The hybrid nature of voiced labiodentals (especially in German)

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Why are voiced labiodental fricatives interesting?

The voiced labiodental fricative /v/ has been shown to behave phonologically both like a sonorant and an obstruent in a number of languages, for instance:

- Russian: /v/ undergoes voicing assimilation but fails to trigger it, see Kiparsky (1985). Kavitskaya (1999) therefore calls it "schizophrenic",
- Hungarian: /v/ behaves as in Russian, e.g. Barkai & Horvath (1978),
- Norwegian: /v/ can occur in phonotactic positions restricted to sonorants and in those restricted to obstruents, Kristoffersen (2000).

Phonetically, these sounds seem to show large contextual variation and to vary between obstruent and sonorant, see e.g. Lulich (2004) on Russian and Kiss & Bárkányi (2005) on Hungarian.

Based on such findings, Padgett (in press) proposes a more fine-grained phonological distinction in abstract categories and universal features:

	Fricative [v]	*Narrow* approximant [ʋ̞]	*Wide* approximant [ʋ] [l, r]	Glide [w]
[sonorant]	–	+	+	+
[*wide*]	–	–	+	+
[vocoid]	–	–	–	+

e.g. in Russian e.g. in Dutch

Padgett further claims "phonology can call on featural distinctions that are rarely or never contrastive".

The present study proposes that:

1. German /v/ behaves phonetically and phonologically like a 'wide approximant',
2. Phonology does not need to call on such fine-grained distinctions; they are taken into account the relation between phonetic and phonological forms.

Phonological patterning of German /v/

This sound class behaves as an obstruent, because it undergoes final devoicing:

brave – brav	[v] – [f]	'good' (adjective – adverb)
Gräser – Gras	[z] – [s]	'grass' (plural – singular)
Orange – orange	[ʒ] – [ʃ]	'orange' (fruit – colour)
Räder – Rad	[d] – [t]	'wheel' (plural – singular)

German has a phonotactic restriction on sequences of voiceless obstruent plus voiced obstruent in the onset: *tz, *pz, *kʒ. However, obstruents plus /v/ occur frequently:

Quark [kv] 'curd', *quer* [kv] 'diagonally', *zwei* [tsv] 'two',
Zwiebel [tsv] 'onion', *Schwan* [ʃv] 'swan', *schwer* [ʃv] 'heavy', etc.

/v/ behaves in that respect like an approximant:

Kran [kʁ] 'crane', *schlau* [ʃl] 'clever', *Piano* [pj] 'piano', etc.

⇒ **German /v/** seems to be phonologically a 'narrow approximant'.

Phonetics of German /v/

Viëtor (1897): friction in German /v/ is very little (compared to English and French /v/). After an obstruent, /v/ is often pronounced as 'bilabial' [ʋ], which is frequently partially voiceless, like [v] in this position.

Kohler (1999): /v/ can become an approximant, especially in initial position.

Cross-language comparison with Dutch, which has both a voiced fricative /v/ and an approximant /ʋ/:
German /v/ (in the nonsense word /va:/) is perceptually and acoustically closer to Dutch /ʋ/ than to Dutch /v/ (Hamann & Sennema 2005a,b)

Experimental data: Acoustic parameters of German /v/ in different contexts

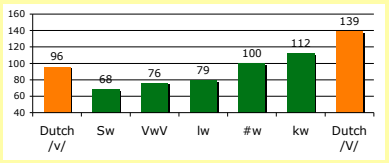
Recordings of five native German speakers (all female, from the area of Berlin, age ranging from 22 to 47). /v/ in the following words:

warm, Schwarm, Kwark	'warm, hive, curd'
brave, Malve	'good, hollyhock'

Ten repetitions of each word in the sentence *Sage* __, "(I) say __".

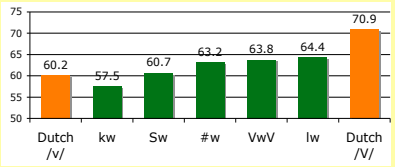
Parameters: duration, intensity, and harmonicity median (harmonics-to-noise ratio).
Average values, those for Dutch /v/ and /ʋ/ are from Hamann & Sennema (2005b):

Duration (ms)



/w/ in /kw/ includes the aspiration of the /k/

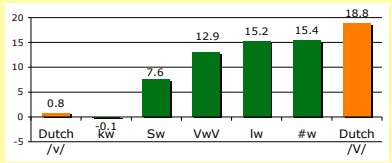
Intensity (dB)



Harmonicity Median (dB)

0 dB: equal energy in the harmonics and in the noise

20 dB: ~100% of the energy in the periodic part



⇒ **German /v/** is phonetically neither /v/ nor /ʋ/, more a 'narrow approximant'.

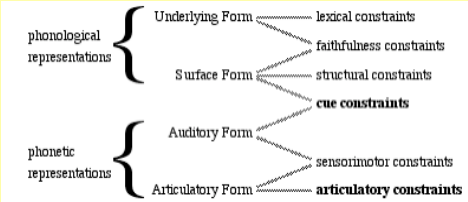
Consequences for phonological representations?

Contextual variants of German /v/:

- devoicing after obstruents (more so after /k/ due to aspiration)
- shorter in onset cluster (exception of /kv/ due to method)
- lenghtening in word-initial position (see e.g. Kuzla et al. 2006)

This phonetic knowledge does not have to be encoded in phonology. Speakers/listeners have to learn to relate phonetic forms (both articulatory and perceptual) to phonological forms, anyway.

Possible way of formalising this:
Boersma's (2005) bidirectional phonetics & phonology



- Interaction between phonetics and phonology takes place in cue constraints,
- phonotactic restrictions on German /v/ are encoded as structural constraints,
- phonological representations only have to account for alternations such as final devoicing, where German /v/ functions as a fricative. This can be formalised with universal or emergent features.

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