Journal of Phonetics 68 (2018) 138–149

Contents lists available at ScienceDirect

Journal of Phonetics

journal homepage: www.elsevier.com/locate/Phonetics

Research Article

Articulatory dynamics of (de)gemination in Dutch ☆

Patrycja Strycharczuk [a,*], Koen Sebregts [b]

[a] University of Manchester, United Kingdom
[b] Utrecht University, The Netherlands

ARTICLE INFO

Article history:
Received 7 July 2017
Received in revised form 21 March 2018
Accepted 22 March 2018
Available online 13 April 2018

Keywords:
Dutch
Fake geminates
Rhotics
Ultrasound
Gestural dynamics

ABSTRACT

So-called 'fake' or derived geminates differ in the extent to which they behave like lexical geminates, both across and within languages. Data that enable us to study the gestural as well as the durational properties of fake geminates can shed light on their status as long consonants or clusters, and on the effects of any degemination rules present in the language. Our focus is on Standard Dutch, which has been said to exhibit categorical degemination of derived identical consonant clusters. The specific interest is in the post-lexical gemination of /r/, which involves gesturally strongly distinct allophones in the language, such that the members of /r#r/ sequences are identical phonologically, but not phonetically. Ultrasound data from 8 speakers of Standard Dutch show that fake geminate /r#r/ sequences present combined articulatory characteristics of coda (bunched approximant) and onset (uvular fricative or alveolar tap) allophones, which can be captured in terms of gestural overlap or ambisyllabicity. At the same time, however, concatenated /r#r/ does not show an increased duration relative to singleton /r/. These results suggest that Dutch degemination does not involve categorical segmental deletion, as previously suggested, but instead it has constraints on phonetic consonant duration that limit temporal gemination. Such specific duration constraints have a more general role to play in any account of gemination, as accumulating evidence suggests that fake geminates at word boundaries tend to behave as consonant clusters, subject to constraints on degree of overlap.

1. Introduction

Fake geminates can be defined as sequences of identical consonants derived by morphological concatenation (Hayes, 1986). They are typologically less restricted than lexical geminates, and may occur in languages where lexical geminates are not present. However, languages vary in the extent to which fake geminates behave phonetically like lexical geminates. At one end of the spectrum, English and German do not have lexical gemination, but fake geminates are phonetically long (Oh & Redford, 2012; Kotzor, Molineaux, Banks, & Lahiri, 2016). In contrast, Dutch is reported to prohibit long consonants, including those derived by external sandhi. In generative accounts, Dutch degemination is described as a categorical, phonological process, consisting in the deletion of one of the two consonants (Booij, 1995, p. 69). This analysis, however, is challenged by Martens and Quené (1994), who report a subtle increase in duration for fake geminates (e.g. *raaf fraai* 'raven beautiful' compared to *ra fraai* 'yard beautiful', mean difference of 18 ms in normal speech). Based on this result, Martens and Quené argue against phonological degemination rules in Dutch, and propose treating degemination as a gradual process instead.

In the present study, we provide new evidence on the nature of fake geminates in Dutch, based on their articulatory characteristics. We focus on the case of /r/, where an on-going sound change has created an allophony pattern that differentiates strongly between the two members of a geminate sequence. In recent years, Standard Dutch in the Netherlands has developed an approximant /r/ realization in the coda (Sebregts, 2015), which is articulatorily either bunched or retroflex (Scobbie & Sebregts, 2010). This variant is increasingly prevalent in the linguistic repertoire of Standard Dutch speakers, but it is restricted to coda position. Onset /r/ is typically uvular (normally a weak fricative or an approximant), or alveolar (typically

☆ The results of a pilot study on which the present work builds were published as Strycharczuk, P. and Sebregts, K. (2014). Erring on the side of phonology. In A. Auer and B. Köhnlein (Eds.), *Linguistics in the Netherlands 2014*, 145–164. The present article supercedes this earlier work. All the data and the analyses presented here are new.

* Corresponding author at: Linguistics and English Language, University of Manchester, Oxford Rd, Manchester M13 9PL, United Kingdom.
E-mail address: patrycja.strycharczuk@manchester.ac.uk (P. Strycharczuk).

https://doi.org/10.1016/j.wocn.2018.03.005
0095-4470/

a tap). The resulting patterns of onset-coda allophony involve robust articulatory distinctions, which allows us to investigate to what extent fake geminates resemble coda and onset variants, and it provides a window on the phonetics-phonology interface: the r#r sequence contains identical consonants at the lexical-phonological level, but highly dissimilar ones at the phonetic level. We also consider to what extent the phonetic characteristics of fake geminates are consistent with phonological approaches to geminates (and potential degemination) in different frameworks.

Lexical geminates are traditionally analysed as a single melodic unit linked to multiple timing slots (Kenstowicz & Pyle, 1973; Schein & Steriade, 1986). This is largely because geminates are argued to behave as a single unit phonologically. For instance, geminate sequences cannot be broken apart by epenthesis, and the two parts of a geminate sequence cannot undergo phonological rules independently of each other. It is less clear, however, to what extent the same type of structure may be appropriate for fake geminates. According to McCarthy (1986), derived geminates can be analysed as identical to lexical ones. However, experimental research suggests there may be some differences between the two types of geminates. Ridouane (2010) compares lexical and fake geminates in Tashlhiyt Berber, and finds that fake geminates pattern phonetically with lexical geminates, but only when they are derived through assimilation. Geminates that arise through concatenation of identical consonants (like the Dutch fake geminate case) show phonetic differences compared to lexical or assimilated geminates. Specifically, the differences concerned RMS amplitude (lower in concatenated geminates) and the duration of the preceding vowel (ca. 15 ms increase in concatenated geminates). Hence, Ridouane (2010) concludes that true geminates and fake geminates can be distinguished at the melodic level: both are associated with two timing slots, but with only one melodic position in the case of true geminates, and two melodic positions for fake geminates.

Similarly to Tashlhiyt, different types of derived geminates behave differently in American English. Oh and Redford (2012) study the acoustic duration of nasals in monomorphemic words such as *immensely*, poly-morphemic words such as *immemorial*, where a geminate is created by suffixation, and in sequences such as *prim memorial*, where a geminate is created across word boundaries. Whereas the absolute duration of the nasal was on average ca. 40 ms greater in both types of geminates than in the baseline singleton consonant, a different temporal pattern emerges once relative duration is considered. The C:V1 duration ratio was considerably increased in word-medial geminates (with a mean of ca. 1.8 in normal speech) compared to word-boundary geminates (mean CV ration of ca. 1.4 in normal speech), and no significant difference was detected in C:V1 ratio between word-boundary geminates and singletons. Oh and Redford (2012) propose that the observed difference between word-internal and word-boundary geminates calls for differentiating between them at the analytical level. They argue that word-internal geminates are best analysed as long consonants which have intrinsic timing properties, whereas word-boundary geminates are underlyingly clusters realized with overlapping gestures. Further support for this analysis comes from the observation that word-boundary geminates, but not word-internal geminates, may be pulled apart in careful speech.

Both Ridouane (2010) and Oh and Redford (2012) argue for an analysis of fake geminates as consonant sequences, but they propose different representational accounts for this phenomenon. Whereas Ridouane (2010) argues that his findings are consistent with an autosegmental model, Oh and Redford (2012) propose an Articulatory Phonology style representation, where gemination is subsumed under a more general process of gestural overlap (Browman & Goldstein, 1986, 1989, 1990, 1992). Gemination effects across word boundaries can be captured in this model as partial overlap between two independent consonantal gestures which are blended, but which do not overlap completely, hence the increased duration.

Scobbie and Pouplier (2010) argue for a gestural interpretation of fake geminates in Southern Standard British English and Scottish English, as part of a larger analysis of how multiple segmental and prosodic factors affect the articulation of /l/. Scobbie and Pouplier (2010) present EPG data on the production of /l/ across a range of segmental and prosodic conditions, including word-initial (*pee leeward*), word-final pre-consonantal (*peel#beavers*), word-final pre-vocalic (*peel#Eve*) and the fake-geminate context (*peel#lemurs*). They report that the fake geminate context shows considerable dorsal retraction, typical of /l/ in canonical coda positions (word-final pre-consonantal). At the same time, however, the fake geminate contexts always show tongue tip contact, which is typical in onset (word-initial) /l/, but which may be reduced in word-final pre-consonantal context. The presence of both advanced dorsal retraction and tongue tip raising makes the fake geminate context unique, and it is consistent with analysing it as a gestural blend of word-initial and word-final /l/. Although Scobbie and Pouplier (2010) argue for a gestural overlap analysis mainly on the basis of comparison between word-final pre-consonantal and word-final pre-vocalic /l/, their argument is reinforced by the presence of articulatory blending in /l#l/ sequences.

The Dutch /r/-allophony case is similar to the English /l/-allophony one, in the sense that it involves two distinct articulatory configurations depending on prosodic position. Cases like this provide a unique window into testing the gestural dynamics of gemination, and of potential degemination. In the extreme case of a categorical, phonological process of degemination (i.e., deletion of one of the two segments or timing slots), it stands to reason that only the gestures associated with one of the two allophones would be recoverable. If the process is gradient, the interest lies in the interplay between gestural overlap and temporal overlap. Again, there is an extreme case imaginable in which the coda and onset gestures are no longer sequential, but truly blended, and the fake geminate r#r forms its own allophonic category. In all but these extreme cases, however, we would see a more sequential presence of coda and onset gestures. The resulting question would then be to what extent the fake geminate differs from other consonant sequences, i.e. those where the two consonants are phonologically non-identical.