

## [0757] A LEXICAL THEORY OF SCHWA-DELETION\*

Germen J. de Haan

*Summary*

*In this paper I will present an alternative for the analysis of syllabic consonant syllables in West Frisian as proposed by Visser (1997). Visser derives such syllables phonologically from schwa-consonantal sonorant sequences by an unconstrained rule of Schwa-deletion, followed by a process of syllable reconstruction. My alternative is based on a proposal of van Oostendorp (1995), who suggests that schwa-deletion should be accounted for lexically: cases of schwa-deletion are derived by base-generating schwa-less syllables, followed by schwa-epenthesis. This lexical theory replaces the process of syllable reconstruction with resyllabification. In this paper, I try to outline empirical and analytic consequences of this conceptual shift. I show that a lexical theory can account for a range of facts involving consonantal sonorant syllables with and without schwa-epenthesis. In particular, the prohibition on two or more consonantal sonorant syllables follows quite easily from this theory. The argumentation concerning analytic differences between my approach and Visser's, makes use of Progressive Nasal Assimilation as a diagnostic for the syllable position of a consonantal sonorant. The results support a lexical theory of schwa-deletion and syllabic consonantal sonorants in Frisian.*

## 1. Introduction

In Modern West Frisian, one can observe very frequently alternations of the following type:

(1)	<i>woartel</i> 'carrot':	[vwatəl]	[vwatl]
	<i>better</i> 'better' :	[bɛtər]	[bɛtr]
	<i>biezem</i> 'broom':	[biəzəm]	[biəzm]

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*fuotten* ‘feet’: [fwotən]                      [fwotn]<sup>1</sup>

In these examples, syllables with a sequence of schwa + consonantal sonorant alternate with syllables without the schwa and with a syllabic consonantal sonorant. In Chapter 6 of his dissertation on the Frisian syllable, Visser (1997) presents an analysis of such alternations which takes schwa-syllables as basic, deriving syllabic consonantal sonorants from them by an unconstrained rule of Schwa-deletion.<sup>2</sup> Visser assumes that this rule removes the schwa-head of the syllable, which implies the deletion of all syllable structure that is dependent on this head. If there are unsyllabified segments after Schwa-deletion, these segments have to be reintegrated into syllable structure. According to Visser (1997), this process of syllable reconstruction is carried out with the help of the same set of syllabification rules that is responsible for the initial assignment of segments to nucleus, onset, and coda. I illustrate this with respect to one of the examples from (1), *biezem* ‘broom’. Taking as a starting point the syllabification (biə)(zəm), the application of Schwa-deletion derives (biə) plus the unsyllabified segments /z-m/. These segments have to undergo syllabic reconstruction. One way of doing this is by assuming that Frisian phonology has a post-lexical rule which projects optionally a nucleus from sonorant consonants. This builds a new syllable with the sonorant /m/ as nucleus and the segment /z/ as its onset. Hence, the (surface) syllable structure corresponding to [biəzm] in (1) is: (biə)(zm̩).<sup>3</sup> This illustrates the core of Visser's approach to syllabic consonantal sonorant syllables in Frisian.

What I like to do in this paper, is to show: [1] that Visser does not take into account certain empirical effects of an unconstrained rule of Schwa-deletion; [2] more importantly, that a principled account of these effects points to a radical different view on schwa-deletion, and hence on how to treat syllabic consonantal sonorants. This underpins my attempt to develop an alternative for Visser's theory.

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1. The velar nasal /ŋ/ can also be syllabic, but there is no alternant with a schwa, since schwa cannot precede /ŋ/ in Frisian.
  2. Note that the phenomenon and the rule are distinguished by using a capital in case of the latter.
  3. I represent syllabic consonantal sonorants in syllable structure as Ç.

## 2. *Schwa-deletion and sonority restrictions*

Visser (1997) pays little attention to the effects of Schwa-deletion if subsequent syllable reconstruction with consonantal sonorants as nucleus is no option. This is the case, for example, if Schwa-deletion applies to the leftmost syllable of two consecutive schwa-syllables. Consider the effect of Schwa-deletion applied to the (derived) form *skeakele* /skɪəkələ/ 'switched' (inflected verb, past tense singular/past participle):

$$(2) \quad (skɪə)(kələ) \Rightarrow (skɪə)k(ələ)$$

Here the segment /k/ is unsyllabified. It is not possible to license this segment by building a new syllable with the sonorant /l/ as the head and the /k/ as the onset. This would leave the final schwa-syllable without an onset, violating the plausible assumption that in Frisian non-initial syllables must have an onset:<sup>4</sup>

$$(3) \quad \textit{Onset Filter}$$

$$*((...)_\sigma((X)_N)_\sigma \dots)_\omega$$

With respect to unsyllabified /k/, there is a choice then between assignment of this segment to the onset of the following syllable, or to the coda of the preceding syllable. As to such choices, Visser (1997: 169) remarks: “(Complex) onsets are created before (complex) codas. This is in line with the MAXIMAL ONSET PRINCIPLE, which states that, when there is a choice, that syllabification is preferred by which the onset is maximised”. Onset assignment is preferred, and in agreement with this, the following syllabification is derived:

$$(4) \quad (skɪə)(kələ)$$

This syllabification corresponds to my intuitions. Interestingly, this derivation seems to comply with the claim made by Booij (1995) and van Oostendorp (1995) for Dutch that Schwa-deletion produces consonant clusters that are constrained by onset sonority restrictions. Consider the following examples of Schwa-deletion:

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4. This filter is borrowed, slightly adapted, from Visser (1997: 324).

(5)	a. <i>hekkel+e</i> 'cleaned ditches':	[hɛkələ]	[hɛklə]
	b. <i>wapper+e</i> 'waved'	[vɑpərə]	[vɑprə]
	c. <i>fûter+e</i> 'grumbled'	[futərə]	[futrə]
	d. <i>ferrifel+e</i> 'deceived'	[fɛrifələ]	[fɛriflə]
	e. <i>izer+en</i> 'iron', adjective	[izərən]	[izrən]
	f. <i>azem+e</i> 'took a breath'	[azəmə]	[azmə]
	g. <i>eamel+e</i> 'whined'	[ɪəmələ]	[ɪəmlə]

Applying van Oostendorp's generalization (1995: 156) to Frisian, the phonological context for Schwa-deletion appears to be that the schwa can be deleted before a non-stressed syllable and between two consonants as long as the second is more sonorous than the first. The second restriction means that the consonant cluster resulting from Schwa-deletion has to manifest a rising sonority slope. Such a pattern corresponds to a slightly relaxed interpretation of the *Sonority Sequencing Principle*, the main factor determining the structure of the onset. This principle states that sonority of consonants in the onset increases from the beginning of the syllable towards the nucleus. In Frisian, onset segments must belong to non-adjacent sonority classes at the lexical level, restricting complex onsets to obstruent-liquid clusters.<sup>5</sup> In the examples in (5), this is the case, with the exception of (5f) and (5g). The derived clusters /zm/ in [azmə] *azeme* 'took a breath' and /ml/ in [ɪəmlə] *eamele* 'whined' are from adjacent sonority classes, be it that the respective segments show a rising sonority slope. If it is assumed that sonority restrictions on possible onsets are less strict at the post-lexical level, then all the clusters in (5) conform to the Sonority Sequencing Principle. This supports the idea that Schwa-deletion has to be followed by onset assignment.

Is it possible to reconcile examples (5f) and (5g) with the Sonority Sequencing Principle, there are cases of schwa-deletion in Frisian which appear to be problematic with respect to the idea that resulting consonant clusters are governed by onset (sonority) restrictions.<sup>6</sup> To me, the following examples of schwa-deletion with segments from the same sonority class are acceptable - I also represent my intuitions on the resulting syllable structure:

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5. See Visser (1997: 87).

6. restrict the discussion here to Frisian, but I like to point out that the following argumentation can also be made with respect to Dutch.

- (6) a. *fol+er+e* 'full', [folərə] [folrə] (fol)(rə)  
infl. compar. adj.  
b. *keal+er+e* [kɪələrə] [kɪəlrə] (kɪəl)(rə)  
'bald', infl. compar. adj.  
c. *skarrel+e* 'muddled along' [skərələ] [skərlə] (skər)(lə)  
d. *pearel+e* 'pearled' [pɪərələ] [pɪərlə] (pɪər)(lə)
- (7) a. *dimmen+e* 'humble', infl. [dɪmənə] [dɪmnə] (dɪm)(nə)  
b. *liemen+e* 'loam', infl. [liəmənə] [liəmnə] (liəm)(nə)  
c. *Ginum+er* 'from Ginnum' [gɪnəmər] [gɪnmər] (gɪn)(mər)  
b. *Deinum+er* 'from Deinum' [dɛinəmər] [dɛinmər] (dɛin)(mər)

Clusters resulting from schwa-deletion can not only be from the same sonority class in the case of nasals or liquids as in (6) and (7), but even from different classes of sonorants with a decrease in sonority:

- (8)  
a. *Kollum+er* 'from Kollum' [kɔləmər] [kɔlmər] (kɔl)(mər)  
b. *ferhoalen+e* 'concealed' [fərhoələnə] [fərhoəlnə] (fər)(hoəl)(nə)  
c. *sulver+en+e* 'silver', [sYlvərənə] [sYlvərnə] (sYl)(vər)(nə)  
infl. adj.  
d. *Starum+er* 'from Starum' [stərəmər] [starmər] (star)(mər)

As far as sonority restrictions are concerned, the derived clusters in the examples (6)-(8) do not qualify as possible onsets. This implies that van Oostendorp's generalization with respect to the output of Schwa-deletion is not as general as he formulates it. Apparently, Schwa-deletion sometimes results in onset clusters (as in (5)), and sometimes it does not (as in (6)-(8)). Interestingly, the difference between these two cases can be connected to the Maximal Onset Principle, which, as noted above, expresses a preference for syllabifications with a maximal onset. In the case of (5), the Sonority Sequencing Principle allows clusters resulting from schwa-deletion to act *in toto* as the onset of the following syllable, and consequently the Maximal Onset Principle picks this analysis. In the case of (6)-(8), the only analysis that is in agreement with both sonority restrictions and the Maximal Onset Principle is a heterosyllabic analysis of these clusters. This is confirmed by my intuitions on the syllabification of the examples (6)-(8), which indicate that the segments of the resulting clusters are heterosyllabic indeed. This

shows that it is not only wrong to incorporate into the grammar a device which guarantees that Schwa-deletion always results in onset clusters, it is also not necessary. All that is needed are the independently motivated Maximal Onset Principle and the Sonority Sequencing Principle.

### 3. *Towards a lexical theory of schwa-deletion*

The alleged generalization that clusters resulting from Schwa-deletion had to show onset sonority restrictions, has the implication that the rightmost segment of this cluster has to be a consonantal sonorant. Although this generalization cannot be upheld, the facts covered by its implication appear to be correct, compare the schwa-deletion cases of (5)-(8) with the following examples where the rightmost segment is an obstruent:

(9)

a. <i>billik+e</i> 'fair', infl.	[bɪləkə]	*[bɪlkə]
b. <i>stien+ig+e</i> 'stony', infl.	[stjɪnəvə]	*[stjɪnvə] (*[stjɪŋvə])
c. <i>iris+en</i> 'irides'	[irəsən]	*[irsən]
d. <i>frommes+en</i> 'women'	[froməsən]	*[fromsən]
e. <i>jimmet+e</i> 'dined'	[ɟɪmətə]	*[ɟɪmtə]

It is not clear how these facts can be accounted for by a theory using an unconstrained rule of Schwa-deletion. Application of this rule in agreement with both the Maximal Onset Principle and the Sonority Sequencing Principle results in heterosyllabic clusters. This theory predicts such strings to be acceptable, contrary to fact. Of course we could stipulate that Schwa-deletion applies before consonantal sonorants and not obstruents.

Such a stipulation is not necessary in an alternative theory of schwa-deletion, suggested by van Oostendorp (1995: 142-148). In his theory, there is no actual rule of Schwa-deletion in the phonological component. The alternation that is described here as involving schwa-deletion follows from generating consonantal sonorants in the head position of a syllable at the level of the lexicon, and a subsequent rule of Schwa-epenthesis. Cases of schwa-deletion are now considered to be base-generated syllabic consonantal sonorants. For a language which permits consonantal sonorants to be syllable-heads, these segments can stay in that position, if all other relevant conditions are met, of course. If a language does not allow for syllabic consonantal sonorants to surface, these segments have to undergo

proper resyllabification with or without the help of schwa-epenthesis. Schwa-syllables that alternate with schwa-less syllables are now a consequence of epenthesis. This theory reduces the fact that schwa-deletion is excluded before obstruents, witness (9), to the assumption that obstruents cannot be syllable-heads. Schwa-segments preceding obstruents are not the consequence of epenthesis, but they have to present at the lexical level. To see this, compare the treatment of the minimally contrasting examples (5e) and (9c):

- (5) e. *izer+en* 'iron', adj. (i)(zɪ)(n<sub>1</sub>) => (i)(zə)(rən)  
 (9) c. *iris+en* 'irides' (i)(rəs)(n<sub>1</sub>) => (i)(rə)(sən)

The difference between these examples as far as schwa-deletion is concerned is already made at the lexical level. Schwa-epenthesis can apply twice in (5e), and once in (9c). Furthermore, both initial syllabifications have an onsetless final syllable, and have to undergo resyllabification in order to satisfy the Onset Filter (3). The final syllable receives the preceding consonant as its onset. There is no way to generate the unacceptable \*[irsən] *irissen*: 'schwa-deletion' before obstruents is excluded.

#### 4. The case of 'hannele': [hɔnlə] or [hɔ<sup>n</sup>lə]?

This lexical theory of schwa-deletion is promising in that it explains the contrast between the facts in (5)-(8) and (9), whereas a non-lexical approach can do the same only with an *ad hoc*-stipulation. Therefore I like to explore this lexical theory of schwa-deletion a bit more, at first by discussing a factual difference of opinion between Visser (1997) and myself. Visser (1997: 325) cites as one of the possible surface forms of the verb form *hannele* 'traded, dealt' (first and third person singular past tense; past participle) [hɔ<sup>n</sup>lə]. To me, this pronunciation is unacceptable; the closest acceptable form of this verb is without nasalization of the vowel: [hɔnlə].

Visser (1997: 325) assumes that the inflected verb form *hannele* /hɔnəl+ə/ is syllabified initially as (hɔ)(nəl)(ə).<sup>7</sup> The Onset Filter (3) forces the resyllabification of the segment /l/ from the coda to the onset of the rightmost schwa syllable: (hɔ)(nə)(lə). This syllabification is illustrative for

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7. I ignore the fact that Visser treats schwa initially as an appendix.

Visser's ideas on the Frisian rhyme. Universally the rhyme of a wordinternal syllable is supposed to be confined to a maximum of two positions:<sup>8</sup>

(10) *Maximal Rhyme Universal*

$$*(((X-X-X)_{\text{RHYME}})_{\sigma} (\dots)_{\sigma})_{\omega}$$

It has been argued for Germanic languages such as Dutch and German that these languages not only obey the Maximal Rhyme Universal, but are also subjected to a rhyme minimum. This minimum would hold for both word-internal and word-final rhymes:

(11) *Minimal Rhyme Constraint*

The rhyme of a syllable is confined to a minimum of two positions.

In combination with the Onset Filter, the Minimal Rhyme Constraint forces one to analyze intervocalic consonants following a (phonologically) short vowel within the same phonological word as ambisyllabic:

$$(12) \quad (\dots V -C_i- V\dots)_{\omega} \Rightarrow (\dots (\dots V -C_i)_{\sigma} (C_i- V\dots)_{\sigma\dots})_{\omega}$$

Ambisyllabicity makes it possible for a V-C-V string to comply with both constraints. According to Visser (1997: 80), there is no evidence that the Frisian syllable is restricted by the Minimal Rhyme Constraint. Therefore he syllabifies *hannele* as (hɔ)(nə)(lə) without an ambisyllabic /n/. Note that his syllable theory does not exclude ambisyllabicity on principled grounds, but since this theory does not incorporate the Minimal Rhyme Constraint, ambisyllabicity is not forced in cases such as (12).

Let us turn now to the effects of the application of Schwa-deletion to the leftmost schwa syllable of (hɔ)(nə)(lə):

$$(13) \quad (hɔ)(nə)(lə) \Rightarrow (hɔ)n(lə)$$

Schwa-deletion leaves the segment /n/ unsyllabified. The question now is: can it be reintegrated into syllable structure, and if so, how? Creating a new syllable with /n/, is no option since this syllable cannot get an onset. The resulting syllable structure (hɔ)(n)(lə) will be rejected by the Onset Filter. So

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8. Cf. Kaye and Lowenstamm (1982).



there is a choice between assignment of /n/ to the onset of the following syllable, or to the coda of the preceding syllable. In agreement with the Maximal Onset Principle and the (relaxed) Sonority Sequencing Principle, the syllabification (hɔ)(nlə) (h) is derived.

Visser does not discuss explicitly the derivation of his pronunciation [hɔ<sup>n</sup>lə], but it seems to me that he has to base this pronunciation on the syllabification [hɔ)(nlə], since this syllabification is derived conform his own principles. But then he faces a problem, because it is wellknown that vowel nasalization in Frisian is based on the tautosyllabicity of the vowel and the adjacent nasal.<sup>9</sup> As far as I see, Visser can only derive the pronunciation [[hɔ<sup>n</sup>lə] by allowing the segment /n/ to be syllabified by assigning it to the coda of the preceding syllable, in violation with the Maximal Onset Principle. Or, even more drastically, he could assume that /n/ is ambisyllabic after all, and try to derive the tautosyllabicity of vowel and nasal from the initial syllabification (hɔn)(nə)(lə). Both routes require changes in his theory of the Frisian syllable. Anyway, Visser's theoretical assumptions cannot account for his own judgement that [hɔ<sup>n</sup>lə] is wellformed, but they predict straightforwardly the acceptability of [hɔnlə] on the basis of the syllabification (hɔ)(nlə).

The approach to these facts I would like to defend here, is based on the lexical theory of schwa-deletion. This alternative should also depart from an ambisyllabic analysis of intervocalic consonants, since as I have argued elsewhere *contra* Visser (1997), there is reason to assume that Frisian phonology contains the Minimal Rhyme Constraint.<sup>10</sup> This gives us the initial syllabification (hɔn)(nl)(ə) for *hannele*. This syllabification is in need for repair, since the final schwa-syllable is onsetless. Resyllabification by maximizing the onset of this schwa-syllable derives (hɔn)(nlə). Since vowel and nasal are not tautosyllabic, vowel nasalization does not apply.<sup>11</sup> Note that the Maximal Onset Principle ensures that ambisyllabic consonants maintain their ambisyllabic status under resyllabification unless sonority properties make this impossible. This analysis predicts the following contrast:

9. See, for example, Visser (1985).

10. See de Haan (1999).

11. The tautosyllabicity condition has to hold for all relevant positions at the skeletal tier. This follows from Schein and Steriade's Uniform Applicability Condition (Schein and Steriade (1986)).

(14) *hannele*: [hɔnlə]                      \*[hɔ<sup>n</sup>lə]

This corresponds to my intuitions.

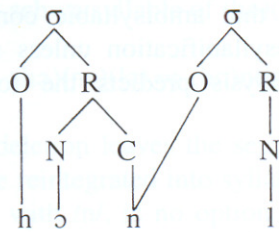
It seems to me that this lexical account of schwa-deletion with subsequent resyllabification has an advantage here over a non-lexical one with subsequent syllable reconstruction. The latter departs from the initial syllabification (hɔn)(nə)(lə), or maybe (hɔn)(nəl)(ə). The crucial point now is that after deletion of the schwa from the leftmost schwa-syllable, the segment /n/ does not remain unsyllabified, since it is licensed through its attachment to the coda of the first syllable. Hence there is no need for syllable reconstruction. The syllabification after Schwa-deletion is (hɔn)(lə), which satisfies the conditions for vowel nasalization. This predicts, wrongly, intuitions opposite to (14). Since, as we have shown, the lexical account makes the correct predictions, this clearly is an encouragement to see how a treatment of syllabic consonantal sonorants in Frisian can be based upon such a lexical theory of schwa-deletion.

##### 5. (Adjacent) syllabic consonant syllables

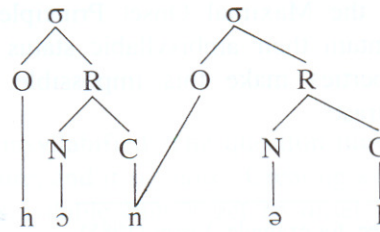
Syllable structure in Frisian is parameterized in such a way that a syllable nucleus cannot only be occupied by vowels, but also by one of the sonorant consonants /l, r, m, n, ŋ/. In a lexical theory of schwa-deletion, syllabic consonant syllables are basic, and their schwa-alternants are derived by epenthesis:

(15) *hannel* 'trade':

a. [hɔnl]



b. [hɔnəl]



The ambisyllabic status of /n/ in both representations illustrates that syllabic consonant syllables and schwa-syllables have to have an onset. This onset

assignment is forced by the Onset Filter (3), which states that word-internal syllables must have an onset, a principle that also applies to syllabic consonant syllables.

That syllabic consonant syllables must have an onset, also explains the contrast between the forms in (15) [hɔnl] and [hɔnəl] on the one hand and \*[hɔ<sup>n</sup>l] on the other. Nasalization of the vowel cannot cooccur with a following syllabic consonant syllable, or a schwa-syllable. The ambisyllabic status of /n/ is not compatible with the tautosyllabicity requirement on nasalization of the vowel. If we would allow for vowel nasalization to apply by assuming the /n/ to be tautosyllabic, this entails disappearance of the nasal, which is then of course no longer available as the onset of the syllabic consonant syllable, violating the Onset Filter (3).

As pointed out by Visser (1997: 334), the fact that the Onset Filter (3) applies to syllabic consonant syllables precludes the possibility of two (or more) adjacent syllabic consonants. As a constituent of the nucleus, a syllabic consonant cannot occupy at the same time a position in the onset of the following syllabic consonant syllable, which, as a consequence, is left onsetless in violation of the Onset Filter. A lexical theory of schwa-deletion must permit adjacent syllabic consonants at the lexical level. The question is how this theory deals with them. Consider the following:

(16) *hannelen* 'traded', plural past tense: (hɔn)(nɫ)(ŋ)

Having an onsetless final syllable, this form needs to be repaired. This can be done in several ways. [1] Resyllabification by assignment of the (maximal) cluster /nɫ/ to the onset of the final syllable: (hɔn)(nɫŋ)[hɔnlŋ]. Here [ɫ] is no longer a syllable head, hence the string [nɫŋ] does not contain adjacent syllabic consonants; [2] Schwa-epenthesis applying to the first syllabic consonant syllable with resyllabification of the /l/: (hɔn)(nə)(lŋ) hɔnəlŋ. [3] Schwa-epenthesis applying to the second syllabic consonant syllable with (maximal) resyllabification of /nɫ/: (hɔn)(nɫən) [hɔnlən]<sup>12</sup>. [4] Schwa-epenthesis applying to both syllabic consonant syllables with resyllabification of /n/ and /l/: (hɔn)(nə)(lən) [hɔnələn]. In summary, this lexical theory accounts correctly for the following facts generated from (16):

(17) *hannelen*: [hɔnlŋ] [hɔnəlŋ] [hɔnlən] [hɔnələn]

12. The ambisyllabicity of /n/ predicts correctly, as before, that vowel nasalization is precluded: \*[hɔ<sup>n</sup>lən].

A slightly more complicated case of two adjacent syllabic consonants is the following:

(18) *sulver+en+e*: (sYl)(vr̩)(ŋ)(ə)

Here we have an extra (final) schwa-syllable, causing the second syllabic consonant to be non-final. This schwa-syllable is onsetless, and has to be 'rescued' by receiving an onset from the preceding syllable. But this time resyllabification cannot be maximal, since /rn/ (let alone /vrn/) does not comply with onset sonority restrictions. So the first option is [1] non-application of Schwa-epenthesis with non-maximal resyllabification: (sYl)(vr̩)(nə) [sYlvr̩nə]. Other options are: [2] Schwa-epenthesis applying twice with resyllabification of /r/: (sYl)(və)(rə)(nə); [3] Schwa-epenthesis applying to the first syllabic consonant syllable (no resyllabification): (sYl)(vər)(nə) [sYlvərənə]; [4] Schwa-epenthesis applying to the second syllabic consonant with maximal resyllabification of /vr/: (SYl)(vrə)(nə) [sYlvrənə]. Summarizing, the following facts are produced correctly from (18):

(19) *sulverene*: [sYlvr̩nə] [sYlvərənə] [sYlvərənə] [sYlvrənə]

The lexical theory of schwa-deletion does not seem to encounter any special problems with respect to cases starting with adjacent syllabic consonants underlyingly. On the contrary, the relevant facts are accounted for without calling upon *ad hoc*-stipulations. I will show now that a case of adjacent syllabic consonants that is problematic for Visser's theory can be solved within this lexical theory quite easily.

#### 6. The case of 'hammeren': [hamrn]

Visser (1997: 335 n. 28) cites plural past tense forms such as (hɑm)(r̩)(ŋ) [hɑmr̩ŋ] from /hɑmər+ən/ *hammeren* 'hammered' and (hɛk)(l̩)(ŋ) [hɛkl̩ŋ] from /hɛkəl+ən/ *hekkelen* 'cleaned ditches' as being in conflict with the prohibition of two adjacent syllabic consonants. I will argue now that they should not, and in fact cannot, be analyzed as adjacent syllabic consonants within a lexical theory of schwa-deletion. This entails that the observation

that adjacent syllabic consonants are excluded (at the surface), can be maintained.

Let us take *hammeren* as the basis for our argument. Within a lexical theory of schwa-deletion, *hammeren* will be treated exactly like the case of *hannelen* we have already discussed above:

- (20) *hammeren*: (hām)(mr̥)(ŋ )  
 a. (hām)(mr̥ŋ ). [hāmɾn] (maximal resyllabification)  
 b. (hām)(mə)(r̥ŋ ) [hāmər̥n] (epenthesis with resyllabification)<sup>13</sup>  
 c. (hām)(mr̥ən) (hāmɾən) (epenthesis with maximal resyllabification)  
 d. (hām)(mə)(r̥ən) (hāmər̥ən) (epenthesis (twice) with resyllabification)

Crucially within this approach, there is no way in which the initial syllabification (hām)(mr̥)(ŋ ) comes to the surface with two adjacent syllabic consonants. In particular, the surface string [hāmɾn] is generated, but with an analysis involving only one syllabic consonant.

There is independent evidence that this analysis is correct. This evidence is based on a diagnostic for the head position of consonantal sonorants, namely the process of progressive nasal assimilation. It is observed (see for instance, Riemersma (1979: 48), Visser (1997: 360 passim)) that the coronal syllabic nasal is homorganic with a consonant to its left:

- (21) *koppen* 'cups': /kop+ən/ \*[kopn] [kopm]  
*libben* 'lively': /lɪbən/ \*[lɪbn] [lɪbm]  
*gatten* 'holes': /gɔt+ən/ [gɔtn]  
*midden* 'middle': /mɪdən/ [mɪdn]  
*sokken* 'socks': /sɔk+ən/ \*[sɔkn] [sɔkŋ]  
*beammen* 'trees': /bjɛm+ən/ \*[bjɛmn] [bjɛm:]<sup>14</sup>  
*toarnen* 'thorns': /twɑn+ən/ [twɑn:]  
*dingen* 'things': /dɪŋ+ən/ \*[dɪŋn] [dɪŋ:]

In (21) the only plausible analysis of the coronal nasal is that of the head (nucleus) of a syllable. That this is a crucial, and hence, diagnostic, characteristic of the rule of *Progressive Nasal Assimilation* can be deduced

13. To some speakers, this example is less acceptable, probably due to a less favorable rhythmic pattern, see Visser (1997: 351).

14. Note that in certain cases assimilation of the coronal nasal results in two adjacent identical sonorants, represented phonetically as '[:]'.  
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from the following two observations. First, the rule does not apply if the consonant and the nasal both belong to the onset. Compare the contrast between the following cases:

- |      |                          |                               |          |           |
|------|--------------------------|-------------------------------|----------|-----------|
| (22) | <i>iepen</i> 'open':     | (iə)(pŋ )                     | *[iəpn]  | [iəpm]    |
|      | <i>libben</i> 'living':  | (lɪb)(bŋ )                    | *[lɪbn]  | [lɪbm]    |
|      | <i>dimmen</i> 'humble':  | (dɪm)(mŋ )                    | *[dɪmn]  | [dɪm:]    |
|      | <i>stikken</i> 'broken': | (stɪk)(kŋ )                   | *[stɪkn] | [stɪkŋ]   |
| (23) | <i>iepene</i> :          | (iə)(pŋ )(ə) => (iə)(pnə)     | [iəpnə]  | *[iəpmə]  |
|      | <i>libbene</i> :         | (lɪb)(bŋ )(ə) => (lɪb)(bnə)   | [lɪbnə]  | *[lɪbmə]  |
|      | <i>dimmene</i> :         | (dɪm)(mŋ )(ə) => (dɪm)(mnə)   | [dɪmnə]  | *[dɪm:ə]  |
|      | <i>stikkene</i> :        | (stɪk)(kŋ )(ə) => (stɪk)(knə) | [stɪknə] | *[stɪkŋə] |

In the approach defended here, the examples in (23) are analyzed as cases in which the consonant-nasal cluster belongs to the onset of the schwa-syllable. The facts corresponding to these structures show that in these cases Progressive Nasal Assimilation does not apply.<sup>15</sup> This contrasts clearly with the examples in (22), where this rule applies obligatory to a nasal in nucleus position.<sup>16</sup>

Second, the rule of Progressive Nasal Assimilation does not apply to a heterosyllabic consonant-nasal cluster:

- |      |                              |             |          |           |
|------|------------------------------|-------------|----------|-----------|
| (24) | <i>opname</i> 'recording':   | (op)(namə): | [opnamə] | *[opmamə] |
|      | <i>fangnet</i> 'safety net': | (fɑŋ)(nɛt): | [fɑŋnɛt] | *[fɑŋŋɛt] |

So the consonant-nasal cluster that has to undergo Progressive Nasal Assimilation cannot belong to the onset (see (23)), nor be heterosyllabic (see (24)). The only possibility left then is that the cluster is split up over the onset and the nucleus. Hence the nasal has to be in the position of the

15. This is also noted by Visser (1997: 364, note 55).

16. This contrast is apparently not recognized by Visser (1997: 353) who cites the assimilation cases of (23) as acceptable. He acknowledges the fact that his derivation violates both the assumption that resyllabification cannot assign an onset consonant to a preceding syllable, and the Onset Filter. People I have consulted share my intuitions, but see Bloemhoff (1991: 306, note 119), who cites similar examples from Stellingwerfs as acceptable.

nucleus (it is syllabic). This confirms our analysis of the examples in (22) with consonantal sonorants in syllable-head position preceded by an onset.

Progressive Nasal Assimilation can be used as a diagnostic for the syllable position of a consonantal sonorant. It can be concluded from the (non-)application of this rule whether a sonorant consonant is in a nucleus position, or not. The example with *hammeren* could not prove this, because the conditions for Progressive Nasal Assimilation are not met: the relevant cluster /mr/ does not contain a coronal nasal. But consider the following cases with a coronal nasal in the relevant context:

- (25) *iepener* 'open', compar.: (iə)(pŋ)(r)  
*libbener* 'living', compar.: (lɪb)(bŋ)(r)  
*dimmer* 'humble', compar.: (dɪm)(mŋ)(r)  
*stiffener* 'broken', compar.: (stɪk)(kŋ)(r)

These initial syllabifications have onsetless final syllables. In order to prevent blocking by the Onset Filter (3), they have to undergo resyllabification. In agreement with the Maximal Onset Principle, the consonant-nasal cluster is assigned to the onset of the final syllable. Since the coronal nasal is not in the nucleus, the conditions for Progressive Nasal Assimilation are not met:

- (26) (iə)(pnr): [iəpnr]                      \*[iəpmr]  
 (lɪb)(bnr): [lɪbnr]                      \*[lɪbmr]  
 (dɪm)(mnr): [dɪmnr]                      \*[dɪm:r]  
 (stɪk)(knr): [stɪknr]                      \*[stɪkŋr]

This contrast is predicted correctly, and it supports a lexical theory of schwa-deletion, which does not allow for adjacent consonantal sonorant syllables to surface.

Two additional comments on the contrast in (26) are in order, however. First, there is a number of people whose intuitions comply with (26), but who also accept the following 'intermediate' forms:

- (27) *iepener*: [iəpmnr]  
*libbener*: [lɪbmnr]  
*dimmener*: [dɪm:nr]  
*stikkener*: [stɪkŋnr]

Apparently, their phonology can make use of a kind of copying mechanism in order to satisfy the Onset Filter. The facts in (27) can be derived, if the coronal nasal is assumed to be copied onto the onset of the final syllable:

- (28) (iə)(pŋ)(r<sub>i</sub>)    =>    (iə)(pŋ)(nr<sub>i</sub>)  
       (lɪb)(bŋ)(r<sub>i</sub>)    =>    (lɪb)(bŋ)(nr<sub>i</sub>)  
       (dɪm)(mŋ)(r<sub>i</sub>)    =>    (dɪm)(mŋ)(nr<sub>i</sub>)  
       (stɪk)(kŋ)(r<sub>i</sub>)    =>    (stɪk)(kŋ)(nr<sub>i</sub>)

After copying, the conditions of Progressive Nasal Assimilation are met with respect to the leftmost consonantal sonorant syllable, the coronal nasal still being in the nucleus position.

A second remark concerns the contrast in (26) itself. My informants accept this contrast as indicated, but some judged the contrast not as 'acceptable' *versus* 'unacceptable', but as 'bad' *versus* 'worse'. This might be related to the fact that these structures have syllabic consonant syllables with a complex onset. Visser (1997: 342) claims that such structures have to be excluded at the phonetic level, citing cases such as:

- (29) *dendrum* 'rhododendron':            (dɛŋ)(drŋ)    \*[dɛndrm]  
       *Sibren* 'Sibren' proper name:        (si)(brŋ)    \*[sibrn]  
       *wankeler* 'shakier':                    (vɑŋ)(klr)    \*[vɑŋklr]

In order to achieve this, he formulates the following filter (slightly adapted here):

- (30) *Syllabic Consonant Onset Filter*  
       \*([<sub>ONSET</sub>consonant -consonant]-[<sub>NUCLEUS</sub> {-VOC, +son}])<sub>σ</sub>

To me, however, examples such as (29) are just as acceptable as the acceptable ones in (26). Therefore I would like to suggest that idiolectal variation with respect to these cases is dependent on the presence or absence of the highly specific filter (30). What is important for my general argumentation, is that although not everyone seems to agree on the (non-) acceptability of all cases, people consulted agree that there is a clear contrast in the examples in (26), showing that adjacent syllabic consonants are not possible. This follows from a lexical theory of schwa-deletion in close cooperation with the Onset Filter and the Maximal Onset Principle.



Finally, I want to show that this theory also derives the correct results if Schwa-epenthesis applies to the representations in (25). Schwa-epenthesis can apply here to the leftmost consonantal sonorant syllable, to the rightmost one, or to both. First, consider application to the leftmost syllable:<sup>17</sup>

- |                     |            |
|---------------------|------------|
| (31) (iə)(pə)(nr̩): | [iəpən̩r]  |
| (lɪb)(bə)(nr̩):     | [lɪbən̩r]  |
| (dɪm)(mə)(nr̩):     | [dɪmən̩r]  |
| (stɪk)(kə)(nr̩):    | [stɪkən̩r] |

The coronal nasal has to undergo resyllabification due to the Onset Filter (3) and is assigned to the onset of the rightmost consonantal sonorant syllable. Since there is no consonant-nasal cluster, Progressive Nasal Assimilation is no option in this derivation. Second, epenthesis to the rightmost syllable derives the following:

- |                  |           |            |
|------------------|-----------|------------|
| (32) (iə)(pnər): | [iəpnər]  | *[iəpmər]  |
| (lɪb)(nər):      | [lɪbnər]  | *[lɪbmər]  |
| (dɪm)(mnər):     | [dɪmnər]  | *[dɪm:ər]  |
| (stɪk)(knər):    | [stɪknər] | *[stɪkɲər] |

Epenthesis is followed by maximal resyllabification, assigning the consonant-nasal cluster to the onset of the next syllable. Subsequent application of Progressive Nasal Assimilation is not possible, since the coronal nasal is in the onset. Third, epenthesis can apply twice, with resyllabification of the coronal nasal:

- |                     |            |
|---------------------|------------|
| (33) (iə)(pə)(nər): | [iəpənər]  |
| (lɪb)(bə)(nər):     | [lɪbənər]  |
| (dɪm)(mə)(nər):     | [dɪmənər]  |
| (stɪk)(kə)(nər):    | [stɪkənər] |

Finally, for those people who can make use of a copying device for onset assignment, forms such as (27) have variants with epenthesis in the final consonantal sonorant syllable:

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17. To me, these examples are fine. As noted before, some speakers do not like such forms, probably due to the rhythmic patterns involved.

(34) <i>iepen</i> :	(iə)(pɪ)(nər):	[iəpmnr]
<i>libben</i> :	(lɪb)(bɪ)(nər):	[lɪbmnr]
<i>dimmener</i> :	(dɪm)(mm)(nər):	[dɪm:nər]
<i>stikkener</i> :	(stɪkɪ)(nər):	[stɪkɪnr]

This concludes my presentation of a lexical theory of schwa-deletion and syllabic consonantal sonorants.

#### 7. *Final remark*

In this paper I have developed a lexical theory of schwa-deletion and consonantal sonorants in Modern West Frisian, based on a proposal made by van Oosterdorp (1995). I have presented this theory in the context of a discussion with Visser (1997), who defends a non-lexical alternative to syllabic consonantal sonorants. It seems to me that I have given reasonable support for a lexical theory, but direct comparison between the two alternatives is complicated by the circumstances that they differ not only in theoretic principles, but also in empirical coverage. Intuitions on a number of cases seem to vary. This is the main reason why it is not possible for me to claim that my proposal is superior to Visser's. It is intended as a contribution to the clarification of an intriguing, but recalcitrant, topic of Frisian phonology.

*Department of Frisian  
University of Groningen*

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