

Pre-lateral mid-vowel colouring and the Dutch tense–lax contrast

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The Dutch vowel system

- Can be grouped into two sets according to phonological behaviour
- Traditionally, short vs. long (Zonneveld 1978, Booij 1995)
- More recently, tense vs. lax – vowel length is secondary (Smith et al. 1989, Van Oostendorp 2000)
- Establishing the phonetic correlates of ‘tense’ and ‘lax’ is problematic
 - ‘tense’ is [ATR]? (Stewart 1967, Halle & Stevens 1967, Smith et al. 1989)
 - No correlation between tense and ATR was found by MacKay (1977) for English and Ladefoged & Maddieson (1996) for German.
 - ‘lax’ is [RTR]? (Van Oostendorp 2000:56)
 - Not backed up by any phonetic evidence (cf. Van Nierop 1973).
- The most likely correlates of ‘tense’ and ‘lax’ are relative peripherality and centrality (Lindau 1979, Harris & Lindsey 1995)
 - This also establishes a link between tenseness and length as its secondary, enhancing feature.

Dutch mid vowel ‘laxing’?

- Three tense–lax mid vowel pairs: /e~ɪ/, /ø~ʏ/, /o~ɔ/ (Booij 1995:72)
- The realisation of /e, ø, o/ before non-nasal sonorants (l,r,v,j) differs from that before obstruents or pause. Traditionally, this is called *laxing* and transcribed as in (1) below (cf. Van der Torre 2003):

(1) *speel* ‘play’ (1sg) /spel/ [sɛpɪt] (2) *spil* ‘pivot’ /spil/ [sɛpɪt] (3) *spelen* ‘play (inf)’ /spelə/ [sɛpələ]
peul ‘pod’ /pøʎ/ [pøʎt] *pul* ‘tankard’ /pʏʎ/ [pʏʎt] *peulen* ‘pods’ /pøʎə/ [pøʎə]
pool ‘pole’ /pɔʎ/ [pɔʎt] *pol* ‘tussock’ /pɔʎ/ [pɔʎt] *polen* ‘poles’ /pɔʎə/ [pɔʎə]

- The forms in (1) alternate with their infinitival (verb) or plural (noun) forms in (3), in which the underlying tense vowels surface.
- The transcriptions in (1) and (2) suggest a qualitative neutralisation of the tense vowels with their lax counterparts before [t], but maintenance of a quantitative distinction.

The problem

- If the transcriptions in (2) are correct, they pose a problem for the tense–lax approach to the Dutch vowel system: why would length (a secondary feature of tenseness) survive in the face of qualitative neutralisation?

- However, claims of /e, ø, o/ surfacing as long lax [ɪ, ʏ, ɔ:] have never been backed up by phonetic evidence. Is the effect of syllable-final l indeed laxing?

The data

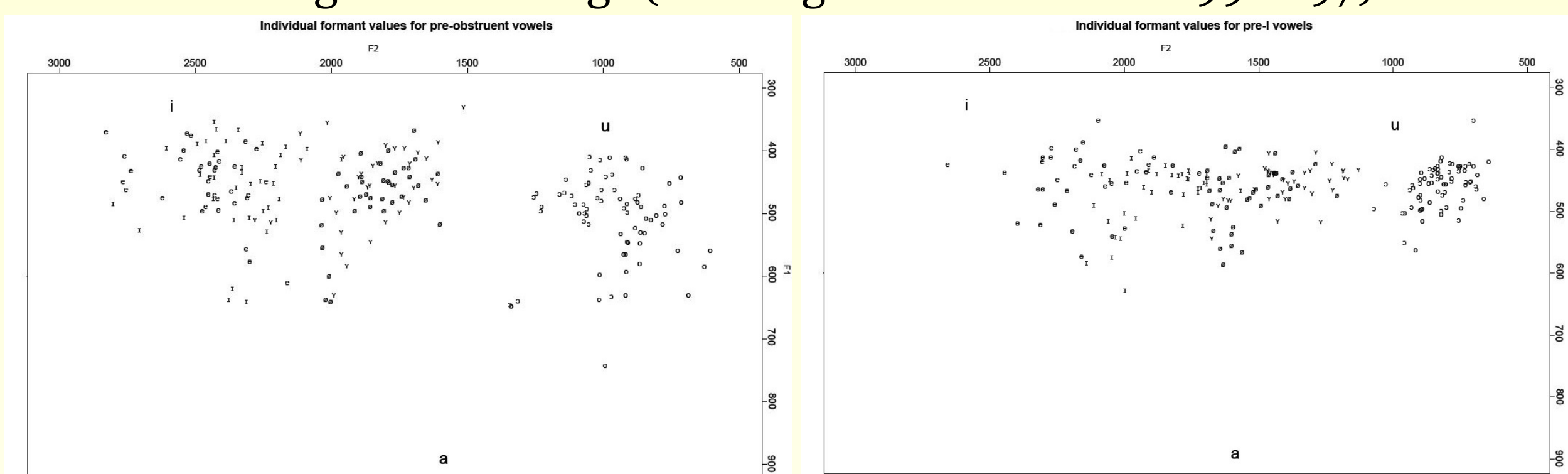
- 15 speakers of Standard Dutch (all female, between 18–24yo) read 3 repetitions of a randomised list of 18 test items and 7 distractors in the frame sentence “Ik ga nu het woord _____ zeggen” (“I will now say the word _____”)
- Test items included the mid vowels /e, ø, o, ɪ, ʏ, ɔ/ in pre-obstruent and pre-l position (minimal pairs in the latter case):

	pre-obstruent		pre-l	
e, ɪ	<i>kees</i>	<i>mis</i>	<i>speel</i>	<i>spil</i>
ø, ʏ	<i>keus</i>	<i>mus</i>	<i>peul</i>	<i>pul</i>
o, ɔ	<i>koos</i>	<i>mos</i>	<i>pool</i>	<i>pol</i>

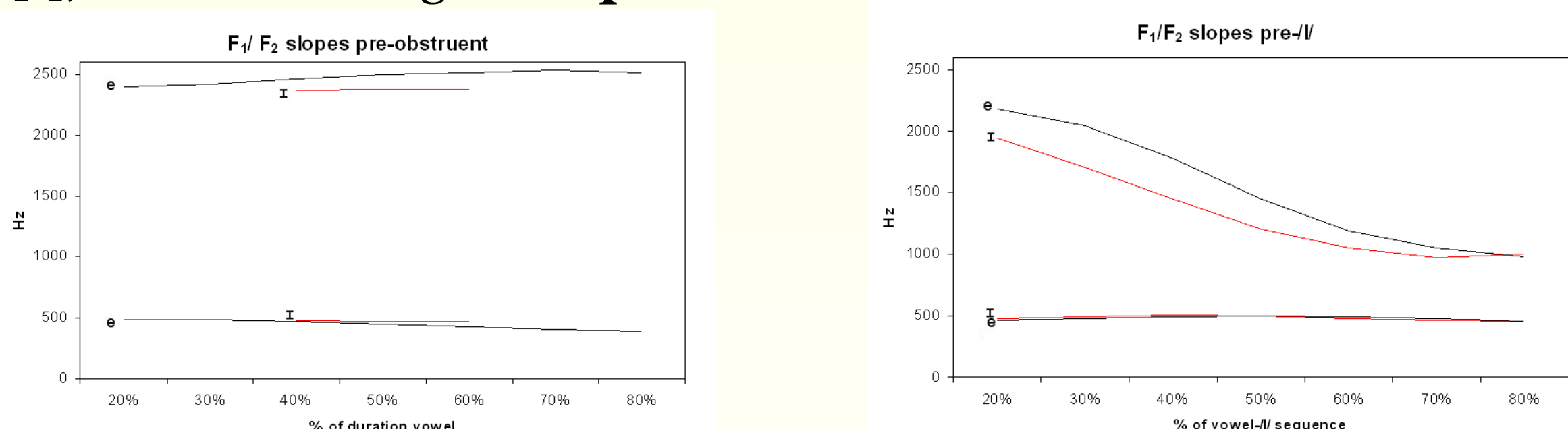
- The relevant vowel and vowel+l tokens were isolated and analysed using *Praat* (Boersma & Weenink 2007). Measurements:
 - F1, F2 at 25%, 50% and 75% of the token and total duration of the token.

Results

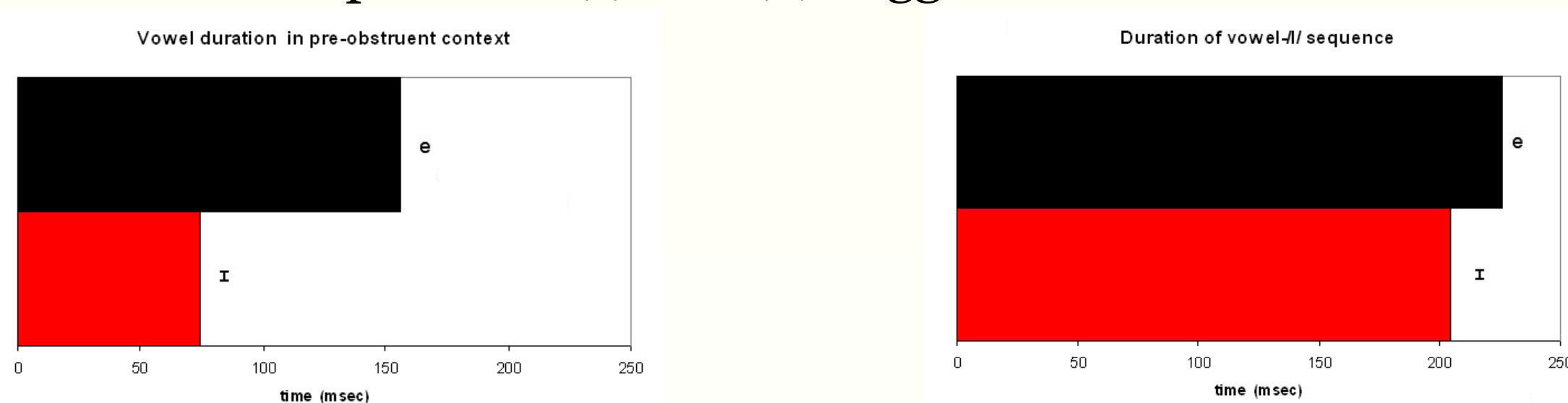
- Syllable-final dark [t] significantly **lowers the F2** of a preceding mid-vowel, in line with cross-linguistic findings (Ladefoged & Maddieson 1996:197).



- Note that [t] lowers the F2 of tense and lax vowels alike. The term ‘laxing’ is therefore inappropriate – the process is one of retraction, not centralisation
- The tense vowels are not realised as closing diphthongs (as they are before obstruents), and the F2 slopes of the tense and lax vowels are highly similar before [t], so there is a degree of **qualitative neutralisation**.



- There is, however, also a high degree of **quantitative neutralisation**, contrary to what the transcriptions in (1) and (2) suggest.



Inter-speaker variation

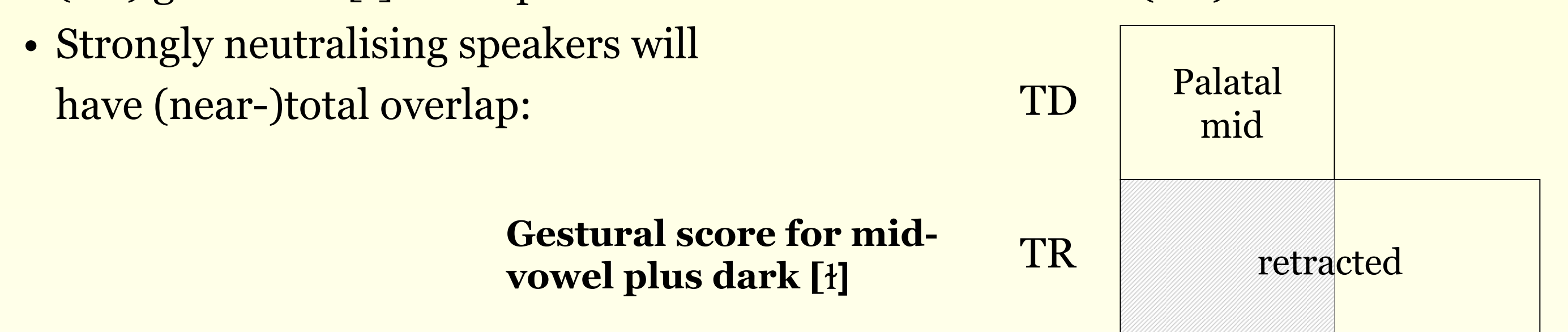
- The averaged results in the previous section obscure considerable variation between speakers. There are 4 outcomes w.r.t. the tense–lax contrast before [t]:

Speaker subsets	Length diff (msec)	F2 difference at 25% (Hz)
Neutralising (3)	11	101
Length neutralising (4)	-7	291
Non-neutralising (4)	22	288
Strongly non-neutralising (4)	54	439

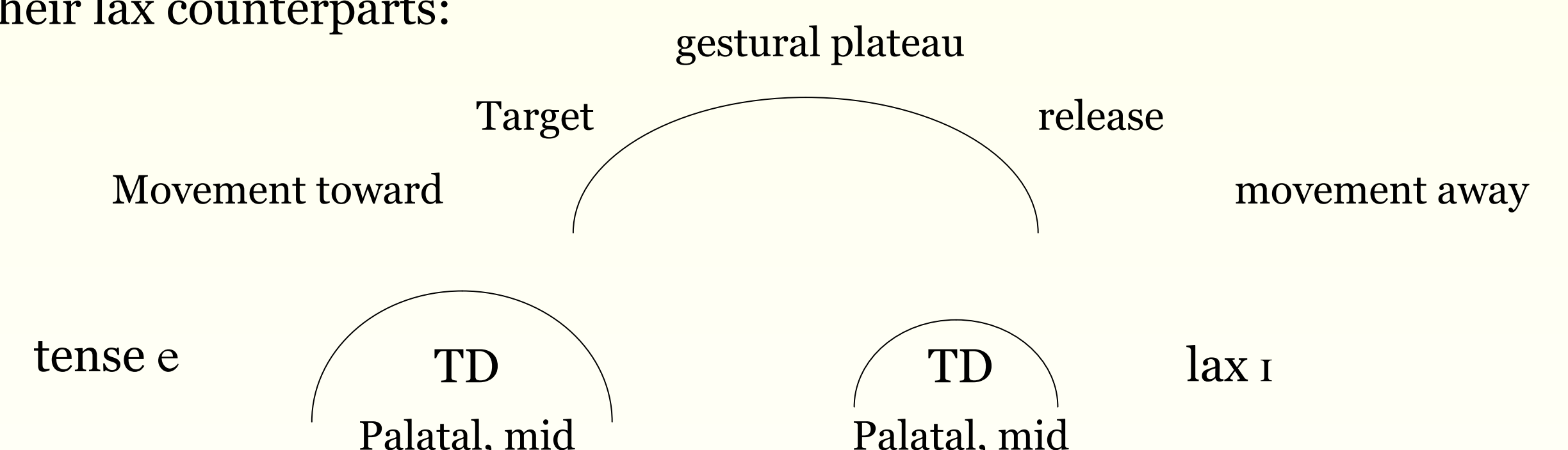
- (Near-)neutralisation of both vowel quality and length
- Neutralisation of the length difference but maintenance of a qualitative contrast
- Maintenance of a qualitative and quantitative contrast, though diminished
- Full maintenance of a qualitative and quantitative contrast
- Contrary to what the transcriptions in (1) suggest, **no speakers neutralise the qualitative contrast, while maintaining a length contrast**
- This supports the claim that **length is a secondary (enhancing) feature of tenseness**

Analysis

- In Articulatory Phonology (Browman & Goldstein 1986 et seq.), vowel ‘colouring’ is represented as **gestural overlap**
- In this case, speakers have varying degrees of overlap between a retracted tongue root (TR) gesture of [t] and a palatal constriction for the vowel (TD)



- The underlying tense–lax contrast in the Dutch vowel system, on the other hand, is more appropriately characterised as involving relative centrality, or less deviation from a neutral position. This can be modelled in Articulatory Phonology using dynamic gestural scores (Gafos 2002). The tense vowels have a greater **gestural magnitude** than their lax counterparts:



- Tense vowels show greater displacement from a neutral position; this entails that their gestures take longer to complete.
- This establishes a straightforward link between tenseness and vowel length: length is a secondary feature inherent to tenseness)

Conclusions

- Dutch mid-vowel colouring before [t] involves retraction, and affects both tense and lax vowels. The term ‘laxing’ is therefore inappropriate.
- Whenever there is a degree of qualitative neutralisation, there is also quantitative neutralisation. The contrast is never expressed solely as length. The transcriptions in (1) are therefore inaccurate.

- The mid-vowel colouring facts provide support for characterising the bifurcation of the vowel system as based on tense vs. lax, rather than long vs. short. Length is an enhancing feature of tenseness.
- The difference between underlying ‘laxness’ (relative centrality) and the colouring effect of [t] (retraction) is easily modelled in Articulatory Phonology as involving gestural magnitude and gestural overlap, respectively.

Acknowledgements

Thanks to Patti Adank, Colin Ewen, Jos Pacilly, Patrycja Strycharczuk and the participants in our experiments



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