The Formation of Syllabic Consonants and Their Distribution in Southern British English

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The aim of this article is to show that the formation of syllabic consonants and their distribution in Southern British English cannot be fully accounted for within phonological approaches that are dependent on particular syllabification theories and assume a direct mapping between underlying /SC/ sequences and surface syllabic consonants ([C]). Several syllabification-dependent and resyllabification-free approaches are considered, and their ability to account for the occurrence and distribution of syllabic consonants is evaluated. It is argued that a number of distributional gaps affecting some syllabic sonorants and the occurrence of certain syllabic consonants in casual speech styles is better accounted for within a non-linear sonority-based approach.

1. Introduction

In Southern British English, syllabic consonants are restricted to unstressed syllables, their possibility of occurrence ranging from contexts where a syllabic consonant is very likely (e.g. little [ˈlɪtl]) through to those where a syllabic consonant is very rare (e.g. fallen [ˈfælən]). Phonostylistic factors may occasionally lead to variation between a syllabic consonant and its non-syllabic counterpart (e.g. history [ˈhɪstrɪ]-[ˈhɪstri], lightning [ˈlaɪtɪnɪŋ]-[ˈlaɪtnɪŋ]). Besides, root- and word-final syllabic sonorants may lose their syllabic status through the addition of vowel-initial suffixes, creating alternations between syllabic consonants and their non-syllabic counterparts in such positions, as in fiddle [ˈfɪdlɪŋ] + ing [ɪŋ] > fiddling [ˈfɪdlɪŋ] - [ˈfɪdlɪŋ].

Descriptive accounts of English syllabic sonorants (e.g. Wells 1995, 2000; Roach 1991; Cruttenden 2001) show that they behave asymmetrically as regards the phonetic contexts where they occur. Thus, whereas both [m] and [n] occur word-finally after [s], [z] and [ð] (e.g. blossom [ˈblɒsəm], listen [ˈlɪzn], criticism [ˈkrɪtɪsɪzm], reason [ˈrɪzn], rhythm [ˈrɪðm], southern [ˈsʌðən], [n], but not [m], frequently occurs after an alveolar plosive (e.g. button [ˈbʌtn] vs. bottom [ˈbɒtəm]-[ˈbɒtm], pardon [ˈpɑrdən] vs. boredom [ˈbɔrdərn]-[ˈbɔrdərn]). Similarly, [l] and [r] share a number of phonetic environments (e.g. model [ˈmɒdl] vs. modern [ˈmɒdrən], barrel [ˈbɛrlɪ] vs. baron [ˈbærən]), but the lateral is common in contexts where the nasal is rare, namely after nasals and after other consonants preceded by a nasal (e.g. normal [ˈnɔrml] vs. Norman [ˈnɔrmən], bundle [ˈbʌndl] vs. London [ˈlɒndərn]).

The examples in (1) illustrate the variety of contexts where syllabic consonants are possible (from very likely [a] to non-occurring [e]).

The asymmetric behaviour of syllabic sonorants and the contextual variation to which they are subject represent a challenge for a unified account of syllabic consonant formation (henceforth SCF) in English. One such account is based on the traditional assumption that a syllabic (sonorant) consonant ([C]) is to be interpreted phonologically as the surface realization of an underlying /C/ sequence (e.g. Wells 1995). This approach,

while offering a single unitary analysis of SCF, has the disadvantage of making SCF strongly dependent on syllabification principles and rules, and fails to account for the occurrence of a number of syllabic consonants in faster styles of speech. Since this analysis of SCF is partly rooted in a linear approach to phonological structure, it suffers from two related shortcomings. The first one concerns its inadequacy to deal with those syllabic consonants that are not derivable from either underlying syllabification or resyllabification, and in particular, those that usually occur in faster styles of speech as a result of /s/ elision (e.g. forget [f'get ]; see Spencer 1996: 229). The second one is the implicit assumption that syllabic consonants must necessarily be absent from phonological representations underlyingly. This has been called into question by several non-linear approaches to SCF (e.g. Gussmann 1991; Giegerich 1999; Toft 2002), according to which word-final syllabic sonorants are to be represented as a single segment attached to a final sonorant consonant and a preceding epenthetic vocalic element.

The aim of this paper is to show that approaches to SCF in English that are dependent on particular syllabification theories and assume a direct mapping between underlying /sC/ sequences and surface syllabic consonants ([Ç]) cannot fully account for the distribution of syllabic consonants unless sonority constraints are allowed to play a role at a level beyond that of underlying syllabification. In this sense, the sonority-based approach to SCF we propose in §5, couched within a non-linear phonological model, is an attempt to improve previous analyses of SCF and a means of accounting for a wider range of surface syllabic consonants.

2. Syllabification-dependent approaches to SCF

The traditional assumption that a syllabic sonorant consonant ([Ç]) is to be interpreted phonologically as the surface realization of an underlying /sC/ sequence makes most accounts of SCF in English strongly dependent on syllabification principles and rules. In fact, the occurrence of a syllabic consonant in a given environment is often taken as evidence supporting a particular theory of syllabification (e.g. Rubach 1996; Jensen 2000). In this section, a number of syllabification-dependent approaches to SCF are examined and their ability to account for the distribution of syllabic consonants in English is evaluated.

Wells’ (1990; 1995; 2000) approach to SCF is based on the assumption that any syllabic sonorant may be analysed as the surface realization of the underlying tautosyllabic sequence /s/+/[Ç]. Thus, the syllabic sonorants in Britain, important, and Italy are analysed as the phonetic realization of an underlying /s/ and a following coda sonorant: /brit.ən/ ([brit@n]), /ɪm.ˈpɔːt.ənt/ ([ɪm@pɔ:t@nt] or [ɪm@pɔ:tɔnt]) /ɪt.əl.i/ ([ɪt@li] or [ɪt@li]) respectively. In words like analyse and satellite, however, the possibility of a syllabic lateral comes into conflict with Wells’ (2000) syllabification principle that syllabifies consonants with the more strongly stressed adjacent vowel. In order to keep this general principle, a variable resyllabification rule called Sonorant Left Capture (SLC) is invoked. This rule resyllabifies a sonorant leftwards, both within words and across morphological and word boundaries, and feeds syllabic consonant formation, as in (2) below (adapted from Wells 1995: 408–9).
2. Derivation of syllabic sonorants in *analyse, co-ordination, borderline* and *get along*

<table>
<thead>
<tr>
<th>Underlying Representation</th>
<th>Syllabification</th>
<th>Sonorant Left Capture</th>
<th>Syllabic Consonant Formation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>’emklaz</em></td>
<td><em>kao,td’netfj</em>n</td>
<td><em>bza’dlaim</em></td>
<td><em>get 3In</em></td>
</tr>
<tr>
<td><em>’enklaz</em></td>
<td><em>kao,td’a</em></td>
<td><em>bza’dlaim</em></td>
<td><em>get 3In</em></td>
</tr>
<tr>
<td><em>’enklaz</em></td>
<td><em>kao,td’dnefj</em>n</td>
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<tr>
<td><em>’enklaz</em></td>
<td><em>kao,td’oefj</em>n</td>
<td><em>bza’dlaim</em></td>
<td><em>get 3In</em></td>
</tr>
</tbody>
</table>

Within Wells’ approach, SCF is restricted to post-tonic */sI+/C+[+son]/ sequences and no instances of non-sonorant or pre-tonic SCF are discussed (e.g. *computer* [ku:pjur’ta], *contain* [ku’n’ten], *correct* [kreff’tk]; cf. *I can take* [ai ku’n’tek]). Moreover, no explanation of the failure of SCF to apply to the words in (1c) above is provided either, where their possibility of occurrence is simply described as “perhaps approaching zero” (Wells 1995: 404).

Post-SPE non-linear approaches to syllable structure (Kahn 1976; Selkirk 1982; Clements and Keyser 1983; Clements 1990) generally assume that underlying syllabification can be restructured in the course of a phonological derivation through resyllabification or ambisyllabification rules that modify syllable structure by re-assigning segmental units to syllabic constituents. Within syllabification theories that allow for resyllabification or ambisyllabification, SCF, among other syllable- or foot-based processes such as aspiration or tapping, has been accounted for through general syllabification principles and the application of specific resyllabification or ambisyllabification rules. These models of syllable structure share the assumption that universal as well as language-specific principles of syllabification hold at underlying levels of representation and need not necessarily account for all surface forms in particular languages. Therefore, they can easily accommodate the phonological analysis of syllabic consonants as the surface phonetic realization of an underlying */sC/ unstressed syllable. They differ from one another, however, with respect to whether surface syllabic sonorants are to be accounted for through ambisyllabicity (e.g. Kahn 1976; Clements and Keyser 1983; Hogg and McCully 1987; Giegerich 1992; Rubach 1996) or resyllabification (e.g. Kiparsky 1979; Selkirk 1982; Borowsky 1986; Wells 1995). For example, Rubach (1996: 221) accounts for the occurrence of syllabic consonants in English through a Coda Ambisyllabicity rule, (3a) below, which makes a post-vocalic consonant ambisyllabic as long as an unstressed syllable follows; a rule that is equivalent to Kahn’s (1976) rule III of English syllable-structure assignment, in (3b) below.

The syllabic consonants in the words in (1c) (e.g. *finally* [fainlI], *history* [histrI]) could be accounted for by Rubach’s (1996) Coda Ambisyllabicity rule, which would in fact lead to exactly the same syllabification as that obtained through the application of Wells' syllabification principles. However, in order to account for some instances of SCF in pre-tonic position (e.g. *police* [plis]), the onset consonant in a stressed syllable should become ambisyllabic and be linked to a preceding unstressed syllable as a coda. Since Coda Ambisyllabicity is blocked by a following stressed syllable, the elision of an unstressed vowel in pre-tonic position cannot trigger SCF, not even in cases where the sonorant...
consonant is in the coda of a pre-tonic unstressed syllable (e.g. *contain* /kɔn.ˈtem/), and must consequently result in syllable loss (i.e. [ˈplɪs]); the voiced (nuclear) and devoiced (onset) allophonic variants of liquids (e.g. *terrific* [ˈtrɪfɪk]-[ˈtrɪfɪk]) provide the distinctive perceptual cue in this context. A number of syllabic consonants occurring in rapid styles of speech preceding an unstressed vowel in pre-tonic position (e.g. *forget* [ˈfɜget]), would necessarily require a different type of analysis, one where SCF does not require a consonant to be in a syllable coda. One such approach, couched within a lexical phonology framework, is Borowsky’s (1986). She explains SCF through the set of rules in (4), which account for any syllabic consonant except those occurring next to consonants of higher sonority ranks (e.g. *currency* [ˈkɜrnəsi], *sonority* [ˈsənərəti]).

(3) Ambisyllabification and resyllabification rules that allow SCF

(a) Coda Ambisyllabicity

(Rubach 1996: 221)

(b) Rule III (normal-rate and faster speech only)

(Kahn, 1976: 32)

(4) A rule-based account of SCF (adapted from Borowsky 1986: 181–85)

(a) Rhyme Rule

(i) Nucleus Rule

(ii) Coda Rule

(b) Sonorant Syllabification Rule (fast speech)

(c) Phonetic Interpretation

The approaches to SCF reviewed in this section rely on resyllabification or ambisyllabicity as a means of accounting for the occurrence of surface syllabic consonants that cannot be mapped directly onto underlying /ːC/ sequences. These approaches (with the exception of Borowsky’s [1986]) do not account for pre-tonic syllabic consonants arising as a result of schwa deletion in casual speech styles. In the following section we assess the ability of a resyllabification-free non-linear phonological model (Government Phonology) to explain SCF.

3. A government phonology approach to SCF

The use of resyllabification operations to make the underlying constituent structure of syllables conform to surface segmental strings (e.g. *file* [fəl] > *filing* [ˈfɪlɪŋ]) requires that constituent structure be modified in the course of phonological derivation. This
restructuring move is explicitly rejected by resyllabification-free frameworks, such as Government Phonology (Kaye, et al. 1985; 1990) where new structures can be added in the course of phonological derivation but already built syllabic structure cannot be subsequently altered.3 Because of this, the non-linear representation of SCF resulting from vowel syncope usually involves the delinking and addition of association lines between segmental units and elements of constituent structure.

In Government Phonology (hereinafter GP), phonological phenomena are derived from the governing relations holding between adjacent timing positions in a phonological string and a set of licensing principles and conditions.4 The Projection Principle (Kaye, et al. 1990: 221) and the Structure Preservation Principle (Harris 1994: 190) which make resyllabification impossible, and the Empty Category Principle, which determines whether a nuclear position is realized phonetically, are crucial to the representation of vowel syncope and SCF in GP: whereas vowel syncope must be expressed through the licensing of a nuclear position by means of Proper Government, the phonetic expression of syllabic consonants requires that the nuclear positions they occupy fail to be properly governed. Charm, a property of segments similar to sonority (Kaye, et al. 1985, 1990), determines the direction of government so that in constituent government (e.g. within an onset such as pl-), the lefthand member is a governor and less sonorous than the righthand member, which is a governee. The number of elements of which a segment is composed (i.e. its complexity value) also plays an important role in phonological government. This Complexity Condition (Harris 1990: 274) whereby a segment associated with a governed position may not be more complex than its governor, explains why [ln], but not [nl], is a possible interconstituent sequence: [n] contains three elements (R.?N), whereas [l] contains only two (R.?). The Complexity Condition also provides a means of expressing sonority constraints at the level of constituent government in terms of a downward complexity slope between a governor and its governee.

Given the charm and complexity conditions on phonological government outlined above and the basic principles and governing relations that form the basis of phonological representations in GP, SCF is expressible through the association of a segment with two skeletal slots that are linked, respectively, to an empty nuclear position and a following onset, as in the case of the word-final syllabic lateral in (5a) below (Harris 1994: 192; Kaye 1995: 330n20; Gussmann 2002: 129); or, alternatively, as the direct association of the lateral with a word-final nuclear position (Harris 1994: 258; Toft 2002: 135), as in (5b) below.

The downward complexity slope in the word-final sequence -tl in (5a) does not allow the type of right-to-left government relationship between a governed rhymal complement and a following governing onset. The possibility of these segments belonging to a single onset constituent, however, must also be discarded due to the fact that homorganic sequences are not allowed in branching onsets (e.g. *pw-, *bw-, *tl-, *dl-) in English. This

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3. Resyllabification is also rejected by other approaches, such as Giegerich’s (1999) theory of lexical stratification. See Jensen (2000) for an account of SCF within a prosodic phonology framework by means of a foot-based rule of compensatory syllabification.

suggests that an empty nuclear position intervenes between $t$ and $l$, which are assigned to different onsets (Gussmann 2002: 75). The domain-final empty nucleus (N3) is parametrically licensed in English (i.e. it is inaudible) and it therefore cannot be a proper governor for N2 (as shown by the broken arrow), which remains unlicensed and must therefore receive phonetic interpretation, either as the @ element (i.e. [a]) or as a syllabic consonant through spreading from the following onset. This results in a phonological representation of a syllabic consonant as a single melodic unit that is simultaneously linked to an unlicensed empty nucleus and a following onset position.

(5) Possible representations for [l] in bottle [bɔtl]

Toft (2002: 135) argues for a representation of [n] as a doubly-linked element, but limits the spreading of R-headed onsets to contexts where another R-headed onset precedes through head licensing. In the case of [l] (Toft 2002: 134), however, the lateral is directly attached to a nuclear position, as in (5b). Postulating different phonological representations for [n] and [l] allows Toft (2002) to account for a number of observed distributional asymmetries, such as the possibility of a non-syllabic realization of a syllabic [l] after the addition of certain vowel-initial suffixes (e.g. subtle [sətəl] > subtly [sətəli] or [sətəli]), a context where [n] must remain syllabic (e.g. cotton [kətən] > cottony [kətni]; but *[kətni]). Toft’s (2002) proposal, however, does not seem to provide a good means of representing a number of syllabic [l]s that alternate with [@l] and are never subject to syllabicity loss, such as the [l] in Italy [itali]-[itali] (but *[itali]) or satellite [sætəli]-[sætələti] (*[sætələti]). Similarly, certain word-final syllabic [l]s may be realized as [l] (but not as non-syllabic [l]) after appending a vowel-initial suffix (Cruttenden 2001: 201), as in special [speʃl]+[li]>[speʃli]-[speʃli] (but *[speʃli]). This does not imply rejecting Toft’s analysis, but strongly suggests that the structure in (6c) below, which is primarily motivated by Toft’s (2002: 111) interest in accounting for the durational and distributional differences between syllabic [n] and [l], cannot adequately represent the optional syllabicity of many [l]s in English.

The structure in (6b) shows the representation a domain-initial onset consonant preceding an unstressed nucleus would obtain when realized as syllabic in rapid styles of speech, as in forget [fəget]. As (6a-b) show, SCF may be represented by linking an onset position to a nucleus, irrespective of whether the nucleus precedes or follows the onset.
This enables us to represent many of the syllabic sonorants (and obstruents) that often occur in rapid styles of speech (e.g. *support* [ˈsɔːpt], *satellite* [ˈsætlɪt]).

(6) Structures for the English syllabic sonorants

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>O</th>
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<th>N</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
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<td></td>
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<td></td>
<td>̥l</td>
<td>̥l</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[n]</td>
<td></td>
<td>[l]</td>
<td>[m]</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Having considered the representational possibilities of syllabic consonants within a GP framework, we would opt, on the basis of the arguments put forward in the discussion above, for a representation of [l] like that of [n], i.e. a single melodic unit simultaneously linked to an onset and a nuclear position. The word-final syllabic sonorants in (1a) could all obtain the representation in (6a), i.e. a melodic unit doubly linked to an onset and a preceding empty nuclear position, which may be empty through vowel syncope (e.g. *button* [ˈbʌt(ə)n], *listen* [ˈlɪs(ə)n]) or underlyingly empty (e.g. *little* [ˈlɪtl], *rhythm* [ˈrɪðm]). The same analysis could apply to the syllabic nasals in (1b) (e.g. *important* [ɪmˈpɔːtnt]), except that the nasal consonant must be linked to a rhymeal complement instead of an onset, as it is followed by a more complex segment.

A government-based analysis of the syllable structure of the words in (1c) and (1d), however, presents the complication of having to relax the role of Proper Government in those cases where a syllabic consonant that is not domain-final appears in prevocalic position (e.g. *Italy* [ˈɪtli], *definite* [ˈdefɪnɪt], *history* [ˈhɪstrɪ], *correct* [ˈkrɛkt], *forget* [ˈfɜrt]). The empty nuclear position that results from vowel syncope and precedes the sonorant consonant is properly governed by a following filled (and therefore licensed) nucleus, and should, according to the Empty Category Principle, receive no phonetic interpretation. This means that in such contexts vowel syncope would necessarily result in syllable loss and the sonorant consonant would not be rendered as syllabic. Consequently, Proper Government can only handle cases of word-final syllabic sonorants that become non-syllabic in root-derived forms (*couple* [ˈkʌpl] > *couplet* [ˈkʌplɪt]) and cases where sonorant syllabicity is (optionally) lost through the addition of a vowel-initial suffix (*threaten* [ˈθriːtn] > *threatening* [ˈθriːtnɪŋ]), but fails to derive syllabic sonorants in prevocalic position (e.g. *analyze* [ˈænəlaɪz], *correct* [ˈkrɛkt]) because the nucleus preceding the syllabic sonorant is licensed by virtue of being properly governed by a following filled nucleus and should, according to the Empty Category Principle, remain unexpressed, which would result in a non-syllabic realization of the sonorant (e.g. *analyze* *ænəlaɪz*). Therefore, SCF is better accounted for by delinking the segmental content of a nuclear position and associating an

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5. The possibility of a syllabic consonant obtaining two different representations, as suggested by (6a) and (6c) for syllabic [l], is also explored in Giegerich’s (1999) base-driven lexical stratification approach to syllabification as a means of accounting for syllabicity variation.
onset melodic unit with it through spreading, as in (6a) above. Further research on the representation of syllabic consonants and the expression of SCF within a GP framework is needed in order to account for those syllabic consonants occurring in casual speech styles that at present are not derivable from the licensing principles and conditions of phonological government.

4. A non-linear sonority-based approach to SCF

The approaches to SCF discussed in §2 and §3 above cannot adequately account for a number of syllabic consonants occurring in casual speech styles. In the present section, we propose a non-linear approach to SCF that highlights the role of sonority constraints in determining the distribution of syllabic sonorants in Southern British English and is capable of accounting for a wider range of data. This analysis assumes that the internal structure of syllables is governed by language-specific phonotactic constraints as well as by more general sonority-based universal constraints. One of the most widely accepted universal principles of phonological organization as far as syllable structure is concerned is the Sonority Sequencing Principle (see Clements 1990 for an overview), which is normally believed to hold at deep levels of representation governing underlying syllabification.

(7) Sonority Sequencing Principle (version from Selkirk [1984: 16]):
In any syllable, there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values.

Implicit in (7) is the notion of “sonority syllables” (Basbøl 1994), i.e. syllables built according to the sonority value of segments, which is related to their degree of stricture and perceptual salience (less stricture = higher sonority). The ranking of phonemes along a sonority scale can be more or less finely graded and the various proposals include models based on traditional types of articulation descriptors (e.g. Hankamer and Aissen 1974; Kiparsky 1979; Selkirk 1984; Hogg and McCully 1987) as well as feature-based models (e.g. Farmer 1979; Clements 1990; Giegerich 1992; Rice 1992; Blevins 1996). For the purposes of the present analysis of SCF, the following six-level sonority scale will suffice:

(8) A six-level sonority scale

<table>
<thead>
<tr>
<th>Sonority Level</th>
<th>Segment Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 [- cons, + syll]</td>
<td>Vowels: i, e, æ, ə, o, ɔ, ø, u, ə, ɔ, 3, ʌ, ə</td>
</tr>
<tr>
<td>5 [- cons, − syll]</td>
<td>Glides: j, w</td>
</tr>
<tr>
<td>4 [+ cons, + son, − nas]</td>
<td>Liquids: l, r</td>
</tr>
<tr>
<td>3 [+ cons, + son, + nas]</td>
<td>Nasals: m, n, ñ</td>
</tr>
<tr>
<td>2 [+ cons, − son, + cont]</td>
<td>Fricatives: f, v, ð, s, z, j, ʃ, h</td>
</tr>
<tr>
<td>1 [+ cons, − son, − cont]</td>
<td>Oral Stops/Affricates: p, t, k, b, d, g, tʃ, dʒ</td>
</tr>
</tbody>
</table>

6. An earlier preliminary version of section 4 was presented as a paper at the 26th AEDEAN International Conference, Universidade de Santiago de Compostela, Santiago de Compostela, Spain (12–14 December 2002).
Two facts about the distribution of syllabic sonorants suggest that in English the SSP also holds at surface levels of representation, where it functions as a phonotactic constraint. First, the SSP seems to prevent the elision of an unstressed vowel, thus blocking SCF, in words where vowel syncope would result in a single-syllable sonority profile.

Secondly, when an unstressed vowel is syncopated in casual speech, the SSP determines which of the two consonants flanking the deletion site is to occupy the syllabic nucleus by selecting the most sonorous candidate. We suggest that the role of the SSP need not be relegated to the establishment of underlying syllabification and should be expanded to include sonority-based well-formedness conditions that explain the occurrence and distribution of syllabic consonants in faster styles of speech. The non-linear phonological approach to SCF we propose is therefore slightly but crucially different from other approaches in two respects: (i) syllabic consonants are not treated merely as the phonetic realization of an underlying /sCj/ sequence, but rather as the direct output, mediated by the SSP, of a phonostylistically conditioned rule of vowel syncope; and (ii) the SSP is taken to be primary not only at an underlying level guiding syllabification principles, but also as a phonotactic constraint conditioning vowel syncope and SCF.

Within a non-linear approach to SCF, syllabicity is to be understood as a sonority-based structural property of segments, so that the ability of a segment to qualify as a sonority peak depends on the position it occupies in a string with respect to surrounding segments. One obvious consequence of this approach to syllabicity is that any segment, and not only those segments ranking higher along the sonority scale (e.g. vowels and sonorant consonants) could be granted syllabic status provided they are preceded and followed by less sonorous segments.

(9) Monosyllabic *mint* vs. disyllabic *mitten*

The syllable structure representations of *mint* and *mitten* in (9) serve to illustrate the structural nature of syllabicity: what makes the nasal syllabic (i.e. a “sonority peak”) in (9b) is the fact that [n] is preceded by a less sonorous segment ([t]), whereas in (9a) the
only segment in the word that qualifies as a sonority peak is the vowel. In a word like
villain, vowel syncope would produce a single-peak sonority profile and it is consequently
blocked by the SSP (*[vIlF]), which requires that consonants be sonority peaks in order
to become syllabic. This approach to SCF provides a straightforward explanation of certain
distributional gaps of English syllabic sonorants. For example, the fact that [n] does not
occur after /m, n, l (e.g. common [*kɒmɔn], fallen [*fɔldın]), despite the fact that the syllable
structure of these words parallels that of button [bɔtın], can be attributed to a sonority
constraint that blocks vowel syncope when this would result in a sonority profile that
makes SCF impossible.

Sonority constraints, however, cannot explain the failure of sonorant consonants to
occur after certain consonants of lower sonority rank. Thus, whereas [l] is apparently free
to occur after any consonant (e.g. little, uncle, reversal, formal, and even after a more
sonorous segment such as [r], as in moral), [n] is much less common after noncoronal
plosives (e.g. open, darken, organ) than after alveolar plosives and [+ continuant]
obstruents (e.g. Britain, listen, strengthen) and [m] only seems to occur after [+ continuant]
obstruents (e.g. rhythm) but not after other consonants (e.g. bottom, custom, freedom,
seldom) (Gussmann 1991). Moreover, the occurrence of syllabic consonants in contexts
that appear to violate the SSP suggests that the perception of consonant syllabicity need
not depend exclusively on sonority; language-specific distributional characteristics of
segments together with phonetic properties other than inherent sonority, such as length
or voicing, may serve to enhance prominence and might also contribute to making a
consonant syllabic (Mora and Mott 2003). This would explain the existence of certain
language-specific sonority reversals (e.g. English sC- and -Cs clusters) and plateaus (e.g.
English act) and would allow for alternations of the type threatening [θretɪn]-[θretɪn],
which may occasionally produce distinctive contrasts between syllabic and non-syllabic
consonants in casual speech, as in finally ['faInli] vs. finely ['faInli], or Hungary ['hʌŋɡri] vs.
hungry ['hʌŋɡri].

Let us now examine the role of the SSP in a sonority-based account of SCF. The
presence of syllabic consonants in the examples in (1a-d) (e.g. little ['lɪtɪ], important
[ɪmˈpɔːtnɪ], Italy ['ɪtli], contain ['kəntɪn]) as well as their absence from most of the words
in (1e) (e.g. fallen ['fɔldın], common ['kɒmən]) can be accounted for if the SSP is invoked
as a sonority constraint. Certain contexts seem to allow either syllable loss or SCF as a
result of vowel syncope (e.g. secretary ['sɛkrrətəri] > ['sɛkrtəri], threatening [θretɪn] >
[θretɪn]-[θretɪn], whereas in other contexts vowel loss must be compensated for by
SCF, as in little ['lɪtɪ]. Thus, SCF applies obligatorily to those segmental strings created by
vowel syncope that violate the SSP, such as sonorant consonants that constitute sonority
peaks because they are preceded by less sonorous segments either in word-final position
(the words in [1a]) or before a less sonorous word-final consonant (the words in [1b]). The
syllabic consonants in (1c), which are preceded by a less sonorous segment and followed
by an unstressed vowel, can all be accounted for by means of the SSP, which will assign
the syllabic nucleus to the most sonorous of the two consonants flanking the vowel syncope
site. The syllabic consonants in the casual speech forms in (4) (e.g. contain ['kəntɪn]) could
be accounted for in the same way: when an unstressed vowel is elided between two
consonants, the most sonorous consonant becomes syllabic, as in (10a) below. This
approach to SCF can also account for the occurrence of syllabic obstruents in casual
speech forms like *suppose* [sˈpouz], and in this sense it is superior to syllabification-based approaches to SCF.

The non-linear representation of SCF can be expressed through the association of a consonant with the vacant nuclear position left by vowel syncope, as in (10) and (11) below. The representations in (10) show that a consonant need not be in the coda of an unstressed syllable to become syllabic: the coda /n/ in the first syllable of *contain* and the onset /s/ in *suppose* become syllabic because they are the most sonorous consonants available.7

(10) Syllable-structure representations of *contain* [kəˈteɪn] and *suppose* [sˈpouz]

\[
\begin{array}{c|c}
\text{(a)} & \text{(b)} \\
\sigma O R & \sigma O R \\
\mid N C & \mid N C \\
x x x x x x & x x x x x \\
k (\sigma) n t e i n & s (\sigma) p e o u z
\end{array}
\]

In certain contexts, doubly-linked syllabic consonants result in an ambisyllabic configuration where a consonant is associated to an onset position and a preceding nucleus, as in (11a) (ambisyllabic consonants are normally associated to a word-internal coda-onset cluster). Syllabic loss in rapid styles of speech could lead to the representation in (11b) where [kr-] forms an onset. The difference between (11a) and (11b) is not only based on the number of timing units used to represent the initial cluster (three for [kr-] and two for [kr-]), one would also expect a devoiced allophone of /r/ in (12b) as a consequence of the aspiration of the preceding [k], which is in the onset of a stressed syllable (the [r] in [11a] is fully voiced).

(11) Syllable-structure representations of *correct* [kɹekt] and [krekt]

\[
\begin{array}{c|c}
\text{(a)} & \text{(b)} \\
\sigma O R & \sigma O R \\
\mid N C & \mid N C \\
x x x x x x & x x x x x \\
k (\sigma) r e k t & s (\sigma) r e k t
\end{array}
\]

7. Linking a syllabic consonant to two timing slots captures the traditional claim that syllabic consonants are longer than their non-syllabic counterparts (Jones 1960; Clark and Yallop 1995; Wells 1995; but see Barry 2000 and Toft 2002 for recent experimental evidence against this claim).
A number of syllabic sonorants occurring in fast speech, however, cannot be adequately handled by a sonority-based approach, because they become syllabic in contexts that do not allow them to qualify as sonority peaks, as the examples in (12) below illustrate. Vowel syncope in the words in (12a-b) occurs between two equally sonorous segments according to the scale in (8). The syllabic /r/ in (12a) could be accounted for if an extra level for /r/ is added to the sonority scale to make it more sonorous than /l/ by virtue of being [+ continuant] (Hogg and McCully 1987; Carr 1993; Harris and Lindsey 1995), but the syllabic /l/ in (12b) and the syllabic /n/ in (12c) cannot be explained in terms of sonority alone, since the most sonorous consonant flanking the vowel syncope site (/r/) is not rendered as syllabic. In (12d-e), vowel syncope affects the sequences /s@!s-/ /-f@!s/, /-m@n/ and /-n@m-/, where syncope should be blocked in order to avoid a sequence of segments with identical sonority value (cf. common *[kmn]). A sonority-based approach to SCF cannot handle these exceptional casual speech forms. It may be the case that the durational characteristics of certain consonants or their word-final position serve to enhance their perceptual prominence. In this sense, experimental research investigating the phonetic correlates of consonant syllabicity is needed if we are to explain why certain consonants are perceived as syllabic in certain positions in casual styles of speech.

(12) Syllabic consonants that are not sonority peaks (in fast speech)

(a) celery [selr], gallery [gælri]
(b) barrel [bær], general [dʒærnəl]-[dʒærnəl]
(c) different [dfrnt], veteran [vetrn], apron [eprn], currency [kərnəl], foreign [fərn]
(d) society [ˈsaIti], suspicious [ˈspfʃ]
(e) government [ˈgəbəmənt], animal [ˈænɪml]

5. Conclusions

In this paper, I have presented evidence suggesting that the difficulty in producing a unified account of the formation of syllabic consonants in Southern British English across different phonetic contexts and speech styles lies in the assumption that surface syllabic consonants must be directly mapped onto an underlying /sC/ phonological string. Phonological frameworks that take this stand make SCF dependent on syllable formation rules and subsequent ambisyllabification or resyllabification operations, and fail to account for pre-tonic syllabic consonants in fast speech styles. While resyllabification-free models do not have to modify syllabic structure in order to derive syllabic consonants, they are also subject to principles and conditions that preclude the derivation of certain syllabic consonants.

In an attempt to account for syllabic consonants occurring in various phonetic contexts and speaking styles, a non-linear sonority-based approach to SCF (§5) is proposed. This approach, which is based on the function of the SSP as a phonotactic constraint, is argued to be superior to other approaches on the basis of its independence.
from syllabification rules and principles and its ability to account for a wider range of cases of consonant syllabicity.

Two facts about the distribution of syllabic consonants, however, cannot be explained within the sonority-based approach I propose. The first one concerns the failure of SCF to apply to the word-final nasals in the examples 1-11 (e.g. bottom, album, badminton, abandon) in (1e). The second one is the occurrence of certain syllabic consonants in contexts where they do not constitute sonority peaks (e.g. barrel [ˈbærəl], foreign [ˈfɔrɪn] and the examples in [12]). Accounting for the former requires the formulation of all manner of articulation phonotactic constraints that inhibit vowel syncope (and consequently SCF) in word-final /C[-cont]->m/ and /C[-nasal]->n/ sequences. Whether understood as distributional gaps or well-formedness conditions on phonological strings, these constraints are normally stated in the phonology as a restriction imposed on the contexts to which a rule may apply, as in the various approaches to SCF discussed in this paper (e.g. Gussmann 1991). A sonority-based approach to SCF is no exception in this respect. Accounting for the latter requires defining sonority in terms of relative perceptual salience. If the notion of sonority is expanded to include phonetic properties other than the degree of aperture of the vocal tract required for their production, then length, voicing or articulatory complexity may contribute to making a particular segment more auditorily salient with respect to adjacent segments. Thus, if the perception of consonant syllabicity is shown to be partly dependent on phonetic features other than inherent sonority, it may be possible to account for instances of consonant syllabicity in contexts where a syllabic consonant does not constitute a sonority peak, such as the contexts the words in (12) illustrate. For example, it may be hypothesized that the final nasal in foreign [ˈfɔrɪn], which does not qualify as a sonority peak because the preceding [r] ranks lower in sonority, is perceived as syllabic due to its comparatively greater length: in terms of duration the [n] in foreign is similar to any other syllabic nasal preceded by a less sonorous segment (e.g. button [ˈbʌtn]) and longer than a word-final post-vocalic coda nasal (e.g. fallen [ˈfɔlən]). Further research investigating the perception of consonant syllabicity is needed in order to explain why certain consonants may be realized as syllabic in certain contexts, apparently violating the Sonority Sequencing Principle. This line of research may lead to interesting observations as regards the phonetic basis of sonority.

Works Cited


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