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# Domains, relations, and the English agma*

*Edmund Gussmann*

The English velar nasal [ŋ] has played a prominent role in the history of phonological theory in the 20th century. In contradistinction to the phonetic tradition which viewed it as a single nasal on a par with other nasal consonants, Edward Sapir (1925) offered an interpretation based on his psychological approach to the phoneme. For Sapir the velar nasal – despite its phonetic parallelism to the labial or alveolar nasals – is a complex unit: using terminology of more recent origin, the final velar nasal of *bring* [brɪŋ] could be said to be a contextual realisation of the cluster /ŋg/. The reasons for making such a sharp break with the phonetic reality would lead main-stream generative phonology to adopt Sapir's analysis a few decades later. We will review them below and also add some more arguments in support of this position.

As is well-known, Sapir's "phonologic representation" (see McCawley 1967, Anderson 1985:228 ff.) did not enjoy much popularity in the post-Bloomfieldian period. The velar nasal was recognised as having a firm phonemic status within the phonology of English since it satisfied the standard requirements of the analysis. Contrasts such as the following could not be by-passed by a model where minimal pairs were the deciding factor in any interpretation: *fan* [fæn] – *fang* [fæŋ], *brim* [brɪm] – *bring* [brɪŋ], *win* [wɪn] – *whim* [wɪm] – *wing* [wɪŋ]. Infrequent alternations such as *in* [ɪn] – *income* [ˈɪŋkəm], *long* [lɔŋ] – *longer* [ˈlɔŋgə] – *length* [leŋkθ] would be assigned to the morphophonemic component, while various distributional peculiarities such as the non-appearance of the velar nasal word-initially would be seen as gaps in the distribution of no phonemic significance. The position of the velar nasal was secure as long as the paradigmatic bias of phonology started with and restricted itself to contrastive units and their phonetically conditioned variants or realisations.

The advent of generative phonology with its refusal to contemplate surface contrasts as theoretically significant brought about not only a return to Sapir's mentalistic attitude but a development of a fundamentally derivational framework.[1] Such a model could easily recognise underlying representations which

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[1] There is an alternative interpretation of this notion where "derivation" means "defining phonological grammaticality"; in this sense any phonological theory can be called derivational. In what follows we shall use the term in the more restricted sense which entails intermediate levels related by ordered rules.

needed to be transformed into the so-called surface forms through a series of intermediate stages – it is precisely the existence of intermediate stages or levels of representation that has been identified with derivationalism in phonology. The phonetic velar nasal [ŋ] in *bring* could easily be derived from phonological /ng/ (or /Ng/) by two sequentially ordered rules: nasal assimilation turning /ng/ or /Ng/ into /ŋg/ and voiced velar deletion yielding [ŋ] (see Giegerich 1992:297 ).

The demise of derivational models in the mid 1980's in Europe and in the early 1990's in the USA produced yet another perspective on the nature of phonological regularities, the form and texture of representations and consequently on the character of phonological description and explanation. The shift away from language-specific statements (or rules) and their idiosyncratic ordering relations marks a return to fundamentally non-derivational frameworks; this is particularly true of the principles-and-parameter approach commonly known as *Government Phonology* (see, for example, Kaye, Lowenstamm, and Vergnaud 1985, 1990, Harris 1990, 1994, Kaye 1990, 1995, 1996, Charette 1991, Brockhaus 1995, Yoshida 1996, Cyran 1997 and references therein), an approach whose fundamental insights will be adopted in this study. Needless to say, the comeback of the non-derivational approach does not imply the return of any set of principles defining an earlier non-derivational orthodoxy, such as the post-Bloomfieldian descriptivism, or its applications. Quite conversely, the conscious rejection of the derivational machinery implies an increased awareness of the limits and properties of phonological generalisations. It is clear that while the classical phonemic approach narrowed down the scope of phonology to surface phonetic contrasts and their contextually-determined variability, the generative pendulum swung in the opposite direction and tried to connect practically any variability in the phonetic shape of *morphemes* with live phonological regularities. The new non-derivational models appear to wish to combine the genuine insights of both trends without succumbing to the extremities of either. In our examination of the place of the velar nasal in the English system we will consider those of its phonological properties which appear sufficiently general to merit a place in any description, irrespective of the theory it follows or the theory-internal details it entails.

Before we look at the distribution and other properties of the velar nasal in English we must address a more basic question about the nature of the units we want to inspect. An initial *negative* formulation is that the units cannot be identified with orthographic words; note that within such orthographic words the velar nasal can be followed by practically any sound:

(1)

| | |
|---|---|
| *longs* [lɔŋz] | *wrongful* [ˈrɔŋful] |
| *longed* [lɔŋd] | *kingship* [ˈkɪŋʃɪp] |
| *strongly* [ˈstrɔŋlɪ] | *wellington* [ˈwelɪŋtən] |
| *prolongment* [prəˈlɔŋmənt] | *songster* [ˈsɔŋstə] |
| *nothingness* [ˈnʌθɪŋnɪs] | *strength* [streŋθ] |



If these examples were to be taken literally as defining the domain for the distribution of the velar nasal word-internally, the conclusion would have to be that there is no difference between what appears in that position and what appears at word boundaries. The sequence [ŋz] of *longs* is no different from *long zebra crossing*; in the latter case it is entirely obvious that the sequence [ŋz] arises as an accident or consequence of word concatenation which is in no way dependent upon phonological structure. If sequences such as [ŋz, ŋd, ŋl, ŋm, ŋn, ŋʃ] etc. found within complex words and at word boundaries were to represent genuine phonotactic possibilities, we should expect to find them also within single morphemes – there should be no dearth of words like *to *fungmo* [ˈfʌŋmou], *a *bangsy* [ˈbæŋzɪ], **rangny* [ˈræŋnɪ]. Nothing of the sort is even vaguely possible – all such words are totally ungrammatical, which means that the word-internal sequences illustrated above in (1) are not different in kind from sequences arising at word junctures, i.e. they are accidental combinations of sounds in sequences rather than systematic segmental clusters.

Rather than inspect words as elements of texts we shall take monomorphemic words as constituting the basic domains of phonotactic generalisations. On this view, polymorphemic words, in so far as they depart from generalisations derived from more basic structures, would require special treatment; most typically, they would be viewed as concatenations of morphemes where novel phenomena emerge at domain boundaries.[2] Otherwise polymorphemic words do not differ from monomorphemic ones and hence they act as single phonological domains. We will have an opportunity to return to this issue and its implications in a later part of this study. For the moment, having cleared the ground a bit, we may identify the phonological properties of the velar nasal in English as contrasted with the bilabial and alveolar nasal; subsequently we shall attempt to construct an account that would make sense of the facts.

The most striking distributional property of [ŋ] is its inability to appear word-initially. Thus while there is no shortage of words like *mist* [mɪst], *millionaire* [mɪlɪəˈneə] or *noble* [noubl], *knowledge* [ˈnɔlɪdʒ], no word beginning with [ŋ] exists in English; furthermore words like *[ŋout], *[ŋailə], *[ŋæpɪ] seem ruled out. If the velar nasal were just another nasal consonant, the existence of such a restriction would be quite puzzling.

Another remarkable property of the velar nasal is the fact that it cannot occur after a long vowel or a diphthong; we again find numerous words like *lime* [laim], *perfume* [ˈpəːfjuːm] or *plain* [plein], *balloon* [bəˈluːn] but nothing like *[luːŋ] or *[blauŋ] is even a vague possibility. If the three nasals are to differ only in their place of articulation, this restriction singles out – yet again – the velar nasal for special treatment.

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[2] Sapir (1925: ftn. 6) adopted the same stance with respect to words like *singer*: "It would almost seem that the English insistence on the absoluteness of its significant words tended at the same time to give many of its derivative suffixes a secondary, revitalized reality. *-er*, for instance, might almost be construed as a "word" which occurs only as the second element of a compound".

Consider now the occurrence of the nasals domain-internally, that is, cases where these consonants appear in the middle of single morphemes. It is easy to point out to words like *summer* [sʌmə], *rumour* [ruːmə] or *minor* [mainə], *annoy* [əˈnoi] where the bilabial or alveolar nasal appear intervocalically but nothing of that sort is possible for the velar nasal *[krɔŋɪ], *[rŋai]. Note that cases like *stringy* [ˈstrɪŋɪ] or *thingy* [ˈθɪŋɪ] are not counterexamples to this claim since the words are morphologically complex and one can assign internal structure to them with *string, thing* constituting domains of their own. The same goes for structures like *singer* [ˈsɪŋə], *singing* [ˈsɪŋɪŋ] etc. where the vowel-initial suffixes *-er* [ə] and *-ing* [ɪŋ] are separated from the base by domain boundaries (see note 2 above). Thus the velar nasal cannot start a morpheme and morpheme-internally it cannot be followed by a vowel; wherever it does occur, it must be preceded by a short vowel. These properties set it apart from the two other nasal and lead us to conclude that the velar nasal is not just another nasal, which means that from the point of view of its behaviour it does not belong together with the bilabial and the alveolar nasals. If that is the case, then we might well ask what exactly it is. To try and answer this question we need to look at combinations of nasals with other consonants.

As we have just seen, morpheme-internally the velar nasal cannot appear before a vowel; in fact it can only be followed by a velar plosive, be it voiced or voiceless. It is practically impossible to find this nasal in any other contexts domain-internally.

(2)

| | |
|---|---|
| *finger* [ˈfɪŋgə] | *singular* [ˈsɪŋgjulə] |
| *angry* [ˈæŋgrɪ] | *anchor* [ˈæŋkə] |
| *mango* [ˈmæŋgou] | *tinkle* [ˈtɪŋkl] |
| *Bangor* [ˈbæŋgə] | *donkey* [ˈdɔŋkɪ] |
| *mongrel* [ˈmʌŋgrl] | *monkey* [ˈmʌŋkɪ] |
| *bungalow* [ˈbʌŋgəlou] | *wrinkle* [ˈrɪŋkl] |
| *sanguine* [ˈsæŋgwɪn] | *uncle* [ˈʌŋkl] |
| *tankard* [ˈtæŋkəd] | *plankton* [ˈplæŋktən] |

Thus domain-internally the velar nasal must be followed by a velar plosive, with dialectal complications which will be discussed below. These dialectal differences are also very much in evidence when we consider now the domain-final situation. In RP the velar nasal can appear as the last segment of the domain or it can be followed by the voiceless velar plosive [k]. It can never be followed by the voiced velar plosive, i.e. a sequence such as [ŋg] is totally impossible domain-finally in RP (*long* *[lɔŋg]).

(3)

| | |
|---|---|
| *hunk* [hʌŋk] | *hung* [hʌŋ] |
| *wink* [wɪŋk] | *wing* [wɪŋ] |
| *sink* [sɪŋk] | *sing* [sɪŋ] |
| *bank* [bæŋk] | *bang* [bæŋ] |
| *brink* [brɪŋk] | *bring* [brɪŋ] |



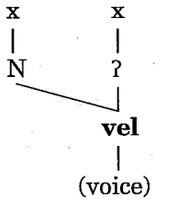
On the face of it, pairs like *wink – wing, clank – clang* seem to differ in that their first members contain a segment, namely [k], which the second members do not; thus they might be seen to differ in the same way as the pairs *mill* [mɪl] – *milk* [mɪlk], *skull* [skʌl] – *skulk* [skʌlk] etc. It is quite obvious, however, that the presence or absence of the consonant [k] in these latter pairs is an accident in that certain words contain it, while others do not. The velar nasal on the other hand must be followed by a velar plosive domain-internally and either by a voiceless velar plosive or nothing domain-finally. There can be no doubt that the velar nasal is inextricably linked with a following velar plosive and the only situation where this is not manifested phonetically is in the final position of the domain. It is this final position then that requires special attention. The occurrence of the velar nasal in RP English can be summarised as follows.

(4)

| *domain-internally* | *domain-finally* |
|---|---|
| ŋg ŋk | ŋ ŋk |
| *ŋ | *ŋg |

The situation in the two domains differs only very slightly and we can assume that one of them is a modification of the other. If we take the domain-internal case as the more basic one, then the non-existence of the velar nasal intervocalically requires no special comment. The nasal and the following plosive are homorganically velar, which also explains why the velar nasal cannot stand before a vowel: it emerges only when followed by a velar plosive. Since sequences of a nasal plus a plosive – or more correctly of a sonorant plus any obstruent – are disallowed in onsets, we have a principled, if somewhat trivially mechanical explanation for the absence of the velar nasal word-initially.[3] Looked at in this way the velar nasal can be seen to be a complex sound whose place of articulation is shared with the neighbouring consonant – we will say that it is doubly associated. The situation can be represented graphically in the following manner:

(5)

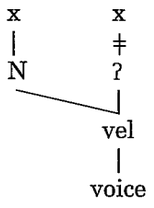



(N) stands for "nasality", (?) denotes "stopness" or "plosiveness", "vel" is short for "velarity" and the self-explanatory "voice" is placed in brackets as it is irrelevant to the characterisation of the velar nasal.

[3] This conclusion is again anticipated in Sapir (1925:113): "*ŋa-* is incredible because there is no *mba-, nda-, ŋ(g)a-* series in English".

If we accept this as a representation of the velar nasal, then to account for the domain-final situation, we need to modify it in such a way that the plosive is inaudible when voiced. One way of looking at it is to say that the melody associated with the skeletal position of the nasal gets delinked from its slot, a situation which we can capture as follows.

(6)




The crucial notion we will employ in connection with this representation is that of licensing: we will say that the skeletal position licenses a melody when it is associated with it; otherwise the melody is not licensed, hence it remains unpronounced.[4] The appearance of the velar nasal domain-finally translates thus into the failure of the skeletal position to license the voiced velar plosive when it is linked with the preceding nasals, i.e. when it appears in what we shall call below "linked structures". Note that velarity is licensed by the nasal hence it is realised on the nasal only. The implications of this theoretical view will be taken up below; for the moment it should be noted that this interpretation of the representation in (6) accounts for the double life of the nasal. On the one hand it is a complex structure as its representation embraces two skeletal positions. In this it does not differ from the velar nasal followed by a voiceless plosive, i.e. [ŋk], hence whatever needs to be said about the phonological behaviour of [ŋk], can also be said about the final velar nasal on its own, for example the fact that neither [ŋk] nor [ŋ] can be preceded by a complex nucleus. On the other hand, the velar nasal as an interpretation of a nasal and an unlicensed voiced velar plosive is clearly associated with a single skeletal position and thus can be said to be a single consonant. Phonologically, then, the close parallelism between [ŋk] and [ŋg] which exists domain-internally is also attested domain-finally, even if the actual physical realisation corresponding to the former is the same [ŋk], and the single segment [ŋ] corresponds to the internal [ŋg]. It thus transpires that there is a difference in *g-licensing* in linked structures which we can tentatively formulate as a following licensing statement:

***g***-LICENSING IN LINKED STRUCTURES

*Domain-internally*: YES
*Domain-finally*: NO

[4] For a detailed discussion of licensing in phonology within the framework adopted here see Harris (1994, 1997).



To see that parameters of this sort are fundamental to phonological structure we will inspect the way other dialects of English handle the velar nasal regularities. We will restrict ourselves to two more varieties of which one is found commonly in parts of the British Midlands (M) and the other is Scots (S). The two dialects differ fundamentally in the way they treat the voiced velar plosive in a sharing relation with the preceding nasal in that in M the velar is pronounced everywhere while in S it is pronounced nowhere (see Harris 1994:84-86). Thus all the words below are pronounced with [ŋg] in (parts of) the Midlands and with [ŋ] in Scots.

(7) a. *finger, angry, mango, Bangor, mongrel , bungalow,*
b. *wing, sing, bang, bring, hung, longs, longed, strongly, nothingness, kingship, wrongful*

The pronunciation of *finger* with [ŋg] as found in M unites this dialect with RP: similarly, the S version of the *wing* type of words with just [ŋ] is the same as in RP. The domain-final support for [g] in M and its absence domain-internally in S are clear distinguishing markers of the dialects. In terms of our *g-licensing* we can characterise the three dialects as having partially different parameter values for the two positions. This is schematically presented below.

***g***-LICENSING IN LINKED STRUCTURES

| | *domain-final* | *domain-internal* |
|---|---|---|
| RP | NO | YES |
| M | YES | YES |
| S | NO | NO |

We adopt here a view of phonological generalisations as resulting from *parametric variation* of certain elementary operations, which can be sensitive to the position in the domain. There is a fundamental difference between the parameter approach to sound regularities and the traditional way of describing them by means of arbitrary phonological rules. While covering the same facts, a rule-based description would say that in S the velar plosive is always deleted after the nasal, it is deleted domain-finally in RP and nothing would need to be said about M since there the plosive is maintained. In other words, the dialects would be seen to differ in the presence of a rule in one of them (S) or in the presence of a different version of the rule (RP). A description along these lines is, of course, a possibility but since rules by their very nature are arbitrary, a theory generating rules predicts situations which are unlikely or impossible to occur; one could just as well formulate a rule that deletes the velar domain-internally in RP and after a front vowel in M, to give just one example. Within the parameter-based approach one can envisage – in addition to the three dialectal arrangements just illustrated – one more possibility, namely setting the parameter YES for the

domain-final position and NO for the internal one – in such a dialect *long finger*, for example, would be pronounced [lɔŋg ˈfɪŋə]. I am not aware of the existence of such a dialect – if, indeed, no such dialect exists, then a principled account predicting the gap would be desirable. We will suggest such an interpretation below where we will also have more occasions to consider the advantages of the parameter approach over the rule-based one. We now turn to consider other sequences of a nasal plus a plosive.

The nasal preceding the labial plosives [p, b] must be homorganic with them, hence it is restricted to just [m]. In terms of the velar nasal analysis we can talk about the sharing of labiality. But the parallelism goes further than that since domain-internally both the voiced and voiceless plosives are present after a nasal, while domain finally only the voiceless one is possible. The facts which hold for RP and M are exemplified below.

(8) a. *bimbo* [ˈbɪmbou]
*Cumbria* [ˈkʌmbrɪə]
*bamboozle* [bæmˈbuːzl]
*lumber* [ˈlʌmbə]
*samba* [ˈsæmbə]
*rhombus* [ˈrɔmbəs]

b. *rampant* [ˈræmpənt]
*limpid* [ˈlɪmpɪd]
*dimple* [ˈdɪmpl]
*crumpet* [ˈkrʌmpɪt]

These examples closely parallel the *finger – anchor* cases where the velar nasal could be followed by either a voiced or a voiceless plosive domain-internally. Domain-finally the voiced plosive was not possible after a velar nasal in RP (recall the *wink – wing* contrast). The same is true about labial sequences where again we find the voiceless plosive but not the voiced one following the bilabial nasal.

(9) a. *stamp* [stæmp]
*lamp* [læmp]
*romp* [rɔmp]
*plump* [plʌmp]
*bump* [bʌmp]

b. *thumb* [θʌm]
*lamb* [læm]
*rhomb* [rɔm]
*bomb* [bɔm]
*crumb* [krʌm]

The parallelism in the behaviour of the velar and bilabial plosives can be brought out more clearly in the form of the following schematic summary where labials and velars are placed side by side.

| *domain-internally* | *domain-finally* |
|---|---|
| ŋg ŋk mb mp | ŋ ŋk m mp |
| *ŋ | *ŋg *mb |

The summary reveals that the voiced bilabial plosive in a sharing relation is licensed only when it appears domain-internally; domain-finally it is inaudible.



The *b-licensing* can be formulated in the form of two general parameters which closely follow the statement for *g-licensing*.

***b*-LICENSING IN LINKED STRUCTURES**

*Domain-internally:* YES
*Domain-finally:* NO

The generalisations concerning the *b-* and the *g-licensing* are independent of each other, a conclusion that is enforced by their different behaviour domain-finally in RP and in M. Recall that *g-licensing* selects the YES setting for both positions in the Midland dialect yielding the pronunciations like *sing* [sɪŋg] – while the parameter is set on NO for *b-licensing* domain-finally in the same dialect. The existence of different parametric options is further reinforced by the Scots handling of the corresponding sequences: as with the velar nasal, Scots disallows *b-licensing* both domain-internally and domain-finally, hence words like *number* are pronounced [nʌmər] there. The pronounceability of the two voiced plosives in our three dialects can be charted using the YES/NO licensing parameter for the two types of domain.

LICENSING IN LINKED STRUCTURES

| | *domain-final* | | *domain-internal* | |
|---|---|---|---|---|
| | g | b | g | b |
| RP | NO | NO | YES | YES |
| M | YES | NO | YES | YES |
| S | NO | NO | NO | NO |

The table reveals clearly that all three dialects agree in disallowing domain-final [mb]. This particular restriction requires more discussion as we have taken some shortcuts in the reasoning above.

When discussing the domain-final velar nasal we argued that the representation consisting of a nasal and a following velar plosive is implemented or realised as either [ŋk] or [ŋ], i.e. that the voiced velar plosive is not supported in that position. Its presence in the representation is seen indirectly in that it shares its velar place of articulation with the preceding nasal. That was the case with RP and S; this conclusion was strengthened by the facts of M, where the voiced plosive is licensed and hence realised also in the final position. Thus the velar nasal is invariably the result of velar sharing; that is why it is impossible between vowels as there would be no source for the velar articulation or initially as a nasal in English cannot be followed by any consonant whatsoever in that position, thus again precluding any velar sharing. In other words, as already noted by Sapir (see note 3 above) the impossibility of initial [ŋ] results from the same constraint that ultimately disallows initial *[ŋk, nd, mp] etc. The bilabial nasal

differs markedly from the velar nasal; it is the result of *b-sharing* in specified contexts, as reflected in the chart above, but it is also an independent segment which can be found in all positions within a domain, hence also domain-finally, e.g. *aim* [eim], *come* [kʌm], *comb* [koum], *tomb* [tu:m]. If this is the case, and if additionally all three dialects disallow the [mb] sequence domain-finally,[5] the question arises on what basis we assume that there is a sharing relation and failure to support [b] in words like *thumb, lamb* etc. Since spelling is generally held not to be directly relevant to phonology, we face an important theoretical and descriptive dilemma.

On the optimistic side let us note that there are instances of direct alternations which force the emergence of the voiced plosive in some cases.

(10) bomb [bɔm] – bombard [bɔmˈbɑ:d]
rhomb [rɔm] – rhombic [ˈrɔmbɪk]
crumb [krʌm] – crumble [krʌmbl]
iamb [ˈaiæm] – iambic [aiˈæmbɪk]

As noted above the presence of a suffix may but does not have to affect the complexity of the phonological domain structure. It is frequently the case that lexicalised forms contain non-productive, opaque affixes which blend with the morphological base into single phonological units or domains, e.g. *bombard, Thumbelina* [θʌmbəˈli:nə] (a character in Tom Thumb cartoons). This may give rise to occasional alternations as illustrated in (10) but these – in view of the fact that they belong to learned vocabulary and are quite rare – are a matter for the lexicon or morphophonology rather than phonology. Put simply, *bomb* may be entered phonologically without any final /b/ in roughly the same way as *drama* is entered without any final /t/, despite *bombard* and *dramatic* respectively. The unquestionable lexical relatedness of the words is no guarantor of the phonological identity of their parts. Should this be a reason to worry about the validity of the generalisations subsumed under segment-support parameters? The answer is no.

The generalisations we try to formulate should be looked upon not as instructions to change anything in the representations but rather as reflections of what the representations conform to. In this way they are constraints that the representations cannot violate; viewed in this way, the constraint stating that *b*-licensing is not available domain-finally is true for English irrespective of the number of forms which can be documented for the suppression of /b/ in the English lexicon, i.e. it is true no matter whether we want to represent *lamb* with or without a final plosive. One can imagine that speakers may differ in the representations they assign to individual items or that they change the representations as they become exposed to the orthographic norm etc.; arguably, it may only be the words which display alternations that contain a final plosive while all other words (*lamb, thumb* etc.) have been reinterpreted without it. What remains stable in this account is that domain-finally a *b*-sharer is inaudible, i.e. is not licensed in the representation.

[5] Pedants might object that pronouncing dictionaries (Jones 1997, Wells 1990) admit as variants words like *iamb, rhomb* with a final [b]. The 2nd edition of the OED lists over a dozen rare, learned or strongly foreign words for which it posits a pronunciation with final [b], e.g. *dithyramb, excamb, gamb, corymb, zimb*.



Finally let us look at a group of examples which involve alveolar consonants following homorganic nasals. As before, it is only the voiced plosive that can be suppressed and, what is more, this is attested in Scots only.[6] But the suppression is manifested with a vengeance as it is found both domain-internally and domain-finally. In other words, Scots disallows sequences of an alveolar nasal followed by an alveolar voiced plosive anywhere within the domain.[7] The words below are pronounced with [nd] in RP and M but with [n] in S.

(11) a. *mend, sound, tend, bind, fiend, fond*
b. *thunder, kindle, handle, Brendan, London*

It is very clear that S does not support [d] after a nasal while RP and M do. This can be formalised as *d-licensing* which we include into the chart established above for velarity and labiality.

(12) LICENSING IN LINKED STRUCTURES

| | *domain-final* | | | *domain-internal* | | |
|---|---|---|---|---|---|---|
| | g | b | d | g | b | d |
| RP | NO | NO | YES | YES | YES | YES |
| M | YES | NO | YES | YES | YES | YES |
| S | NO | NO | NO | NO | NO | NO |

Let us take stock of the questions we have asked and the answers we have tried to offer. What clearly transpires from the discussion thus far is that the velar nasal does not constitute a problem of its own. Rather we are dealing with the relations between a nasal and a following homorganic plosive. The problem of the velar nasal is a side issue of the licensing relation reflected in the sharing by voiced plosives of their place of articulation with the preceding nasal: depending on the dialect it is possible that the plosives will not be supported , i.e. licensed to be pronounced. When not licensed the plosives are silent although their phonological presence is manifested indirectly through the influence they exert on the

[6] It is worth-noting that [d] may be optionally suppressed in alveolar clusters also in RP, e.g. *friendly* [frenlɪ], *kindness* [kainnɪs] etc.

[7] It hardly needs stressing that there is no such thing as a uniform variety of Scots and what we present here is just one subsystem. Suppression of consonants is clearly a very strong tendency in the history of the language (or dialect), hence we must allow for some variability both historically and synchronically. For some discussion see Johnston (1977:101-2) and Jones (1977:326-8).

phonological environment, i.e. the place of articulation of the preceding nasal, and the absence of complex nuclei before non-coronal sequences. What also finds a natural account in our interpretation is the parallelism between voiced and voiceless combinations affecting labial and velar consonants, i.e. domain-internally we find both [mp, ŋk] and [mb, ŋg], while domain-finally only the former set is possible. The cross dialectal distinctions have been shown to be reducible to different parameter settings for the same licensing principles.

It might be objected that the chart in (12) above merely recapitulates the facts, and that a similar recapitulation would be possible if the concept of consonant licensing were to be replaced by the traditional term "deletion". While it is undoubtedly true that the chart captures the facts, it does more than this: it makes the fundamental claim that phonological regularities are parametric, sensitive to domains, and involve relations between consecutive skeletal positions. In the specific instance, dialects are shown to differ not so much in having different rules but rather in adopting different parameter settings for the same regularities. Furthermore, by handling the licensed plosives individually it is asserted that the three articulatory areas are independent, a conclusion fully confirmed by our data. In other words, it is perfectly possible for each of them to follow their own distinctive licensing pattern.[8] Whether we call it licensing or (non)-deletion depends on the potential of the theoretical framework we adopt: clearly notions such as deletion and insertion presuppose a derivational model, with underlying representations which can in various ways be modified. The non-derivational framework which we believe is better able to reflect the linguistic reality allows no such mechanisms. However, it must be admitted that there are stipulations in the non-derivational description as well and we would like to address them now. We can characterise the stipulations by asking three simple questions:

- why is it only the *voiced* plosives that require special licensing statements?
- what is so special about the domain-*final* position that distinguishes it from the internal one?
- why do labials, coronals, and velars require different licensing statements?

To try and provide at least partial answers to these questions as well as to try and demystify other puzzles besetting the nasals in English we need to make

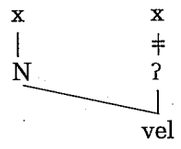
[8] In this we depart drastically from the classical generative view with its insistence on collapsing partially similar rules: note that the effacement of voiced plosives after a nasal in RP – in order to be "more highly valued" – would have to be collapsed as a noncoronal deletion. The drive to collapse whatever looks similar to something else produced numerous "abbreviatory devices" such as braces, brackets, angled brackets, superscripts, subscripts, variables etc. which have all, by degrees, been abandoned. It should be added that there were some dissenters even in the heyday of generativism: *rules typically apply to partial classes, and to entire classes only as the result of generalization* (Foley 1977:25).



clear some of the claims of Principles-and-Parameters or Government Phonology. As these have been extensively discussed and justified in the literature referred to above, we will restrict ourselves here to some of the conclusions that are directly relevant to our discussion, namely, to remarks on the internal organisation of phonological expressions, the structure of the syllable and in particular on the notion of word-final codas.

The first of our three questions asks about the reasons for the different behaviour of voiced and voiceless plosives. Recall that all three dialects show no differences when it comes to voiceless plosives, which are licensed both domain-internally and domain-finally, e.g.: *rampant – ramp, banter – mint, anchor – link*. In other words, domain-finally these plosives can sustain a sharing relation with a preceding nasal, while voiced plosives display various, dialect-specific restrictions on this relation. The fundamental asymmetry seems to involve then the voice opposition and it is here that we must look for an answer to the puzzle. Although we have been referring to voiced and voiceless plosives in the discussion above, this was nothing else but a simplified shortcut: it is well-known that voicing is not an adequate feature for the characterisation of the two kinds of consonants, since there are truly voiceless consonants in English, but truly voiced ones hardly exist at all. For this reason other terms have been used by both phoneticians and phonologists, such as *fortis/lenis,* or *tense/lax,* which are intended to reflect the basic imbalance of strength on the part of the two series of consonants. As it turns out, it is the lenis, or weak consonants in linked structures that in various ways fail to emerge phonetically in the final position, while the fortis or stronger consonants display no difficulty in doing so. In this way the consonant's ability to appear in a given position is connected with its strength.[9] In terms of Government Phonology the relative strength of the English fortis consonants is reflected directly in their elemental make-up in that they contain the element H (high tone) responsible for a cluster of properties associated with voicelessness, aspiration etc. (see Harris 1990, 1994:133 ff.) while the lenis consonants have no source specification. In English, then, obstruents are high-toned (= fortis) or toneless (= lenis). Thus it seems that we are able to make a systematic initial connection between the change – in this case the failure to license a melody – and the content of the melody. Our earlier representation of the licence failure in (6) can be recast as (13) where no voice specification is included.

(13)




[9] In a different framework, Harris-Northall (1990) takes susceptibility or resistance to deletion as a criterion of, respectively, the weakness and strength of consonants.

A central claim of the syllabic theory as developed in this framework admits at most binary branching constituents, i.e. branching onsets and branching rhymes. Whether this claim can be maintained fully is something of an open question with reference to rhymes: English is one of the languages which seem to admit branching nuclei within branching rhymes, i.e. a complex vowel can be followed by a coda consonant even if the nature of the consonantal coda is restricted almost exclusively to a coronal. Thus we find the complex rhymes [ein, aun, oul] etc. in words like *ancient, flounder, boulder* (for more discussion see Harris 1994:76 ff.). If the coda consonant following a branching rhyme must be coronal, then we have a straightforward account for the absence of the velar nasal in such super-heavy rhymes, i.e. for the impossibility of words like *[ˈflouŋgɪt], or *[ˈreiŋkə]: since the velar nasal is obviously not a coronal, it is barred from the coda position if it follows a branching nucleus.

Another distinctive feature of Government Phonology which sets it apart from most other frameworks is the view that there are no domain-final coda consonants – differently put, consonants with which words end are, in fact, onsets, and hence need to be licensed by a following nucleus. The arguments in favour of this position are quite complex and cannot be repeated here (see Kaye 1990, Harris 1994:66ff., Harris and Gussmann, this volume). This point of view has direct implications for our interpretation of the linked nasals in English. Firstly, it means that the final plosives are not final but rather they constitute final onsets which – as any onset – need to be licensed by a following nucleus; the nucleus itself is not manifested phonetically. Moreover, the velar nasal preceding the final onset may not follow a complex nucleus for the same reason as it cannot do so domain-internally: super-heavy rhymes in English admit coronals as codas only. Thus we do not need separate statements concerning the impossibility of a complex nucleus before a following velar nasal domain-internally, e.g. *[ˈreiŋkl], and domain-finally, e.g. *[reiŋk]; still less do we need a statement referring specifically to the necessary simplex nature of the nucleus before a velar nasal, since all we need to say is that the ban against ternary rhymes, i.e. cases where a branching nucleus is followed by a rhymal consonant, is relaxed in English only to the extent that a coronal is admitted into such codas. This interpretation is possible as long as the velar nasal results from linked structures, no matter whether the onset velar plosive is or is not manifested phonetically.[10] Additionally, the way the ban is executed in English provides a partial answer to the problem of evidence for the domain-final bilabial plosive: note that since the linked /b/ is not licensed domain-finally in any variety of English, we have no phonological arguments for or against a position that would place the consonant there in individual cases; in other words there is nothing in our system that would either

[10] In other words, if the velar nasal were an independent segment, not requiring a following plosive to support it, then it would appear in the onset position and could not influence the complexity of the preceding nucleus, i.e. it could not force it to be non-branching. This seems to be happening in Scots, if the data in Harris (1994:86) are representative.



necessitate or disallow final /b/ in, say, *lamb*. While this particular case still stands as a problem, we have positive evidence against such a final /b/ in words like *tomb* [tu:m], *comb* [koum], and *climb* [klaim]: no final onset /b/ appears in these words, as it would necessarily "push" the preceding bilabial nasal into the coda position of the super-heavy rhyme, in violation of the coronality requirement.

As we have seen, the view that word-final consonants are in fact onsets forces us to assume that the consonants are followed by nuclei – this falls out from the general requirement of the syllabic theory stating that onsets must be licensed by nuclei. Final nuclei which are empty, i.e. without any melody attached, remain phonetically silent. As nuclei, however, they perform their usual function of licensing preceding onsets, which brings us to suggest an answer to the second of our three questions above, namely what lies behind the bifurcation into domain-internal and domain-final effects. Domain-internally the plosives in question are licensed by nuclei with phonetic content (e.g. *finger, anchor*), while domain-finally the licensing is performed by empty nuclei (e.g. *wink, wing*). It is generally the case that the licensing potential of domain-final empty nuclei is different from that of full vowels; empty nuclei are for the most part weak(er) licensers.[11] This tallies rather neatly with the facts of English: domain-finally more consonants are denied licensing than domain-internally. We may then suggest that the disparate behaviour of the plosives is consistent with the different licensing properties of their licensers. It is possible to combine the answers to the two questions by saying that, in general, it is only weak consonants that may fail to emerge phonetically when licensed by final or weak empty nuclei – in other words, weak nuclei prove incapable of offering enough support to weak onsets, which consequently remain inaudible.[12]

Discussing the possible parameter settings for *g*-licensing above we noted that of the four theoretical possibilities one does not seem to be recorded, namely the arrangement where the plosive would be licensed domain-finally but not domain-internally, yielding *[lɔŋg ˈfɪŋə] as a possible pronunciation of *long finger*. This impossibility can now be seen to have a rational base in the licensing properties of nuclei: if domain-final nuclei are weaker licensors than domain-internal ones, then once a given regularity is found before a domain-final or weak licensor, it cannot be excluded before a stronger or internal one. The theoretical

[11] The licensing potential of empty nuclei has been studied by Charette (1990, 1992); she points out, among other things, that domain-final nuclei parametrically license final branching onsets, which results in word-final sequences such as /tr/ or /kl/ in languages such as Polish and French, as against their absence in English or Irish. See also Harris-Northall (1990:37ff.) for a discussion of diachronic developments within Spanish that crucially involve final empty nuclei (or the "absolute final position" in his terms).

[12] In our discussion we disregard the existence in English of so-called *syllabic resonants* as they do not affect the main argument: in *mumble, bundle, wrangle* the lateral must be preceded by a nucleus which may be sounded phonetically or not; in the latter case the lateral takes over: *Instead of a syllabic consonant it is always possible to pronounce a vowel [ə] plus an ordinary (non-syllabic) consonant* (Wells 1990:698).

possibility of the fourth parameter setting is, in fact, ruled out by the logic of the system: if a weak nucleus licenses a specific onset, a stronger one cannot be prevented from doing the same. Note that the impossibility of the parameter combination arrangement producing *[lɔŋg ˈfɪŋə] is not in any way necessarily true in advance. Within the traditional rule-based system on the other hand, a description could easily be formulated which would derive the impossible, or at least unrecorded situation (e.g.: *delete /g/ in /ŋg/ before a vowel*). The fact that the principle-based model is incapable of generating such a combination can be viewed as an additional argument in its favour.

The third question is much more problematic and our answer must be appropriately tentative. Recall that of the three dialect areas we have considered it is the Scots pattern that is most radical in that linked voiced plosives, if we continue to use this inadequate term, are not licensed anywhere, either domain-internally or domain-finally. Of course one could say that the Scots plosives which enter into a sharing relation are so weak that neither strong nor weak licensers can support them; alternatively, one could say that the licensing of plosives in a sharing relation with a preceding nasal is a parameter which in Scots is set for OFF. In this way the Scottish situation might be described without involving the concept of consonantal strength. This we cannot do with respect to RP and M: domain-finally they agree in failing to license the bilabial plosive, which might thus be called the weakest consonant, and in licensing the alveolar or the strongest plosive, but they differ in their treatment of the velar stop. An option which suggests itself is to view the velar as stronger in M than in RP, with resulting different strength hierarchies for different dialects (and languages).[13]

This brings us to an evaluation of the notion of strength itself. Although not a new concept by any means, its place within a coherent theory remains yet to be worked out; in the past it has been applied in very different ways and has, as a result, met with mixed response (cf. Zabrocki 1951, Bańczerowski 1969, Sadalska 1976, Foley 1977, Lass 1984:177ff., Anderson and Ewen 1987:229ff., Harris-Northal 1990, Goblirsch 1994, Ladefoged and Madieson 1996:95ff). The concept has not been recognised as a formal notion within GP[14] where the complexity of segments is directly proportional to the number of elements that make them up. Since voiceless plosives in English are more complex than voiced ones, a question might be asked whether the strength of a segment can be identified with its complexity, and in this way the concept of strength could be done away with. At

[13] This was originally suggested by Foley (1977:48-52) who claimed, for instance, that labials and dentals have different strength in Germanic and Romance. This conclusion is inconsistent with his universalist approach to strength hierarchies, as noted by Lass (1984:183). Compare also the following statement from Harris-Northall (1990:29): *Strength hierarchies, however, do not have an absolute value across the board in any language: the phonological strength of a segment depends not only on its intrinsic properties, but also on its relationship with other, surrounding segments.*

[14] *Charm* as used in the early stages of the development of the model (Kaye *et al.* 1985), and subsequently discarded bears certain similarities to it.



the present stage of research such an idea must be greeted with open-minded scepticism. Recall that segmental complexity is fundamentally a realistic notion as it refers to the number of monovalent elements, each with its own "autonomous interpretation" (Harris and Lindsey 1995:34 ff.), found within a segment. If segments are combinations of up to four or perhaps five elements, then it is practically impossible to encode the strength distinctions required by the phonology into complexity differences. In our cases different elemental structures would have to be assigned to the plosives /b, d, g/ although all these consonants require the element for stopness, place, and presumably noise. Likewise it is difficult to imagine /g/ as having a different elemental composition in each of the three dialects, something that is required by its phonological behaviour. These considerations are sufficient to show that complexity on its own is not enough[15] and it needs to be supplemented by something like strength. That the two notions are not interchangeable follows from the observation that while the more complex expressions (e.g. voiceless plosives) are stronger than the less complex ones (voiced plosives), expressions of equal complexity (e.g. different voiced plosives) display variations of strength; thus, complexity and strength have to remain distinct notions. The strength of segments cannot be read off from their acoustic or articulatory signatures but can be ascertained primarily through the study of distributional regularities. The linked nasals in English reveal a distinct pattern of strength hierarchy; as we will see below this pattern is confirmed by other phonological facts of the language. First let us note some of the conclusions we have reached so far:

- a difference in strength lies behind the basic audibility bifurcation of plosives in linked structures;
- the relative strength of the following nuclei lies behind the different behaviour of domain-internal and domain-final consonants;
- presumably, the strength of individual consonants lies behind their idiosyncratic licensing requirements.

Another problem we would like to return to with reference to the proposed interpretation of the post-nasal plosives relates to phonological domain structure. It has been claimed that the licensing – or its failure – of the voiced plosives crucially depends on their position within domains, or more precisely, on the position of the nuclei which license their onsets. However, as mentioned at the outset, the domain structure of linguistic forms is not something that can be

[15] More precisely: it is not enough at the present stage of research. One can imagine various ways of enriching the element theory to make it more amenable to the phonological reality; it might be claimed, for example, that not all elements contribute in equal measure to the complexity of an expression. A revision along these lines would require a departure from the strictly realistic stance, hence even if the notion of strength could be incorporated into the theory of elements, it would be a very different theory from what it is today.

determined mechanically; in particular it cannot be identified with the more familiar – if no less controversial[16] – division of forms into morphemes. It goes without saying that the majority of domain boundaries coincide with morpheme boundaries but the statement is inadequate in both ways since there are morpheme boundaries without any corresponding phonological domain boundaries (Kaye 1995), and, conversely, we may have to recognise phonological domain boundaries with little or no morphological justification.

A clear case where morphological boundaries are not accompanied by domain structure comes from the exceptional behaviour of the comparative and superlative degree suffixes of the three adjectives: *young, strong, long*. These suffixes force the emergence of the velar plosive so that we get [ŋg] before *-er, -est* in these adjectives, which suggests that they are attached directly to the stems without any intervening boundaries.[17] This would have to be regarded as a lexical peculiarity of the adjectives in question since elsewhere the suffixes exert no such influence: *wrong* and *cunning* appear to have the plain velar nasal in *wronger, cunningest*. As the absence of domain structure with unquestionably morphologically complex forms is commonplace (Kaye 1995), the present case need not worry us.[18]

There is a number of words where it would be morphologically very difficult or downright impossible to justify domain structure and which nonetheless display an internal velar nasal. Some of these items are proper names such as *Birmingham* [ˈbɜ:mɪŋəm], *Dingley* [ˈdɪŋlɪ] or *Wellington* [ˈwelɪŋtən] where pseudo-morphemes *-ham, -ley, -ton* are not implausible, at least on historical grounds. Others, such as *tungsten, angstrom, dinghy, hangar* admit two types of pronunciation, with and without a velar plosive following the nasal, i.e. [ˈtʌŋ(k)stən, ˈæŋ(k)strəm, ˈdɪŋ(g)ɪ, ˈhæŋ(g)ə]; the variant with the velar plosive requires no comment, as this is precisely what we would expect. The variants [ˈtʌŋstən, ˈæŋstrəm, ˈdɪŋɪ, ˈhæŋə] seem to call for domain structure, a step that does not require too much adjustment; in the case of the first two words we are dealing with longer words whose second parts could be separate morphemes, i.e. [stən] and [strəm] have the phonological structure of regular English morphemes (such as *stone, strum*) subjected to vowel reduction. The words *hangar, dingy* contain the vowels [ə] and [ɪ] which frequently function as morphemes (e.g.: *hanger, Johnny*), hence an enforced morphological division is not an unlikely possibility. A case for *false segmentation* and the resulting 'pseudo-morphemes' has frequently been made in synchronic studies (Lass 1984:33-34), while the reality of the phenomenon is amply attested in the diachronic exemplification of folk etymology. The degree to which such false segmentation can take root cannot be better illustrated than by the popular name of the protagonist of this study, viz. *agma*. The OED supplies two pronunciation variants for this word, namely the relatively uninteresting [ˈægmə] and the challenging [ˈæŋmə]; the latter can be fitted into our account only if we assume that [æŋ] is a (pseudo-)morpheme whose final voiced plosive is not licensed domain-finally.

[16] Recall in this context the various problems surrounding so-called *cranberry morphemes;* for a review see Spencer (1991:40, 86).

[17] The examples sometimes regarded as a minimal pair, namely the adjective *longer* with [ŋg] and the de-verbal noun *longer* with just [ŋ] are then interpreted as resulting from different domain structures: the noun has an internal domain comprising the verb *long* hence the final velar plosive is not licensed. The adjective constituting a single domain is not different from words like *finger, anger*.

[18] A good example are the *-ity* derivatives which form one domain with the basic adjectives and hence, from the point of view of stress-placement behave as monomorphemic forms – compare *ˈstupid – stuˈpidity* vs. *Aˈmerica, ˈcinema*.



The strength cline developed on the basis of the nasal-plosive sequences will now be shown to apply in other areas of English. Consider first another instance of the coda-onset sequence, where the coda is the lateral and the onset is a plosive; of relevance will be the following sequences domain-internally and domain-finally: /lt, ld, lp, lb, lk, lg/.

| (14) | *domain-final* | *domain-internal* |
|---|---|---|
| /lp/ | help, gulp | culprit, palpable |
| /lb/ | bulb (——?) | elbow, album |
| /lt/ | asphalt, difficult | welter, filter |
| /ld/ | build, field | boulder, shoulder |
| /lk/ | bulk, silk | falcon, calculate |
| /lg/ | ——— | vulgar, pilgrim |

This list brings out a few striking properties: the lateral can be followed by a voiceless plosive both domain-internally and domain-finally in exactly the same way as the nasal can be followed by a voiceless plosive. On the other hand there is the total non-existence in any variety of English of words ending in /lg/ and an extremely restricted lexical attestation of items in /lb/, where the word *bulb* seems to be the only instance in common use;[19] domain-internally there are no relevant restrictions affecting these clusters. The significance of these observations cannot be overstated: we would hope to provide a systematic answer as to why English cannot have words ending in [lg] and – with one exception – words in [lb], when words ending in [lk] and [lp] are widespread. Similarly there are no difficulties about having alveolar clusters in both types of domains. For RP a comparison of these sequences with the nasal plus plosive is highly instructive as the restrictions are identical even to the extent that the bilabial plosive is admitted domain-finally in rare or learned vocabulary (see notes 5 and 19). The total impossibility of /lg/ parallels closely the total impossibility of /ŋg/, as does

[19] The 2nd edition of the Oxford English Dictionary lists, in addition to *bulb,* four other words: *alb, galbe, ilb* and *stilb*. In this context compare the remarks in note 5 above.

[mb] the ungrammaticality of that of [lb]; on the other hand the appearance of [ld] is just as unconstrained as is [nd]. It is difficult to view these parallelisms as accidental – rather they suggest that whatever is responsible for one type of restriction should also be brought to bear on the other phenomena. We suggested above that a plosive in a sharing relation with the preceding nasal will not be pronounced if it is not strong enough on its own or if its licenser is not strong enough. Sequences of a lateral and plosive are not required to be homorganic – they just happen to be so in the case of alveolars – but still combinations of a rhymal complement and a following onset are subject to very strict conditions as far as their melodic content is concerned (see Kaye, Lowenstamm, and Vergnaud 1990:210ff., Harris 1994:66ff.).They form governing domains where the more complex consonant on the right governs the less or equally complex one on the left; the governing relations between consonants must – as always – be licensed by nuclei. Viewed in this way the nasal plus plosive and the lateral plus plosive sequences are both governing domains where the plosive governs the preceding rhymal complement. It is thus to be expected that both types can be subject to similar or identical licensing requirements. In the case of RP the match is indeed identical: the governing voiced velar is categorically not tolerated when its licenser happens to be an empty domain-final nucleus; the voiced bilabial is likewise not licensed with minor exceptions; in all other contexts plosives are licensed to be pronounced. In simple prose this means that we do not get [ŋg, mb] in the same contexts and for the same reasons that we do not get [lg, lb].[20] Within the outline of a possible solution we have presented above these facts are due to /b/ and /g/ being interpreted as weak consonants, too weak to be licensed by a weak licenser , i.e. an empty final nucleus. The remaining plosives /t, d, p, k/ are sufficiently strong themselves not to require more licensing than that afforded by weak final licensers. It must be stressed that the ability to govern results primarily from the melodic representation of a segment in accordance with the basic tenets of the model. Thus we distinguish between a segment's governing potential and its pronounceability: the latter results, as we have just seen, from the strength of the consonant and its vocalic licenser. This means in concrete terms that the final velar plosive of, say, *king* governs the preceding nasal even though it is not itself licensed to be pronounced. The same strength considerations account for the absence in English of words like *[vʌlg] (as against [vʌlgə]); in this case, however, there is no evidence of the velar governing the preceding lateral domain-finally since no alternations of the type *{[vʌl] – [vʌlgənt]} appear on record. The interpretation depends crucially on certain views of syllable structure, segmental strength and licensing relations. Our primary initial objective of interpreting nasal combinations in English has brought into focus facts previously unnoticed which jointly derive from what must be fairly basic principles of sound organisation.

[20] The situation in M and S should be investigated closely as the data are not clear. There is strong evidence for part of S of the suppression of the alveolar voiced plosive after /l/ (see Johnston 1977:101).



The discussion of the sonorant coda followed by an obstruent onset has omitted so far the third sonorant, namely /r/. This will now be rectified even though our data can obviously only come from the rhotic dialects of English. We bypass here the specific ways in which rhoticity is realised (a full segment, an r-coloured vowel, different vowel qualities); what is relevant is that the /r/ segment is in some way present in the representation. As with the other coda sonorants, /r/ can be followed by a strong (voiceless) plosive both domain-internally and domain-finally, e.g. *ca*[rp] – *to*[rp]*or*; *sma*[rt] – *ma*[rt]*yr*; *ba*[rk] – *me*[rk]*in*. However, examples are not difficult to come by showing voiced plosives in the onset position as well.

(15)

| | *domain-finally* | *domain-internally* |
|---|---|---|
| /rb/ | curb, barb, orb | marble, warble, urban |
| /rd/ | bard, ward, word | ardent, sordid, hurdy-gurdy |
| /rg/ | morgue, iceberg, erg | purgatory, bargain, argue |

Admittedly, there are relatively few convincing examples involving the final /rg/, but compared to the sonorant /l/, it must be conceded that /r/ is more accommodating: recall that final /lg/ is totally impossible, and /lb/ only marginally so. Likewise the nasal, dialectal variation notwithstanding, displays major gaps in its combinatorial potential. So far we have attributed these gaps to the strength of the governing onset and the type of support afforded by the nucleus licensing the onset. Here we see a novel factor since the weak consonants /b, g/, even when licensed by a weak final nucleus, remain themselves licensed and are pronounced. It thus seems that it is not only the head of the governing relation, its inherent strength and the strength of its nuclear licenser that play a part in the pronounceability of the onset consonant, but also the nature of the rhymal governee. If the approximant were to be viewed as the weakest of English sonorants, then we might say that the governing relation the onset contracts with the rhymal complement does not deplete its strength to the same extent that the preceding nasal or lateral do. For this reason it is audible. The factors, then, affecting the pronounceability of an onset governing a rhymal complement are its inherent strength, the strength of the nucleus which licenses the onset, and, finally, the strength of the governee. The general picture is clear: the stronger the onset and its nucleus, and the weaker the rhymal complement, the greater the likelihood of the onset being pronounced.

The view that /r/ is the weakest sonorant in English is an interesting result as, historically speaking, /r/ has indeed shown signs of being a very weak segment, as documented by the emergence of non-rhotic dialects. In these dialects /r/ has been restricted to the onset position before a pronounced vowel and effaced elsewhere. Thus the weakness of this sonorant that is seen today in its being tolerated as a rhymal complement in an unrestricted fashion in some dialects tallies with its historical weakness and the concomitant tendency to weaken itself out of existence in other varieties of the language.

This does not exhaust the mysterious properties which began to emerge in our discussion of nasal clusters, but which, as we have seen, are more embracing and involve sonorant plus obstruent domains in general. Referring to the group of nasal and obstruent clusters licensed domain-finally Szigetvári (1994:193) made the intriguing observation that /mp/ and /ŋk/ *occur exclusively in monosyllabic words, i.e. after a stressed vowel*. To avoid the interesting but tangential discussion as to what – given degrees of stress – counts as a stressed vowel, we shall adopt a somewhat simpler but uncontroversial position that the schwa vowel is prototypically unstressed in English; hence in the following discussion we will restrict ourselves to sequences of [ə] plus following consonants. With this notion in mind Szigetvári's observation must be deemed basically correct:[21] indeed, there are no words in English ending in *[əmp] or *[əŋk]. This observation, however, does not cover all the relevant facts; trivially, there are no words ending in *[əŋ] – this we have learned to expect as restrictions holding for final [ŋk] also hold for [ŋ]. Completely unsurprising in view of the impossibility of final [mb] is the absence of *[əmb]. What appears unrestricted is the presence of the nasal in alveolar clusters after schwa: we find [ənt] in *servant, rodent, dormant, potent, ancient* and [ənd] in *second, jocund, husband, diamond, errand* etc. The total absence of non-alveolar clusters in this context is puzzling as there is no obvious reason why a preceding vowel should determine the nature of the following consonant cluster or vice versa. In other words, given the existence of words like *evident* [ˈevɪdənt] and *rodent* [ˈroudənt] we would expect to find items like **evidenk* [ˈevɪdəŋk], **evidemp* [ˈevɪdəmp], or *[ˈlækəŋk], *[ˈbouləŋ], a expectation which is not borne out by the facts of the language. An initial hypothesis could connect the irregularities with the claim that an unstressed rhyme, i.e. one containing the vowel schwa, cannot branch yielding a final CC cluster because it has to be light. This hypothesis has to be rejected out of hand: the existing alveolar clusters in words like *servant, second* unambiguously disprove the stress-to-weight connection. As long as gimmicky ploys such as extrametricality are not tolerated within Government Phonology, unstressed rhymes must be allowed to branch in a language such as English; restrictions on the melodic content of such branching rhymes must be sought elsewhere. Before we put forward some tentative suggestions, let us inspect data involving other sonorant plus obstruent sequences in the context after the reduced vowel.

Of the possible lateral plus obstruent final sequences [lp, (lb?), lt, ld, lk] it is again only the alveolar ones that admit a preceding schwa: *difficult, Tybalt, herald, cuckold* while *[əlp, əlb, əlk] are all ruled out.

The approximant, which as we have seen is relatively unconstrained in its combinability with the following onset obstruent in rhotic dialects, supplies the r-colour to the preceding schwa and thus they jointly emerge as [ə˞] before a coronal. Hence we find words like *effort, yoghurt, comfort, Gilbert* with final [ə˞t]

[21] It seems entirely correct in insisting on the stressedness of the vowel preceding the cluster; it is less correct when it claims that such clusters appear in monosyllabic words only – *gazump, heffalump, debunk* are clearly not monosyllabic.



and *custard, leopard, milliard, hazard* with [ə˞d] but no words with *[ə˞p, ə˞b, ə˞g, ə˞k].[22]

Let us stop to take stock of some of the observations. Initially we tried to find reasons for the impossibility of certain combinations domain-finally (i.e. [ŋg, mb, lg]). What we have seen just now is that within the licensed sequences there are further restrictions which bar some of them from occurring after a reduced vowel; these we can tabulate as follows.

| | *nasal* | *lateral* | *approximant* |
|---|---|---|---|
| *labial* | *əmp | *əlp *əlb | *ə˞p *ə˞b |
| *coronal* | ənt ənd | əlt əld | ə˞t ə˞d |
| *velar* | *əŋk *əŋ | *əlk | *ə˞k *ə˞g |

Let us be clear about the meaning of these asterisked combinations: they do not include impossible domain-final *consonant* sequences – quite conversely they are all allowed in the language as long as some other vowel precedes them (e.g. *hemp, help, link, silk* etc.). Thus while the sonorant plus obstruent rhyme-onset sequences are licensed by a domain-final empty nucleus, this licensing is – on its own – insufficient everywhere except in the coronal series. To be fully licensed such sequences require a non-reduced vowel to precede the cluster or, in slightly more technical terms, the rhymal sonorant needs to be licensed by a nucleus which is a full vowel. Obviously there is no direct way in which the full nucleus of, say, *bulk* [bʌlk], could influence the plosive /k/ in the following onset . It does, however, license its own rhymal complement in accordance with the general structure of the organisation of constituents (Harris 1994:167). The facts of English appear to suggest that a rhymal complement calls for a full vowel as a licenser when the onset which governs it is a weak consonant. The distinction between a full and a reduced vowel we have been using so far is a shortcut for a vowel with full or depleted licensing charge, along the lines described in Harris (1997). A vowel with a depleted licensing charge, i.e. the reduced vowel, cannot support a rhymal complement which is simultaneously not governed by a strong consonant. In sum, then, the appearance of a sonorant plus plosive cluster is determined by the nature of the preceding and following nucleus, and the strength of the participating consonants. Since an empty nucleus is weaker than a filled one, and furthermore, a non-reduced vowel is stronger than schwa, we may generally say that what is involved in the licensing of a plosive is the combined strength of all the participating objects. This can be seen at its most extreme in the rhotic pronunciation of words like *barter* where a strong nucleus precedes and a non-empty one follows a strong onset governing a weak rhymal complement. Weaker combinations are allowed, as we have seen, up to a point, but there is a bottom line which involves the necessary presence of a preceding non-reduced vowel with non-coronals. The non-reduced vowel is one whose licensing charge has not been depleted, which in effect most often denotes a stressed vowel.

[22] One exception to note is *bulwark* with final [ə˞k].

As a final by-product of our analysis we would like to point to certain aspects of the well-known phenomenon of vowel reduction in English whereby non-high vowels, when unstressed, undergo a change to schwa. This regularity results in numerous alternations such as those found in the first syllables of *validity, Bostonian, telegraphy* (cf. *valid, Boston, telegraph*) and is behind the frequent occurrence of schwa in the pre-stressed, word initial position, e.g. *adroit, akimbo, allow, about, obstruct, obtain, oppress, o'clock, agree* etc. This pattern is predominantly thwarted when the initial vowel is followed by a sonorant plus plosive sequence: *ambition, ambiguous, ambassador* are pronounced with initial [æm] rather than [əm]; *anxiety, angora, Ancona* with [æŋ] and not [əŋ]; *alpaca, Alberta, albino* with [æl] instead of the expected (?) [əl]. Furthermore, non-reduction seems to be the preferred option even before alveolar clusters, e.g. *anterior, anticipate, Andronicus* with [æn] and not [ən]. The facts are not as clear-cut here as they are with reference to the final position but the absence of schwa in *ambition, anxiety* etc. remains a challenge if we have it in *obstruct, obtain*. If we follow the suggestion that a rhymal complement should be licensed by a full vowel, i.e. by a vowel not depleted of its licensing charge, then the absence of words ending in [əmp, əŋk, əlk] etc. is manifested initially in the absence of vowel reduction before the same consonantal clusters, a regularity which initially is even strengthened and extended to alveolar clusters. Both regularities implement the preferred tendency for rhymal complements to be licensed by full vowels. In this way our concern with agma and other nasal consonants has brought us, rather unexpectedly, to invoke questions of vowel reduction and its failure. Vowel reduction is a major and extremely complex phonological regularity whose surface we have not even scratched here – it must remain a descriptive challenge for further studies.

## Conclusion

The phonology of English, one of the most widely studied languages, remains to a large extent a mystery. Partly this is due to the rapidly changing views on what counts as a phonological regularity, how such regularities can be integrated into a phonological system etc. All too often, new proposals are content with concluding that certain well-known facts can be fitted into the new theoretical straitjacket. While appearing relevant to the development of theoretical models, such procedures seldom enrich our understanding of the phonology of a given language and in the final account prove counterproductive for the theory as well. In this study we adopted the standard procedure as the point of departure: given a set of some well-known properties of the English velar nasal we have tried to interpret them in terms of a specific non-derivational framework. This has led us to discover connections which had passed unnoticed or which had not been integrated into a coherent interpretation of English phonology. These primarily include the restrictions on the combination of sonorants with plosives in different positions within the phonological domain, and the role of the surrounding vowels in their distribution. It seems that no matter what modifications are necessary for the interpretation proposed here, future studies of English will have to come to terms with the impossibility of such sequences as word-final [lg] or word initial [əmb], among other things.



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# Polish consonantal sequences: a phonological testing ground

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## 1. Introduction

Polish consonantal sequences exert an almost magic fascination for the practising phonologist in that they appear to defy most of the assumptions (s)he has been accustomed to hold dear. Faced with initial sequences such as [vzgl]*ędny* 'relative', [bzd]*ura* 'nonsense', [dždž]*ownica* 'earthworm', [fskš]*eszenie* 'resurrection' or [źdźbw]*o* 'blade of grass' one can abandon hope of ever determining an underlying pattern which would conform to principles capable of being applied anywhere outside Polish. Indeed, part of the Polish linguistic tradition appears to have resigned itself to supplying more or less exhaustive lists of consonantal combinations. Thus Sawicka (1974) documents over three hundred two-consonant strings, well over a hundred three-consonant sequences, and about twenty four-consonant combinations.

A competing tradition attempts to devise ways to deal with the odd-looking combinations. Here Kuryłowicz's (1952) study occupies a special position as it approaches the issue in its totality and provides an explicit account. Kuryłowicz's main claim is that Polish initial consonant sequences may be complex structures, i.e. it is emphatically *not* the case that whatever appears word initially up to the first vowel is a permissible onset. Quite conversely, the initial position of the word may be occupied by a sequence of two independent onsets which must meet specified conditions. Using today's terminology we could say that a non-branching onset may contain practically any consonant while a branching onset must conform to sonority requirements of the familiar type (*Sonority Sequencing Generalisation*). A few additional provisos have to be made: the spirant [s] and its congeners may be appended to an onset to create some of the three-consonant clusters. Kuryłowicz's interpretation has to resort to a degree of abstractness so that the phonetic spirants [š/ž] in some positions are analysed as the phonological sonorant /r´/; the same holds for [f/v] which are derived from underlying /w/. By and large, however, the model is remarkably neat since initial sequences emerge as the mere mechanical result of combining totally unremarkable onsets. Thus the five examples above, which were intended to illustrate the unpredictable complexity of Polish initial onsets, turn out on this analysis to result from combinations of non-branching and branching onsets. [vzgl] results from the non-branching onset /w/ followed by the branching onset preceded by an s-type consonant /zgl/ (similarly [bzd] = /b+zd/, [fskš] = /w+skr/); the se-