While Dutch has no true geminates (underlyingly long consonants), lexical and post-lexical processes may create derived or “fake” geminates, by the formation of clusters of identical consonants. Such clusters are then subject to a process of degemination. Degemination in Dutch has been described as a categorical, phonological process in generative accounts, consisting in the deletion of one of the two consonants ( Booij 1995:121). However, at least for fricatives, the process has been shown to be gradient in durational terms ( Martens & Quené 1994), and consequently treated as a phonetic process instead ( Ernestus 2000). In this paper, we examine the gestural dynamics of a specific fake geminate in Dutch, the derived /rt#r/ cluster, in the light of particular approaches to the phonetics/phonology distinction (or lack thereof).

Speakers of Standard Dutch increasingly display a pattern of /r/ allophony in which coda /r/ (as in paar ‘couple’) is realised as a post-alveolar approximant (either bunched or retroflex), whereas onset /r/ (e.g. raden ‘to guess’) is typically a uvular fricative or trill (Scobbie and Sebregts 2010). In a fake geminate context (paar raden) this creates /rt#r/ clusters in which the target allophones are expected to be phonetically strongly distinct (e.g. [ɻ#ɭ]). We investigate the spatial and temporal characteristics of coarticulation in these sequences of phonemically identical but phonetically disparate consonants to answer the question of whether degemination indeed applies here, and in case it does, what it entails in gestural terms.

We present articulatory data from 8 speakers of Standard Dutch, collected with a high-speed ultrasound system (121 fps). The test materials included /r/ in canonical onset, canonical coda and fake geminate contexts, in a controlled prosodic and segmental environment (10 tokens per context per speaker). The ultrasound data were analysed using two methods: i) dynamic analysis of principal components of pixel intensity data in the ultrasound image (TRACTUS, Carignan 2014), and ii) SS-ANOVA (Davidson 2006) comparison of tongue contours at the point of maximal constriction for the /r/ and at the acoustic onset of the vowel. Additionally, the acoustic duration of the vowel+rhotic sequences was modelled using linear mixed-effects regression. We used the principal components (PCs) obtained using TRACTUS in a Linear Discriminant Analysis trained to distinguish /a:#rV/ (pa raden) from /a:rtC/ (paar baden). We then used the algorithm to classify /r/ tokens in the fake geminate context, /a:#r#/ (paar raden). The average discriminant values for a representative speaker, DF2, are plotted in Figure 1.

![Figure 1](image1.png)

![Figure 2](image2.png)
For most of the /a:r/ duration, the fake geminate context shows values that are in between the two baselines, suggesting an intermediate articulation between coda and onset /r/. This is confirmed by results of SS-ANOVA at the /r/-constriction: there is a simultaneous bunching gesture (as in canonical codas) and dorsal raising (as in canonical onsets) in paar raden, although both gestures are spatially reduced compared to those in non-geminate onsets and codas (Figure 2). There is, in other words, both gestural blending and reduction.

In temporal terms, however, the fake geminate context patterns with singleton onset /r/, as there is no difference in duration between them. That is, degemination in the temporal domain does appear to be categorical. This situation differs from that of /l#l/ fake geminates in English (e.g. peel lemurs, Scobbie and Pouplier 2010), which show varying degrees of gestural overlap but less temporal reduction, lending itself more readily to a gradient, phonetic interpretation.

The Dutch facts are easily modelled in Articulatory Phonology (AP) as a blending of two gestures that overlap completely in time. However, such a representation crucially needs to refer to the allophonic relationship, i.e. the phonological identity, between the two /r/s involved, so as to capture the difference between /r#r/ and other /r#C/ sequences (i.e. the gestural and temporal reduction in /r#r/). This is problematic in the AP framework, given the restrictive view AP takes towards allophony (two allophones are considered to consist of the same gestures, with possible differences only in magnitude and timing), and the lack of a “phonemic” level. A more abstractionist hierarchical model would struggle, on the other hand, with degemination having to take place at the phonological level (given the durational neutralisation), while features of both allophones are preserved at the phonetic level. What is needed is a model in which processes can be both phonological and gradient, with distinct implementations in the temporal and gestural domains.

References