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THE HARDENING OF NASALIZED GLIDES IN BOLOGNESE

1.0 *Velar Nasal Epenthesis in Bolognese.*

Mainoldi (1967), Coco (1970) and Saunders (1979), amongst others who describe the phonology of the dialect of Bologna, refer to a process of velar nasal 'epenthesis' before intervocalic historical /n/, e.g. LUNA > [ˈlɔŋna] *moon*, MATUTINA > [maˈtɛŋna] *morning*.¹

Conditions of intervocalic epenthesis in Bolognese are restricted: 'epenthetic' [ŋ] is not permitted before historical /NN/, /m/ or /NJ/ in any circumstance, nor before intervocalic /n/ in historical proparoxytones, cf. (1a).²

(1)a.	PINNA	>	[ˈpanna]	<i>fin</i>
	LIMA	>	[ˈlemma]	<i>blade</i>
	*VINJA	>	[ˈveŋna]	<i>vine</i>
	'ANIMA	>	[ˈa:nma]	<i>soul</i>
☐☐.	LANA	>	[ˈlɛ:na]	<i>wool</i>

An additional restriction operates to block the appearance of intervocalic epenthesis after historical tonic /a/ in Bolognese, cf. (1b).³ The reasons for such a constraint on epenthesis in Bolognese do not appear to be immediately obvious, but are discussed in greater detail below.

In addition to intervocalic ŋ-epenthesis, one also finds in Bolognese a process of velar nasal epenthesis in stressed and unstressed syllable-final position, after loss of earlier /n/, e.g. LINUM > /lin/ > [leŋ], MONTE > [maŋt], BONU > [baŋ], TANTU > /tant/ > [tã:t] > [tæŋt], and IMPORTANTE > [i:porˈtã:t] > [iŋporˈtæŋt]. However, in this context, as is evident from the data given, restrictions do not apply to epenthesis after historical /a/. The divergent behaviour of /a/ in open and closed syllables will be considered in greater detail below.

According to Saunders (1979), all cases of velar epenthesis in Bolognese are vestiges of successive processes of nasalization and "denasalization", as in (2):

- (2) VINU > vin > vīn > vī: > vē: > vēŋ > veŋ
LUNA > luna > lū:na > lō:na > loŋna > loŋna
(Saunders 1979:1147)

Whilst many aspects of Saunderson's ordering of historical processes seen in (1), e.g. vowel lengthening, are arguable, three crucial elements, one of which Saunders (1979) alludes to herself, have been ignored.

The appearance of ŋ-epenthesis only before historical /n/ is the result of the restricted historical application of a language-specific rule of vowel nasalization that applied only before historical simple /n/ and before no other nasals, e.g. /m/, /ɲ/ (< NJ), and /n/ (< /nn/).

Second, the absence of intervocalic epenthesis after historical /a/ is especially peculiar, given the claim by Saunders (1979:1141) that low vowels are likely to have been nasalized first. Finally, Saunders (1979) makes no reference to the historical diphthongization of non-low vowels before nasals, which survives in traditional Bolognese orthography, e.g. "louna" *moon* "vein" *wine*, "mount" *mountain*, but "lana/lāna" *wool*, "can/cān" *dog*. Coco

(1970:XXXIII;nn.9,31) found diphthongization before historical simple /n/ to be an archaic feature almost completely lost in the modern dialect, e.g. [lõw̃na] > [loŋna] *moon*.⁴ On the basis, therefore, of orthographic evidence, all vowels, except /a/ appear to have been diphthongized before historical /n/, as in (3):

- (3) /i/ > [ej] /u/ > [ow]
 /e, ε/ > [æj] (> [a]) /o, ɔ/ > [ɔw] (> [a])
 but /a/ > [æ] > [ε]?

Coco (1970) suggests that ŋ is inserted after the nasalized glide, after which the nasalized glide itself was deleted. Coco's account has obvious advantages over Saunders', since it incorporates historical diphthongization, for which we have adequate evidence. In addition, the absence of intervocalic 'epenthesis' after /a/ in forms like LANA > [lɛ:na] can be easily accounted for by the suggestion that /a/, unlike the rest of the vowel system, remained monophthongal before intervocalic /n/. I shall accept this account of the aberrant behaviour of /a/ as an initial hypothesis, but will reconsider it and ultimately reject it at a later point.

Despite the advantages inherent to Coco's account, it remains unnecessarily complicated. One can eliminate both insertion and deletion rules proposed by Coco (1970) by hypothesizing that at some point after diphthongization nasalized off-glides [w̃, j̃] were, themselves, subsequently hardened to [ŋ], as in (4i-ii):

- (4i) a. LUNA
 b. > luuna V > V: /_ \$CV
 c. > lūūna V: > Ṽ: /_ n
 d. > lūw̃na ũ > w̃ /ũ_ n
 e. > lōw̃na ũ > ɔ̃ /_ w̃
 f. > loŋna w̃ > ŋ /_ n

- (4ii) a. VINU
 b. > viinu V > V: /_ \$
 c. > vīīnu V: > Ṽ: /_ n
 d. > vīīn V > ɔ̃ /_ #
 e. > vējn ī > ɛ̃ /_ j̃
 f. > vēj̃⁵ n > ɔ̃ /j̃_
 g. > veŋ j̃ > ŋ /_ \$

2.0 Cross-linguistic and Phonetic Evidence for Glide Hardening

The appearance of 'epenthetic' [ŋ] before historical intervocalic /n/ is not restricted to Bolognese. Similar processes of epenthesis of [ŋ] before historical intervocalic /n/ are recorded in other areas of Northern Italy, and in many Franco-Provencal dialects of Switzerland, cf AIS LANA, Andersen (1988).⁶ 'Epenthetic' [ŋ] in historically closed syllables is even more widespread in these and other areas of Romània, cf. AIS PANE.

Cross-linguistic evidence supports the hypothesis that both types of so-called 'epenthetic' [ŋ] are in fact two parts of the one process of nasalized glide hardening. Parry (1984) notes synchronic alternation in the Ligurian dialect of Cairo Montenotte between diphthongal and 'epenthetic' forms, e.g. LANA > [lajna]/[laŋna], LUNA > [lyjna]/[lyŋna]. Nicoli (1976) describes the diphthongization of word-final nasal vowels in popular Vogherese, e.g. BENE >

[bē:] > [běj], BONU > [bō:] > [bōw̃]. However, he also makes the significant observation that in the more educated variety of the same dialect, nasalized glides are consonantized: [běj] > [beŋ], [bōw̃] > [boŋ]. Similarly, Standard Portuguese final [w̃] corresponds to [ŋ] in closely related Macanese Portuguese and Galician, e.g. Std. Port. [pãw̃] *bread* > [paŋ]. In Lusitanian Portuguese all final nasal vowels may in fact surface with a homorganic nasalized off-glide which can then alternate with a very lightly articulated [ŋ], cf. Mattoso Camara (1972:51), and Morais-Barbosa (1962:692). In Charleroi French, de Reuse (1985:82) reports free variation in word-final position between nasalized off-glide [j̃] and [ŋ̃], e.g. in Charleroi French, e.g. *gamin* [gaměj̃], but also sometimes [gaměŋ̃]. Rossi (1976:481) derives [-ajna] equally from [-awna] and [-aŋna] in the Lunigianese dialect of Zeri, given variation such as [laŋna]/[lajna]/[lawna].

Analogous to hardening of nasalized glides in Bolognese and elsewhere is the consonantization of oral glides [w, j] in Romantsch falling diphthongs, to velar [g] (and secondary devoiced [k]), e.g. COR > [kowr] > [kogr] > [kokr], ROTA > [rowda] > [rogda], RIVA > [rijva] > [rigva], VIVU > [vijf] > [vikf], cf. Kamprath (1985) and Haiman (1988). Historical weakening also points to some relationship between labio-velar and palatal on the one hand and velar on the other in many parts of Romània, cf. GATTU > S.Italian [jattu]/[wattu].

Phonetic explanations for alternation between [w̃]/[j̃] and [ŋ] are not difficult to find. [ŋ] and [w̃] have similar oral cavity settings, as a result of shared place features [+high], and [+back]. Ohala and Lorentz (1978:140-143) argue that this similarity in configuration, resulting in shared acoustic properties, largely explains the cross-linguistic pattern in which [w] normally appears or acts as [ŋ] when changed into a non-continuant nasal or when [w] determines the place of articulation of adjacent nasal segments.

Unlike [w̃], [j̃] shares only one place feature with [ŋ], i.e. [+high].⁷ Explanation for alternation between [j̃] and [ŋ] lies, according to Rossi (1976:478), in the similar acoustic properties of [ŋ] and [i, ĩ]. It is tempting also to offer a simple articulatory explanation, whereby dorsal raising seen in [+high] in [j̃] facilitates contact between the raised tongue body and the lowered velum, resulting in the closure of the oral cavity.⁸ Contact has only to be fleeting to achieve some sort of nasalized velar contoid that may only be overlaid over a palatal articulation. This was borne out by my Bolognese data. It was often impossible, when analyzing the recorded data, to distinguish between palatal glide and velar nasal variants: [j̃], [j̃ŋ̃], [ŋ̃j̃] and [ŋ], cf. AVENA > [avěj̃na], [avej̃ŋ̃na], [aveŋ̃j̃na], [aveŋna].⁹ Similar evidence of a continuum between glide [w] and nasal stop [ŋ] was also found, e.g. SONAT > [sãw̃na], [sãw̃ŋ̃na], [saŋ̃^wna], and [saŋna].

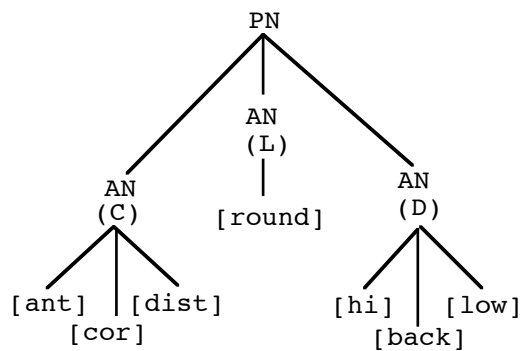
3.0. A Phonological Account of Nasalized Glide Hardening

Whilst an underlying phonetic motivation for nasalized glide hardening is easily formulated, this type of explanation is in itself insufficient, since it provides no reason as to why the phenomenon occurs in some languages and not in others. It is clear for instance that in Bergamasco, where historically nasal vowels have been lost through denasalization, there is no evidence to suggest that 'epenthetic' [ŋ] ever occurred in forms such as CANE > [kã:] > [ka:]. The cross-linguistically variable nature of ŋ-epenthesis may, therefore, be best accounted for by a phonological analysis that can adequately motivate language-specific developments.

3.1 An Autosegmental Account

A significant first step to providing a reasonable phonological account of nasalized glide hardening is afforded by autosegmental formalism, whereby features are placed on individual tiers and behave independently, and across domains larger than the individual segment. The particular type of autosegmental representation we use depends largely on its success in making apparent the phonetic association between [back] and [high], given our phonetic explanation for the hardening of [w̃] and in particular [j̃] to [ŋ]: velar contact, as in [+back] and [+cons, -cont], is facilitated by the lowered velum, as in [+nasal], and raised dorsum, as in [+high]. In recent phonological theory, this articulatory link between the two dorsal features [high] and [back] is seen in the model of feature geometry advocated by Sagey (1986, 1988), whereby related place features are organized under phonetically determined Articulator Nodes. It is accepted that assimilation occurs by spreading the Articulator Node, or by individual features attached to the Articulator Node. A slightly modified version of the complete model indicating only the hierarchical structure of place features under the Place Node, relevant to our discussion of Bolognese facts, is given in (5):

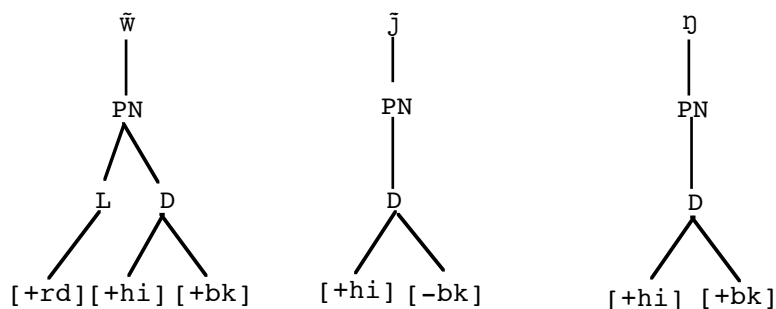
(5):



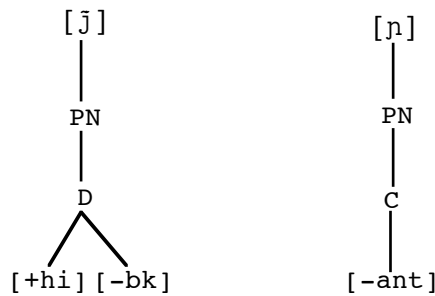
PN: Place Node
 AN: Articulator Node
 D: Dorsal L: labial C: coronal

Sagey's model has the advantage of clearly indicating that the features [high] and [back] are related dorsal features. It is not surprising, therefore, that they should be found operating together in Bolognese ŋ-epenthesis. In addition, I accept Yip's (1989) hypothesis that Articulator Nodes whose dependent features are all negatively specified are not present at all in the representation of a particular segment. Given the suggested phonological structure and the structural constraint that operates on it, [w̃], [j̃] and [ŋ] have the following underlying Place Node representations:

(6)



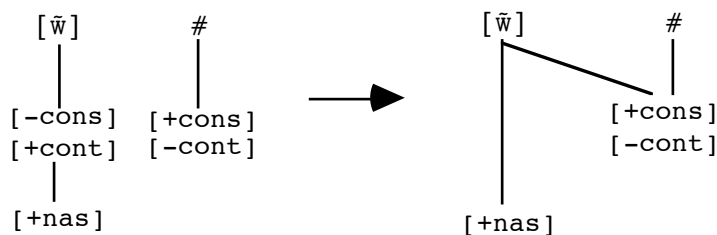
(8)



Whilst the representations in (8) are supported by the lack of any historical or synchronic relationship between [j] and [ŋ] in Bolognese, the solution may seem slightly *ad hoc*. An alternative solution would allow for initial hardening of [j] to [ŋ]. However, since [ŋC] is the only permissible nasal cluster in Bolognese, [ŋc] clusters are ill-formed in Bolognese, and must be corrected immediately by a repair rule changing [-back] to [+back]. As a result, all nasal clusters now conform to Bolognese phonotactic requirements and surface as [ŋC] as predicted.

The issue of velar epenthesis in word-final position remains to be considered. The historical process here is similar to that already considered: vowels were nasalized and diphthongized before final /n/ which was later lost. The nasalized off-glides, [j̃] and [w̃] were subsequently consonantized, e.g. LINU > [lɛ̃in] > [lɛ̃j] > [lɛŋ], UNU > [õw̃n] > [õw̃] > [oŋ]. An autosegmental account of epenthesis similar to the one given above for pre-consonantal consonantization is difficult to justify in this case, since in word-final position, simple feature spreading of [+cons, cont], used earlier, is not apparent if no adjacent segment bearing those features is found. 'Epenthesis' of [ŋ] in word-final position is not unusual, and is recorded through much of Northern Italy, Southern France, Southern Spain and Hispano-America, cf. Rohlf's (1966:427-428).¹³ If we constrain the analysis by denying ourselves the use of organizing structures above the skeletal tier, one solution with possible explanatory effect is an *ad hoc* one that claims that in Bolognese, word-final position has a closing effect on the articulation of nasalized glides, i.e. is the equivalent of [+cons, -cont], as in (9):

(9)



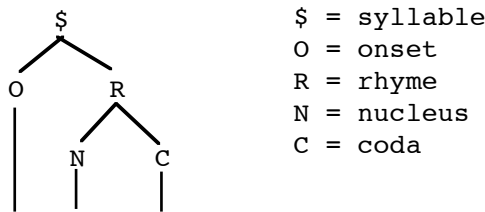
Since, word-boundaries are not ordinarily accorded any status on the skeletal tier in autosegmental phonology, either external evidence must be found to support my claim, or the analysis as it stands must be rejected as *ad hoc* and unmotivated. Mascarò (1984:293) and Lozano (1979) face a similar problem when dealing with the phenomenon of voiced stop fricativization in Spanish. They argue that historical /b d g/ are synchronically no longer underlyingly specified for the feature of [continuant]. With some complications, rightward feature spreading of [\pm continuant] results predictably in allophones [β ð γ] and [b d g]. However, they are unable to deal elegantly with obstruentization in initial position, when no feature [-continuant] to the left of the stop is available for spreading, and are forced to posit an *ad hoc* solution of correct feature specification.

3.2 A Syllable Account of Diphthongization and Glide Hardening

Although an autosegmental account of glide-hardening in Bolognese is attractive for the most part, word-boundaries present problems for an otherwise reasonably well-motivated process of feature-spreading, as Lozano (1979) and Mascarò (1984) discovered for Spanish. In an attempt to overcome this apparent problem of word-final glide consonantization in Bolognese, I wish to consider hierarchical structures above the skeletal tier that may have some bearing on the development of η -epenthesis in Bolognese. I hope to demonstrate that diachronic processes affecting permissible syllable and phonotactic structure in this dialect can help to explain not only consonantization of nasalized glides, but also diphthongization of nasalized vowels at an earlier stage.¹⁴

The syllable model used in my analysis is a variant of one generally accepted type, seen in (10):

(10)



Only the Nucleus and the superhierarchical structure attached to it are universally obligatory across languages. In addition, all subsyllabic constituents may have branching structures, as in (11):

(11)



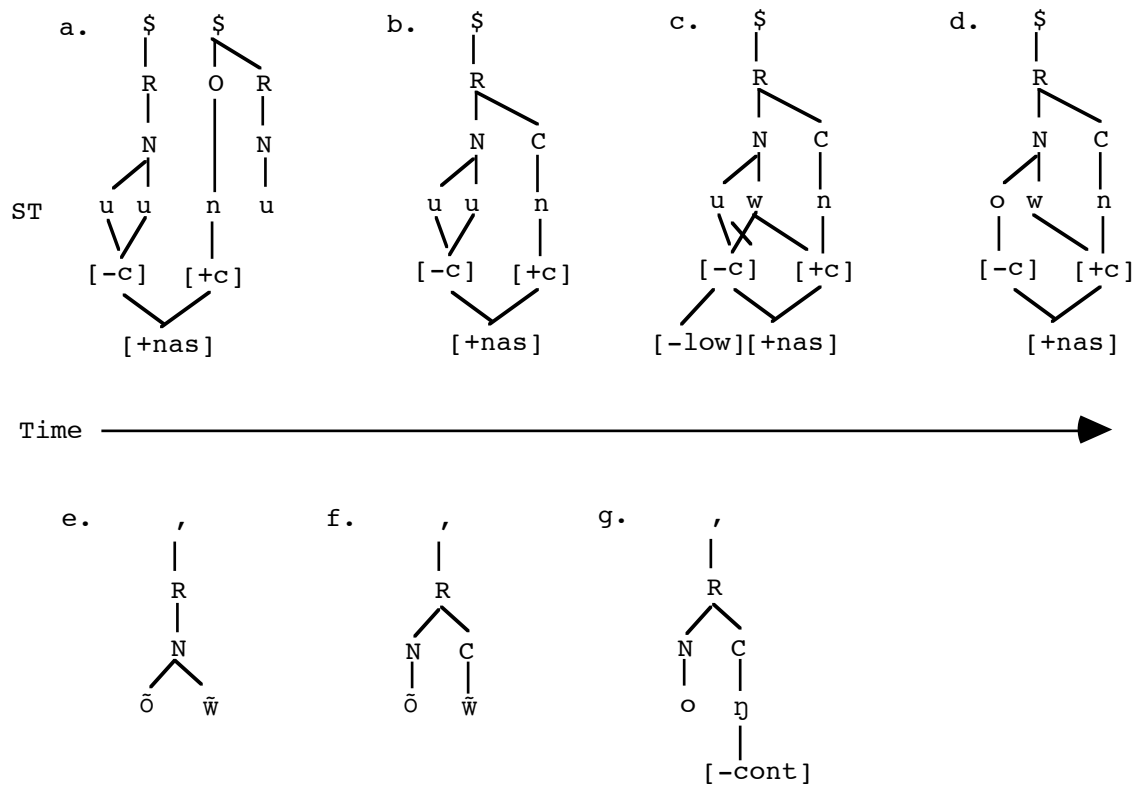
Whilst I am not opposed to pluribranching structures under the onset and coda nodes, I accept the generally expressed view that the Nucleus is maximally binary-branching, a point which shall become important later.

Universal and language-specific syllable structure rules and language-specific phonotactic constraints operate to determine all permissible syllable types in a language, cf. Lapointe *et al.* (1982:82-84). I also assume that any language-specific constraint, regardless of type, may be altered over the course of time, allowing for the development of new permissible syllable and phonotactic structures in a language.

In order to characterize syllable-structure and phonotactic rules adequately in Bolognese, important assumptions are made: (1) in some languages [+consonantal] must be used to distinguish glides from high vowels, cf. Hayes (1989) and Booij (1989); and (2) all nasal non-continuants specified as [+nasal, +consonantal, -continuant] are automatically assigned to the Coda at all stages in the history of Bolognese. I address these and other issues below.

Given this theoretical framework of syllables and syllabification, I will argue that nasalized glide-hardening in Bolognese is only the end-result of a longterm process of nasal vowel hardening, directly related to changing syllable and phonotactic requirements in the dialect, as in (12):

(12)



ST = skeletal tier, R = rhyme, O = onset, C = coda, [c] = [consonantal]

12a. The first step is a conflation of two independent processes: (1) open syllable vowel lengthening. This is a Proto-Romance phonotactic requirement, cf. Italian [fa:to] *Fate* but [fatto] *fact*; and (2) nasalization which here is part of a generalized process before historical /n/ in all contexts: V → \tilde{V} / _n

Nucleus requirement: [-consonantal]
Coda requirement: [+consonantal]

In addition, all nasals are predictably also [-cont] by default. This added restriction eliminates the possibility of nasalized [+cons] glides at this stage in Bolognese.

b. deletion of all final unstressed vowels, except /a/. Resyllabification results, shifting /n/, formerly in Onset, into Coda of preceding syllable.

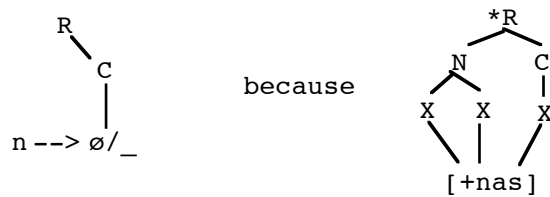
c. diphthongization of non-low nasal vowels occurs as a result of changing Bolognese phonotactics: long nasalized nonlow vowel nuclei are no longer permitted and are eliminated in what is in effect the first hardening of vowels to glide, by leftward spreading of [+consonantal].

New Nucleus and Coda Requirements: where Rhyme is [+nasal], Nucleus = [+continuant], Coda = [-continuant]. Nasalized continuants [j, \tilde{w}] remain in Nucleus, whilst [n] (and [m, ɲ]) stays in the Coda.

d. vowel dissimilation before glides (common process)

e. deletion of historical /n/ from the Rhyme, first reported in the early 19th century, i.e.

(13)



Given the nature of the syllable-sensitive rule, intervocalic /n/ as in [lõw̃na] is preserved. The deletion rule, resulting in a much simplified Rhyme structure, is motivated by changing phonotactic requirements: syllables with nasalized nuclei no longer require a nasal Coda.

f. glides are shifted from Nucleus to Coda as part of a more general secondary process in Bolognese that ensures that all nuclei incorporating historically non-low vowels are unary when nasalized or before any nasal, cf. LIMA > [li:ma] > [lemma], but LANA > [la:na] > [lɛ:na] and LAMA > [la:ma]. Binary nuclei, except for low vowel /a/, are no longer permitted. One significant collateral result of this process is an almost complete return to the unmarked syllable structure condition originally posited for Bolognese and other Romance dialects (cf. 18 a-b): Nucleus = [-consonantal] Coda = [+consonantal]. The only remaining divergence is that nasal consonants may be either [+cont] or [-cont]).

g. glides harden in Coda to [ŋ]. Spread [-cont] (where available) leftward to satisfy phonotactic conditions, or derive [-cont] in *ad hoc* manner in word-final position. We now have a complete restitution of the original unmarked syllable structure: where Coda = [+nasal], all nasal members of Coda must now be not only [+consonantal] but also [-cont]. Vowels are denasalized. Whilst one still needs to derive [cont] in an *ad hoc* fashion word-finally, the reasons for its derivation are made more apparent by means of a syllable analysis of the whole process of glide hardening.

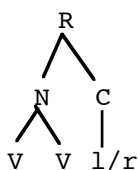
3.3 Nasals, and Glides: which part of the Rhyme?

Selkirk (1982), Lapointe *et al.* (1982), amongst others, allow non-syllabic nasal stops when in the Rhyme to be located in the Nucleus or in the Coda. However, the traditional view, supported by Lass (1983:253,256) is to assign non-syllabic nasals in the Rhyme always to the Coda, and not to any part of the Nucleus.

Certainly there is no reason to suspect that nasal consonants are not assigned to the Coda in Bolognese and other Northern Italian dialects. Some evidence against placing nasals in the nucleus includes the fact that nasal consonants are never syllabic diachronically or synchronically in these dialects.

Comparison of the historical behaviour of nasals and liquids /l r/ provides evidence that all non-vocalic sonorants must be assigned to the coda in Bolognese. Given that all vowels before /l,r/ are long, and the assumption that Nucleus is maximally binary, then liquids must be placed in the Coda. The relevant Rhyme structure is the following:

(14)



Historical developments affecting vowel height changes in VN(C) syllables pattern more closely with closed VCC syllables, in which CC are always assigned to the Coda.¹⁵

In my analysis of developments in Bolognese, I have argued that nasalized glides at some point were reassigned to the Coda, as a result of altered phonotactic conditions, as a preliminary step to hardening. It is generally accepted in syllable theory that glides may optionally appear in the Coda, although diphthongs with off-glides are frequently assigned to a branching Nucleus.¹⁶ Although Selkirk (1982,1984) normally assigns diphthongal glides to the Nucleus, Selkirk (1984:135,fn28) also notes that in Thai only glides and nasals are permitted in the Coda. Fujimura *et al.* (1982:12) assign glides to the Coda in English as necessary for the capturing of greater generalizations about phonotactic restrictions in that language.

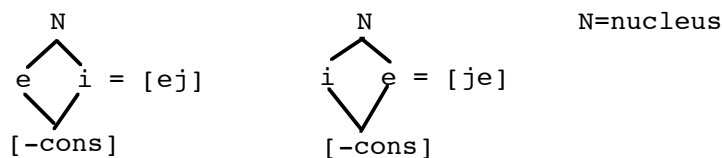
Steriade (1984:53) assigns postconsonantal glides in Romanian to the Coda, whilst Hooper (1976:215) notes that in Spanish there is evidence to suggest that glides belong either to the Nucleus with vowels or to the syllable margin (= Coda). However, she decides that there is no reason in the end not to treat glides as consonants and assign them to the Coda. Marotta (1988) also claims that post-vocalic glides [j,w] in Italian must be assigned to the Coda and not the Nucleus. Vennemann (1988 267-268) considers competing evidence in German that suggests that glides can be assigned to either the Nucleus or the Coda.

Savoia (1989:236-237), in an analysis of the Lucanian dialect of Stigliano, assigns glides to both the Nucleus and to the Coda according to synchronic behaviour which is ultimately determined historical derivation: diphthongal [w] in [ew] (< /u/) does not close the syllable and is Nuclear, whilst [w] from earlier /g/ closes the syllable, blocking metaphony, and is found in the Coda.

There is also support in synchronic syllable theory for my analysis of resyllabification and reassignment: Kaye *et al.* (1984) argue that in French the glide in the final syllable of a word is assigned to the Coda, rather than the expected Nucleus. Piggott *et al.* (1984:93) argue that this is likely the result of a resyllabification process that shifts the glide out of the Nucleus and moves it into the Coda.¹⁷

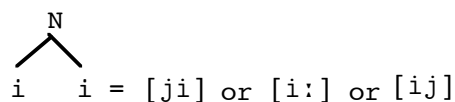
Linked to position within the Rhyme is my suggestion that glides can be specified in some languages as [+consonantal], rather than the more usual [-consonantal], e.g. Lucanian (Savoia 1989). Evidence of the consonantality of glides is easily found in Bolognese and other Northern Italian dialects: intervocalic lenition of stops was blocked after Latin [w], e.g. AUCA > Bol. [o:ka] but ROTA > [ro:da]. Hayes(1989) on the basis of other cross-linguistic data is also forced to come to the same conclusion. Previously, it was thought that vowels and glides shared the same specification [-consonantal], but were distinguishable by their position in the nucleus, cf. (15):

(15)



However, inadequacies in the same non-linear formalism force us to conclude that [+consonantal] must be used to distinguish glides from high vowels in some cases. It is simply impossible by means of the Nucleus alone to distinguish between long vowels and diphthongs:

(16)

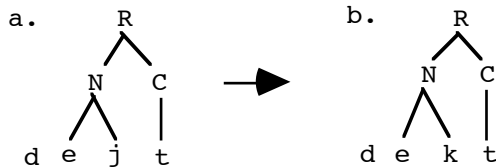


In addition, the maximally binary Nucleus cannot represent sequences recorded in languages of the types [i:j] [j:i], [jij] and [ij:].

3.4 An Alternative Hardening Analysis

An alternative analysis allows for hardening within the nucleus and not outside it, as Kamprath (1985) argues for consonantization of diphthongal [jw] to [g] (or [k]) in Berguener Romantsh, cf. (17):

(17)



c. Glide Hardening Rule:

$$\begin{matrix} [+high] \\ [-cons] \end{matrix} \rightarrow \begin{matrix} [+cons] \\ _ [+cons] \end{matrix}^{18}$$

According to Kamprath (1985:228), hardening must occur in the Nucleus, since rhyme restructuring is not permitted: no independently proposed formulation of a rule to syllabify a glide out of a Nucleus exists. She also claims that the Nuclear Integrity Constraint proposed by Kaye *et al.* (1984) which does not permit resyllabification of material into or out of a branching Nucleus supports this view.

Vennemann (1988:268) provides evidence to demonstrate that the Nuclear Integrity Constraint is an invalid restriction on diachronic change. In fact, he argues that there is no firm line of division between the Nucleus and the margins of the syllable. He notes that in Ancient Greek, diphthongal offglides were formerly Nuclear, underscored by the shift /ai/ > /e/. However, /u/ in /au, eu/ has become a labiodental, fricative in Modern Greek and *is* frequently reassigned across syllables: /dZéus/ > /zefs/ *Zeus*, /tau\$ros/ > /ta\$vros/ *bull*, /au\$τός/ > /a\$ftos/ *this*. The opposite process of reassignment into the Nucleus is also well attested. Historical weakening in many Romance dialects of [+consonantal] segments to glides leads to reassignment (and frequent monophthongization), cf. ACTUM > Sp. /auto/, and ALBA > Fr. aube [ob], cf. also De Chene *et al.* (1979).

Kamprath's own analysis of velar obstruentization in Berguener Romantsh is in any case problematic. To claim that obstruents, [g, k], may be found in the Nucleus as a result of glide-hardening, is counter-intuitive to generally accepted patterns of obstruent assignment to the Coda, cf. Lass (1983:252-264). These agree with the general lack of evidence to suggest that consonants are assigned to the Nucleus in Northern Italian. Second, glide-hardening in Kamprath's analysis depends on leftward feature spreading of [+consonantal] from adjacent consonants, as appears to occur in Berguener Romantsh, and as I argue, in most circumstances in Bolognese. However, Kamprath's account could not deal as well or better with word-final consonantization in Bolognese than the syllable restructuring-autosegmental account I detail above, since [+cons] is not available for spreading. Given that Rhyme restructuring (in conjunction with alteration of phonotactic requirements), by her own account, is not permitted to motivate hardening, Kamprath would presumably be forced in this case to set up a completely unmotivated and *ad hoc* Nucleus Hardening Rule, with the recurrent but unusual result of finding obstruents in the Nucleus.

4.0 η-epenthesis and Historical /a/

Whilst the consonantization of nasalized glides in Bolognese can largely be dealt with and motivated by using autosegmental and syllable theory, the problem of η-epenthesis and the low vowel /a/ remains. We have seen that before intervocalic /n/, η-epenthesis is not permitted, cf. mod. [lɛ:na]. Conditions of intervocalic 'epenthesis' in Bolognese are in perfect agreement with

those recorded in the Parmesan dialects of Collecchio (Longhi 1976) and Fidenza (Montanari 1977), cf. SPINA > [speŋna] but LANA > [la:na].¹⁹ In other Northern Italian dialects, such restriction clearly do not apply, e.g. [lajna]/[laŋna] in the dialect of Cairo Montenotte (Parry 1984). Given the distribution of 'epenthetic' [ŋ] in Bolognese, I have to this point accepted the hypothesis that /a/ was never diphthongized before /n/, as all other vowels were. Such a claim is supported by the lack of clear orthographic evidence of diphthongization of the low vowel, e.g. *mount*, *lein*, *louna*, but *can/cän*, *lana/läna*.

Problematic, however, is ŋ-epenthesis after /a/ in closed syllables, e.g. TANTU > [tæŋt] and CANE > [kæŋ]. This fact suggests that in at least closed syllables, /a/ was diphthongized and participated fully in the glide-hardening process, despite the lack of clear orthographic evidence. Perhaps the graph *ä* can also be interpreted as some kind of slightly diphthongal fronted low vowel. Diphthongization (and subsequent hardening) of synchronic nasal low vowels, derived from earlier /an\$/ sequences is certainly not uncommon in Romance dialects: (1) one notes the very slight diphthongization in French Canadian [dʒɪfɛraãs] < [diferãs] *différence*, [pãws] < [pã:s] *panse*; (2) de Reuse (1985) reports slight but frequent diphthongization of [ã:] in Charleroi Walloon to [ãʲ]. Subsequently, velar hardening may also occur, e.g. [ʒã:] > [ʒãʲ] > [ʒãŋʲ] > [ʒaŋ] *Jean*; (3) Portuguese [ã] has alternants [ã̃] and [aŋ] in final position;

Having posited generalized diphthongization of vowels before historical, including /a/ in closed syllables, the presumed conserved monophthongal quality of /a/ before /n/ in open syllables seems less plausible. Certainly, the synchronic result [ɛ:] (< /a/) fits in poorly with the outcome of /a/ before other nasals in primary and secondary open syllables, cf. LAMA > [la:ma], *BANJA > [ba:ŋa], MAMMA > [ma:ma], PANNA > [pa:na]. The unexpected fronted and raised qualities of the tonic vowel in [lɛ:na] < LANA, etc... is, however, suggestive of diphthongization (and subsequent monophthongization) of this vowel too, e.g. LANA > [lã:na] > [lãʲna] > [lɛ:na]. Presumably, glide hardening is never recorded in this particular context because remonophthongization occurred first, cf. (18):

(18)	TANTU	LANA	
1	tant		final vowel loss
2	tãnt	lã:na	nasalization
3	tã:t		syllable-final n-deletion
4	tãʲt	lãʲna	diphthongization
5	tæʲt	læʲna	vowel fronting
6		lɛ:na	raising and monophthongization of [æʲ] in open syllables
7	tæŋt		hardening of nasalized glides
8	tæŋt	lɛ:na	complete denasalization

References

- AIS = Jaberg, K. and J. Jud (1928-1940) *Sprach- und Sachatlas der Sudschweiz*, Zofingen.
- Andersen, H. (1988) "Center and Periphery: Adoption, Diffusion, and Spread" in Fisiak, Jacek(ed.) *Historical Dialectology, Regional and Social*, Berlin: Mouton De Gruyter, 39-83.
- Aronoff, M. and R. T. Oehrle(eds.) (1984) *Language Sound Structure*, Cambridge: MIT Press.
- Booij, G. (1989) "On the Representation of Diphthongs in Frisian", *Journal of Linguistics* 25:319-332.
- Cairns, C. E. and M. H. Feinstein (1982) "Markedness and the Theory of Syllable-Structure", *Linguistic Inquiry* 13:193-226.
- Coco, F. (1970) *Il dialetto di Bologna*, Bologna: Patròn.
- De Chene, B. and S. R. Anderson (1979) "Compensatory Lengthening", *Language* 55:505-535.
- Feng, G. (1987) "Etudes articulatoire-acoustique des voyelles nasales du français", *Bulletin de l'Institut de Phonétique de Grenoble*, 16:1-102.
- Ferrari, C. E. (1835) *Vocabolario bolognese-italiano*, Bologna: Volpe, 2nd ed.
- Fujimura, O. and J. B. Lovins (1982) *Syllables as Concatenative Units*, Bloomington: Indiana University Linguistics Club.
- Haiman, J. (1988) "Rhaeto-Romance" in Harris, M. and N. Vincent (eds.) *The Romance Languages*, London: Croom Helm.
- Halle, M. and G.N. Clements (1983) *Problem Book in Phonology*, Cambridge: MIT Press.
- Hayes, B. (1989) "Compensatory Lengthening in Moraic Phonology", *Linguistic Inquiry* 20:253-306.
- Hooper, J. B. (1976) *An Introduction to Natural Generative Phonology*, New York: Academic Press.
- Hulst, H. van der, and N. Smith (1982) *The Structure of Phonological Representations* (Part II), Dordrecht: Foris.
- Hyman, L. M. (1975) *Phonology: Theory and Analysis*, New York: Holt, Rinehart and Winston.
- Kamprath, C. X. (1985) "The Syllabification of Consonantal Glides: Post-Peak Distinctions", *NELS* 16:217-229.
- Kaye, J. and J. Lowenstamm (1981) "Syllable Structure and Markedness Theory" in A. Belletti, L. Brandi and L. Rizzi (eds.) *Theory of Markedness in Generative Grammar*, Pisa: Scuola Normale Superiore, 287-316.
- Kaye, J. and J. Lowenstamm (1984) "De la Syllabicité" in Dell, F. D. Hirst, and J.-R. Vergnaud (eds.) *Forme Sonore du Langage*, Paris: Hermann.
- Lapointe, S. G. and M. H. Feinstein (1982) "The Role of Vowel Deletion and Epenthesis in the Assignment of Syllable Structure" in van der Hulst and Smith (1982), 69-120.
- Lass, R. (1984) *Phonology, an Introduction to Basic Concepts*, Cambridge: Cambridge University Press.
- Longhi, G. (1976) *Saggio di fonetica storica e analisi strutturale del dialetto di Collecchio /PR/*, Bologna: Università degli Studi. Tesi di laurea. Relatore: Prof. F. Coco, 1976-1977.
- Mainoldi, P. (1967) *Vocabolario del dialetto bolognese*, Bologna: Forni.
- Marotta, G. (1988) "The Italian Diphthongs and the Autosegmental Framework" in Bertinetto, Pier Marco and Michele Loporcaro (eds.) *Certamen Phonologicum. Papers from the 1987 Cortona Phonology Meeting*, Turin: Rosenberg and Sellier, 389-418.
- Mascarò, J. (1984) "Continuant Spreading in Basque, Catalan and Spanish" in Aronoff, M. and R. T. Oehrle(eds.) *Language, Sound, Structure*, Cambridge: MIT Press, 287-298.
- Montanari, S. (1977) *Analisi di fonetica storica del dialetto di Fidenza /PR/*, Bologna: Università degli Studi. Tesi di laurea. Relatore: Prof. F. Coco, 1977-1978.
- Nicoli, P. (1976) "Fonetica del dialetto vogherese" in Maragliano, A. *Dizionario dialettale vogherese*, Bologna: Patròn.
- Ohala, J. J. and J. Lorentz (1978) "The Story of [w]: an Exercise in Phonetic Explanation for Sound Patterns", *BIS* 3:577-599-
- Parry, M. (1984) *The Dialect of Cairo Montenotte*, Ph.D., University College of Wales Aberystwyth.
- Piggott, G. L. and R. Singh (1984) "The Empty Node in Phonology: an Analygig of Epenthesis" *McGill Working Papers in Linguistics* 1(2):64-109.

- Reuse, W. de (1985) "La phonologie français de Charleroi", *Texas Linguistic Forum* 25:73-92.
- Rohlf, G. (1966) *Grammatica Storica dei Dialetti Italiani*, Vol.2 *Fonetica*, Turin: Einaudi.
- Rossi, M. (1976) *Contributions à la méthodologie de l'analyse linguistique avec application à la description phonétique et phonologique du parler de Rossano*, Lille: Université de Lille III, Atelier Reproduction des Thèses.
- Rubach, J. (1976) "Feature Invasion", *JIPA* 6:23-28.
- Sagey, E. (1986) *The Representation of Features and Relations in Non-Linear Phonology*, Ph.D diss., M.I.T, Cambridge, Mass.
- (1988) "Place Feature Geometry" *NELS* 18(2):451-464.
- Saunders, G. (1979) "Speculations on a Contact-Induced Phonological Change in Gallo-Italian" in Hollein, H. and P. Hollein (eds.) *Current Issues in the Phonetic Sciences*, vol.2, Amsterdam: John Benjamins, 1139-1147.
- Savoia, L. (1989) "Teoria generativa, modelli fonologici e dialettologia. La propagazione di *u* in una varietà lucana", *RID* 11:185-263.
- Selkirk, E. (1982) "The Syllable" in van der Hulst and Smith (1982), 337-384.
- (1984) "On the Major Class Features and Syllable Theory" in Aronoff and Oehrle(ed.), 107-136.
- Steriade, D. (1984) "Glides and Vowels in Romanian", *BLS* 10:47-64.
- Vennemann, T. (1988) "The Rule Dependence of Syllable Structure" in Duncan-Rose, Carol and Theo Vennemann (eds.) *On Language: Rhetorica, Phonologica, Syntactica*, London: Routledge, 257-283.
- Werlen, I. (1982) "Velarisierung (Gutturalisierung) in den Deutschen Dialekten" in Besch, Werner *et al.* (eds.) *Dialektologie (= Handbuecher zu Sprach- und Kommunisationswissenschaften*, 1.2, Berlin: Mouton de Gruyter, 1130-1136.
- Yip, M. (1989) "Feature Geometry and Cooccurrence Restrictions", *Phonology* 6.2:349-374.

Footnotes

¹"Intervocalic" refers only to consonants before historical word-final /a/, which is the only final vowel to survive into modern Bolognese.

²It is a slight, but convenient misnomer to call this process of epenthesis "intervocalic", when in fact epenthesis occurs in syllable final position before historic intervocalic /n/. In any case, I hope to demonstrate that the process in Bolognese is not true epenthesis, i.e. $\emptyset \rightarrow X$ ($X = C$ or V), but consonantization of nasalized glides. With reference to glides, the two terms are used interchangeably here.

³Intervocalic velar epenthesis is similarly not permitted after historical /a/ in other Emilian dialects, cf. the Parmesan dialects of Collecchio (Longhi 1976) and Fidenza (Montanari 1977).

⁴My own fieldwork demonstrates that alternation between nasalized diphthongs and [Vŋ] is not an archaic feature for all speakers, cf. below.

⁵Nasal diphthongs, as in [vɛ̃j], survive today in rustic Bolognese dialects, e.g. Val di Setta /BO/ (Michele Loporcaro, pers. comm.)

⁶Cf. AIS, LANA and Andersen(1988)

⁷Halle & Clements (1983:33) specify them as [+cor, -high], but [-anterior] to distinguish them from alveolars. However, I agree with Hyman (1976) that [j], [ɲ] and other palatal consonants are [+high], but [-coronal], on the basis that [j] and [w] pattern in Bolognese and elsewhere when obstruentized.

⁸The view that lowering of the velum in the articulation nasalized vowels (and glides) results in a propensity towards complete closure is supported by Feng (1986) who incorporates this tendency in his phonetic model of nasalization in French.

⁹Cf. de Reuse (1985:82).

¹⁰Cf. Rossi (1976:479-480,596-597) for detailed discussion of alternation between [w] and [ŋ] in Lunigianese dialect of Rossano, including phonetic explanation.

¹¹In fact, before fricatives, nasalized fricatives, derived by the leftward spreading of [+consonantal] only are normal.

¹²One needs also to specify [+nasal] in the melody of [w], to prevent non-occurring velar obstruentization of oral [w] before stops in Bolognese, e.g. [vawd] "empty", [anvawd] "nephew".

¹³It is not suggested that diphthongization of nasalized vowels occurred before η-epenthesis in all Romance dialects referred to here, but it undoubtedly occurred in many of them, cf. Bolognese, Cairese. See below.

¹⁴For discussion of syllables, syllable-structure, and processes of syllabification, cf. Selkirk (1982), Lass (1983), Kamprath (1985), Lapointe and Feinstein (1982), and Vennemann (1988).

¹⁵There is minor variation in vowel height changes in VN(C) according to the place of articulation of N. However, these are not considered to be relevant. It is more important to note that developments in Vη(C) (< Vw̃/j(C) generally pattern with those recorded before other nasal obstruents.

¹⁶Cairns et al. (1982:196,fn4) admit that more work needs to be done on diphthongs in syllable theory.

¹⁷Piggott et al. (1984:93) argue that glide reassignment to the Coda is a marked option triggered by a language-specific constraint or feature. Whether such a change is universal or language-specific (i.e. unusual) is irrelevant, however.

¹⁸Without more information about default feature rules, I would suggest that the hardening rule incorrectly predicts hardening to surface as [c] or even [ɲ] and [ŋ].

¹⁹19 Similarly, in Berguener Romantsh there is no evidence of 'epenthetic' stops [g/k] after historical /a/, cf. CORE > [kokr], but CARU > [car].