Chapter 2

Sonorant expansion in English and German

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This paper aims to integrate three apparently divergent phenomena in which the leading role is played by sonorants. We start the discussion by looking closely at syllabic consonants and vowel syncope in two languages: English and German. Additionally, the two structures are compared to certain cases of vowel-zero alternations. It will be pointed out that syllabic consonants stem from the expansionist behavior of sonorants as a reaction to their positional weakness. This solution is then extended to cover the cases of vowel syncope and vowel-zero alternations in both English and German. Finally, the findings allow us to assume an active role of sonorants which can cover a long distance from a syllabic consonant to a governing relation with the preceding obstruent.

Key words: sonorants, syllabic consonants, vowel syncope, vowel-zero alternation

2.1 Introduction

The paper explores three apparently unrelated phenomena in two related languages: English and German. The scope of our research interests here includes syllabic consonants, vowel syncope, and certain vowel-zero alternations. We look at these processes with the ambition to provide convincing evidence for their intimate relationship. This will in turn allow us to offer a unified solution for the phenomena in question. It will be pointed out that all the three processes, i.e. syllabic consonant, vowel syncope, and vowel-zero alternation, have the same origin and stem from the expansionist behavior of sonorants, which is in turn a reaction of the latter to positional weakness. Moreover, this

paper deals with some additional phenomena which help us better understand the role of sonorants in various phonological processes. Thus, apart from syllabic consonants, vowel syncope, and vowel-zero alternations, we shall look at the progressive nasal assimilation, final obstruent devoicing in German and partial geminates. In the analysis of the relevant facts, we shall adopt the Strict CV model (Scheer 2004 and Cyran 2010) and the lenition theory known as the Coda Mirror (Ziková and Scheer 2010).

2.2 Syllabic consonants

In recent non-linear phonological models like Government Phonology or Strict CV, syllabic consonants are represented as doubly linked, left-branching structures. In other words, a syllabic consonant, while being linked to its own consonantal slot, can additionally spread to the preceding nuclear position and replace a weak vowel. Generally speaking, consonants which can act in this way constitute a natural class of sonorants. This observation is confirmed by Germanic languages like English and German, for example, which we shall scrutinize here in search for the relevant data. This choice is justified by the fact that in both languages syllabic consonants are a common and well-documented phenomenon.

The representation of syllabic consonants discussed above requires a schwa vowel to step aside and make room for the following sonorant. In other words, a receding schwa enables a neighboring sonorant to take over its duties. Interestingly, it is not the case that all sonorants have an equal opportunity to become syllabic. For instance, in English only nasals and liquids can play the syllabic role. Moreover, in English the syllabic velar nasal is rare as it never appears after the schwa (see Szigetvári 1999; Gussmann 1998). It follows that each single example of the syllabic velar nasal must be the result of the progressive place assimilation, e.g., *chicken* [tʃɪkən] > [tʃɪkn̩] > [tʃɪkŋ̩]. Note further that English is a language which generally does not tolerate heavy consonant clusters. The upper limit on the number of consonants in clusters is two in most of the cases. However, syllabic consonants are responsible for the appearance of much more complex sequences with up to four or even five consecutive segments, e.g. *accountant* [əˈkaʊntn̩t] and *singleton* [ˈsɪŋgl̩tn̩], respectively. Finally, it must be mentioned here that the appearance of syllabic consonants is strictly connected with and depends

on the tempo of speech. Thus, although in a careful and somewhat learned pronunciation the schwa separates [g] from the final [nt] cluster in *arrogant* ['ærəgənt], in fast, less controlled speech the vowel is lost and the sonorant becomes syllabic ['ærərgn̩t]. In (1) we provide some more examples of syllabic consonants in English which have been adopted from Hammond (1999).

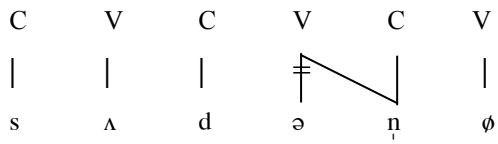
(1) English syllabic consonants

a. *word-internally*		b. *word-finally*		c. *word-initially*	
legend	['ledʒn̩d]	sudden	['sʌdn̩]	until	[n̩'tɪl]
arrogant	['ærəgn̩t]	napkin	['næpkn̩]	balloon	[b'l̩u:n]
cabinet	['kæbn̩ət]	bosom	['bʊzm̩]	convulsed	[kn̩'vʌlst]
cavalry	['kævl̩ri]	gradual	['grædʒul̩]	confetti	[kn̩'feti]/[km̩'feti]
faculty	['fækl̩ti]	rascal	['rɑ:skl̩]		
violin	['vaɪl̩'ɪn]	shrapnel	['ʃræpnl̩]		

The immediate conclusion one can draw from the examples in (1) is that there are hardly any constraints on the context of syllabic consonants. They can arise in the word-internal (1a), as well as the word-final (1b) position. They can also appear as the second member of the word-initial consonant cluster or even as the first consonant of the word (1c). More specifically, it seems practically impossible to capture the exact context of syllabic consonants, which varies dramatically. Thus, they can appear between two consonants (e.g., *arrogant* ['ærəgn̩t]), before a vowel (e.g., *cabinet* ['kæbn̩ət]), after a vowel (e.g., *gradual* ['grædʒul̩]), or even inter-vocalically (e.g., *violin* [vaɪl̩'ɪn]) (cf. Szigetvári 2002).

The left-branching structure of syllabic consonants mentioned above is confirmed by the data under (1) where the phonetic realization containing the schwa is equally possible (e.g., *sudden* ['sʌdən] vs. ['sʌdn̩]). Note that in the former situation the sonorant is never syllabic. It follows that the disappearance of the schwa is intimately connected with the appearance of the syllabic consonant. This situation is depicted in (2).

(2) The representation of syllabic consonants



In (2) the sonorant spreads to the left and docks on to the position originally occupied by the schwa.

In German, syllabic consonants are subject to similar constraints (see, for example, Hall 1992; Brockhaus 1995; Wiese 1996; Scheer 2004). First, only sonorants, predominantly nasals and the lateral, can spread to the preceding nuclear position and form syllabic consonants. Secondly, the nuclear position invaded by a sonorant is occupied by a weak vowel, that is, the schwa. Finally, the suppression of the schwa vowel is not obligatory, the form like *Segel* 'sail' can be pronounced either with the schwa or with the syllabic consonant [zeːgəl] vs. [zeːgl̩]. Consider some more data in (3) below which have been collected from Hall (1992) and Scheer (2003).

(3) German syllabic consonants

a.			b.		
wetten	[vɛtn̩]	*bet*	Handel	[handl̩]	*trade*
haben	[hɑːbm̩]	*have*	Mantel	[mantl̩]	*coat*
Flammen	[flamm̩]	*flame,(pl.)*	Henkel	[hɛŋkl̩]	*handle*
sagen	[zɑːgŋ̍]	*say*	Löffel	[lœfl̩]	*spoon*
Löwen	[løːvm̩]	*lion, (pl.)*			
fahren	[fɑːʁN̩]	*go*			

Similarly to English but on a far larger scale, syllabic nasals in German are additionally subject to the progressive place assimilation (3a). Moreover, all the final clusters in (3) alternate with the schwa (e.g., *wetten* [vɛtən], *sagen* [zɑːgən] and *Mantel* [mantəl], etc). Finally, although the formation of the syllabic nasal after the uvular [ʁ] is far less common, it is still possible to find some examples where the nasal acquires the uvular place of articulation (e.g., *fahren* [fɑːʁN̩]). Turning now to differences, we can notice that German, in opposition to English, lacks the syllabic /r/. Thus, in the rhotic accents of English /r/ is allowed to play the syllabic function (e.g., *tiger* [ˈtaigɹ̩], *anchor* [ˈæŋkɹ̩], *adverb* [ˈædvɹ̩b], etc.), whereas German /r/ cannot appear in this function. As explained by Scheer (2004: 698), /r/ is not a good candidate for the syllabic consonant as it undergoes vocalization and is realized as a low schwa [ɐ]. Moreover, German /r/ is claimed to be a uvular fricative, which may effectively exclude /r/ from the group of potential syllabic consonants. Interestingly, Scheer (2003) points out that in certain cases the alternation between syllabic and non-syllabic consonants in German is obligatory. Note that if a vowel-initial suffix is attached to a form terminating in a syllabic consonant, the latter obligatorily alternates with a non-syllabic variant. In this situation the nasal not only loses its left branch but also becomes dissimilated from the preceding obstruent (e.g., *trocken* [tχɔkŋ] vs. *trocken+en* [tχɔkn-ən]

or *trockener* [tχɔkn-ɐ]). Such obligatory alternations are illustrated in (4) (Scheer 2004: 703).

(4) Fluctuating clusters in German

	a.	b.	c.	d.	
Segen	[ze:gən]	[ze:gn̩]	[ze:kn-ən]	[ze:kn-ɐ]	*blessing*
Wagen	[vɑ:gən]	[vɑ:gn̩]	----------	[vɑ:kn-ɐ]	*carriage*
Regen	[ʁe:gən]	[ʁe:gn̩]	[ʁe:kn-ən]	----------	*rain*
Garten	[gɑ:tən]	[gɑ:tn̩]	[gɛɐtn-ɐn]	[gɛɐtn-ɐ]	*garden*
Kasten	[kastən]	[kastn̩]	----------	[kɛstn-ɐ]	*box*
offen	[ʔɔfən]	[ʔɔfn̩]	[œfn-ən]	[œfn-ɐ]	*open*

The first two columns in (4), i.e., (4a) and (4b), depict an optional alternation between a syllabic consonant and the schwa. Note, however, that when the infinitive (4c) or agentive (4d) vowel-initial suffix is added to such forms the nasal is obligatorily non-syllabic and non-homorganic. Crucially, the voiced obstruents occurring before the nasals in (4c) and (4d) undergo devoicing, compare the following two forms [ze:gn̩] and [ze:kn-ɐ].

In the discussion so far, we have seen that in both languages syllabic consonants are left-branching structures, i.e., a sonorant spreads to the left and docks on to the nuclear position occupied by the schwa. What calls for the explanation, however, is the exact context in which syllabic consonants arise. More importantly, we should explain the reason behind the expansionist behavior of sonorants. In other words, why do syllabic consonants appear in the first place? Additionally, the obligatory devoicing of the obstruent preceding the non-syllabic consonant (4c, 4d) also deserves a comment. Finally, we should look more deeply at the syllabification of syllabic consonants in complex consonant sequences bearing in mind that both languages allow for at most three-consonant clusters. Before we address the above questions, however, we broaden the discussion to two additional processes which are apparently unrelated to syllabic consonants, i.e., vowel syncope in English and certain vowel-zero alternations in German.

2.3 Vowel syncope

Vowel syncope in English resembles regular vowel-zero alternations in languages like German or Polish in that the vowel [e], in the latter

language, alternates with zero in related forms, *lew* [lef] vs. *lwa* [lva] 'lion, nom./gen.'. However, certain aspects of vowel syncope put it in line with syllabic consonants rather than with Polish vowel-zero alternations, e.g., both processes are optional rather than obligatory and appear mostly in casual speech styles. More importantly, they occur in a similar context and have identical structure, i.e., a consonant followed by a sonorant. For instance, the word-internal [kl] cluster in *chocolate* [ˈtʃɒklət], which is the result of vowel syncope, resembles the sequence with the syllabic consonant in, for example, *faculty* [ˈfækl̩ti] with the only difference that in [ˈtʃɒklət] the sonorant does not play the syllabic function. Harris (1994) provides us with some crucial details concerning vowel syncope in English. First, the alternating vowel is always some kind of schwa. Secondly, the process relies on stress pattern in that it occurs in the post-tonic nucleus[1]. Finally, the syncope is strictly connected with the affiliation of the segment which immediately follows the syncope site. Surprisingly enough, it is always a sonorant. From the three mentioned, the most important observation for us here is the one which says that a sonorant is an obligatory member of the cluster arising from syncopation. Note that despite its obligatory character, the presence of sonorants in such structures must be recognized as a mere accident as it does not play any active role in vowel syncope. Furthermore, syncopated clusters resemble traditional branching onsets as the former just like the latter consist of an obstruent followed by a sonorant (e.g. [ˈmedli], [ˈɒprə] and [ˈtʃɒklət], etc). Two obstruents separated with the schwa which anyway meet all the general conditions stated above, are never subject to vowel syncope (e.g., *bracketing** [ˈbræktɪŋ], *gossiping** [ˈgɒspɪŋ] or *menacing** [ˈmensɪŋ]). The ungrammaticality of the above forms makes us admit that the role played by sonorants in syncope-related clusters has not been given a sufficient attention in previous studies. Before we move any further, however, we should first provide some more data illustrating vowel syncope in English. The following examples are quoted from Harris (1994: 185), the upper-case schwa indicates the syncope-prone vowel.

(5) Vowel syncope-related clusters in English

a.		b.	
separate	[ˈsepᵊrət]	misery	[ˈmɪzᵊri]
temperature	[ˈtempᵊrətʃə]]	every	[ˈevᵊri]
elaborate	[ɪˈlæbᵊrət]	surgery	[ˈsɜːdʒᵊri]
factory	[ˈfæktᵊri]	nursery	[ˈnɜːsᵊri]

[1] If the post-tonic nucleus is followed by a secondary-stressed nucleus, which occurs in an independent foot, syncope is not activated, e.g., *separate* adj. [ˈseprət] vs. v. [ˈsepəˌreɪt] (Harris 1994 and Szigetvári 2002).

a. continued		b. continued	
boundary	[ˈbaʊndᵊri]	camera	[ˈkæmᵊrə]
chocolate	[ˈtʃɒkᵊlət]	prisoner	[ˈprɪzᵊnə]
mystery	[ˈmɪstᵊri]	definite	[ˈdefᵊnət]
reference	[ˈrefᵊrəns]	opener	[ˈəʊpᵊnə]
awfully	[ˈɔːfᵊli]		

c.			
rocketing	[ˈrɒkɪtɪŋ]	menacing	[ˈmenəsɪŋ]
monitor	[ˈmɒnɪtə]	opacity	[əˈpæsəti]
gossiping	[ˈgɒsɪpɪŋ]	balloting	[ˈbælətɪŋ]

From (5) it follows that the syncope-prone schwa is suppressed not only within a sequence resembling a traditional branching onset (5a), but also within a sequence which does not pass the test for onsethood (5b). Furthermore, the forms in (5c) confirm the earlier assumption according to which syncope is unable to act between two obstruents. It has been pointed out (Harris 1994: 186) that the forms in (5b) invalidate the traditional analysis based on resyllabification. Similarly, the epenthetic vowel solution is likewise impossible here. Note that the same consonant sequence [dl] would be subject to epenthesis in *pedalling* [ˈpedlɪŋ] – [ˈpedəlɪŋ] but not in *maudlin* [ˈmɔːdlɪn]. The insertion of the schwa in certain forms only, makes the epenthetic solution invalid[2]. Finally, note that both Harris (1994) and Szigetvári (2002) hint at the idea that a syllabic consonant can replace the syncope-prone schwa. It follows that besides unsyncopated and fully syncopated variants there is a third option, one which contains a syllabic consonant, e.g., [ˈɒp̩rə], [ɪˈspeʃl̩i], [ˈpɜːsn̩l̩]. Unfortunately, however, this attempt to combine syncope-related clusters and syllabic consonants has been abandoned halfway through.

Summing up the discussion so far, we have seen that sonorants have the ability to dock on to the preceding nucleus which results in syllabic consonants (Section 2.2). The general ability of sonorants, however, should be increased as they are also responsible for the appearance of syncope-related consonant sequences. What still calls for the explanation are forms like *fiddle* [fɪdl̩] and *fiddler* [fɪdlə] which differ in the status of the sonorant. In other words, while in the former case the lateral can play the syllabic function, in the latter this option is unavailable. Before we address this and other questions, we should first look at similar structures in German.

[2] For some problems in analyzing the forms in (5b) within the Government Phonology framework, see Kijak (2008).

Although the German case is not an exact copy of the English one in that the former resembles the vowel-zero alternation in Polish or the *fiddle* [fɪdᵊl] and *fiddler* [fɪdlə] alternation in English, rather than a vowel syncope, we have decided to discuss it here anyway. It means that the following discussion is concerned with spurious clusters. These are sequences of consonants which resemble branching onsets, i.e., where the second member of the sequence is a sonorant. Spurious clusters, which were dubbed variable items, were introduced and first analyzed in Vennemann (1968)[3]. The reason why they are called variable items is that the obstruent, which is always the first member of the spurious cluster, is affected by a general rule of Final Obstruent Devoicing in one dialect only, that is, Northern Standard German, but it refuses to undergo devoicing in another one – Hochlautung. The situation in both dialects is depicted in (6) below. Thus the forms in (6a) are characteristic of Hochlautung, while those in (6b) of Northern Standard German (NSG).

(6) Spurious clusters in German dialects (Brockhaus 1995: 186)

	a. Hochlautung	b. NSG	
Adler	[ˈʔɑːdlɐ]	[ˈʔɑːtlɐ]	*eagle*
biblisch	[ˈbiːblɪʃ]	[ˈbiːplɪʃ]	*biblical*
Kübler	[ˈkyːblɐ]	[ˈkyːplɐ]	*cooper*
Bügler	[ˈbyːglɐ]	[ˈbyːklɐ]	*sb. who irons*
Regler	[ˈreːglɐ]	[ˈreːklɐ]	*regulator*
eignen	[ˈʔaɪgnən]	[ˈʔaɪknən]	*suit*
Segnung	[ˈzeːgnʊŋ]	[ˈzeːknʊŋ]	*blessing*
ebnen	[ˈʔeːbnən]	[ˈʔeːpnən]	*level*
Ordnung	[ˈʔɔɐ̯dnʊŋ]	[ˈʔɔɐ̯tnʊŋ]	*order*

It must be explained here that despite being morphologically complex, none of the sequences in (6) is separated by a morphological boundary. In other words, the spurious clusters in (6) do not have their origin in mechanical concatenation of separate morphemes. Secondly, the difference between both dialects boils down to obstruent devoicing in that the obstruent undergoes devoicing in NSG but there is no change to its voice specification in Hochlautung. Finally and more importantly, the forms in (6) are of particular interest to us as the fluctuating obstruent is always followed by a sonorant which brings to mind the syncopated clusters in English. Thus, similarly to (5b) above, the consonant sequences in (6) are spurious, i.e., they cannot be interpreted as branching onsets simply because they are not possible branching onsets,

[3] For the analysis of these sequences within the Government Phonology framework, see Brockhaus (1995).

e.g., [dn] in *Ordnung* and [gn] in *Segnung*[4]. More crucially, the spurious character of such sequences is confirmed by the vowel-zero alternation found in some related forms (7).

(7) Vowel-zero alternations in spurious clusters (Brockhaus 1995: 191)

Bibel	[ˈbiːbəl]	*Bible*	eigen	[ˈʔaɪgən]	*own*
Kübel	[ˈkyːbəl]	*vat*	Segen	[ˈzeːgən]	*blessing*
bügeln	[ˈbyːgəln]	*iron*	eben	[ˈʔeːbən]	*level (adj.)*
regeln	[ˈreːgəln]	*regulate*	Ordentlich	[ˈʔɔɐ̯dəntlɪç]	*tidy*

The immediate conclusion drawn from the discussion above is that, similarly to English, the German word-medial consonant sequences in (6) are spurious, i.e., they are separated with a vowel in the related forms (7). Note that although some of the sequences in (6) are identical to branching onsets (e.g., [bl] in *biblisch* [ˈbiːblɪʃ] 'biblical'), they are only apparently so as confirmed by the related forms in which the same sequence is separated by the vowel (e.g., *Bibel* [ˈbiːbəl] 'Bible'). The spurious character of such sequences can be independently confirmed by the word-medial realization of the [kl] sequence in (6b). This cluster, as pointed out by Brockhaus (1995: 191), has two variants, i.e., it can be realized as [k] plus the sonorant or the obstruent is weakened to the fricative [ç], [x] before [l]. Crucially, this alternative realization does not affect [k] in the word-initial clusters. It follows that what looks like the same cluster can have two different structures, i.e. a branching onset or a sequence of two onsets separated with the nuclear position which hosts a vowel-zero alternation.

Summing up, the conclusion at which we arrive is that word-medial obstruent plus sonorant clusters in (6) are spurious as separated by the alternating vowel which surfaces in related forms (7). Now, it must be noted that the forms in (7) illustrate careful pronunciation and that in rapid and/or casual speech the schwa is not usually realized but the following sonorant becomes syllabic instead. This once again resembles the situation in English where syncopated clusters are replaced by a syllabic consonant. Crucially, Löhken (1995), who has analyzed the development of consonant sequences from OHG to NHG, argues that the origin of consonant sequences under (6) was syncope which took place only before sonorants. In other words, the syncope was strictly connected with the context in which it occurred in that it did not take place were the vowel was sandwiched between two obstruents or two

[4] The analysis of word-initial [gn] and [kn] sequences in German can be found in Kijak (2008).

sonorants. One last thing worth mentioning is that certain clusters in NSG escape the otherwise general rule of obstruent devoicing illustrated in (6b) above (e.g., *Rudrer* [ˈruːdrɐ] instead of expected *[ˈruːtrɐ]). Recall that before other sonorants the obstruents get devoiced (e.g., *Siedler* [ˈziːtlɐ] 'settler' and *Ordner* [ˈʔɔɹtnɐ] 'usher'). Since both the latter forms and the former ones exhibit the same stress pattern, have the obstruent in the same position and contain the same agentive suffix *–er*, it must be the sonorant /r/ which is responsible for the absence of devoicing in the preceding obstruent.

The conclusions that I draw from the discussion above is that both languages allow for spurious clusters, i.e., clusters which host the schwa-zero alternations. In a situation when the vowel gets suppressed we can observe, as a result, the development of either a spurious cluster or a syllabic consonant. Furthermore, both phenomena boil down to a single structure, i.e., an obstruent (less often a nasal) followed by a sonorant which are separated by the empty nuclear slot.

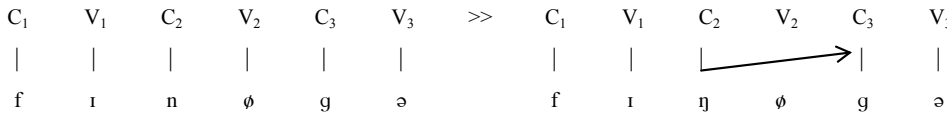
2.4 Analysis

At the outset of this section it should be pointed out that the following analysis is based on some theoretical assumptions the most important of which are stated and briefly discussed immediately below. First of all, we adopt the view that in a weak position sonorants, unlike obstruents, have the ability to spread and dock on to neighboring positions. In this way, they can gain stability and avoid lenition. This idea is taken from Scheer (2003), who contrary to previous accounts, ascribes an active role to nasals in partial geminate clusters. Briefly put, it is the sonorant which is an active member of the partial geminate cluster and it takes what it needs from the following obstruent. Secondly, the present analysis is couched in the Strict CV model (Scheer 2004; Cyran 2010). Note that in this framework partial geminates, similarly to all other consonant clusters, are separated by the empty nucleus. The latter fact apparently precludes any kind of relationship between the members of the partial geminate clusters, which may be regarded as a problem for the Strict CV model. Thirdly, in the vast majority of cases what makes sonorants spread is the positional plight, i.e., prosodically weak positions. Finally, the distribution of empty positions in the syllable structure is regulated by the *ø-ø constraint which bans the sequence of two consecutive empty nuclear positions (Cyran 2010).

Consider the representation of the partial geminate cluster [ŋg] in *finger* (8), which is given here to illustrate the abovementioned theoretical solutions at work.

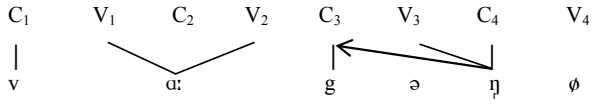
(8) Formation of partial geminates

a. b.



In (8) the nasal in C_2 appears in a weak position, i.e., before the empty nuclear slot V_2. This is generally recognized as a lenition site (8a). The following obstruent in C_3, on the other hand, occurs before a vowel in V_3, and this is a typical strong position. The most common response of segments to a weak position is the loss of the melodic material, that is, lenition. However, as already mentioned, a typical reaction of sonorants to the positional plight is spreading to neighboring positions. In this way, they gain the stability required to avoid lenition. Thus, as depicted in (8b), the nasal can reach the following plosive and dock on to its place of articulation. In consequence, they end up as a partial geminate cluster.[5] Finally, note that the empty nuclear position V_2 does not violate the *ø-ø constraint in neither of the two forms. Recall further that in Standard German, nasals can appear in post-consonantal position word-finally. Such clusters arise due to the optional realization of the schwa separating both consonants. In the situation when the schwa is dropped, the nasal obligatorily agrees in place with the preceding consonant, e.g., *Wagen* [vɑːgən] > [vɑːgŋ̩] 'car'. It means that in the progressive nasal assimilation a nasal not only acquires the same place of articulation as the preceding obstruent, it also becomes syllabic (9).

(9) Progressive nasal assimilation and the formation of the syllabic consonant in German



[5] Partial geminates are generally recognized as more stable, while geminates are the most stable structures of all (see Kenstowicz and Pyle 1973; Schein and Steriade 1986; McCarthy 1986 and Scheer 2003).

Similarly to (8) above, the nasal [ŋ] in (9) occurs in a weak position, i.e., before the empty slot V_4. In order to survive the nasal spreads and displaces the preceding schwa V_3, which results in the syllabic consonant. The same explanation applies to another candidate for syllabic consonants in German, the alveolar lateral [l]. Thus the forms like, for example, *Segel* 'sail', *Handel* 'commerce', and *Henkel* 'handle', can be realized with the schwa or without it. In the former situation the lateral is not syllabic but becomes one in the latter scenario [ˈzeːgəl], [ˈhandəl], [ˈheŋkəl] and [ˈzeːgl̩], [ˈhandl̩], [ˈheŋkl̩], respectively. Identically to the nasal in (9), the lateral can displace the preceding schwa and become syllabic. It must be stressed here, however, that syllabicity is not the end of the road for nasals as they can reach as far as the preceding obstruent and dock onto its place of articulation. This is illustrated in (9) where the nasal in C_4 spreads further left and docks onto the place of articulation of the velar plosive C_3 which results in the partial geminate cluster. In this way the nasal creates a structure which is branching; it displaces the preceding schwa and additionally docks on to the place of articulation of the obstruent. This solution can help to understand why syllabic consonants arise only after schwa vowels and why they are so common word-finally. As for the former, it is a widely accepted fact that the schwa is the next but last step on the lenition trajectory from a full vowel to zero. It follows that a full vowel, unlike the schwa, is not weak enough to be displaced by the sonorant. The reason why they appear so readily at the right margin is the fact that this is a lenition site.

Now recall from Section 2.2 that the progressive nasal assimilation is blocked when a vowel initial suffix is added to forms ending in obstruent plus nasal clusters (4a–d). A cursory look at the forms in (4) suffices to notice that one and the same consonant sequence can have at least three different realizations. For instance, the sequence [gn] in *Wagen* 'car', can be separated by the schwa [vɑːgən], it can appear without the schwa but with a syllabic and homorganic nasal [vɑːgŋ̍] or it can be produced with the devoiced obstruent when followed by a vowel-initial suffix [vɑːkn-ɐ]. The explanation of the former two forms has already been presented, i.e., the nasal displaces the preceding schwa and docks on to the place element of the obstruent. On the other hand, the latter form is interesting for at least two reasons. First, the nasal is neither syllabic nor homorganic but the schwa is dropped. Secondly, the obstruent undergoes devoicing. It seems natural to seek the solution to devoicing and the lack of assimilation in the presence of the suffix vowel. Note further that the situation of the nasal in [vɑːkn-ɐ] is radically changed for better, i.e., now it occurs in a strong position – before

a vowel. Strong position explains the reason why the nasal does not search for the place to spread, hence the lack of both homorganicity and syllabicity in [vɑ:kn-ɐ]. Furthermore, note that the schwa in the latter form may remain suppressed as it does not violate the constraint on two consecutive empty nuclear positions. Finally, the reason why the obstruents in suffixed forms undergo devoicing (4c, 4d) again boils down to the presence of the suffix vowel or, to be precise, to the presence of the empty nucleus following the obstruent. We assume that the obstruent devoicing in German occurs in a weak position, i.e., before the empty nucleus (see also Brockhaus 1995). Note that this solution provides a ready answer to the absence of obstruent devoicing before syllabic consonants. In this context obstruent devoicing does not take place simply because the nuclear position after the obstruent is not empty, but is occupied by the following sonorant.

Concluding, the solution advocated here predicts three different reactions of sonorants to the positional weakness. First, the sonorant may spread to a neighbor to share the place element (progressive, regressive assimilation). Secondly, it may spread to the preceding nucleus displacing the schwa and taking over its duties (syllabic consonant). Finally, the sonorant for some reason is not able to spread to a neighboring position and hence faces lenition (loss of manner or place elements). This solution explains the appearance of syllabic consonants in both languages and German vowel-zero alternation, it can also be applied to vowel syncope in English. However, before we analyze vowel syncope in some more detail, let us briefly return to syllabic consonants in English. Note that syllabic consonants occur not only before empty nuclei (as indicated above) but also before realized vowels (see Section 2.2). It means that syllabic consonants appear in the intervocalic position, i.e., after the schwa and before a nucleus, be it empty or phonetically realized.

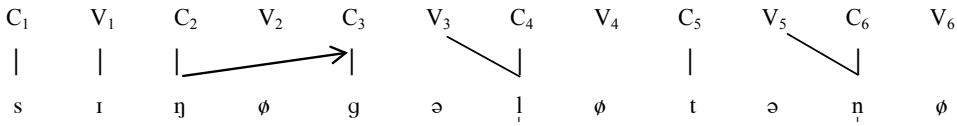
2.4.1 Syllabic consonants in English

Although both languages allow for word-final syllabic consonants, e.g., Ger. *Magen* [ˈmɑ:gən]>[ˈmɑ:gn̩] ‘stomach’ and Eng. *chicken* [ˈtʃɪkən]>[ˈtʃɪkn̩], English seems to be much more permissive as there are hardly any restrictions on the distribution of syllabic consonants in this language. Let us recall from Section 2.2 that they can be found not only word-finally but also word-internally and word-initially, before consonants, vowels, and intervocalically. The only requirement that must be satisfied is the presence of the preceding schwa. This, as was indicated above, is a natural consequence of the fact that the schwa is the weakest

vowel and can be easily displaced by the spreading consonant. Since in the Strict CV model there are no branching constituents and consonant sequences are always separated with the empty position it means that syllabic consonants are followed by the nuclear position, be it empty or occupied by some vowel. Therefore, the conclusion we arrive at here is that syllabic consonants appear intervocalically. Furthermore, both contexts, i.e., pre-empty nuclear position (traditional coda) and intervocalic position are recognized as weak[6]. The latter observation contributes to the explanation of the origin of syllabic consonants. A sonorant which appears in a weak position and which does not want to fall prey to lenition spreads to the left and docks on to the preceding nucleus. Additionally, this solution predicts the position in which syllabic consonants arise more frequently. Thus, in the intervocalic position they are optional, depending on the tempo of speech; however, before an empty nucleus the sonorant gets syllabic more readily. This is predicted by the lenition theory according to which the intervocalic position is less 'destructive' than the position before an empty nucleus (Ziková and Scheer 2010).

Let us further recall (Section 2.2) that syllabic consonants are responsible for the existence of heavy consonant clusters of up to even five consonants in a row, e.g., *singleton* [ˈsɪŋgl̩tn̩], *napkin* [ˈnæpkn̩], *twinkle* [ˈtwɪŋkl̩], *falcon* [ˈfɔːlkn̩], *husband* [ˈhʌzbn̩d], *faculty* [ˈfækl̩ti], etc. Note that in [ˈsɪŋgl̩tn̩], for example, we find three sonorants which appear in a weak position and so are predicted to react in one of the ways described above.

(10) Heavy consonant clusters and syllabic consonants



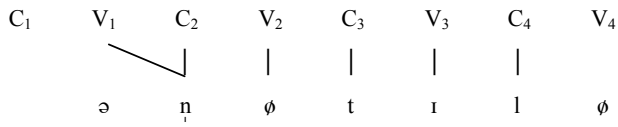
There are two independent factors responsible for the appearance of the consonantal sequence in [ˈsɪŋgl̩tn̩]. The first one boils down to sonorant spreading as a reaction to positional weakness and the second one is simply the ban on two consecutive empty nuclear slots. Thus in (10) the sonorants in C_2, C_4, and C_6 are followed by the empty positions (V_2, V_4, and V_6). This makes the sonorant spread and form either a partial geminate [ŋg] cluster or a syllabic consonant [l̩] and [n̩]. Since the syllabic consonants are linked to the preceding nucleus, such nuclei are not

[6] For more information concerning the lenition theory in the Strict CV model, see Ziková and Scheer (2010).

empty and do not violate the *ø-ø constraint. Furthermore, forms containing two sonorants in a row before an empty nucleus (e.g., *shrapnel*, *grapnel*), usually wind up with one syllabic consonant as predicted by the *ø-ø constraint, hence [ˈʃræpn̩l̩] and [ˈgræpn̩l̩], respectively. In other words, the nuclear position between [p] and [n] in both of these forms may remain empty as it does not violate the *ø-ø constraint. Moreover, the nasal [n] appears in a strong position, i.e., it is followed by the nucleus occupied by the left branch of the syllabic consonant and so does not have to spread to the left to survive. Although theoretically possible, sequences of two consecutive syllabic consonants are rather rare (e.g., *general* [ˈdʒen̩r̩l̩], *marginal* [ˈmɑːdʒn̩l̩], *personal* [ˈpɜːsn̩l̩], *national* [ˈnæʃn̩l̩], etc). We have managed to confirm the existence of *personal* [ˈpɜːsn̩l̩] only (Jones 2006). In Harris (1994: 185), on the other hand, such forms represent a different phenomenon, that is, vowel syncope (e.g., [ˈdʒenrəl], [ˈmɑːdʒnəl], [ˈpɜːsnəl], [ˈnæʃnəl], respectively). Since, however, the nuclei which host the left branch of the syllabic consonant count as regular vowels, one more option becomes available, i.e., syncope followed by a syllabic consonant (e.g. *general* [ˈdʒenr̩l̩], *marginal* [ˈmɑːdʒn̩l̩], *personal* [ˈpɜːsn̩l̩] and *national* [ˈnæʃn̩l̩]), which is a more common pronunciation.

Similarly to other contexts, word-initial syllabic consonants arise in response to the positional weakness. In (11) below the syllabic consonant is the first segment in a row.

(11) Word-initial syllabic consonants



To sum up, in English, just as in German, sonorants which occur in weak positions spread to the preceding nucleus if it is occupied by the schwa vowel. Furthermore, it has been pointed out that syllabic consonants appear in the intervocalic position, i.e., after the schwa and before a nucleus either empty or phonetically realized.

2.4.2 Vowel syncope

In what follows we discuss the assumption according to which vowel syncope is related to syllabic consonants in that both of them have the same trigger (cf. Szigetvári 2002). Moreover, vowel syncope results in

consonantal sequences which resemble the spurious clusters in German illustrated in (6).

As mentioned in Section 2.3, vowel syncope affects only weak vowels, i.e., the schwa, and appears in a rigidly defined context – between a consonant, usually an obstruent, and the following sonorant[7], e.g., *company* [ˈkʌmpøni], *chocolate* [ˈtʃɒkølət], *separate* [ˈsepørət], *family* [ˈfæmøli], *silvery* [ˈsɪlvøri], etc., where 'ø' denotes the vowel syncope site. The immediate observation is that vowel syncope and syllabic consonants occur in an identical context, which can be represented schematically as 'CøR' (any obstruent 'C' followed by a sonorant 'R'). The only difference between these two phenomena is that the sonorant following the syncopated schwa must itself be followed by a phonetically realized vowel. Although possible in the pre-vowel position, syllabic consonants, in the vast majority of cases, are followed by empty nuclear slots. This observation lets us propose a solution according to which a syllabic consonant is an essential prerequisite for vowel syncope. To put it differently, the syncopated schwa is displaced by the following sonorant in the form of a syllabic consonant. This solution can be further confirmed by Harris (1994) who points out that vowel syncope has an intermediate variant containing a syllabic consonant (e.g., *opera* [ˈɒpr̩ə]>[ˈɒprə], *especially* [ɪˈspeʃl̩i]>[ɪˈspeʃli], *personal* [ˈpɜːsn̩əl]>[ˈpɜːsnəl]). Moreover, note that the mysterious obligatory presence of sonorants following a syncope site is solved. It must be a sonorant because only sonorants can spread and become syllabic. Furthermore, vowel syncope never appears before the empty nucleus; it can only appear in a situation where a sonorant is followed by a realized nucleus (see (5a, 5b)). This is a consequence of the ban on the sequence of empty nuclei. Thus, in the word *fiddle* [ˈfɪdəl], for example, the final cluster is either separated by the schwa (in a very slow and careful pronunciation) or the sonorant [l] becomes syllabic [ˈfɪdl̩]. Note, however, that the schwa separating the cluster is never syncopated as it would violate the *ø-ø constraint *[fɪdøløø]. On the other hand, syncope is possible if the cluster is followed by a vowel, e.g., *fiddler* [fɪdølə].

Now, we are in a position to look again at German spurious clusters represented in (6) and discussed in Section 2.3. We have seen that such clusters are separated by the empty nuclear slot which is confirmed by the presence of the schwa in underived or related forms (e.g., *biblisch* [ˈbiːblɪʃ], *Kübler* [ˈkyːblɐ] and *Segnung* [ˈzeːgnʊŋ] vs. *Bibel* [ˈbiːbəl], *Kübel*

[7] Although in the vast majority of cases it is an obstruent followed by a sonorant, two sonorants are also possible. In the latter case the first sonorant is always a nasal, e.g., *finally* [ˈfaɪnøli], *general* [ˈdʒenørəl], *family* [ˈfæmøli], etc.

[ˈkyːbəl], and *Segen* [ˈzeːgən], respectively). What we are facing here is a regular schwa-zero alternation which brings to mind vowel syncope in English in that it is a sonorant which follows the vowel-zero alternation site. Moreover, the schwa in the latter forms can be optionally replaced with a syllabic consonant, e.g., [ˈbiːbl̩], [ˈkyːbl̩], and [ˈzeːgn̩], etc. It follows that a final sonorant in *Kugel* [ˈkuːgəl] 'ball', for example, appears in a weak position, i.e., before the empty nucleus. In consequence, in order to survive, it spreads and replaces the preceding schwa winding up as a syllabic consonant. However, in a situation when the sonorant happens to be followed by a realized nucleus, for example of a vowel-initial suffix, a new situation arises, that is, a spurious cluster, e.g., [ˈkuːglɐ]. The spurious character of the cluster is betrayed by the vowel-zero alternation and additionally by the fact that the velar plosive [g] in this context is realized by some speakers as [ç] which is not the case in, for example, [gl]*auben* 'believe' or [gl]*ocke* 'bell'. It follows that the latter consonantal sequences are true clusters in that they constitute a domain of the governing relation (Scheer 2004; Cyran 2010). Without going into details, a governing relation can be contracted between an obstruent and a sonorant over the lexically empty nuclear position. Such an empty nucleus enclosed in the governing relation is deactivated in that it is not visible to the *ø-ø constraint and so does not violate it. The distinction between true and spurious clusters can be illustrated on the example of obstruent devoicing in two dialects of German, i.e., Hochlautung and NSG. Recall from (6) above that in the former variety, unlike in the latter one, the obstruent preceding the syncopated vowel is devoiced, e.g., [ˈbiːblɪʃ] Hochlautung vs. [ˈbiːplɪʃ] NSG 'biblical'. If obstruent devoicing in German applies in the context before the empty nucleus, the distinction between both varieties, we claim, boils down to a different character of the clusters in question. In Hochlautung the spurious clusters reach the final stage which is a contraction of the governing relation between an obstruent and sonorant. Since the nucleus enclosed within the relation is deactivated, obstruent devoicing becomes inoperative here. On the other hand, in NSG the consonants do not reach this final stage (governing relation) and so the obstruent gets devoiced before the empty nucleus. Finally, note that this solution can explain the exceptional behavior of the [dr] cluster in German. Recall that the obstruent in this cluster never undergoes devoicing regardless of the dialect and the position it holds in the word. Thus, the form *Rudrer* [ruːdrɐ], for example, is pronounced identically in both Hochlautung and NSG. It may mean that [dr] and [tr] are the best candidates to undergo the change from a spurious cluster to a governing relation. Note further that this claim is not indefensible as a similar situation

can be observed in English. In short, in certain contexts the alveolar plosive is weakened to a glottal stop, e.g., *pottery* [pɒʔri], *battery* [bæʔ ri] (in the expression *assault and battery*) (Harris 1994: 222). However, many speakers differentiate the latter word and *battery* [bætri] (car) in which the lenition does not affect the plosive. Note that in both forms the cluster [tr] is separated by a syncope-prone schwa. It follows that for speakers who differentiate [bæʔri] and [bætri] a different structure must be assumed. The cluster in the former example is separated by the empty nucleus, while the latter must be regarded as a true cluster. In other words, the spurious cluster in [bætri] has been reanalyzed to a governing domain. On the other hand, the same cluster in [bæʔri] illustrates the application of two processes: vowel syncope and lenition before the empty nucleus.

2.5 Conclusions

The main conclusion we draw from the discussion in this paper is that in both studied languages three seemingly separate phenomena like syllabic consonants, vowel syncope, and certain cases of vowel-zero alternations are in fact closely related. The two structures, i.e., syllabic consonants and vowel syncope, occur in a similar context (intervocalically) and operate on identical consonantal sequences, i.e., an obstruent followed by a sonorant. Finally, both structures are unified by their identical origin which is a sonorant in a weak position. In other words, a sonorant evolves into a syllabic consonant and this structure can be later changed into a syncopated cluster unless it violates the *ø-ø constraint. The final stage such a cluster may reach is a governing relation. The solution proposed here resolves two traditional problems, that is, the obligatory presence of sonorants in spurious clusters and in vowel-syncope site. Additionally, it contributes to the explanation of two different realizations of the same clusters in two varieties of German, that is, Hochlautung and NSG.

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