Branching onsets and syncope in English*

Péter Szigetvári, Eötvös Loránd University, Budapest
szigetva@seas3.elte.hu

1 Introduction

English abounds in lexical consonant clusters; their nature and constraints on their occurrence are treated extensively in the phonological literature. There is, however, also a possibility for creating morpheme-internal consonant clusters postlexically, by syncope (the deletion of a schwa within a word). In theories that do not recognize empty nuclei, the consonant clusters thus created are usually analysed as coda–onset clusters. My arguments here aim at supporting the claim that syncope-created consonant clusters in English bear much closer a resemblance to so-called branching onsets. For the sake of argument, I will be entertaining the idea that the two categories are not entirely distinct, rather branching onsets are a special type of the set that includes all syncope-created clusters. In this sense, I am close to Hooper's (1978) view of syncope-created clusters, who sees them as syllable-initial branching onsets.

I will first introduce three types of consonant cluster that may be distinguished in English (§2). In the next section (§3), I survey the representations of these clusters in two related frameworks, which, however, are radically different in exactly this respect. This is necessary in order to show the problem that forces the unification of two of the three cluster types. The similarities between the two types are discussed next in §4. §5 is devoted to discussing productive syncope in English, a process relevant for the present discussion in two respects. I then proceed to disparaging the reasons standardly believed to distinguish the two types of cluster (§6). The paper is closed by drawing up an alternative system of cluster types including only two types, each with two subtypes. My primary aim is to question long-accepted, but apparent truisms about consonant clusters, rather than to offer a fully operational alternative classification of them.

2 Types of consonant cluster: a first apprach

The consonant phonotactics of numerous languages makes it obvious that different types of consonant cluster must be distinguished. tr, for example, is more common a cluster at the beginning of words than rt — the latter being impossible there in the overwhelming majority of languages —, while rt is more common at the end of words; i.e., there is an implicational relationship between clusters and this is different word initially (#rt ⊃ #tr) and word finally (tr# ⊃ rt#).

Such differences have for long been blamed on sonority (cf. Sievers 1881, Jespersen 1904, Grammont 1933): the sonority profile of tr is rising, thus the cluster qualifies as a syllable-initial cluster, hence it occurs word initially. Scheer (1998 : 201f) points out that this reasoning is circular: the whole idea of tr being an onset comes from it occurring word initially, the fact then that sonority is rising in this type of cluster is yet another observation, not an explanation of

* An anonymous reviewer improved the quality of this paper significantly. This is the only way I can thank her or him. (Disclaimers as usual.) I was also partly supported by the Bolyai János Scholarship of the Hungarian Academy of Sciences.

why it is a branching onset. Examining the syllabification of word-final and “trapped” word-medial sonorants and also word-initial strident + C clusters, Lowenstamm (1981) shows that the common practice of equating the sets of word-initial and of branching-onset clusters is flawed. The algorithm he proposes syllabifies strings only by reference to the sonority of segments. The lesson is that the intuitively obvious assumption that word boundaries and syllable boundaries coincide must be taken with a sizeable pinch of salt. Following the argumentation of Lowenstamm, government phonology emphasizes the falsity of this assumption from one aspect, namely, if a certain consonant cluster occurs at the beginning of words in a given language it is not necessarily a possible onset in that language (e.g., Kaye 1992) and if a certain cluster occurs at the end of words it is not necessarily a possible coda (e.g., Kaye 1990, Harris 1994). The claim argued for here is that the assumption is also false from the other aspect too: “branching onsets” do not all occur word initially, and “codas” word finally. As a starting point, I will nevertheless classify clusters according to their distribution at word edges.

The phonotactics of monomorphemic[1] English words appears to call for the separation of three categories of two-member consonant clusters. Practically all such clusters occur word medially. Some clusters also occur word initially, but never word finally. These clusters typically exhibit a rising sonority profile, their first member being an obstruent (or nasal, liquid or h) and the second a nonnasal sonorant (only j if the first member is a sonorant).[2] Such a cluster will be referred to as an ONSET CLUSTER instead of the traditional, but theoretically biased term “branching onset”.

Another set of clusters occurs word medially and word finally, but never word initially. As opposed to the previous case, in such clusters, sonority is usually falling (e.g., nt, lp, ft), but sometimes level (e.g., pt, as in *Egypt*; kt, as in *act*), or even rising (this is the case with some *s*-final clusters: ps, as in *lapse*; ks, as in *wax*; or ts, as in *quartz*). This kind of cluster will here be referred to as CODA CLUSTER.

The third type is such that it only occurs word medially. Examples for this type of cluster are tl (*atlas*), kn (*acne*), nr (*Henry*), mb (*samba*) and lg (*vulgar*); I am going to refer to them as MEDIAL CLUSTERS. They occur neither at the beginning, nor at the end of words. Intriguingly, medial clusters are not a uniform set. The first three listed above exhibit a rising sonority profile, while sonority is falling in the last two. Although divergent sonority profiles characterize coda clusters too, in the case of medial clusters the dichotomy is accompanied by other differences in the behaviour of the two types as will be explicated in §4. Rising-sonority medial clusters are labelled “bogus clusters” by Harris’s (1994 : 67), while falling-sonority medial clusters are not distinguished from coda clusters (coda–onset clusters, as standard government phonology refers to them). For the ease of exposition, and also to help readers familiar with Harris’s terminology, I will use the term BOGUS CLUSTER as he does, and leave the set of falling-sonority medial clusters dormant for the time being.

[1] In this paper “monomorphemic” includes items whose morphological complexity is etymological, and not accessible for a synchronic phonological analysis, cf. Harris 1994 : 25ff, Kaye 1995. Hence the reader may find some words in Appendix 2 which could be analysed as morphologically complex. Their alternative classification, i.e., their exclusion, does not influence the overall picture significantly.

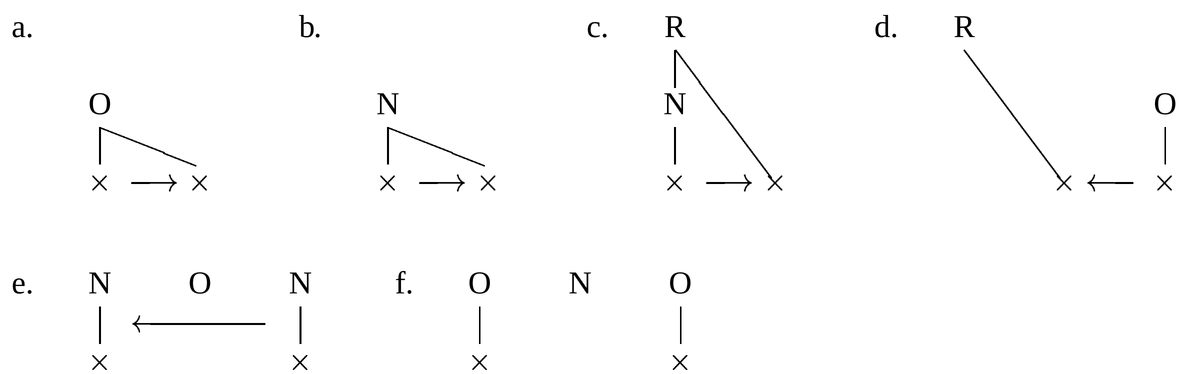
[2] To simplify the picture *s*C clusters must be excluded from the discussion, some of them (sp st sk) occur both word initially and word finally, others (sm sl) only word initially, but still fail to behave like other onset clusters, e.g., tolerate j after them in *smew, slew* (vs. *blew* *blju:, *clue* *klju:).

Two appendices are attached to the end of the paper: Appendix 1 contains a chart of two-member consonant clusters occurring word initially, medially and finally in English. To produce lists of the relevant words, I used two electronic databases. One of them is available for on-line search at http://seas3.elte.hu/epd.html, the other is the database of Nádasdy 2000, prepared by Ádám Nádasdy and myself, which is not publicly accessible. Both include transcriptions reflecting Received Pronunciation. The data, of course, are debatable: both the existence of morpheme boundaries in some items (which the source does not indicate) and their "Englishness" had to be decided individually. Appendix 2 gives an example for each cluster type, unique clusters — exemplified by maximally two morphologially/semantically unrelated items — are italicized.

3 The representation of clusters

The categorization of consonant clusters described above is purely empirical and partly language specific. The task of phonological theories is to provide explanations for such distributional facts. The general practice is deduce them from the syllable structure of the given language. To define syllable structure, government phonology (e.g., Kaye & al. 1990, Harris 1994) posits three syllabic constituents: the onset, the nucleus and the rhyme, each containing one segment in the default case, and zero or two in the two borderline cases, of which the latter are shown in (1a–c). Skeletal slots are related not only by syllabic constituents but also by relations, referred to as government and/or licensing. Government — represented by arrows in (1) — connects the two skeletal slots in branching constituents, as well as certain other slots that do not belong to the same syllabic constituent, as in (1d–e).

(1)

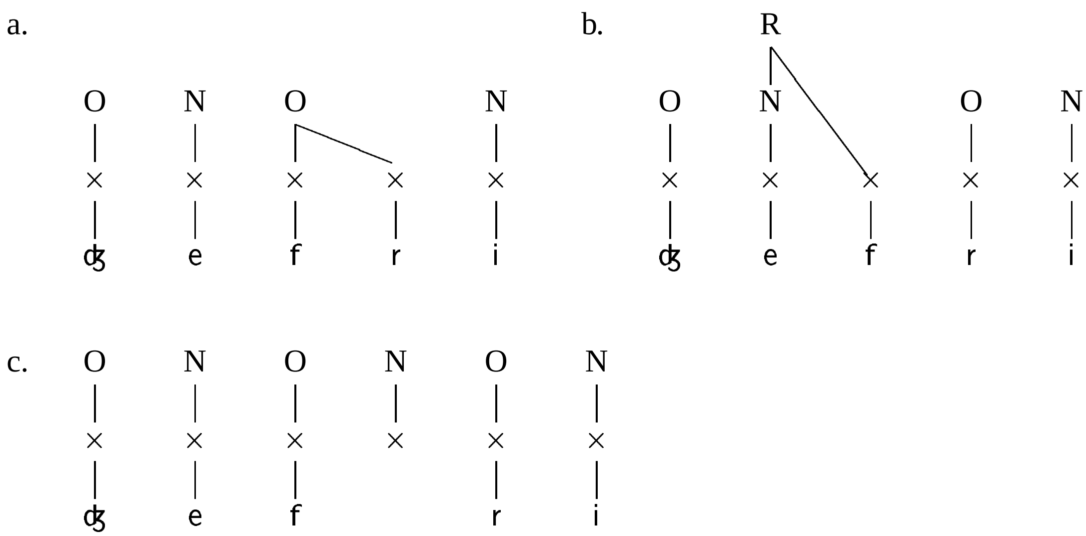


Of the configurations in (1) three — (1a), (1d) and (1f) — represent consonant clusters, onset, coda/falling-sonority medial and bogus clusters, respectively. Their representational difference is straightforward: the two consonants are skeletally adjacent in the first two, but not in the last type. In onset clusters it is the first consonant that governs the second, in coda and falling-sonority medial clusters the relation holds in the opposite direction. Which of the two consonants governs the other is determined by their charm values in some versions of the theory, or by their melodic complexity in others — both notions are related to sonority. Charm and complexity are derived from the internal make-up of segments, i.e., sonority is derived (like in Anderson & Ewen 1987, Basbøll 1977, Clements 1990, Rice 1992, and others).

Up to this point, government phonology is not significantly different from other frameworks that do not posit skeletal slots which remain unpronounced (for this to be true, I deliberately ignore word-final consonants). The representation of bogus clusters, however, is unique: it involves the alleged presence of an unpronounced nucleus. The muteness of this vowel is blamed on its being governed by a following vowel, which in turn must be pronounced (Kaye & al. 1990 : 219ff); thus what renders this vowel mute is a governing relationship between it and the following nucleus, cf. (1e).

Allowing phonological positions in representations to remain mute has the unwanted consequence that several representations may be posited for a single surface string. For example, for a string like the fr in *Geoffrey* the representations in (2) could be imagined.

(2)



The choice between the two "traditional" candidates — i.e., the ones not involving an empty position — (2a) and (2b), viz., whether fr is tauto- or heterosyllabic, could be decided in favour of (2a) by invoking onset maximalization[3] or in favour of (2b) by claiming that ʤe is not possible word finally, hence syllable finally, but ʤef is.[4] Government phonology rejects the heterosyllabic fr cluster in (2b) by claiming that r cannot possibly govern f due to their charm values or complexity difference. Since this government relation is indispensable for a coda–onset cluster (cf. (1d)), this option is out. On the other hand, the choice between (2a) and (2c) becomes problematic. In fact, government phonology has no principled way to decide on the syllabic constituency of *Geoffrey*, unless it wishes to make the provision that if two consonants CAN form a branching onset, they DO form a branching onset. The difficulty with such a statement is that it presupposes that syllable structure is built post-lexically based on the melodic properties of segment strings, a view government phonology does not subscribe to. I see two ways out of this unpleasant situation: universally rejecting either empty skeletal positions, i.e., (2c), or branching onsets, i.e., (2a) — as well as branching nuclei and branching rhymes. Many phonologists pursue the first path; in the rest of this paper I will pursue the

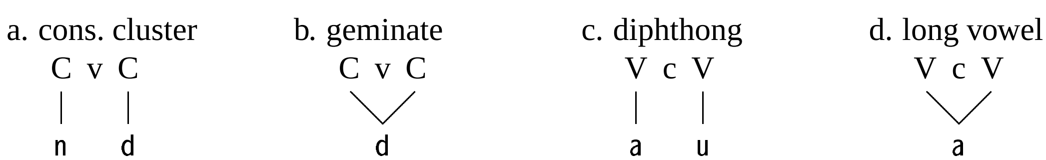
[3] A simple reference to the left edge would be undecisive here, since both fr and r are possible word initially.

[4] To show the inadequacy of the latter principle, let me point out that if we accept it syllabification should be impossible in case of words like *Gerry*, where both ʤe and ʤer are impossible word finally.

second. (A more detailed reasoning for why these two are the theoretical null hypotheses as opposed to the standard government phonology stance is given in Szigetvári 2001.)

Lowenstamm (1996) proposes that syllabic constituents never branch, the skeleton is made up of strictly alternating simple onsets and nuclei, typically hosting consonants and vowels, respectively; hence indicated by C and V. If the skeleton were faithfully representing the superficial string of sounds, such a view would be patently untenable in the light of data from many well-known languages, in fact, it could hold only for those languages that have no consonant clusters, no word-final consonants and no long vowels and/or diphthongs, i.e., languages possessing only the simplest syllable type: CV. But I see no reason why the phonological skeleton should be directly mapped from superficial sound strings. The phonological skeleton is part of the theoretical framework the analyst applies to interpret his data, similarly to other notions like "root node", "mora", "coda" or the "strident" feature. A simple — therefore theoretically desirable — skeleton is one on which C and V slots alternate monotonously. On such a skeleton, neither two C slots, nor two V slots can ever be adjacent, thus the members of a consonant cluster are always separated by a V slot, which remains unpronounced in the utterance; and vice versa, the two parts of a long vowel or diphthong are separated by a C slot, also unpronounced. The relevant configurations are shown in (3).[5]

(3)



As far as their skeletons are concerned all two-member consonant clusters are represented identically, as CvC (cf. (3a, b)). ((3c) and (3d) exemplify the vocalic analogues of these clusters, a diphthong and a long vowel; here shown only for the sake of completeness.) While theoretically desirable, the merger of the representation of all types of consonant cluster in CV phonology is empirically inadequate: we now lack an explanation for why some clusters occur only word medially, while others are found also word initially or word finally.

CV phonologists have come up with two sets of proposals for distinguishing consonant clusters, all of which show up as CvC on the skeleton. Scheer (1998) proposes that so-called infrasegmental government mutes the V slot within branching onsets, while V-to-V government, depicted in (1d), is responsible for both coda and bogus clusters. It has been shown that coda and bogus clusters must be distinguishable, at least because the former but not the latter occur word finally. Further differences are to be introduced below. Hence the dichotomy onset vs. all other clusters is not feasible. Dienes & Szigetvári (1999) claim that the dichotomy is between coda clusters on the one hand and onset and bogus clusters on the other. Our representation of coda clusters involves the second consonant of the cluster governing the first (which is reminiscent of (standard) government phonology's solution, cf. (1d)). In this view, it is the representation of onset and bogus clusters that is obfuscated. Although this also appears to be unjustified empirically, I intend to show that there are more similarities between onset and bogus clusters than generally assumed.

[5] I follow the practice of marking unpronounced skeletal slots by lowercase letters.

4 The distribution of clusters

The consonant cluster types identified above display divergent behaviour not only with respect to their occurrence at word edges, but also in the vicinity of a further consonant, after long vowels and diphthongs, and preceding a syncope site. The chart in (4) compares the distribution of onset, bogus and coda clusters, in English. A discussion of the criteria follows the chart. *T* stands for a "strong" consonant, which cannot form a coda cluster with the following consonant, *R* stands for a "weak" consonant, which can.

(4)

	#__	__#	__C	T__	R__	V̄__
onset	✓	∗	∗	∗	✓	✓
bogus	∗	∗	∗	∗	✓	✓
coda	∗	✓	✓	∗	?	∗

The data in the first two columns form the basis of the classification: this is why the three types were distinguished in the first place.[6] Apart from the first column the distribution of onset and bogus clusters is very similar: neither occurs word finally, preconsonantally or after a consonant, unless in the resulting $C_1C_2C_3$ cluster C_1 and C_2 form a coda cluster, i.e., while *-tkl- and *-tkn- are impossible, -ntr- and -ntn- are not (e.g., in *pantry* and *maintenance*). In addition, both types of cluster are possible following a long vowel, i.e., neither induces closed-syllable shortening: *āpricot, fāvourite* feɪvrɪt.

The only point where coda and bogus clusters behave alike as opposed to onset clusters is again word initially. Word finally and preconsonantally it is only coda clusters that can occur. One instance of preconsonantal coda clusters is produced by syncope: while it is possible after these, it is not after onset and bogus clusters. E.g., sílv⟨ə⟩ri (*silvery*), kʌ́mp⟨ə⟩ni (*company*), but bɜ́ːgl*⟨ə⟩ri (*burglary*), kʌ́tl*⟨ə⟩ri (*cutlery*), ígn*⟨ə⟩rəns (*ignorance*).[7,8]

Although English is claimed to exhibit closed-syllable shortening (cf. Kenstowicz 1994 : 437, Harris 1994 : 78ff), the current state of the language seems to defy this claim. Several historical developments blur the picture: e.g., the Old English precluster lengthening (which took place before *nd, ld, rd, mb, ng,* and which was later undone but not always before coronal clusters, cf. Fisiak 1968 : 26ff and references there) and the resistence to shortening before *st* (*op.cit.* : 30) like in *chīld, mōld, fīnd, hound, ghōst, priest,* etc.; the lengthening of æ to ɑː before fricatives and in some words before NC clusters in the South of England, like in *āsk, stāff, pāth, dānce, sāmple*; compensatory lengthening accompanying *r*-vocalization in *r*CC clusters, like in *absorption, arctic, excerpt, burst, world*; pre-*l* lengthening, like in *fault, bald.* Thus, it is

6 The exclusion of *s*C clusters, more specifically, sp st sk, saves us from having to include a fourth type of cluster for which both columns would contain a tick.

7 Wells (1990) has two spurious transcriptions: **admiral** ˈæd mᵊr̮əl and **rosemary** ˈrəʊz mər̮i. According to his conventions, these transcriptions encode the pronunciations ǽdmrəl and rə́ʊzmri, among others. These forms do not appear to be possible, probably what is meant are ǽdm̩rəl and rə́ʊzm̩ri, respectively.

8 It must be admitted that syncope is not fully adequate to categorize clusters, since it is an optional process and whether a given dictionary marks it or not is often accidental. For instance, the cases where syncope after the cluster mn could be examined — to check whether it is a coda cluster — are only *somnolence* and *somnolent.* One cannot know whether syncope is not marked by Wells in these because it is not possible or because these are infrequent items of the lexicon, thus syncope is not common in them.

not exactly true that coda clusters do not occur after a long vowel, though the set of vowels occurring there is constrained as opposed to that occurring before onset and bogus clusters.[9] Embarrassingly, there also seem to exist "double" coda clusters: $C_1C_2C_3$ clusters in which both pairs (C_1C_2 and C_2C_3) are coda clusters: e.g., *attempt, sculpt, succinct, mulct.* Recall, it is only after coda clusters that syncope may occur, this is the case with these double clusters as well: e.g., skʌ́lptʃ⟨ə⟩rəl (*sculptural*), pərémpt⟨ə⟩ri (*peremptory*). These clusters are as baffling as st and company, accordingly, I will treat them alike, acknowledging their existence I will ignore them in the present paper.

5 Syncope

Syncope is the prime source of bogus clusters in present-day English. Harris (1994 : 182–193) argues that syncope is effected by V-to-V government and that the two consonants now superficially adjacent remain skeletally separated, because phonotactically independent of each other. However, as Harris himself notes, this is not exactly true: there are several constraints on when a vowel can be syncopated; being followed by a single consonant and a pronounced vowel is far from being enough.

Data on the conditions of syncope are contradictory, perhaps dialect-specific. Not being a native speaker of the language, I have little chance of accessing a truly reliable internal corpus of English pronunciation, therefore in this paper I will accept the data presented in Wells's LPD (1990).[10] Accordingly, the "English" to be discussed here means "LPDese". This variant of English is often referred to as RP, although the term appears to be less and less justified. As for the tempo — an issue very relevant in any consideration of syncope — Wells explicitly excludes what he calls casual speech from the pronunciations he records (1990 : 241).

Firstly, the vowel following the syncope site must be totally unstressed, i.e., ə, ɪ/i or a syllabic consonant: e.g., sep⟨ə⟩rət (*separate*$_a$), kǽθ⟨ə⟩lɪk (*Catholic*), fǽm⟨ə⟩li (*family*), nǽʃ⟨ə⟩n̩ (*national*); pretonic syncope is not possible in English:[11] sɪ̀g*⟨ə⟩rét (*cigarette*), lɑ́ːns⟨ə⟩lət, but lɑ́ːns*⟨ə⟩lɒt (*Lancelot*), sep*⟨ə⟩reɪt (*separate*$_v$), mém⟨ə⟩ri (*memory*) vs. mém*⟨ə⟩raɪz (*memorize*). That this has nothing to do with avoiding stress clash — as is assumed by, e.g., Burzio (1994 : 61) — is proven by the absence of pretonic syncope even if no stress clash would follow: hʌ̀ləb*⟨ə⟩lúː (*hullabaloo*), mèθəd*⟨ə⟩lɒ́dʒɪkəl (*methodological*).

[9] There again some vowels, e.g., aʊ, occur very marginally before onset and bogus clusters: *bowdlerize, outrage* is an exhaustive list, while words with a coda cluster following are much more in number: *bound, count, found, ground, ounce, oust, scrounge* etc.

[10] John Wells says "[compression, i.e., syncope — PSz] depends on which word we're dealing with." About the ungrammaticality of *ˈmeldi (*melody*) he says "there is some constraint. Whether it's to do with the word or something about l space d I'm not sure" (Varga 2002). It can be concluded that Wells is giving his transcriptions without any well-defined theory about the conditions of syncope, therefore they represent some kind of native speaker intuition, not data dictated by theory.

[11] Strictly speaking, this is false, alternative forms like ptéɪtəʊ for pətéɪtəʊ (*potato*) do exist. As noted, I here limit syncope to cases occurring in noncasual, nonfast speech, the model illustrated in Wells 1990.

It is also noted by Harris (1994 : 184), as well as Hooper (1978), that the single consonant following the syncope must be a sonorant.[12] In addition to this proviso, it can also be stated that of the two consonants flanking the syncope site the first must be less sonorous than the second for syncope to occur: cf. fǽm⟨ə⟩li (*family*), kǽm⟨ə⟩rə (*camera*) vs. pɑ́ːl*⟨ə⟩mənt[13] (*parliament*), hɑ́ːm*⟨ə⟩ni (*harmony*), sín*⟨ə⟩mə (*cinema*). There also seems to be a constraint on the place of articulation of the two consonants: unless coronal, they may not be homorganic. What supports this claim is that none of the handful of otherwise syncope-prone items with labials around the relevant schwa (*blasphemy, infamous* and the like) actually exhibit the syncopated form. It must, nevertheless, be admitted that syncope before m is much less frequent anyway, therefore its absence is not necessarily due to homorganicity.[14]

To summarize, it is noteworthy that syncope in English seems to conspire to produce clusters that are similar to onset clusters. It is true for both onset and syncope-created bogus clusters that their second member is a sonorant, their first member is less sonorous than the second, and the two members are not homorganic. (Their position with respect to stress I will return to below.) The constraints on syncope-created clusters, however, are more liberal: thus while all consonant clusters I here label as onset clusters may be created by syncope, not all syncope-created clusters qualify as an onset cluster, at least inasmuch as they do not all occur word initially. Apart from this, however, the two clusters are rather similar, therefore if one is to reduce the tripartite categorization of consonant clusters, this can more plausibly be done by equating onset and bogus clusters than by equating bogus and coda clusters, as Scheer (1998) proposes.

6 Alleged differences between onset and bogus clusters

At this point, the question arises if syncope-created clusters are so similar to onset clusters and so different from coda clusters why do many researchers analyse them as belonging to coda clusters. I can think of three arguments for refusing to equate onset and bogus clusters: (i) the first consonant of the two types differ in their readiness to undergo lenition, (ii) a difference in making syllables heavy, (iii) a difference in occurring word initially; I attempt to weaken each.

6.1 Lenition

A standard argument for the onset status of consonant clusters is the way lenition affects them. Since the t of *atrocious* is part of the onset it is aspirated, that of *Atlantic* is not, hence it is glottalized (Kenstowicz 1994 : 251). While this is certainly the case pretonically, before unstressed vowels the situation is much more ambiguous. Although Harris (1994 : 222) very explicitly claims that there is no glottalization in words like *petrol, matrimony* and *mattress*, Wells (1990) does not indicate any difference (in syllabification) in the primary pronunciations of *symmetry* and *cemetery* — apart, of course, from the stressed vowel — thus declaring them to

[12] To maintain this claim forms such as védʒtəbəl (*vegetable*), kʌ́mftəbəl (*comfortable*), or médsɪn (*medicine*) must not be treated as cases of syncope. This is in fact likely to be the situation since vowel loss is not possible in phonologically very similar forms, e.g., *vegetative* védʒ*⟨ə⟩tətɪv, *comforter* kʌ́mf*⟨ə⟩tə.

[13] The syncopated form is deemed possible for RP by Gimson (1989 : 238), but it is still not an option in LPD.

[14] Again note the Gimsonian (1989 : 238) but not LPDese form gʌ́vmənt (*government*).

be a minimal pair. He cites ǽʔkjʊrət (*accurate*) as an example of glottal reinforcement, common especially in BrE (= RP here, *op.cit.* : 307), i.e., lenition attacks the "head of a branching onset." Giegerich (1992 : 221) also claims that nonpretonic stops in the onset clusters of words like *Cypriot, petrol, macron* are glottalized in all three of his reference accents (namely, RP, General American and Scottish Standard English), just like the stop in the bogus cluster of *atlas*.

It is important to note that consonant lenition is not necessarily connected to whether the given consonant occupies onset or coda position. It would be difficult to find reasons for why the glottalized t of words like *metre* or *water* should be in coda position, unless our motivation is to explain lenition, in which case, however, the reasoning becomes circular. It is also suspicious that while onset clusters are more common before a stressed vowel, bogus clusters are few and far between before a stressed vowel. Examples of the handful of items whose existence I am trying to marginalize are *athlétic, magnétic* etc. Thus, it can loosely be claimed that onset and bogus clusters are in complementary distribution, occurring primarily before stressed and unstressed vowels, respectively. This is a symptom of them being two sides of the same coin.

6.2 Closed vs. open syllables

Another well-known argument for distinguishing onset and coda clusters is related to stress placement. For nouns and many adjectives the rule stresses the penult if it is heavy and the antepenult if the penult is light. What is of relevance for us here is that light syllables are open, i.e., lack a coda consonant. Hence, if we examine stress placement in nouns and adjectives matching the -$VC_0V\underline{CC}VC_0$ template we should find a clear bifurcation: if the underlined cluster is a coda cluster stress should fall on the penult, if it is an onset cluster on the antepenult.

In many cases our expectations are met. Coda clusters are mostly moraic,[15] e.g., *agénda, catálpa*; onset clusters are often not, e.g., *ádequate, Álcatraz, álgebra, cólibri, cólloquy, vértebra,* etc. There are, however, counterexamples too, both for nonmoraic coda clusters, e.g., *báluster, cálendar*, and for moraic onset clusters, e.g., *allégro, Cleopátra, methéglin, Patróclus, pellágra, physiátrist,* etc. To save the analysis making reference to heavy vs. light penults, one could hypothesize that in the last set what we have are bogus clusters and their stress is "underlyingly" antepenultimate: "*pellág*⟨ə⟩*ra*" — although there is little evidence for this stance apart from stress placement itself.[16] Examining bogus clusters that exhibit vowel–zero alternation proves this stance to be untenable: many indeed have (ante)penultimate stress (e.g., *benefíci*⟨*a*⟩*ry, cadáv*⟨*e*⟩*rous, carnív*⟨*o*⟩*rous, ephém*⟨*e*⟩*ra, illít*⟨*e*⟩*rate*), but many others have (pre-)antepenultimate stress (e.g., *accúsat*⟨*o*⟩*ry, córon*⟨*a*⟩*ry, nécess*⟨*a*⟩*ry, sáliv*⟨*a*⟩*ry*). In fact, in about half of the words matching the -$\acute{V}C_0VTRVC_0$ template superficially (where TR is a stop + liquid/glide cluster) the cluster exhibits vowel–zero alternation (i.e., is allegedly a bogus cluster), while in the other half it does not (i.e., is allegedly an onset cluster).

Thus the stress placement evidence is not conclusive: it does not explicitly separate coda and bogus clusters on the one hand, as clusters that make the preceding syllable heavy, and onset clusters on the other, as ones that leave the preceding syllable light. Therefore, it is not immediately evident that it could neatly split the sets of bogus and onset clusters.

[15] I use the term 'moraic' in a purely descriptive sense.

[16] Note, however, Elton John's "and it's no sacərifice. . . "

6.3 Word-initial position

The basic motivation for singling out onset clusters from among consonant clusters is the fact that they occur word initially. While it is certainly an important property of a given cluster that it may turn up at one edge of a monomorphemic word, as we have seen, this is only one of the factors that can be used to classify them.

Looking at the other end of the word: while most analysts would classify mb as a coda cluster without scruple, it does not occur word finally. There is a long set of such clusters, these are the so-called falling-sonority medial clusters left dormant in §2, including lg, lz, nf, mb, ŋg, zb, zd, sʧ, gz, gʒ. These may precede a syncope site: kɒ́nf⟨ə⟩rəns (*conference*), slʌ́mb⟨ə⟩rə (*slumberer*), líŋg⟨ə⟩rɪŋ (*lingering*), rɑ́ːzb⟨ə⟩ri (*raspberry*), lʌ́gʒ⟨ə⟩ri (*luxury*), like other coda clusters. It also likens them to coda clusters that long vowels and diphthongs do not occur before them.[17]

If clusters that clearly qualify as coda clusters are nevertheless not found word finally, it may well happen that other clusters that pattern with onset clusters are not found word initially. Accordingly, the fact that a given cluster (e.g., tl or mr) is not found at the beginning of English words is not in itself a reason to deny its status as an onset cluster.

7 Types of consonant cluster: a second approach

The scheme that can be drawn from the above is that two basic types of cluster have to be distinguished (in English): onset clusters and coda clusters. Ignoring clusters containing the notoriously misbehaved voiceless stridents, onset clusters uniformly exhibit a rising sonority profile, while coda clusters have either falling or level sonority. As a result, sonority, which is an inherent property of sounds derivable from their make-up, alone may be sufficient to categorize consonant clusters. The chart in (5) shows the current simplified scene.

(5)	__C	T__	R__	$\bar{V}$__
onset cluster	*	*	✓	✓
coda cluster	✓	*	*	*

I do not want to deny the importance of the distribution of consonant clusters at word edges in categorizing them. It is telling, however, that if we momentarily ignore this criterion, a radically different picture emerges.

There obviously is a need for further, more sharpened criteria for the categorization of consonant clusters. In this paper I try to take one step, seeing that many others are yet to be taken.

[17] Voiceless C+strident clusters mirror the ambiguous behaviour of *s*+C clusters: some occur word finally (ps ts ks) and allow syncope to follow, e.g., swíts⟨ə⟩lənd (*Switzerland*), éks⟨ə⟩lənt (*excellent*), ɪksépʃ⟨ə⟩nəl (*exceptional*), lʌ́kʃ⟨ə⟩ri (*luxury*), strʌ́kʧ⟨ə⟩rəl (*structural*), suggesting that they are coda clusters, yet they tolerate a preceding consonant, e.g., sfɪŋks (*sphinx*), fʌ́ŋkʃ⟨ə⟩nəl (*functional*), skʌ́lpʧ⟨ə⟩rəl (*sculptural*), a characteristic of onset and bogus clusters. (Alternatively, we may be witnessing the return of the "double" coda clusters ignored above.) Interestingly, this ambiguity ceases in the case of voiced clusters, e.g., ǽŋkʃəs (*anxious*) vs. æŋzáɪəti, *æŋgz- (*anxiety*). This is clear-cut evidence that the explanation for the mystery of *s*C clusters must not be sought exclusively at the beginning of the word, must include C*s* clusters and must be extended to all voiceless sibilants, even in English.

REFERENCES

Anderson, John M. and Colin Ewen. 1987. Principles of Dependency Phonology. Cambridge: Cambridge University Press.

Basbøll, Hans. 1977. The structure of the syllable and proposed hierarchy of phonological featuers. In: Wolfgang U. Dressler & al. (eds.) Phonologica 1976. Innsbruck. 143–148

Burzio, Luigi. 1994. Principles of English Stress. Cambridge: Cambridge University Press.

Clements, George N. 1990. The role of the sonority cycle in core syllabification. In John Kingston and Mary E. Beckman (eds.) Papers in Laboratory Phonology 1: Between the Grammar and the Physics of Speech. Cambridge: Cambridge University Press. 283–333.

Dienes, Péter and Péter Szigetvári. 1999. Repartitioning the skeleton: VC Phonology. Ms., Eötvös Loránd University. (http://seas3.elte.hu/szigetva/papers.html#vc_1)

Fisiak, Jacek. 1968. A Short Grammar of Middle English I: Graphemics, Phonemics and Morphemics. Warsaw: Państwowe Wydawnictwo Naukowe.

Giegerich, Heinz J. 1992. English Phonology: An Introduction. Cambridge: Cambridge University Press.

Gimson, Alfred C. 1989. An Introduction to the Pronunciation of English (4th ed., rev. by Susan Ramsaran). London etc.: Edward Arnold.

Grammont, M. 1933. Traité de Phonétique. Paris: Librairie Delagrave.

Harris, John. 1994. English Sound Structure. Oxford: Blackwell.

Hooper, Joan B. 1978. Constraints on schwa-deletion in American English. In: Jacek Fisiak (ed.), Recent Developments in Historical Phonology. The Hague: Mouton. 183–207.

Jespersen, Otto. 1904. Lehrbuch der Phonetik. Leipzig and Berlin.

Kaye, Jonathan. 1990. 'Coda' Licensing. Phonology 7 : 301–330.

Kaye, Jonathan. 1992. Do you believe in magic? The story of s+C sequences. SOAS Working Papers in Linguistics & Phonetics 2 : 293–313. (Reprinted in Henryk Kardela and Bogdan Szymanek (eds.). 1996. A Festschrift for Edmund Gussmann from His Friends and Colleagues. Lublin: The University Press of the Catholic University of Lublin. 155–176.)

Kaye, Jonathan. 1995. Derivations and interfaces. In: Jacques Durand and Francis Katamba (eds.) Frontiers of Phonology: Atoms, Structures, Derivations. Harlow: Longman. 289–332.

Kaye, Jonathan, Jean Lowenstamm and Jean-Roger Vergnaud. 1990. Constituent structure and government in phonology. Phonology 7 : 193–232.

Kenstowicz, Michael. 1994. Phonology in Generative Grammar. Cambridge, Mass. and Oxford: Blackwell.

Lowenstamm, Jean. 1981. On the maximal cluster approach to syllable structure. Linguistic Inquiry 12 : 575–604.

Lowenstamm, Jean. 1996. CV as the only syllable type. In: Jacques Durand and Bernard Laks (eds.), Current Trends in Phonology: Models and Methods. European Studies Research Institute, University of Salford Publications. 419–442.

Nádasdy, Ádám. 2000. Huron's English Pronouncing Dictionary/Huron angol kiejtési kézikönyv. Budapest: Biográf, 2000.

Rice, Keren D. 1992. On deriving sonority: a structural account of sonority relationships. Phonology 9 : 61–99.

Scheer, Tobias. 1998. A theory of consonantal interaction. Folia Linguistica 32.3–4 : 201–237.

Sievers, E. 1881. Grundzüge der Phonetik. Leipzig: Breitkopf und Hartel.

Szigetvári, Péter. 2001. Dismantling syllable structure. Acta Linguistica Hungarica 48 : 155–181.

Varga, György. 2002. We can't say as we perhaps once did that all educated English people speak with Received Pronunciation: An interview with Professor John C. Wells. novELTy 9.

Wells, John C. 1990. Longman Pronunciation Dictionary. Harlow: Longman.

Appendix 1

The distribution of two-member non-syncope-created consonant clusters in English.

	p	t	k	b	d	g	tʃ	dʒ	f	θ	s	ʃ	v	ð	z	ʒ	m	n	ŋ	l	r	w	j	h	
p	◁□▷	◁■▶	◁□▷	◁□▷	◁□▷	◁□▷	◁■▷	◁□▷	◁□▷	◁□⋗	◁■▶	◁■▷	◁□▷	◁□▷	◁□▷	◁□▷	◁■▷	◁■▷	◁□▷	◀■▷	◀■▷	⋖□▷	◀■▷	◁□▷	p
t	◁□▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□⋗	◁■▶	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁■▷	◁■▷	◁□▷	◁■▷	◀■▷	◀■▷	◀■▷	◁□▷	t
k	◁□▷	◁■▶	◁□▷	◁□▷	◁⊡▷	◁□▷	◁■▷	◁□▷	◁⊡▷	◁□▷	◁■▶	◁■▷	⋖□▷	◁□▷	◁□▷	◁□▷	⋖⊡▷	⋖■▷	◁□▷	◀■▷	◀■▷	◀■▷	◀■▷	◁□▷	k
b	◁□▷	◁■▷	◁⊡▷	◁□▷	◁■▷	◁□▷	◁□▷	◁■▷	◁⊡▷	◁□▷	◁■▷	◁□▷	◁■▷	◁□▷	◁■▷	◁□▷	◁■▷	◁⊡▷	◁□▷	◀■▷	◀■▷	⋖⊡▷	◀■▷	◁⊡▷	b
d	◁⊡▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁⊡▷	◁□▶	◁⊡▷	◁□▷	◁■▷	◁□▷	◁⊡⋗	◁□▷	◁■▷	◁■▷	◁□▷	◁■▷	◀■▷	◀⊡▷	◀■▷	◁■▷	d
g	◁□▷	◁□▷	◁□▷	◁⊡▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁■▷	◁⊡▷	◁■▷	◁■▷	◁□▷	◀■▷	◀■▷	◀■▷	⋖■▷	◁□▷	g
tʃ	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	tʃ
dʒ	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	dʒ
f	◁□▷	◁■▶	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁■⋗	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◀■▷	◀■▷	⋖□▷	◀■▷	◁□▷	f
θ	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁⊡▷	◁□▷	◁⊡▷	◀■▷	⋖⊡▷	◀■▷	◁□▷	θ
s	◀■▶	◀■▶	◀■▶	◁□▷	◁□▷	◁□▷	◁■▷	◁□▷	◀■▷	⋖⊡▷	◁□▷	◁□▷	⋖□▷	◁□▷	◁□▷	◁□▷	◀■▷	◀⊡▷	◁□▷	◀■▷	◁□▷	◀■▷	◀■▷	◁■▷	s
ʃ	⋖□▷	◁□▷	◁⊡▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	⋖⊡▷	◀□▷	◁□▷	◁□▷	◀□▷	⋖□▷	◁□▷	◁□▷	ʃ
v	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◁⊡▷	◁■▷	⋖■▷	⋖■▷	◁□▷	v
ð	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁■▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	ð
z	◁□▷	◁□▷	◁□▷	◁■▷	◁■▷	◁⊡▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁■▷	◁⊡▷	◁□▷	⋖■▷	◁⊡▷	◁■▷	⋖■▷	◁□▷	z
ʒ	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	⋖⊡▷	◁□▷	◁□▷	ʒ
m	◁■▶	◁⊡⋗	◁⊡▷	◁■▷	◁■▷	◁□▷	◁□▷	◁⊡▷	◁■▶	◁□⋗	◁■▷	◁⊡▷	◁⊡▷	◁□▷	◁■▶	◁□▷	◁□▷	◁■▷	◁□▷	◁■▷	◁■▷	◁■▷	◀■▷	◁⊡▷	m
n	◁⊡▷	◁■▶	◁■▷	◁⊡▷	◁■▶	◁■▷	◁■▶	◁■▶	◁■⋗	◁■▶	◁■▶	◁■⋗	◁■▷	◁□▷	◁■▶	◁■⋗	◁⊡▷	◁□▷	◁□▷	◁■▷	◁■▷	◁■▷	◀■▷	◁■▷	n
ŋ	◁□▷	◁□▷	◁■▶	◁□▷	◁□▷	◁■▷	◁□▷	◁□▷	◁□▷	◁□⋗	◁■▷	◁□▷	◁□▷	◁□▷	◁⊡▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁⊡▷	ŋ
l	◁■▶	◁■▶	◁■▶	◁■⋗	◁■▶	◁■▷	◁■▶	◁■▶	◁■▶	◁■▶	◁■▶	◁■⋗	◁■▶	◁□▷	◁■⋗	◁□▷	◁■▶	◁■⋗	◁□▷	◁□▷	◁■▷	◁□▷	◀■▷	◁⊡▷	l
r	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	r
w	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	w
j	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	j
h	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	◁□▷	h
	p	t	k	b	d	g	tʃ	dʒ	f	θ	s	ʃ	v	ð	z	ʒ	m	n	ŋ	l	r	w	j	h	

LEGEND

	initially	medially	finally
does not occur	◁	□	▷
one or two cases	⋖	⊡	⋗
more than two cases	◀	■	▶

Appendix 2

A list of English two-member consonant clusters with examples initially, medially and finally. The list does not include synchronic syncope-created clusters; unique examples (where only one or two exist) are italicized.

pt		chapter	apt
ptʃ		capture	
pθ			*depth*
ps		gypsum	lapse
pʃ		caption	
pm		*chipmunk*	
pn		hypnosis	
pl	play	apply	
pr	pray	approve	
pj	pure	oppugn	
pw	*pueblo*		
tk		*Atkins*	
tf		*platform*	
tθ			*eighth*
ts		Switzerland	quartz
tm		atmosphere	
tn		partner	
tl		atlas	
tr	tray	patrol	
tj	tube	attune	
tw	twin	Antwerp	
kt		sector	sect
kd		*anecdote*	
ktʃ		fracture	
kf		*breakfast*	
ks		exodus	box
kʃ		section	
kv	*kvass*		
km	*Khmer*	*acme*	
kn	*Knesseth*	acne	
kl	clay	cyclic	
kr	cry	acrid	
kj	cure	acute	
kw	queer	equity	
bt		obtain	
bk		*subcutaneous*	
bd		molybdenum	
bdʒ		object	
bf		*subfusc*	
bs		absolute	
bv		obvious	
bz		observe	
bm		submit	
bl	blob	oblique	
br	bray	algebra	
bj	beauty	fibula	
bw	*Buenos Aires*	*Zimbabwe*	
bh		abhor	

dp		*jodhpurs*	
dk		*vodka*	
dg		*Edgar*	
df		*Godfrey*	
dθ			width
ds		*medicin*	
dv		advent	
dz		*Pudsey*	*adze*
dm		admiral	
dn		kidney	
dl		pedlar	
dr	dry	Audrey	
dj	duke	seduce	
dw	dwell	*Edward*	
dh		*adhere*	
gb		*rugby*	
gd		*Magdalene*	
gz		example	
gʒ		*luxury*	
gm		pigmy	
gn		signal	
gl	glue	ugly	
gr	gray	migrate	
gj	*gules*	argue	
gw	guano	iguana	
dʒt		*vegetable*	
ft		after	soft
fg		*Afghan*	
fθ		diphthong	fifth
fn		*Daphne*	
fl	fly	affluent	
fr	fry	Geoffrey	
fj	few	curfew	
θm		*arithmetic*	
θn		*ethnic*	
θl		*athlete*	
θr	throw	arthritis	
θj	thuja	enthuse	
θw	*thwack*	*athwart*	
sp	spy	suspect	wasp
st	sty	astute	mast
sk	sky	mosquito	mask
stʃ		eschew	
sf	sphere	asphalt	
sθ	*sthenic*	*esthete*	
sv	*svelte*		
sm	small	jasmine	
sn	snow	parsnip	

sl	slow	parsley	
sj	suit	assume	
sw	swing	persuade	
sh		*exhale*	
ʃp	*spiel*		
ʃk		*droshky*	
ʃm	*schmalz*	*yashmak*	
ʃn	schnapps		
ʃr	shrug	*mushroom*	
ʃw	*schwa*		
vl		*Evelyn*	
vr		every	
vj	*view*	uvula	
vw	*voyeur*	*reservoir*	
ðm		*rhythmic*	
ðr		*brethren*	
zb		husband	
zd		asdic	
zg		*Glasgow*	
zʤ		*phosgene*	
zv		*transverse*	
zm		cosmos	
zn		*business*	
zl	*zloty*	gosling	
zr		*Israel*	
zj	*Zurich*	resume	
zw		*Oswald*	
ʒw		*bourgeois*	
mp		vampire	vamp
mt			*dreamt*
mb		samba	
md		*Camden*	
mf		comfy	nymph
ms		plimsoll	
mv		*circumvent*	
mz		damsel	*James*
mn		hymnal	
ml		omelette	
mr		*comrade*	
mj	muse	amuse	
mw		chamois	
mh		*Amharic*	
nt		antenna	ant

nk		concoct	
nd		panda	hand
ng		congressional	
nʧ		poncho	branch
nʤ		danger	range
nf		info	*Banff*
nθ		anthem	absinth
ns		answer	sense
nʃ		tension	*avalanche*
nv		envy	
nz		frenzy	lens
nʒ		*congé*	*mélange*
nm		*enmity*	
nl		only	
nr		Henry	
nj	new	menu	
nw		*ennui*	
nh		inhale	
ŋk		anchor	yank
ŋg		finger	
ŋθ			*length*
ŋs		*tungsten*	
ŋz		*anxiety*	
ŋh		*Singhalese*	
lp		alpine	pulp
lt		filter	felt
lk		falcon	talc
lb		elbow	*bulb*
ld		solder	fold
lg		vulgar	
lʧ		culture	belch
lʤ		soldier	bulge
lf		dolphin	shelf
lθ		*Meltham*	filth
ls		ulcer	else
lʃ		emulsion	*Welsh*
lv		velvet	twelve
lz		palsy	*Charles*
lm		almanac	elm
ln		vulnerable	*kiln*
lr		walrus	
lj	lewd	value	
lh		*bilharzia*	