Three Accounts of the Velar Nasal in Dutch

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Summary

The velar nasal in Dutch (and German) is different from other nasal consonants in several respects. Various accounts have been proposed to deal with this behaviour: the velar could be placeless, or it could be derived from a cluster with an obstruent. We discuss the problems with each of these accounts, and show that both need a few extra assumptions. We then propose a third account, which is built on these two assumptions alone.

Outline of this talk

1. Six observations on the velar nasal

2. /ŋ/ as a hidden cluster

3. /ŋ/ as a placeless segment

4. /ŋ/ as a velar nasal

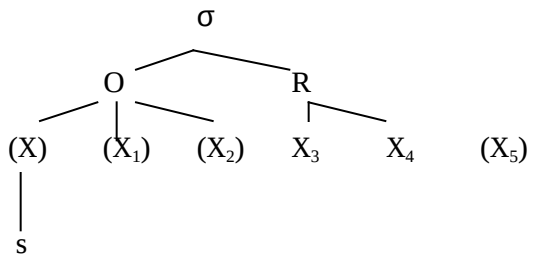
Appendix: Stress

1. Six observations on the velar nasal

1.1. Phonotactic behaviour

For the sake of concreteness, we assume the following syllable template (Booij 1995):

(1)



Note: in my view, $X_5 = X_1$

Observation I. (first approximation)

In Standard Dutch, /ŋ/ can only occupy the coda position X4. Other nasal consonants are much less restricted.

(2)

	m	n	ŋ
X_1	*maan* [maːn] 'moon'	*naam* [naːm] 'name'	_
X_2	_	*knaap* [knaːp] 'guy'	_
X_3	_	_	_
X_4	*lamp* [lɑmp] 'lamp'	*land* [lɑnt] 'land'	*dank* [dɑŋk] 'thank'
X_5	*arm* [ɑrm] 'arm' *naam* [naːm] 'name'	*kern* [kɛrn] 'core' *maan* [maːn] 'moon'	_

Some dialects (Netherlands Low Saxonian; also Frisian) also allow syllabic nasals:

(3) [wetn̩] 'to know' [pɑkŋ̍] 'to take' [lopm̩] 'to walk'

Observation I. (refinement)
In variants of Dutch, /ŋ/ can only occupy the rhymal position X3 and X4. Other nasal consonants are much less restricted.

Trommelen (1984) notes that this holds true only at the 'phonological level'. Phonetically, /ŋ/ can also occur in X5, as the result of assimilation:

(4) *tuin-kabouter* [ŋk] 'garden gnome'
kern-kop [ŋk] 'nuclear war head'

1.2. Assimilation to vowels

Like all nasal consonants, /ŋ/ can be the result of assimilation to an adjacent obstruent:

(5) *i*[ŋ]*consequent, i*[m]*populair, i*[n]*transitief*

In some variants of Dutch (Van den Berg 1943, Daan 1985, 1997, Van Ginneken 1935, Heeroma 1954, Hoeksema 1999, Kieft 1945, Scholtmeijer 1996, Verstegen 1953, Weijnen 1939, Daan 1951, Van Oostendorp 2000b), however, the /ŋ/ can also be the result of assimilation to a preceding vowel:

(6) a. *dans* 'dance' [dɑŋs], *hond* 'dog' [hɔŋt]
b. *eend* [eːnt]
c. *man* 'man' [mɑn], *ramp* 'disaster' [rɑmp]

These examples show that there is an extra condition: the assimilating vowel should be followed by a coronal consonant. I assume the reason is that this coronal 'protects' the word boundary from changing; cf. Van Oostendorp (2000b); the fact will be disregarded here.

Other vowel features do not have this property in any dialect:

(7) *hond* 'dog' *[hɔmt], *eend* 'duck' *[ɛnʲt]

Observation II.
Velar nasals are the only consonants that can result from assimilation to a vowel.

It should be noted that Observation I also holds for the velar nasals of this type:

(8) *maand* 'month' [ma:ŋt]

This assimilation is thus of a different type ('phonological' rather than 'phonetic') than the one between consonants (cf. (4))

1.3. Tone behaviour

Maasbracht Dutch is one of the Dutch dialects in which we can find one of two tones on the main stressed syllable of the word, provided this has either a long vowel or a sonorant consonant:

(9) Maasbracht Dutch

falling tone		*dragging tone*	
bi:	'bee'	bi:	'at'
bu:	'build'	bu:	'construction'
mɪn	'minus'	mɪn	'vile'
mɔl	'to break'	mɔl	'mole'

Yet we do not find this contrast on short vowels followed by a velar nasal:

(10)

	falling tone	dragging tone
a.	strɑŋ 'severe'	—
b.	stoŋ 'stood'	—
c.	krɪŋ 'bitch'	—

It has been argued that falling tone is actually the default tone (Hermans 1994, Van Oostendorp 2000b). In that case we can summarise as follows:

Observation III.
Velar nasals cannot bear tone.

The velar nasals share this property with (word-internal) /r/.

1.4. Cluster development

In Eastern Dutch dialects (like in Northern German), /ŋ/ cannot be word-final; it should always be followed by a homorganic obstruent.

(11) *[dɪŋ], [dɪŋk] 'thing'

Something like this does not hold for other nasals in any other dialect:

(12) [lɑm] 'lamb', [mɑn] 'man

Observation IV.
Velar nasals need to be followed by a nasal obstruent (in some dialects)

This observation may or may not be linked to another fact about the velar nasal:

Observation V.
Velar nasals may not be followed by a full vowel; in this context we rather find [ŋɣ]

(13) a. *diftong* [dɪftɔŋ] 'diphthong'
b. *diftongeren* [dɪftɔŋɣiːrə], *[dɪftɔŋiːrə] 'to diphthongize'

Before schwa, we find a reversed situation:

(14) c. *diftongen* *[dɪftɔŋɣə], [dɪftɔŋə] 'diphthongs'

Observation VI.
[ŋɣ] clusters cannot be followed by a schwa; in this context we rather find [ŋ]

Trommelen (1984) observes that preconsonantally we find both [ŋ] and [ŋɣ]:

(15)	a.	*Bangla Desh* [ŋɣl]	b.	*Sjanghai* [ŋh]
		ganglion [ŋɣl]		*jongleur* [ŋl] 'juggler'
		mangrove [ŋɣr]		*kongsi* [ŋs] 'combine'
		Ingewoon [ŋɣw]		*Ingweoon* [ŋw]

Several subregularties may be observed here (e.g. it seems to me that [ŋɣ] cannot be combined with [s] and [ŋɣ] cannot be combined with [r]), but I will leave this aside.

2. /ŋ/ as a hidden cluster

Hidden Cluster Analysis
[ŋ] is /nɡ/ or /nɣ/ at some level of representation.

Observation I is explained right away, since [ŋ] is allowed exactly in the same configurations as nasal+obstruent clusters:

(16) a. *[ŋa], [ok][ɑŋ], *[aːŋ]
b. *[mpa], [ok][ɑmp], *[aːmp]

Yet **Observation II** constitutes a problem for this account: if velar nasals which are the result of assimilation to a *vowel* (hence not to some putative underlying consonant), it is not clear why they obey the same syllabic restrictions as those in (12):

(16) c. *[ŋɑt] [nɑt] 'wet', [dɑŋs] *[dɑns] 'dance', *[maːŋt] [maːnt] 'month',

Observation III might be related to the fact that nasal+obstruent clusters also do not show tone contrast. Yet in these cases, it is consistently a dragging tone that shows up. It is not clear, then, how the explanation would work.

Observation IV of course follows directly from this theory; if all dialects have the same underlying form, it is to be expected that the cluster reduction process does not apply everywhere. **Observations V and VI** could be taken as indications about the precise way in which this process operates.

Under the Hidden Cluster Analysis, we need to add at least assumptions about:
- the fact that these processes involve *velars*
- the fact that it involves nasals and place; and that nasals are well-known for being sensitive to place assimilation anyway

Further problems:

- *Richness of the Base:* What happens to a putative input [dɪŋ]?
- Why does cluster reduction only apply to velar clusters?
- (Trommelen 1983, 1984): In diminutive formation, [ŋ] behaves like a single sonorant segment, rather than a cluster:

(17)	a.	*ram-metje* 'ram'	b.	*Mokəm-pje* 'Amsterdam'
		man-netje 'man'		*heidən-tje* 'heathen')
		bal-letje 'ball'		*druppəl-tje* 'drop'
		kar-retje 'car'		*werkər-tje* 'worker'
		raŋ-ŋətje 'order'		*houdəŋ-kje* 'attitude'

(18) *lamp-je* 'lamp'
vent-je 'bloke'
**rang-je*

Trommelen notes that this is not necessarily an argument against the HCA, since it could be the case that diminutive formation applies at a level in which /ŋ/ no longer behaves like a cluster

- Similarly (Trommelen 1984:174), [ŋ] can no longer be a cluster at the level at which voicing assimilation of obstruent clusters applies:

(19)	*brood-zaag* [ts] 'bread-knife'	*denk-vorm* [kf] 'way of thought'
	kaaz-fondue [sf] 'hot cheese'	*dank-zegging* [ks] 'acknowledgements'

(20) *meng-vorm* [ŋv] 'mixture' *zang-zaad* [ŋz] 'singing-seed'

3. /ŋ/ as a placeless segment

Placeless Segment Analysis
[ŋ] is a unspecified for Place of Articulation at some level of representation.

This analysis is inspired by the fact that in some languages, velar nasals clearly behave as placeless. E.g. in Japanese, a nasal in coda position assimilates in place to an immediately following consonant. Yet if this nasal occurs prepausally it is realised as "unreleased, either velar, or uvular" (Yip 1991):

(21) *sekke*[ŋ] 'soap', *ze*[ŋ] 'goodness;', *ho*[ŋ] 'book'

Similarly in some European Portuguese dialects (Barbosa 1965, Trigo 1993), nasal vowels at a certain point became denasalised. The resulting nasal consonant presents is velar before a pause (and assimilates to a following consonant in other contexts, just as in Japanese):

(22) *b*[õ] → *b*[ɔŋ] 'good'
rw[ĩ] → *rw*[iŋ] 'basis'

Some people have observed in personal communication to me that something along these lines happens in variants of Dutch as well, in which one says [rɛstoraŋ]. I have not found confirmation for this.

Observation I might follow if we assume that placeless segments all have a limited distribution: [h] and [ʔ] only appear in the onset, [ə] only appears in the nucleus, [ŋ] only appears in the coda. It is as yet unclear what would in turn explain this complementary distribution.

Observation II and any type of assimilation is a problem for this account: why should a placeless nasal prefer the context of a *velar* segment? Furthermore, in Dutch dialects (like in other Germanic languages), the consonant that shows up in non-alternating contexts (i.e. before a pause or a vowel) is [n]:

(23) *i*[n]*actief*

'Underlying' [ŋ] never alternates. For similar reasons, **Observation IV** is a complete mystery for this analysis.

Observation III may follow, under some plausible account as to why tone-bearing units should not be empty; the fact that [r] obeys the same restriction may be seen as an extra indication, since this segment behaves as placeless in this dialect in some other ways as well.

Observation V and in particular **Observation VI** are quite mysterious from the point of view of this analysis. As a matter of fact, other empty consonants are not allowed to occur next to a schwa at all:

(24) *[ʔə], *[hə], *[əʔ], *[əh]

Under the Placeless Segment Analysis, we need to add at least assumptions about:
- the fact that these processes involve *velars* in *coda's*
- the fact that it involves nasals in coda's and place; and that nasals are well-known for being sensitive to place assimilation in coda position

4. /ŋ/ as a velar nasal

Neither the Hidden Cluster Analysis nor the Placeless Segment Analysis is entirely successful in explaining all the relevant facts. Furthermore, both of them need to make at least two extra assumptions.

I try to construct an analysis on these two assumptions without either the Hidden Cluster Analysis or the Placeless Segment Analysis. This is at least as succesful as the previous two.
We restate the relevant assumptions in the form of constraints:

(25) NASALPLACE:
A nasal in the rhyme needs to share its place with an adjacent segment (preferably a consonant).

(26) VELAR:
A nasal is velar iff it appears in the coda

In spite of the fact that these constraints seem empirically justified — we need them also under the Hidden Cluster Analysis or the Placeless Segment Analysis — it would be good to have some independent justification.
As to (18) (which I suppose is hardly controversial), this justification might be provisionally found in phonetic grounding: place is hardly distinctive on nasals.
As to (19), two observations can be made:
(i) Levelt (1994) observes that something more general is going on in child language. At a certain stage of development, children are able to pronounce a word such as (27a), but not (27b):

(27) a. *poes* [pus] 'pussycat'
b. *soep* [sup] 'soup

This might be due to a more general restriction on child language of the following type:

(28) [-back] segments occur in the beginning of words; [+back] segments at the end of words

(19) can be seen as a slightly more general version of this constraint.
(ii) Furthermore, studying Cologne German (Scheer 1999), we find out that (19) is not necessarily restricted to nasals:

(29)

Standard German	Cologne German
Zeit [tsajt] 'time'	*Zick* [tsik]
Leute [lojtə] 'people'	*Lück* [lyk]
schneiden [ʃnajdən] 'cut'	*schigge* [ʃnigɛ]
braun [brawn] 'brown'	*brung* [bruŋ]
binden [bindən] 'to bind'	*binge* [biŋə]
bunt [bunt] 'colourful'	*bungk* [buŋk]

So, whatever the source of these restrictions, we seem to need them anyway.
I think it is possible to given an account of the observations I-VI without taking recourse to hidden clusters or placeless segments. I call this the Velar Nasal Analysis:

Velar Nasal Analysis
[ŋ] is a single velar nasal at all levels of representation

Observation I follows, or, to be more precise, (19) is a way of formulating this observation as a constraint, especially if we consider that X5=X1.

Observation II also follows from (19) and (18), under an appropriate constraint ranking. Usually, a nasal would assimilate to an adjacent consonant, rather than to an adjacent vowel. Yet if this can make the nasal velar, it can exceptionally also assimilate to a vowel. For other places of articulation, there is no such independent force.

Observation III needs a somewhat different explanation now. Recall that [r] displays the same behaviour; now, [r] clearly has a velar / uvular articulation in the dialect under discussion. It might therefore be the case that in this dialect there is a cooccurrence restriction on tone and velarity (for whatever reason)

(30) ANCHOR
The final segment of the word should not change (its place specification) (Van Oostendorp 2000b)

(31)

kɑn	ANCHOR	NASALPLACE	VELAR
kɑŋ	*!		
☞ kɑn		*	*

(32)

kɑnt	ANCHOR	NASALPLACE	VELAR
☞ kɑŋt			
kɑnt			*!

(33)

zɪŋ	ANCHOR	NASALPLACE	VELAR
☞ zɪŋ		*	
zɪn	*!		*

We actually predict that there are dialects in which the velarisation is not just the result of 'assimilation', but persistent across dialects. These actually exist, in Limburg (more or less neighbouring Cologne):

(34)

vɛnt	VELAR	ASSIMILATE
☞ vɛŋt		*
vɛnt	*!	

(35)

hɔnd	VELAR	ASSIMILATE
☞ hɔŋt		
hɔnt	*!	

Observation IV and **Observation V** follow directly from (18) (but it is not clear why this applies exactly to velar nasals; this remains a puzzle).

Observation VI remains somewhat of a mystery — this is probably a property of schwa; clusters before schwa behave as if they are word-final (Kager and Zonneveld 1986). The fact that a velar nasal *can* occur next to a schwa is no longer a real mystery.s

Appendix: Stress

It is thus possible to analyse the velar nasal as a velar nasal, given a few assumptions. We have also seen, that the analysis is not without problems. In this section a few other curious properties of velar nasals are mentioned, that are hitherto unexplained:

Observation VII.
Final syllables on [ŋ] avoid stress. They are only stressed if they are the only syllable in the word, or if the other syllable contains a schwa.

(36) a. *wóning* 'house', *háring* 'herring', *kóning* 'king'
b. *ring* 'ring', *ding* 'thing', *zing* 'sing'
c. *seríng* 'lilac'

(37) a. *sárong* 'id., Indonesian dress', *kámpong* 'id.',
b. *zong* 'sang', *tang* 'pair of tongs', *long* 'lung'
c. *senáng* [sənɑŋ] 'happy'

This observation seems in direct conflict with the Hidden Cluster Analysis, since consonant clusters make a syllable superheavy, hence attract stress. Yet neither the Placeless Segment Analysis, nor the Velar Nasal Analysis has anything to say about this observation either.

Appendix: Richness of the Base

As far as observation IV is concerned, there are two dialects of German, just like there are two dialects of Dutch:

(37)

	End of word	Before schwa	Before full vowel
a. Standard German	diŋ	diŋə	diftɔŋgirə
	thing	*things*	*diphtongize*
b. CNG:	diŋk	diŋə	diftɔŋgirə

(38)

	End of word	Before schwa	Before full vowel
a. Standard Dutch	dɪŋ	dɪŋə	dɪftɔŋʏɪːrə
	thing	*things*	*diphtongize*
b. Eastern Dutch	dɪŋk	dɪŋə	dɪftɔŋʏɪːrə

Itô and Mester argue for constraints of the following:

(39)
a. *VC: No voiced codas
b. *VCDC: No voiced dorsal plosives in complex codas
c. Ident(voice): input specifications for [voice] should be respected in the output.
d. Max: underlying segments should surface

(39a) is the constraint that is responsible for Final Devoicing

(40)

	/tag/	*VC	Max	Ident(voice)
a.	tag	*!		
b.	ta		*!	
c.	☞ tak			*

The constraint *VCDC becomes relevant in the analysis of /dɪŋg/:

(41)

	/diŋg/	*VCDC	Max	Ident(voice)
a.	diŋg	*!		
b.	diŋ		*!	
c.	☞ diŋk			*

The problem mainly resides with Standard German forms. Standard German displays final devoicing effects as well as CNG, so that we have evidence for the ranking Ident(voice) » Max also here. Yet according to the logic of (40), this should mean that the surface form [diŋk] should be optimal in this variant as well.

If we assume that in Standard German the input for these forms is /diŋ/, the constraint Dep will always choose the winner, independent of its ranking.

(42)

	/diŋ/	*VCDC	Max	Ident(voice)	Dep
a.	diŋg	*			*!
b.	☞diŋ				
c.	diŋk				*!

Unfortunately, under the Richness of the Base hypothesis, we are not allowed to restrict the focus of our attention to the input /diŋ/ only; we need to have some plausible story about /diŋg/ as well.

(43)

		Standard German	CNG
Before word boundary	input /diftɔŋ/	do nothing	insert [k]
	input /diftɔŋg/	delete /g/	final devoicing
Before schwa	input /diftɔŋ/	do nothing	do nothing
	input /diftɔŋg/	delete /g/	delete /g/
Before full vowel	input /diftɔŋ/	insert [g]	insert [g]
	input /diftɔŋg/	do nothing	do nothing

It is actually not very difficult to describe these patterns if we allow ourselves to assume that the underlying form in Standard German is /diftɔŋ/ and the underlying form in CNG is /diftɔŋg/. Only two changes are needed in this case (apart from Final Devoicing which is independently necessary as we have seen): in Common Northern German /g/ has to be deleted before a schwa, and in Standard German /g/ has to be inserted before a full vowel.

(44) a. [ŋə]: [ŋ] should be followed by schwa

b. *[ŋV]: [ŋ] should not be followed by a full vowel

With these two constraints, we can actually account for the full range of patterns in both dialects:

(45)

Standard German input /…ŋ/	[ŋə]	Max(g)	*[ŋV]	Dep(g)
☞ diŋ	*			
diŋk	*			*!
☞ diŋə				
diŋgə	*!			*!
diftɔŋirən	*		*!	
☞ diftɔŋgirən	*			*

The only ranking that is relevant here is that *[ŋV] » Dep(g).

(46)

CNG input /…ŋg/	[ŋə]	Max(g)	*[ŋV]	Dep(g)
diŋ	*	*!		
☞ diŋk	*			
☞ diŋə		*		
diŋgə	*!			
diftɔŋirən	*	*!	*!	
☞ diftɔŋgirən	*			

In this case, the only relevant ranking is [ŋə] » Max(g). The ranking of the other constraints cannot be determined. Since this is so, Standard German and CNG could actually be assumed to have the same grammar (in which *[ŋV] » Dep(g) and [ŋə] » Max(g)) if this would prove useful.

Things are not as simple if we have to strictly adhere to Richness of the Base. The patterns before schwa and before a full vowel do not pose any specific problems, since they are the same in the two dialects:

(47)

Standard German input /…ŋg/	[ŋə]	Max(g)	*[ŋV]	Dep(g)
☞ diŋə		*		
diŋgə	*!			
diftɔŋirən	*	*!	*!	
☞ diftɔŋgirən	*			

(48)

CNG input /…ŋ/	[ŋə]	Max(g)	*[ŋV]	Dep(g)
☞ diŋə				
diŋgə	*!			*!
diftɔŋirən	*		*!	
☞ diftɔŋgirən	*			*

The grammars of the two languages can thus still be the same. The pattern before pause is where the real problem is.

(49) *[ŋ#]: [ŋ] should not be followed by a word boundary.

(50) *[ŋ#] » Max(g), Dep(g)

But this is what happens to the inputs /diftɔŋ/ and /diftɔŋg/ in Standard German:

(51) Dep(g) » *[ŋ#]

(52)

/diŋ/	Dep(g)	*[ŋ#]
diŋ		*
diŋk	*!	

Itô and Mester (1999) propose that the solution to this riddle is constraint conjunction

(53) a. Ident-voice: Underlying specifications for [voice] should be respected.

b. *[ŋC]: [ŋ] should not occur in a consonant cluster.

We now have the following grammar accounting for the output [dɪŋ] from the input /dɪŋg/:

(54)

/diŋg/	Ident-voice *[ŋC]	Max(g)
diŋ		*
diŋk	*!	

If we now turn our attention to Dutch dialects, the situation becomes even more complicated.

(55)

	End of word	Before schwa	Before full vowel
a. Standard Dutch	dɪŋ	dɪŋə	dɪftɔŋʏɪːrə
	thing	*things*	*diphtongize*
b. Eastern Dutch	dɪŋk	dɪŋə	dɪftɔŋʏɪːrə

For Dutch we have to postulate something like (56):

(56) *[g]: No voiced velar stops

(57)

Standard Dutch input /…ŋ/	[ŋə]	Max(g)	*[ŋV]	Dep(g)	*[g]
☞ diŋ	*				
diŋk	*			*!	
☞ diŋə					
diŋgə	*!			*!	*!
diftɔŋːrən	*		*!		
☞ diftɔŋʏɪːrən	*			*	
diftɔŋgɪːrən	*			*	*!

(58)

Eastern Dutch input /…ŋg/	[ŋə]	Max(g)	*[ŋV]	Dep(g)	*[g]
diŋ	*	*!			
☞ diŋk	*				
☞ diŋə		*			
diŋgə	*!				
diftɔŋɪːrən	*	*!	*!		
☞diftɔŋʏɪːrən					
diftɔŋgɪːrən	*				*!

If we have to strictly adhere to Richness of the Base, the analysis becomes much more complicated. The problems mentioned for the German dialects of course arise again. It even becomes more obvious that the split into two possible dialects is a real one; there also are no 'in between' dialects in Dutch.

Furthermore it now becomes obvious that we could also assume that the *fricative* is underlying:

(59) *ŋɤ: A nasal should not be followed by a (homorganic) fricative.

This constraint is well known from the literature (cf. Padgett 1994, Van Oostendorp 2000):

(60)

/dɪŋʏ/	*ŋɤ	Max(g)	Ident-contintuant (Ident-voice)
dɪŋ		*!	
dɪŋx	*!		(*)
☞ dɪŋk			*(*)

The question now arises however why, if *ŋɤ is so strong, the same ranking does not cause the same effect (in this case, hardening) in other circumstances, such as in the context before schwa:

(61)

/dɪftɔŋɣ/ + /ɪːrə/	*[ŋV]	*ŋF	Max(g)	Ident-contintuant (Ident-voice)
dɪftɔŋɪːrə	*!		*	
dɪftɔŋɣɪːrə		*!		(*)
☹ dɪftɔŋkɪːrə				*(*)

More generally, we need to have a story about inputs with a fricative, inputs with a voiced stop and inputs with just a velar nasal under the Richness of the Base hypothesis. Since these putative underlying forms correspond fairly closely to at least one of the output forms, it seems most reasonable to assume that these can surface in some (non-null) way, and if they do, that they would pattern alike. This would give us the following table:

(62)

		Standard German	CNG	Standard Dutch	Eastern Dutch
Before word boundary	/diftɔŋ/	do nothing	insert [k]	do nothing	insert [k]
	/diftɔŋg/	delete /g/	devoice	delete /g/	devoice
	/diftɔŋɣ/	delete /ɣ/	harden, devoice	delete /ɣ/	harden, devoice
Before schwa	/diftɔŋ/	do nothing	do nothing	do nothing	do nothing
	/diftɔŋg/	delete /g/	delete /g/	delete /g/	delete /g/
	/diftɔŋɣ/	delete /ɣ/	delete /ɣ/	delete /ɣ/	delete / ɣ /
Before full vowel	/diftɔŋ/	insert [g]	insert [g]	insert [ɣ]	insert [ɣ]
	/diftɔŋg/	do nothing	do nothing	spirantise	spirantise
	/diftɔŋɣ/	harden	harden	do nothing	do nothing

(63) Ident(dorsal-of-stop)»*ŋ»Ident(dorsal)).

References

Barbosa, J.M.M. (ed.) 1965. *Études de phonologie portugaise*. Lisbon: Barbosa.

Berg, B. van den. Boers en beschaafd in het begin der 17e eeuw. *De Nieuwe Taalgids* 37: 242-246.

Booij, Geert. 1980. De onderliggende vorm van de velaire nasaal. *Leuvensche Bijdragen* 69:1-10.

Booij, Geert. 1981. *Generatieve fonologie van het Nederlands.* Utrecht: Spectrum.

Booij, Geert. 1993. Against Coronal Underspecification. The Case of Dutch. In: H. Demeersseman and Th. De Jong (eds.) *Jaarboek Corpusgebaseerde Woordanalyse 1993.* Amsterdam: VU, 11-20.

Booij, Geert. 1995. *The Phonology of Dutch.* Oxford: Oxford University Press.

Daan, Jo. 1985. Sociolecten en stijlen bij Bredero. *Spektator* 14:254-260.

Daan, Jo. 1997. Stads- en buitenlui. Typering door velarisering. In: Ariane van Santen en Marijke van der Wal (eds.) *Taal in tijd en ruimte.* Leiden: SNL, 183-191.

Ginneken, Jac. van. De correlatie van harde en weeke medeklinkers in het Oud- en Nieuwnederlandsch. *Onze Taaltuin* 3.10:302-317.

Heeroma, K. 1954. Nasalering en mouillering. *Handelingen van het drie en twintigste Nederlands philologen-congres.* Groningen: Wolters, 19-21.

Hermans, Ben. 1994. *The Composite Nature of Accent.* PhD Dissertation, Free University of Amsterdam.

Hoeksema, Jack. 1999. Velarisatie van /n/ in plat Hollands. *TABU* 94-96.

Hufman, Marie K. and Rena A. Krakow. 1993. *Nasals, Nasalisation and the Velum. Phonology and Phonetics 5.* San Diego: Academic Press.

Itô, Junko, and Armin Mester. 1999. On the Sources of Opacity in German. Coda Processes in German. Manuscript, UCSC.

Kager, René and Wim Zonneveld. 1986. Schwa,syllables and extrametricality in Dutch. *The Linguistic Review* 5:197-221.

Kieft, A.P. 1945. Gutturalisering en dentalisering in het Nederlands. *De Nieuwe Taalgids* 38:111-113.

Levelt, C. 1994. *The Acquisition of Place.* The Hague: HAG.

Leys, O. The Phonemic Status of <ng> and the Existence of a Phoneme /g/ in Dutch. *Leuvense Bijdragen* 59:128-136.

Nijen Twilhaar, J. 1990. *Generatieve fonologie en de studie van Oostnederlandse dialecten.* Amsterdam: P.J. Meertens-Instituut.

Nijen Twilhaar, J. and M. van Oostendorp. 2000. Feature Domains in Hellendoorn Dutch. Manuscript.

Oostendorp, Marc van. 2000a. *Phonological projection.* Berlin: Mouton de Gruyter.

Oostendorp, Marc van. 2000b. Wieringse nasaalvelarisering. *Taal en Tongval* LII.1: 163-188.

Oostendorp, Marc van 2000c. Syllabic Sonorants in Clay Frisian and Padgett's Generalisation. *Philologia Frisica Anno 1999.* Ljouwert: Fryske Akademy, 225-240.

Paradis, Caroline, and Jean-François Prunet. 1991. *The Special Status of Coronals. Internal and External Evidence.* San Diego: Academic Press.

Robinson, O.W. 1972. *Synchronic Reflexes of Diachronic Phonological Rules.* PhD Disssertation, Cornell.

Scheer, Tobias. 1999. Comment in LINGUIST List 10.316.

Scholtmeijer, Harrie. 1996. Het Bunschoten-Spakenburgs te midden van de andere dialecten. *Taal en Tongval* 48.2: 174-190.

Stroop, Jan. 1994. Afgedwongen nasalering. *TNTL* 110: 55-67.

Tiersma, Pieter Meijes. 1985. *Frisian Reference Grammar.* Dordrecht: Foris.

Trigo, R. Lorenza. 1993. The Inherent Structure of Nasal Segments. In: Hufman and Krakow (eds.), 369-400.

Trommelen, Mieke. 1983. Phonological Properties of the Dutch Velar Nasal. In: M. Van Den Broecke, V. van Heuven, W. Zonneveld (eds.) *Sound Structures. Studies for Antonie Cohen.* Dordrecht: Foris, 259-269.

Trommelen, Mieke. 1984. *The Syllable in Dutch.* Foris: Dordrecht.

Trommelen, Mieke, and Wim Zonneveld. 1989. *Klemtoon en metrische fonologie.* Muiderberg: Coutinho.

Verstegen, V. 1953. *D* na *n* en *l* in een groep Oostlimburgse dialekten. *Taal en Tongval* 5.4: 164-168.

Weijnen, Antoon A. 1939. Taalkaarten strand, hond en honger. *Onze Taaltuin* 7.11:343-349.

Yip, Moira. 1991. Coronals, Consonant Clusters, and the Coda Condition. In Paradis and Prunet (1991), 61-78.

Observation I.

In variants of Dutch, /ŋ/ can only occupy the rhymal position X3 and X4. Other nasal consonants are much less restricted.

Observation II.

Velar nasals are the only consonants that can result from assimilation to a vowel.

Observation III.

Velar nasals cannot bear tone.

Observation IV.

Velar nasals need to be followed by a nasal obstruent (in some dialects)

Observation V.

Velar nasals may not be followed by a full vowel; in this context we rather find [ŋɣ]

Observation VI.

[ŋɣ] clusters cannot be followed by a schwa; in this context we rather find [ŋ]