

# Background

Velum position in speech  
A scale of decreasing height

*(high)*

plosives, fricatives

high vowels

low vowels

nasals

*(low)*

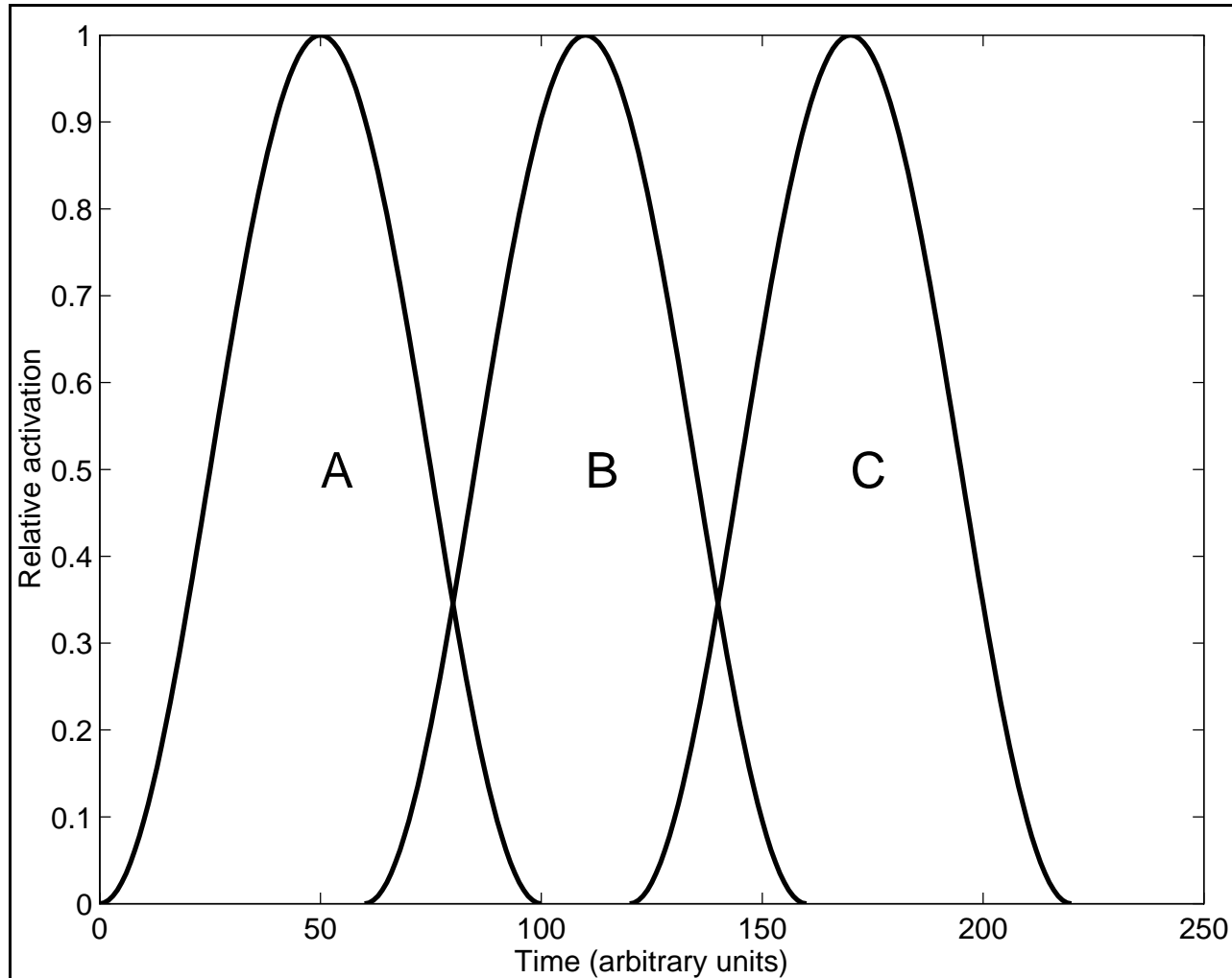
In running speech, velum position is not restricted to the two extremes of either completely lowered or completely raised.

(This can be readily observed in the **fiberendoscopic film** of velar movement.)

This fact will be important for the interpretation of the experiment shown below.

More background: Both the fiberendoscopic film and the **cineradiographic films** have many examples where velar coarticulation can be observed, e.g. velar lowering starting well before the nasal sound to which it “belongs”.

# COARTICULATION





# Velar Coarticulation

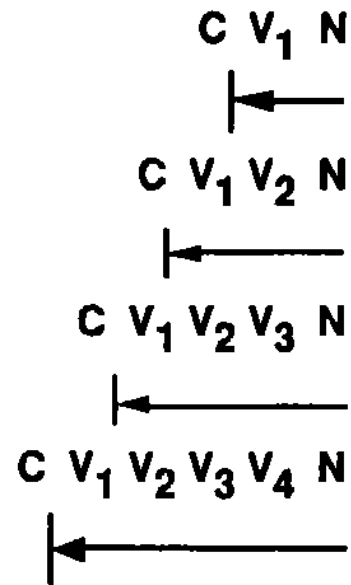
Examples from Bell-Berti et al. (1991), *Anticipatory velar lowering: A coproduction account*, J. Acoust. Soc. America, 90, 112-123.

Figures 7 and 8 show the time course of velum height. Zero on the time axis indicates the end of the word "its" from the carrier phrase "Its \_\_\_\_ again".

At first sight, the sequence "say lansal" (bottom panel of Fig.7) appears to support the feature-spreading model. However, the movements shown in solid lines in Fig.8 indicate that some velar lowering can occur even when there is no nasal in the sequence. So the feature-spreading explanation for Fig. 7 may not be justified.

## coarticulation model predictions

### (1a) feature spread



### (1b) coproduction

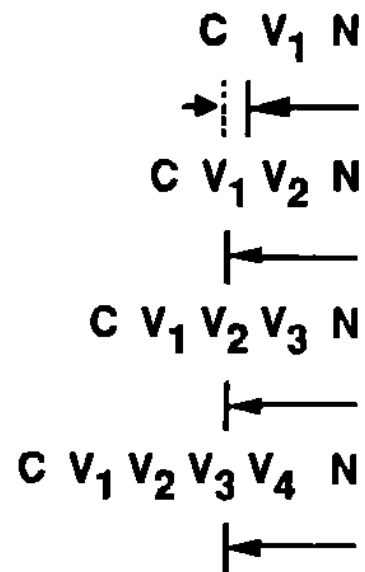


FIG. 1. Predictions of feature spread and coproduction models. (a) Feature-spread models predict that velar lowering in anticipation of a nasal consonant extends to the beginning of the vocalic sequence preceding the nasal consonant, regardless of vocalic string duration or number of segments. (b) Coproduction models predict that velar lowering during a vocalic sequence preceding a nasal consonant begins at a stable time before the nasal consonant, regardless of vocalic string duration.

## Subject 2

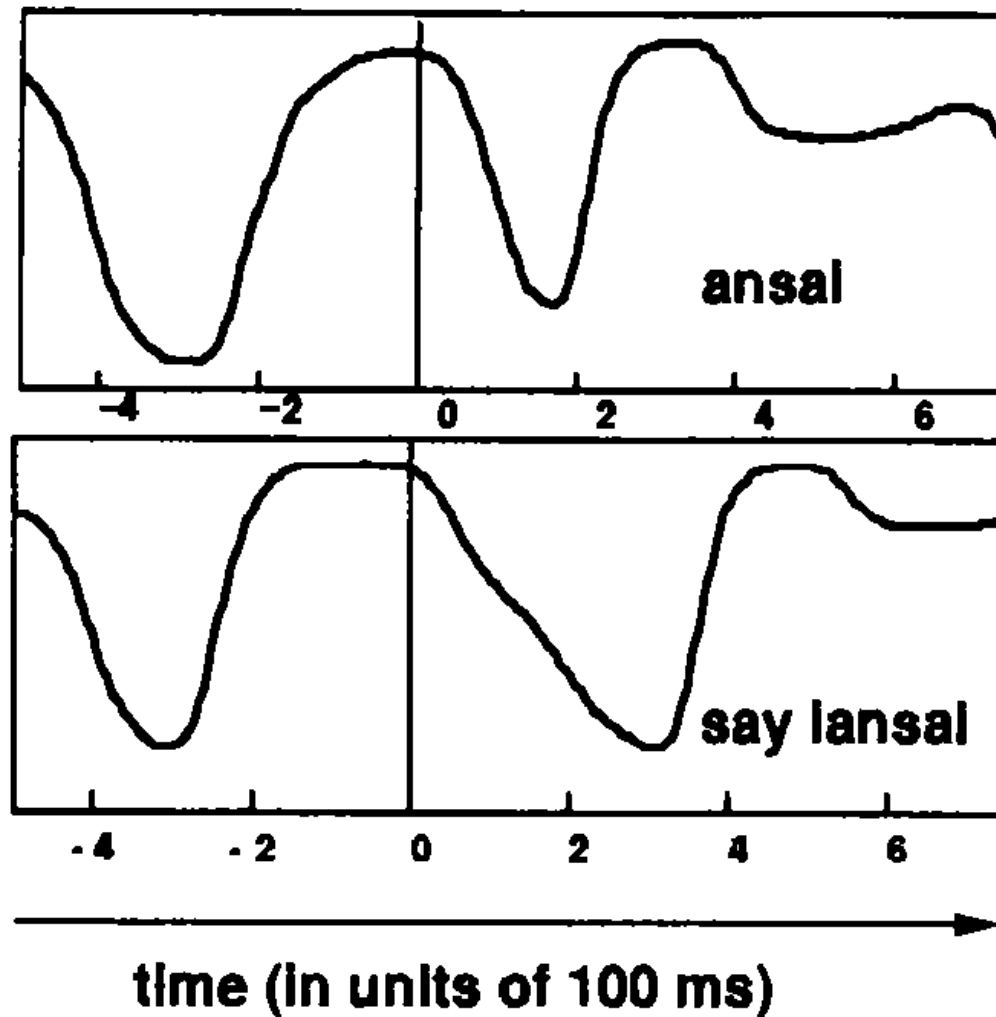


FIG. 7. For “say lansal”, 0 on the time axis corresponds to the end of /s/ in “say”. Other details as for Fig. 8.

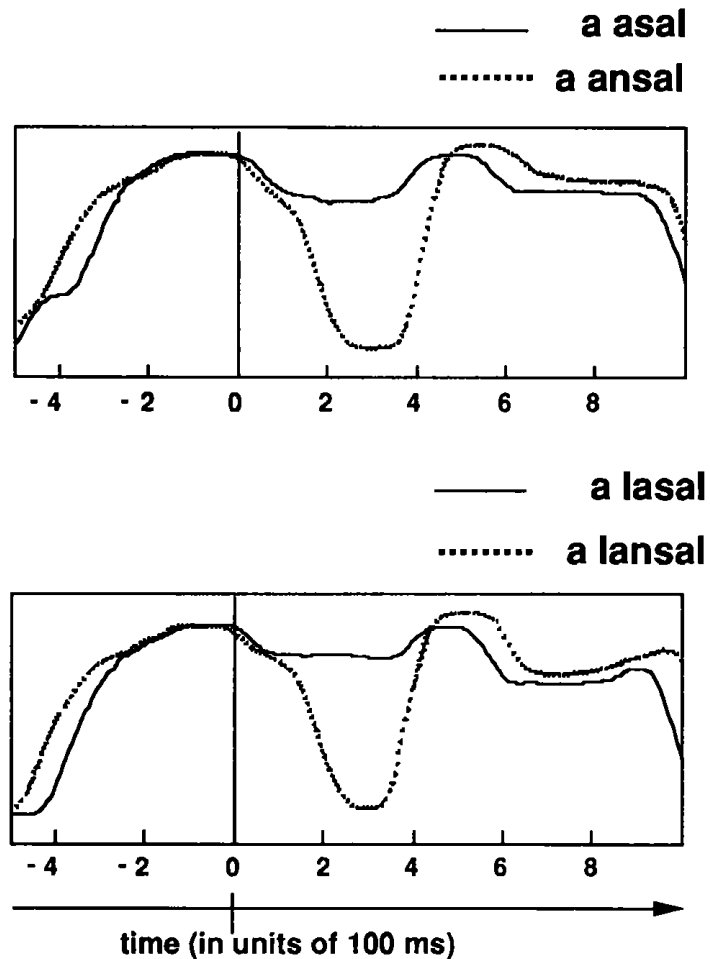


FIG. 8. Displacement functions of two representative minimally contrastive oral and nasal utterance pairs, demonstrating similar lowering onsets within each pair for subject 3. Displacement is represented on the ordinate, with velar lowering indicated by a downward movement. Time is represented along the abscissa, with "0" marking the end of the /s/ of the carrier phrase.