Geminate onsets in Dutch interjections – VOT normalisation and the gemination factor

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In the standard grammatical tradition, interjections are taken to reside outside the core grammar: interjections have deviant syntax (e.g. they resist *merge*) and have deviant phonology (e.g. they allow lax vowels word-finally in Dutch), e.g. /hɛ↗/, /bɑ↘/, /ɣɔ↘/, etc. However, Dingemanse *et al.* (2013) claim that interjections are inside the phonological system. We will report on a novel deviant aspect of interjections: they systematically start with an onset geminate in Dutch, e.g. /b:ɑ↘/, which had thus far remained unnoticed.

Phonetic evidence. Native speakers of Dutch (N=18) read a list of words and interjections. Voice Onset Time (VOT) values for the initial /b/ in the minimal pair *bak* 'container' – *bah* 'interjection of disgust' are measured and compared. We expect that prevoicing (negative VOT) for /b/ in *bah* is longer than in *bak.* In order to account for differences in speech rate, VOT was normalised. Relational measures have been shown to be a better measure to distinguish singletons from geminates than the raw durational values do (Kawahara, in press).

We will discuss several ways to compute normalised VOT (VOT divided by word length or by vowel length). Segments overlap in articulation as well as in acoustics. For example, when the non-lingual onset /b/ is acoustically present in the spectrogram, articulation for the vowel can already be made. Similarly, when the vowel /ɑ/ is not visibly present in the spectrogram anymore, the tongue may still be in place for its articulation, e.g. during the closure phase of the following stop, or when voicing has stopped in a word-final vowel. Therefore, we explored several ways to measure vowel length acoustically: the end of the vowel was placed either in the traditional way, at the moment where voicing stops and the second formant weakens, "[ɑ]", or in a different way. For *bak*, vowel length then includes the closure duration of the following stop, "[ɑ_]". For *bah*, vowel length then includes the soft noise or fricative /h/-like or /x/-like sound which follows the vowel, "[ɑh]". Normalised VOT for *bah* was then divided by normalised VOT for *bak* (Gemination factor).

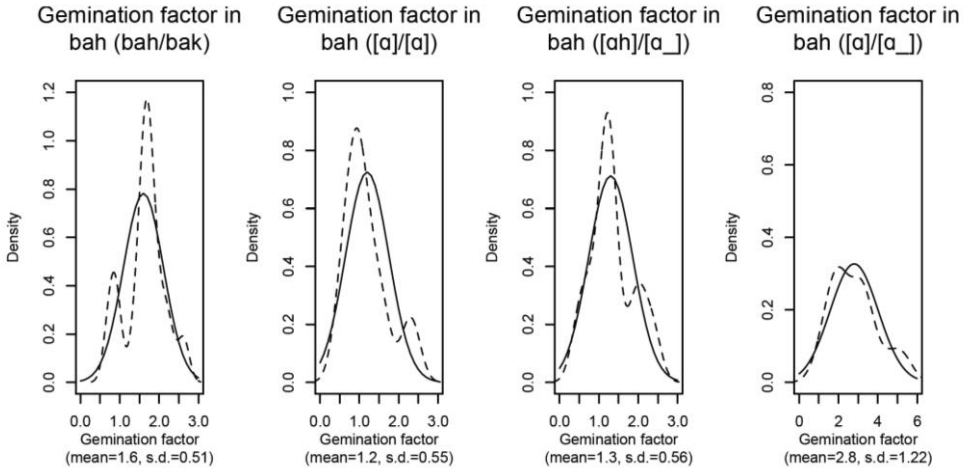

Figure 2: Gauss curve and density for the four different methods of computing the Gemination factor

Figure 2 shows normal distributions (N=15) of the four different ways to compute the Gemination factor. Absolute as well as normalised (as in Gauss curve 1 and 4) VOT values show that there is significantly more prevoicing in *bah* than in *bak*. There is no significant difference in word length between *bak* and *bah*, which means that /b/ is not just longer because interjections are longer in duration. By computing the Gemination factor as in the first and fourth Gauss curve (see Figure 2), most speakers have values around two, which means that their /b/ is about twice as long in *bah* as in *bak*.

Phonological evidence. Geminates are not just phonetically longer, length is also present in the phonological representation. For example, this is shown by the existence of minimal pairs. Either the initial consonant or the vowel of the interjection can be lengthened, which may result in a difference in meaning:

(1)	a.	bbah!	[bːɑ]	(or [bːɑɦ])	physical or moral disgust
	b.	baah!	[bɑː]		physical disgust only

Further phonological evidence is that some speakers (N=2) do not geminate the onset, but devoice it to [p]. Devoicing is one of the ways of realizing geminates (Topinzi 2004:213). We will provide a model in Moraic Theory that captures both the gemination and the devoicing, i.e. copying the [sg] feature in the coda to the onset.

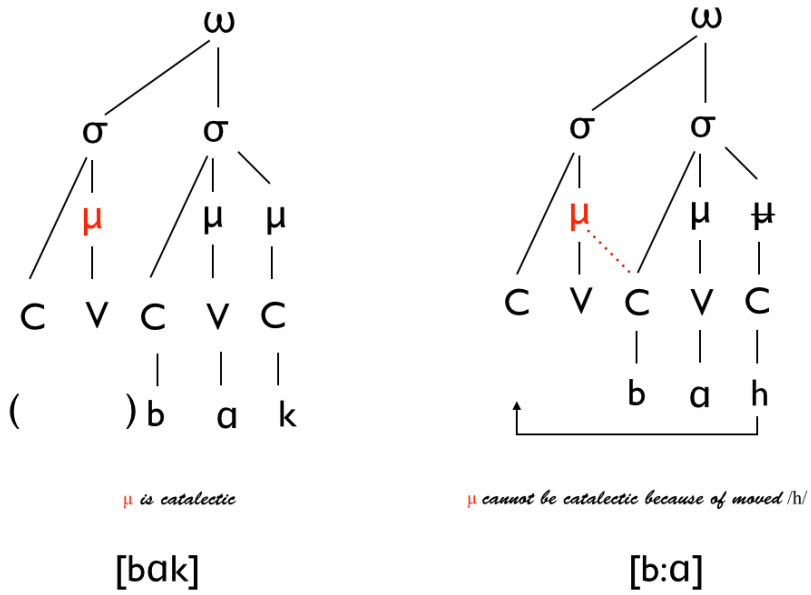

Figure 1: Phonological representation of *bak* and *bah*

Discussion and conclusion. We showed phonetic and phonological evidence for geminate consonants in Dutch. Phonologically, both the gemination and devoicing of /b/ in *bah* can be explained by the copying of the [sg] feature from the coda to the onset. There are different ways to compute normalised VOT and the Gemination factor, some of which show the difference between singletons and geminates better than others. Since segments overlap, only studying the acoustics of sounds is not sufficient. In future research, articulation of Dutch geminates should also be tested. In addition, a larger study with more items and repetitions should be used.

References

Dingemanse M., Torreira F., Enfield N.J. (2013). Is ‘‘Huh?’’ a Universal Word? Conversational Infrastructure and the Convergent Evolution of Linguistic Items. *PLoS ONE* 8(11): e78273. doi:10.1371/journal.pone.0078273.

Kawahara, S. (in press). The phonetics of obstruent geminates, sokuon. *The Handbook of Japanese Language and Linguistics: Phonetics and Phonology*.

Postma, G., Scheer, T. (2014). Hèh [hɛ], and hé [heː] in Dutch - Synchronic Linguistic Competence or Convergent Evolution? - A reply to Dingemanse et al. 2014.

Topintzi, N. (2004). Moraic Onsets and WSP Partition in Pirahã. *CamLing* 2004: 211-218.