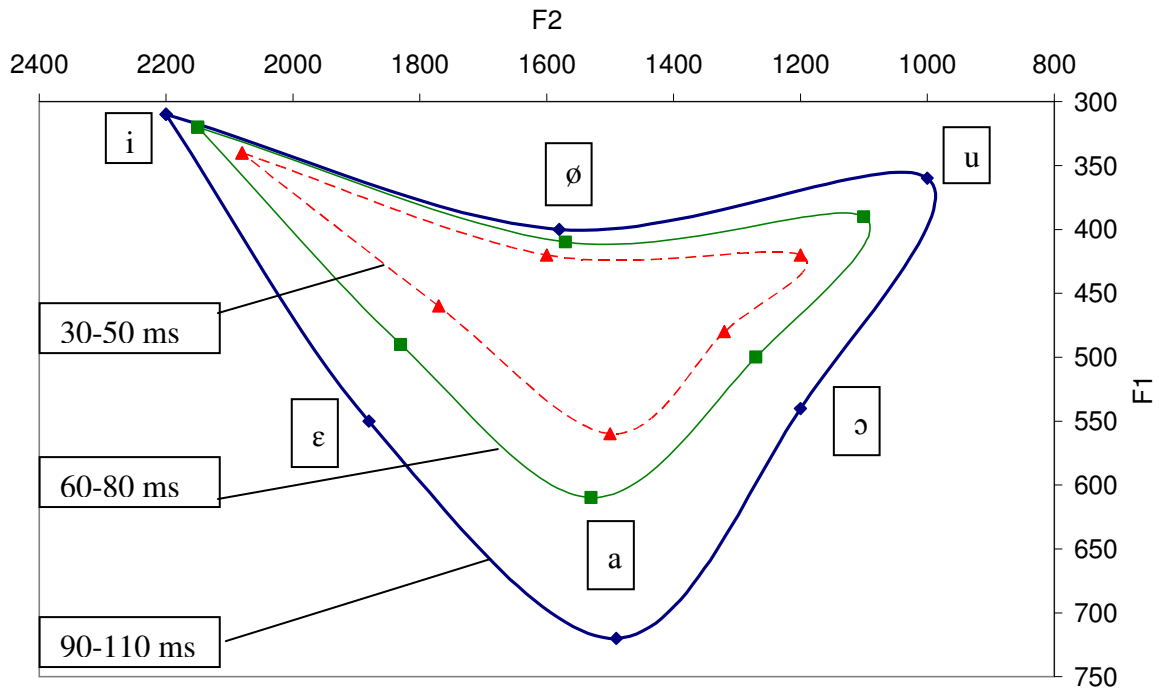

Fig. 2. *Measured mean average values of F1 and F2 for Kera vowels according to duration*