Dutch regressive voicing assimilation as a symmetric coarticulation process: acoustic evidence (abstract)

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According to what might be termed the received view, final laryngeal neutralisation (a.k.a. 'final devoicing') in Dutch and many similar languages is to be modelled as an operation that turns [+voice] (syllable or word) final obstruents into their [-voice] counterparts. Thus, the process is regarded as a fundamentally asymmetric phenomenon that targets only one of the members of a binary lexical opposition. When it occurs in languages with final laryngeal neutralisation, regressive voicing assimilation (*RVA*) is usually conceived of as an equally asymmetric process that targets [-voice] obstruents before [+voice] obstruents (plosives in Dutch) only, and transforms them into their [+voice] counterparts. In clusters ending in a [-voice] obstruent assimilation is assumed to apply vacuously or not at all, since the potential targets are 'already' [-voice].

(1) *Derivation of* <breedband> *and* <klaptafel>

UR	/breːd/ + /bɑnd/	/klɑp/ + /taːfəl/
FN	/breːtbɑnt/	N/A
RVA	/breːdbɑnt/	N/A
SF	[breˈːdbɑnt]	[klɑptaːfəl]

As illustrated in traditional derivational fashion in (1), these asymmetric conceptions of laryngeal neutralisation and RVA entail that whilst both processes target the medial cluster in a word like <breedband>, *broadband* (underlying /breːd/ + /bɑnd/), neither of them are active in the production of <klaptafel>, *folding table* (underlying /klɑp/ + /taːfəl/): *UR* = underlying representation; *FN* = final neutralisation; *SF* = surface form.

Especially in its recent autosegmental and non-derivational incarnations, this model of final laryngeal neutralisation and RVA is pervasive in the literature on the topic. It is reflected in transcription conventions, and has spawned theories about the monovalent nature of the [voice] feature (e.g. Lombardi 1994). It is even adopted in much of the experimental literature on (Dutch) voicing assimilation (e.g. Slis 1986; Menert 1994), which generally ignores the phonetics of [-voice][-voice]

clusters. Only recently has the view that laryngeal neutralisation is an asymmetric process begun to be challenged. Hsu (1996), Steriade (1997), and specifically for Dutch Ernestus (2000), have argued on phonetic grounds that laryngeal neutralisation is a symmetric process that affects both [+voice] and [-voice] obstruents and transforms them into a third class of obstruents that is surface-underspecified for [voice] (in the sense of Pierrehumbert and Beckman 1988).

This paper mounts a similar challenge against the asymmetric conception of RVA in Dutch. This challenge is based on acoustic data from a experiment concerning the production of word final obstruent clusters. As part of this experiment, 4 speakers produced sequences composed of word final /ps/ followed by a word initial phonologically voiceless plosive (/p, t/, voiced plosive /b, d/, /m/, /h/, or a lexical vowel (usually preceded by a phonetic [ʔ]). These sequences were part of noun + noun or adjective + noun constructions and embedded in carrier sentences designed to attract nuclear stress on the second word. The word final /ps/ clusters always consisted of a stem-final /p/ followed by a possessive or adjectival suffix /s/ (e.g. /kaːp/ + /s/, *of, from, pertaining to the Cape*).

Although this experiment was originally designed to test the claim by e.g. Brink (1975) that no regressive assimilation occurs in Dutch obstruent + fricative + [+voice] plosive clusters, its results have ramifications that stretch beyond this issue. For example, /ps/ clusters have the greatest amount of phonetic voicing before /b, d/, the smallest before /p, t/ (as well as /h/, [ʔ]), and an almost exactly intermediate amount of voicing before /m/ (cf. the left panel of figure 1). The latter segment is traditionally assumed to be phonologically 'inactive' with respect to RVA and is therefore expected to pattern with /p, t, h/, [ʔ] under the sort of model illustrated in (1). For a number of reasons, the most straightforward interpretation of the tree way voicing effect revealed by the experiment is that /ps/ assimilates to /p, t, h/, [ʔ] as well as /b, d/. In other words, the results of the experiment indicate that Dutch RVA is symmetric rather than asymmetric with regard to the ±voice] feature.

One of the arguments for this interpretation follows from the acoustic data itself, which indicates that Dutch RVA is a gradient, coarticulatory, i.e. *phonetic* process related to the production of phonetic (de)voicing rather than a phonological process that operates on a lexical [voice] feature (cf. Barry & Teifour 1999; Ernestus 2000). For example, the phonetic voicing of /ps/ clusters is affected by the nature of a following sound in a different way than their duration (see the right panel of figure 1), whilst the duration of the preceding vowels shows no effect at all. This mismatch of phonetic voicing and durational parameters is (broadly) consistent with acoustic data concerning RVA to English fricatives (Jansen in progress) and Hungarian voicing assimilation (Jansen & Toft to appear). If RVA indeed stems from the coarticulation of voicing-related articulatory gestures, the three-way voicing effect before /p, t/, /h/, [ʔ] vs. /m/ vs. /b, d/ follows naturally from articulation: /p, t/ are likely to be actively devoiced and /h/, [ʔ] have a negative effect on phonetic voicing by virtue of their glottal articulation (abduction and constriction respectively); /b ,d/ are actively voiced, probably through a variety of articulatory

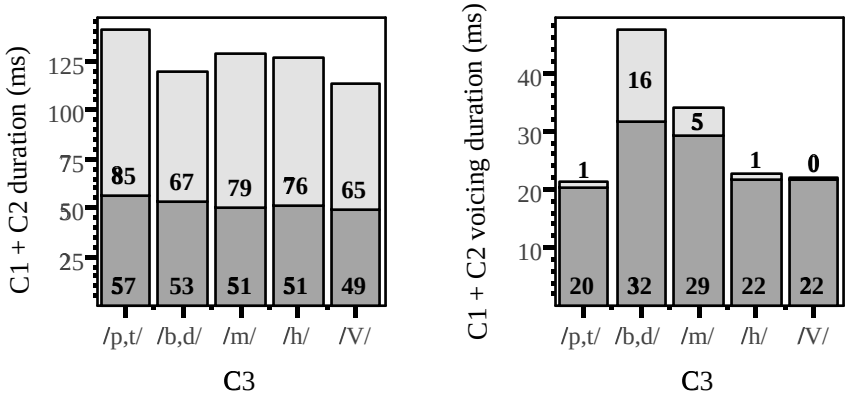

Figure 1: Segmental duration and voicing of /ps/ clusters (C_1C_2). Left panel: mean segmental durations (ms) of C_1 (bottom segments, dark grey fill) and C_2 (top segments, light grey) before [-voice] stops, [+voice] stops, /m/, /h/, and /V/ (preceded by phonetic [ʔ]). Right panel: voicing durations (ms) of C_1 (bottom segments, dark grey fill) and C_2 (top segments, light grey) in the same set of contexts. Note how there is a mismatch between the three way contrast defined by C_1C_2 voicing (/p, t, h, V/ vs. /m/ vs. /b, d/) and C_1C_2 duration (main split between /p, t/ and the rest; subsidary split between /m, h/ and /b, d, V/).

mechanisms (e.g. Stevens 1998), whilst /m/ is the only category that lacks all voicing-related gestures and is therefore predicted to act as a neutral context.

Standard 'agreement' rules or spreading operations referring to a (lexical) [voice] feature on the other hand, are fundamentally incapable of capturing the data uncovered by the experiment, and should therefore be abandoned. If Hsu's (1996) and similar analyses of final neutralisation are correct, this means that <breedband> and <klapdeur> are equally affected by both final neutralisation and a symmetric phonetic process of regressive voicing assimilation.

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