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Branching onsets and segment licensing: the lack of debuccalization or deletion of the *muta cum liquida* clusters in central Sardinian dialects

Lucia Molinu

Université Toulouse-Jean Jaurès/Université Côte d'Azur, CNRS, BCL, France
(molinu@univ-tlse2.fr)

Abstract:

Some central Sardinian dialects undergo debuccalization of /f/ and /k/. The clusters /fr/ and /kr/, on the other hand, fail to undergo debuccalization or deletion (Wagner 1984 [1941]; Contini 1987; Molinu 1997). The purpose of this article is to attempt to answer the following questions: why does debuccalization of /f/ and /k/ or /f/ deletion systematically affect the fricative in a simple onset but not when /f/ and /k/ are in a branching onset? Which syllabic and segmental requirements determine the different outcomes of /f/ and /k/? I will focus on Rice's model (Avery and Rice 1989; Rice and Avery 1991; Rice 1992, 1993, 1994a, 1994b) which makes use of the representation of segments to account for their licensing in a syllabic constituent. Indeed Rice assumes two principles (*government* and *binding*) which license the consonants in tautosyllabic or heterosyllabic sequences in structural terms, i.e. on the basis of the segment structure. I will account for the absence of debuccalization in the /fr/ and /kr/ clusters showing that the debuccalization process is blocked or repaired when it violates a principle on the structural relationships that hold within segments of branching onsets.

Keywords: Binding, Debuccalization, Government, Sardinian Dialects, Syllabic Structure

1. *Introduction**

Some central Sardinian dialects undergo debuccalization of /f/ and /k/: e.g. /'fenu/ → ['henu] 'hay', /'kanɛ/ → ['ʔane] 'dog'. Furthermore, in most dialects,

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/f/ is deleted, e.g. /'fenu/ → ['enu] 'hay'. The clusters /fr/ and /kr/, on the other hand, fail to undergo debuccalization or deletion, e.g. /'fradɛ/ → ['vraðɛ] 'brother', /'kras/ → ['kraz^a] 'tomorrow' (Wagner 1984 [1941]; Contini 1987; Molinu 1997).

The purpose of this article is to attempt to answer the following questions: why does debuccalization of /f/ and /k/ and deletion of /f/ systematically affect the fricative in a simple onset but not when /f/ and /k/ are in a branching onset? Which syllabic and segmental requirements determine the different outcomes of /f/ and /k/?

I adopt a classic syllabic structure (Blevins 1995; Calabrese 2005) and I argue for the existence of branching onsets and codas. Therefore, I shall investigate the segment licensing conditions and especially the type of structural relationship between two consonants that determines their syllabification in a branching onset.

I will apply Rice's model (Avery and Rice 1989; Rice and Avery 1991; Rice 1992, 1993, 1994a, 1994b) which proposes a representation of segments that accounts for their licensing in a syllabic constituent. Indeed Rice assumes two principles (*government* and *binding*) which license the consonants in tautosyllabic or heterosyllabic sequences in structural terms, i.e. on the basis of the segment structure.

I will especially focus on the segment licensing within branching onsets to show that the sonority constraints cannot alone account for the well-formedness of branching onsets and I will assume, in agreement with Rice, that two consonants cannot be syllabified within an onset if they have identical Place structure.

I will account for the absence of debuccalization in the /fr/ and /kr/ clusters showing that this process is blocked or repaired when it violates the constraint on the Place structure.

After giving a description of the debuccalization of /f/ and /k/ in some Sardinian dialects (Sections 2-3), I will summarize the principal tenets of Rice's model (Sections 4-4.2) and finally I will investigate the constraint which blocks debuccalization in the /fr/ and /kr/ strings (Section 4.3). I will conclude the paper with some instances of repair strategies at work in the Sardinian dialect of Orgosolo and in other Romance languages to avoid ill-formed configurations (Section 4.4).

2. *Debuccalization of /f/*

Some central Sardinian dialects undergo debuccalization of /f/ (Wagner 1984 [1941]; Contini 1987).¹ This phenomenon, found also in Spanish, Gascon and in some northern Italian varieties (Jungemann 1955; Rohlf's 1966, 1970; Mazzaro 2005), is characterized by the loss of oral place of articulation of /f/, through the bilabial fricative [ɸ], which becomes [h]; in some dialects, the laryngeal fricative

¹ These dialects belong to dialectal areas of the 'Circondario di Bitti', of the 'Baronia' and of the 'Barbagia di Ollolai' (Contini 1987: 217).

turns into \emptyset (Contini 1987: 327). The examples in (1) give a glimpse of the different outcomes in some dialects affected by this process:

- (1) /f/ → [ϕ] / [β] → [h] → \emptyset
- a. *intervocalic position: word internally*
 Latin TRIFOLIUM > [tri'odzu] 'clover' (Wagner 1984 [1941]: §146)
- b. *intervocalic position: external sandhi*
 /sa 'feminal/ → [sa 'ϕemina] 'the woman' (Contini 1987: 209, *Orotelli*)²
 /sa 'fotsa/ → [sa 'βotsa] 'the leaf' (*Ibidem*, *Orotelli*)
 /sa 'feminal/ → [sa 'hemina] 'the woman' (*Ibidem*, 320, *Ovodda*)
 /su 'fer:u/ → [su 'er:u] 'the iron' (Molinu 1998, *Orgosolo*)
- c. *word-initial position*
 /'feminal/ → ['ϕemina] 'woman' (Contini 1987: 207, *Orotelli*)
 /'fitsu/ → ['βitsu] 'son' (*Ibidem*, 208, *Orotelli*)
 /'fenu/ → ['henu] 'hay' (*Ibidem*, 319, *Ovodda*)
 /'fer:u/ → ['er:u] 'iron' (Molinu 1998, *Orgosolo/Bitti*)
- d. *after consonant*
 /sɔs 'fer:ɔs/ → [sɔr 'fer:ɔzɔ] 'the irons' (Molinu 1998, *Bitti*)
 /sɔs 'fer:ɔs/ → [sɔs 'er:ɔzɔ] 'the irons' (*Ibidem*, *Orgosolo*)

In Sardinian, this change first affects the intervocalic environments both word internally and in external sandhi (e.g. [tri'odzu] 'clover', [sa 'hemina] 'the woman', [su 'er:u] 'the iron'), then in word-initial position and finally, according to dialects, debuccalization or /f/ deletion occurs after a consonant except /N/ as shown in (2)-(4).

(2) *Bitti* (Molinu 1998)

- a. /'feminal/ 'woman'
- | | | | | |
|------------|----------------|-----------------|-----------------------|-----------------|
| #_ | V_V | C[continuant]_ | RF_ ³ | C[nasal]_ |
| /'feminal/ | /una 'feminal/ | /sas 'feminas/ | /'ɔminɛs εC 'feminas/ | /kiN'feminas/ |
| ['emina] | [una 'emina] | [sar 'feminaza] | ['ominez ε 'feminaza] | [kin 'feminaza] |
| 'woman' | 'a woman' | 'the women' | 'men and women' | 'with women' |

² In Sardinian the lax mid vowels /ɛ/ and /ɔ/ tense to [e] and [o] respectively as a result of the metaphony rule that spreads the feature [ATR] leftwards, from the high vowels [i] and [u] onto the adjacent vowel (Contini 1987: 439, 442; Frigeni 2003).

³ RF indicates *Rafforzamento* (or *Raddoppiamento*) *Fonosintattico*. In Sardinian RF is triggered:

- a) by the assimilation at word boundaries between inflectional ending *-t/* (3rd person singular) and the following initial consonant;
- b) by a ghost segment of some function words as /aC/ 'to', /εC/ 'and', /ɔC/ 'or', /niC/ 'neither... nor' (Wagner 1984 [1941]: §§ 362-371; Contini 1986: 531; Bertinetto and Loporcaro 1988; Loporcaro 1988; Molinu 1992: 144). The symbol /C/ indicates the ghost segment which causes the doubling of the following consonant:
 /aC 'fratε 'meu/ → [a 'f:ratε 'meu] 'to my brother'

b. /'fakɛr/ 'to do'

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|----------|--------------|----------------|---------------|------------------|
| /'fakɛr/ | /si fa'kiat/ | /'ɛst'fatu/ | /'at'fatu/ | /'aN'fatu/ |
| ['akɛrɛ] | [zi a'kiata] | ['ɛr'fat:u] | ['a'fat:u] | ['an'fat:u] |
| 'to do' | 'one did' | 'it is done' | 'he has done' | 'they have done' |

(3) *Ovodda* (Contini 1987: 320)

a. /'femina/ 'woman'

| #_ | V_V | C[continuant]_ | C[nasal]_ |
|--------------|----------------|---|-----------------------------|
| /'femina/ | /sa'femina/ | /sas'feminas/ | /kiN'feminas/ |
| ['hem(:)ina] | [sa'hem(:)ina] | [sas:'em(:)inas ³]/[saf:'em(:)inas ⁴] | [?in'feminas ⁵] |
| 'woman' | 'the woman' | 'the women' | 'with women' |

(4) *Orgosolo* (Molinu 1998)

a. /'femina/ 'woman'

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|-----------|-------------|----------------|---------------------|----------------|
| /'femina/ | /sa'femina/ | /sas'feminas/ | /'ɔminɛsɛC'feminas/ | /kiN'feminas/ |
| ['emina] | [sa'emina] | [sas'eminaza] | ['ominɛzɛ'eminaza] | [?in'feminaza] |
| 'woman' | 'the woman' | 'the women' | 'men and women' | 'with women' |

b. /'fakɛr/ 'to do'

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|----------------|---------------------|----------------|------------------|------------------|
| /'fakɛt'fritu/ | /'ɛst a lu'fakɛr/ | /'ɛst'fatu/ | /'at'fatu/ | /'aN'fatu/ |
| ['aʔɛ'frit:u] | ['ɛst a lu'aʔɛrɛ] | ['ɛs:at:u] | ['a'fat:u] | ['an'fat:u] |
| 'it is cold' | 'it has to be done' | 'it is done' | '(s)he has done' | 'they have done' |

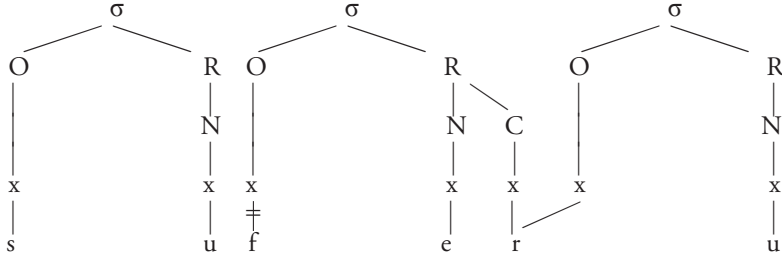
Furthermore, in the dialect of Orgosolo, the masculine singular determiner /su/ 'the' and the plural one /sɔs/ 'the' fail to undergo vowel deletion and fricative voicing respectively before words with an underlying /f/, unlike what occurs before vowel-initial words:

(5) /f/ vs vowel-initial words

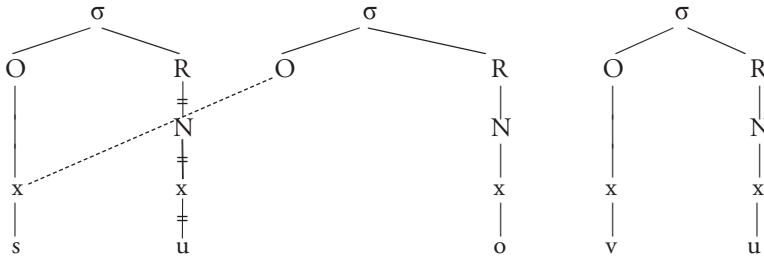
| | | | | |
|--------------|-------------|----|-------------|------------|
| [su'er:u] | 'the iron' | vs | [s'ovu] | 'the egg' |
| [sɔs'er:ɔzɔ] | 'the irons' | vs | [sɔz'ɔvɔzɔ] | 'the eggs' |

The following diagrams show that, after /f/ deletion, the onset of /'fɛr:u/, although phonetically empty, is still linked to a skeletal position. Thus this structure blocks vowel deletion (6a) and fricative voicing (6c). However, the word /'ɔvu/ has a null onset and then vowel deletion (6b) and fricative voicing (6d) are allowed.

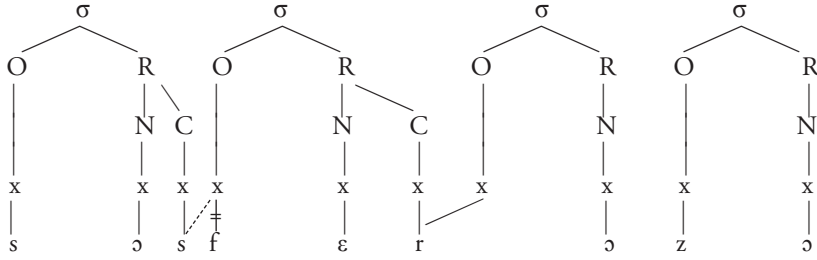
(6) a. /su 'fɛr:u/ → [su 'ɛr:u] 'the iron'



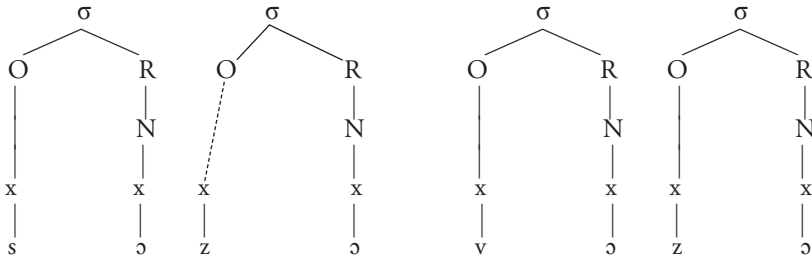
b. /su 'ɔvu/ → [s 'ɔvu] 'the egg'



c. /sɔs 'fɛr:ɔs/ → [sɔs: 'ɛr:ɔzɔ] 'the irons'



d. /sɔs 'ɔvɔs/ → [sɔz 'ɔvɔzɔ] 'the eggs'



What is debuccalization? In these dialects, /f/ debuccalization or deletion is a kind of lenition which affects in the same contexts, according to the varieties, voiced stops and /s/, as shown in (7) and in (8) (Contini 1987: 210, 249, 251, 305, 488):

(7) *voiced stops /b(r), d(r), g(r)/⁴*

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|-------|----------|----------------|-----------------|-------------|
| /'bœ/ | /su 'bœ/ | /sɔs 'bœs/ | /at 'bœs/ | /kiN 'bœs/ |
| [βœ] | [su βœ] | [sɔr βœzɛ] | [a b:œzɛ] | [kim 'bœzɛ] |
| 'ox' | 'the ox' | 'the oxen' | '(he) has oxen' | 'with oxen' |

(8) *fricative /s/*

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|-----------------|---------------------|----------------------|------------------------|------------------------------|
| /'sɔkru/ | /su 'sɔkru/ | /sɔs 'sɔkrɔs/ | /ɛC 'sɔkru 'mœu/ | /sɔN 'sɔkrɔs 'mœs/ |
| [zɔkru/'sɔkru] | [zu/su 'zɔkru] | [zɔ/sɔ 's:ɔkrɔzɔ] | [ɛ 's:ɔkru 'mœu] | [sɔN 'sɔkrɔr 'mœzɔzɔ] |
| 'father-in-law' | 'the father-in-law' | 'the fathers-in-law' | 'and my father-in-law' | 'they are my fathers-in-law' |

The voiced stops undergo spirantization and /s/ is subject to voicing; on the other hand /f/ loses its articulation place or is deleted.

Whereas voiced stops are also affected by spirantization in 'muta cum liquida' clusters (e.g. [βraθu] 'branch', Contini 1987: 210),⁵ debuccalization or /f/ deletion does not apply within the /fr/ cluster which, according to dialects, does not undergo any change in word-initial position (cf. (9)) – at best it exhibits a voiced fricative (cf. (10)):⁶

(9) *Bitti* (Molinu 1998)

a. /'fratɛ/ 'brother'

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|-----------|-----------------|----------------|-----------------|---------------------|
| /'fratɛ/ | /'kustu 'fratɛ/ | /sɔs 'frates/ | /aC 'fratɛ'mœu/ | /suN 'frates/ |
| [fratɛ] | [kustu 'fratɛ] | [sɔr 'fratezɛ] | [a 'f:ratɛ'mœu] | [sun 'fratezɛ] |
| 'brother' | 'this brother' | 'the brothers' | 'to my brother' | 'they are brothers' |

b. /frɔ'kaŋ:ɛ/ 'snowing'

| #_ | C[continuant]_ |
|--------------|------------------|
| /frɔ'kaŋ:ɛ/ | /'ɛst frɔ'kaŋ:ɛ/ |
| [frɔ'k:aŋ:ɛ] | ['ɛr frɔ'k:aŋ:ɛ] |
| 'snowing' | 'it is snowing' |

⁴ What holds for /b/, holds as well for the other voiced stops.

⁵ In these dialects there are no /sr/ clusters.

⁶ In others dialects /f/ surfaces as [ϕ] (Orotelli) or [β] (Oliena):

i. [ϕraðɛ] 'brother' (Contini 1987: 208)

ii. [βraðɛ] 'brother' (Molinu 1998)

(10) *Orgosolo* (Molinu 1998)

| | | | | |
|-------------|---------------|----------------|------------------|---------------------|
| a. /'fradε/ | 'brother' | | | |
| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
| /'fradε/ | /su 'fradε/ | /səs 'frades/ | /aC 'fradε 'meu/ | /'suN 'frades/ |
| ['vræðε] | [su 'vræðε] | [sər 'fraðεzε] | [a 'f:raðε'meu] | ['sun 'fraðεzε] |
| 'brother' | 'the brother' | 'the brothers' | 'to my brother' | 'they are brothers' |

| | | | | |
|-----------------|--------------------------------|--|-----------------|------------------|
| b. /frε'vardʒu/ | 'February' | | | |
| #_ | V_V | | RF_ | C[nasal]_ |
| /frε'vardʒu/ | /aC'priməs dε frε'vardʒu/ | | /aC frε'vardʒu/ | /'iN frε'vardʒu/ |
| [vrε'vardʒu] | [a 'p:rimər dε vrε'vardʒu] | | [a f:re'vardʒu] | [in frε'vardʒu] |
| 'February' | 'at the beginning of February' | | 'in February' | 'in February' |

3. *Debuccalization of /k/*

Some dialects which undergo /f/ debuccalization or /f/ deletion are also subject to /k/ debuccalization in the same contexts as /f/ (Wagner 1984 [1941]; Contini 1987; Molinu 1997):⁷

(11) a. *word internally*

| | | | |
|--------|----------------|----------------|-----------|
| V_V | C[continuant]_ | C[continuant]_ | C[nasal]_ |
| ['iʔu] | ['arʔu] | ['musʔa] | ['aŋka] |
| 'fig' | 'arch' | 'fly' | 'leg' |

b. *word-initial position and external sandhi*

| | | | | |
|---------|------------|----------------|---------------------------|---------------|
| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
| /'kanε/ | /su 'kanε/ | /səs 'kanεs/ | /'tɛnɛt 'kimbe 'an:ɔs/ | /'kiN 'kanεs/ |
| ['ʔanε] | [su 'ʔanε] | [səs 'ʔanεzε] | ['tɛnɛ 'ʔimb 'an:ɔzɔ] | ['ʔiŋ'kanεzε] |
| 'dog' | 'the dog' | 'the dogs' | '(s)he is five years old' | 'with dogs' |

But the cluster /kr/ fails to undergo debuccalization, as shown by the following examples:⁸

⁷ The varieties which are subject to /k/ debuccalization belong to the dialectal group of the 'Barbagia di Ollolai' (Contini 1987: 118; Molinu 1997). In these dialects the other voiceless stop do not undergo lenition:

voiceless stops /p(r), t(r), k(r)/

| | | | | |
|---------|-------------|----------------|------------------|--------------|
| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
| /'panε/ | /su 'panε/ | /səs 'panεs/ | /'bi 'at 'panε/ | /'kiN 'panε/ |
| ['panε] | [su 'panε] | [səs 'panεzε] | ['ba 'p:anε] | [kim 'panε] |
| 'bread' | 'the bread' | 'the breads' | 'there is bread' | 'with bread' |

⁸ Let us add that loanwords also fail to undergo debuccalization of /f/ and /k/ (Molinu 1997: 147):

- | | | |
|----|----------------------------------|--------------------------|
| a. | [fɔtɔgra'f:ia]/[sa fɔtɔgra'f:ia] | 'picture', 'the picture' |
| b. | [if:ila'strɔk:a] | 'nursery rhyme' |
| c. | [ka'f:ε]/[su ka'f:ε] | 'coffee', 'the coffee' |

(12) /k(r)/ *Oliena* (Molinu 1997)a. *word internally*

| | |
|---------|----------------|
| V_V | C[continuant]_ |
| ['okru] | ['maskru] |
| 'eye' | 'male' |

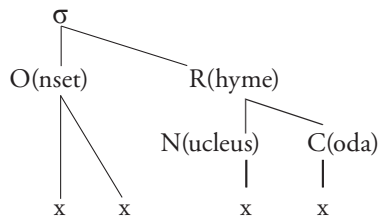
b. *word-initial position and external sandhi*

| | | | | |
|-----------|--------------|------------------------------|--------------|--------------|
| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
| /'krezja/ | /sa 'krezja/ | /sas 'krezjas / | /aC 'krezja/ | /iN 'krezja/ |
| ['krezja] | [sa 'krezja] | [sas 'krezjas ^a] | [a 'k:rezja] | [iŋ' krezja] |
| 'church' | 'the church' | 'the churches' | 'to church' | 'in church' |

4. *The analysis*

The purpose of this paper is to suggest a possible answer to the following questions: why does debuccalization of /f/ and /k/ or /f/ deletion systematically affect the fricative in a simple onset but not when /f/ and /k/ are in a branching onset? Which syllabic and segmental requirements determine the different outcomes of /f/ and /k/?

In this paper I adopt the syllabic structure in (13) (Blevins 1995; Calabrese 2005) and I argue for the existence of branching onsets and codas.

(13) *Syllabic structure*

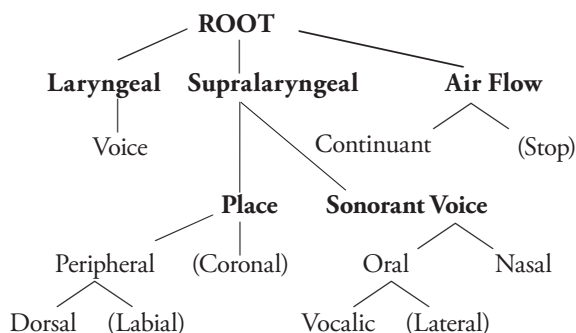
As already mentioned, one of the main problems regards the segment-licensing conditions and especially the type of structural relationship between two consonants that determines their syllabification in a branching onset.

Rice's model (1992: 76) allows us to demonstrate that debuccalization is blocked or repaired when it violates a constraint on the structural relationships that holds within segments in branching onsets.

4.1 *The segment structure in the Rice's model*

In this model, segments are represented as a hierarchical tree structure of features, as shown in (14):

(14)



(Rice and Avery 1991; Rice 1992)

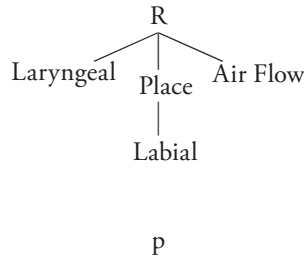
This structure, like other models of Feature Geometry (Clements 1985), is not a description of the physiological organization of the vocal tract, but represents its phonological organization. Indeed, “the ultimate justification for a model of phonological features must be drawn from the study of phonological and phonetic processes, and not from a priori considerations of vocal tract anatomy or the like” (Clements 1985: 230).

I will outline the description of this structure without going further into detail. The tree consists of ‘organizing nodes’ and of ‘content nodes’. The organizing nodes define major constituents: in other words, Root node governs and sums up the architecture of segment features; Laryngeal node groups laryngeal features like Voice, Spread glottis, Constricted glottis and Sonorant Voice node, which take the place of the feature [sonorant], and which is specific to vowels, liquids, glides, and nasals.⁹

The ‘content’ nodes represent the monovalent, privative features, which compose the constituent (the organizing node) and define the content of a given segment. For instance, a labial segment has the structure illustrated in (15) – only the relevant structure is given:

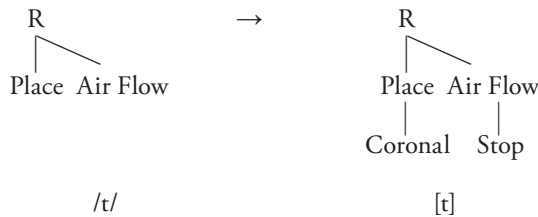
⁹ The organizing nodes are: R(oot) node, L(aryngeal) node, S(upra)L(aryngeal) node, S(onorant) node and P(lace) node.

(15)



The content nodes are dependent on the organizing nodes¹⁰ and in addition, they are characterized by a Markedness relationship. Each organizing node has a marked and an unmarked node (in parentheses). Therefore, the representation is not fully specified: only the marked nodes are present in underlying representation. The unmarked nodes, on the other hand, are inserted by default rules at the level of phonetic interpretation, as shown in (16) for /t/:

(16)



It follows that in conformity with the coronal underspecification theory (Paradis and Prunet 1989, 1991; Hall 2011; Rice 2011), the coronal /t/ lacks a Coronal Node in underlying representation and as a plosive, /t/ is underspecified for stricture features.¹¹ These features are inserted only later as phonetic specifications.

I also adopt the framework of Modified Contrastive Underspecification (Avery and Rice 1989; Dresher *et al.* 1994; Rice 1999a, 1999b, 2007; Dresher and Rice 2007; Dresher 2009). According to Modified Contrastive Under-

¹⁰ The organizing nodes themselves are in a dependency relationship (Rice 1992: 62).

¹¹ The contrast with the other segments is anyway maintained. The Labial and Dorsal Nodes warrant place distinctions among unvoiced stops (/p/: Labial, /t/: Ø and /k/: Dorsal). The specification of the [continuant] feature warrants the opposition between the fricative /s/ and the stop /t/. Last, /t/ contrasts with /d/ because the latter is underlyingly characterized by the feature [voiced], while /t/ does not contain any feature under the Laryngeal Node.

specification, contrastive features (nodes) are assigned by *language-particular feature hierarchies* and only contrastive features (nodes) can be phonologically active. In this model, the markedness relationship also is *language particular* (Rice 1999a, 1999b, 2005, 2007).

4.2 Syllabification principles

In this model, segments are given a specific representation in order to account for their licensing in a syllabic constituent. More specifically Rice assumes two principles (*government* and *binding*) which license the consonants in tautosyllabic or heterosyllabic sequences in structural terms, i.e. taking into account their segment structure. The main principles are given in (17) and in (18):

(17) *Government*:

A governs B if B has more relevant structure than A

(Rice 1992: 83)

(18) *Binding*: A bound consonant contains dependent structure, i.e. identical Place structure to the consonant that binds it or no place structure

(*Ibidem*, 79)

According to Rice, if the grammar of a language allows syllabic structures with branching onsets and codas, then it has to define the structural constraints governing the segment classes and sequences able to fill these constituents as well.¹²

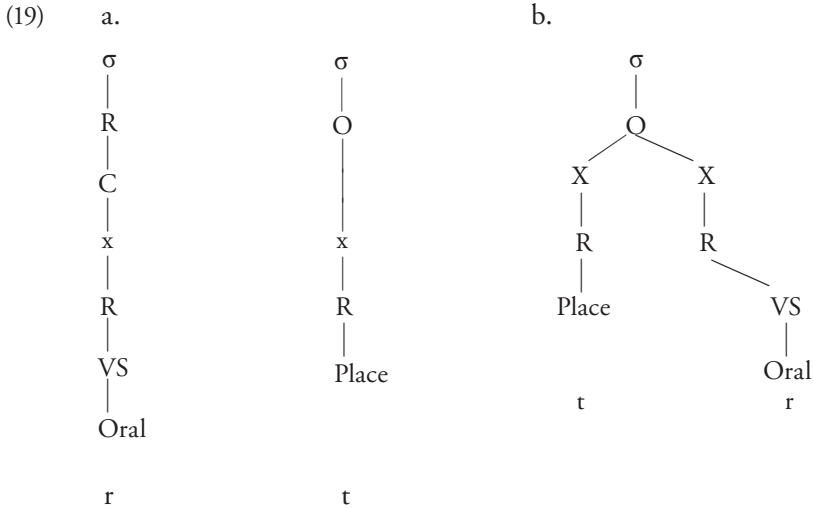
A consonant can be licensed in rhyml position or within a branching onset only if it satisfies some structural relationships with the preceding or following consonant. These relationships involve chiefly Sonority and Place.

The *government* principle mainly accounts for the sonority relationships between adjacent segments, cf. *Sonority Sequencing Principle* (Selkirk 1984: 116) and *Minimal Sonority Distance Principle* (Clements 1990: 303). In this model, sonority is not computed from sonority scales but it is an integral part of segment structure and it can be defined in terms of structural complexity. Sonorants (nasals, liquids and glides), vowels and sonorant obstruents (Rice 1992, 1993) have *Sonorant Voice* (SV) node, while obstruents do not have it and are thus less complex. According to the *government* principle, sonorants can be licensed in rhyml position because they have more SV structure than the following syllabified consonant. For the same reasons but specu-

¹² In other frameworks, these relationships are accounted for by sonority scales (Sievers 1881; Jespersen 1913; Grammont 1933; Selkirk 1984; Clements 1990).

larly, sonorants (liquids and glides) can be governed by the first consonant in a branching onset.

In Sardinian, words like /'ortu/ 'vegetable garden' and /'pratu/ 'plate' show that /t/ is licensed in coda position (19a) and in a branching onset (19b) because it has more SV structure than /t/, the governor:¹³

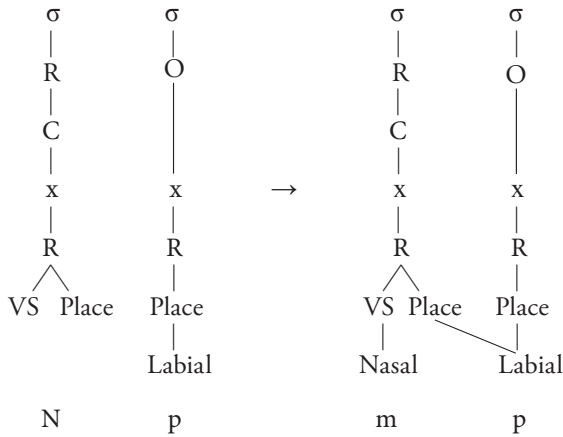


The *binding* relationship, on the other hand, licenses a consonant in rhymal position if it has equal or less relevant structure than B, namely if the consonant has the same Place structure as the consonant that binds it or no Place structure at all (Rice 1992: 79, 83). Indeed, in some languages Place must be just underspecified, while in others Place must be the same as that of the following syllabified onset consonant. The application of the binding relationship must be specified for each language because it relies on two specific parameters. The first parameter allows in coda position the first half of a partial or a full geminate and consonants underspecified for the Place structure like coronals /n, l, r, s/ (Paradis and Prunet 1991).¹⁴ The second parameter, on the other hand, only licenses the first half of partial or full geminates (cf. (20)).¹⁵

¹³ Observe that in the diagrams the irrelevant nodes will be omitted.

¹⁴ This situation is typically found in many Romance languages: e.g. it. *kanto* 'song', *salto* 'jump', *sarto* 'tailor', *kasto* 'chaste', *gatto* 'cat' (Baroni 1993; Pons Moll 2005).

¹⁵ This parameter is at work in languages like Japanese, where we find only partial or full geminates: e.g. *kampai* 'clapping', *sekken* 'soap' (Rice 1992: 77).

(20) *Binding*

Government licenses onset clusters when the first consonant is less complex in terms of SV structure than the adjacent one. However, in some languages (e.g. English, Catalan, Latin) a cluster like /tl/ although it satisfies the Government requirements, cannot be licensed as a branching onset. According to Rice (1992: 76) this cluster has identical Place structure, therefore sonority constraints cannot alone ensure the well-formedness of branching onsets and the prohibition of this clusters results from constraints on place articulation. Indeed Rice (1992) assumes that:

(21) Two consonants can be syllabified into an onset only if they do not have identical Place structure.¹⁶

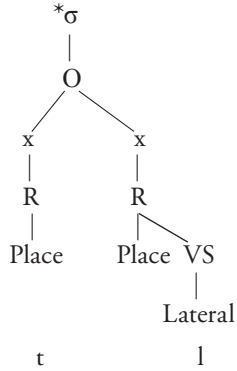
(Rice 1992: 76)

However, if the /tl/ cluster is an ill-formed onset because the two consonants have identical Place structure, why would the /tr/ sequence be allowed, given that /t, r, l/ are coronals? Rice considers the possibility that in English /r/ “lacks a Place node and thus differs from the coronals which lack a Place dependent but have a Place node” (Rice 1992: 76; Wiese 2011: 723). The diagrams in (22) illustrate the two structures:

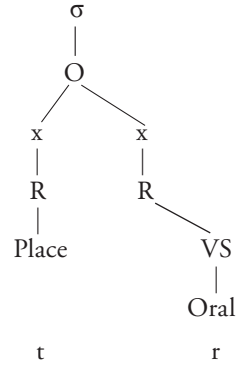
¹⁶ According to Rice (1992: 81): “[b]inding of Place within an onset is generally not allowed cross-linguistically”.

(22)

a.



b.



4.3 *The case of Sardinian*

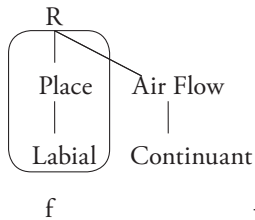
In this section, I shall investigate the hypothesis according to which /r/ is placeless to account for the lack of debuccalization in the clusters /fr/ and /kr/ in Sardinian dialects (cf. (23)):

- (23) a. /'fɛr:u/ → ['her:u] / ['er:u] 'iron' vs /'fraðɛ/ → ['vraðɛ] instead of *['hraðɛ]/*['raðɛ] 'brother'
 b. /'kanɛ/ → ['ʔanɛ] 'dog' vs /'krezja/ → ['krezja] instead of *['ʔrezja] 'church'

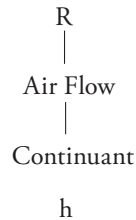
In our model the debuccalization of /f/ and /k/ can be represented as in the following diagrams:

(24) *Debuccalization of /f/*

a.

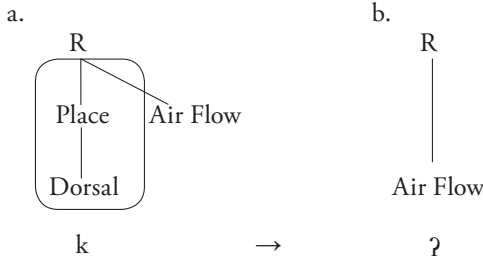


b.



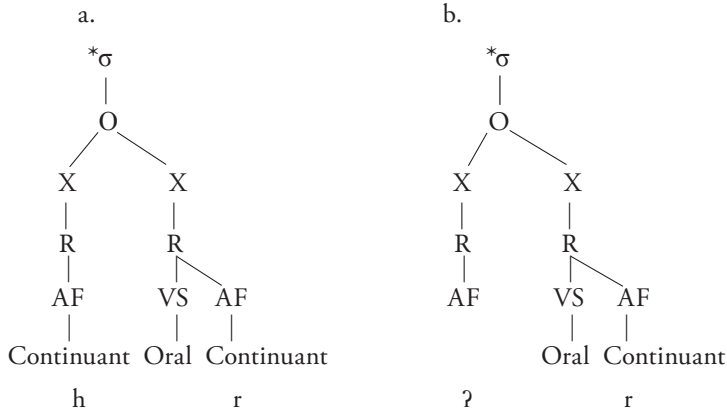
→

(25) Debuccalization of /k/



Given that in Rice's model Laryngeal consonants are placeless (Rice, 1992: 75, 2011: 532),¹⁷ if /r/ also lacks a Place node then the two adjacent consonants have identical Place structure as in the /tl/ cluster, and therefore they cannot be licensed in a branching onset, as shown in (26):

(26)



It should be made clear that the absence of Place node for /r/ is just a hypothesis, and some historical changes may provide some evidence for the exact status of /r/. These changes concern the processes of neutralization and assimilation.

¹⁷ The laryngeal consonants have a special status because of their ambiguity. Indeed, in some languages they behave as obstruent consonants while in others as laryngeal glides (Clements 1990: 322; Kaisse 2011: 290, fn. 3; Vaux and Miller 2011: 685-686). According to some models, these consonants are [-consonantal] (Chomsky and Halle 1968: 302; Anderson 1974: 298; Halle 1995: 17). Hume and Odden (1996), on the other hand, attempt to remove [consonantal] from the inventory of features altogether and argue that the sonority hierarchy need not refer to [consonantal]. According to Hume and Odden the sonority hierarchy can be unified within the nasalizability scale using the notion of 'impedance', i.e. "the resistance offered by a sound to the flow of air through the vocal tract above the glottis" (*Ibidem*, 358). Since laryngeals have no impedance (*Ibidem*, 359), they are vowel-like and nasalizable, but they are inadequate syllable peaks, because some impedance is required for a syllable peak.

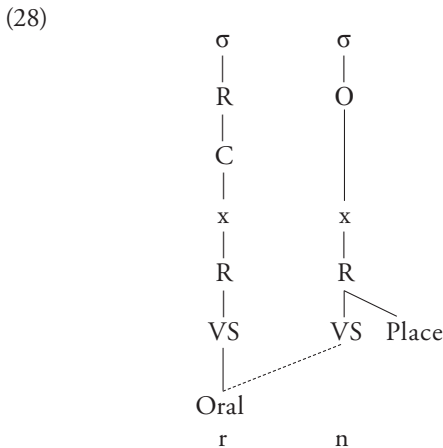
According to several scholars (Trubetzkoy 1964 [1939]; Vennemann 1988, among others), the outcome of neutralization is related to markedness.¹⁸ The dialects we are dealing with have both a lateral and a rhotic liquid ([ˈrɔza] ‘rose’, [ˈluna] ‘moon’), but, in certain positions, the contrast between them has been lost.

Indeed only /r/ is founded in the ‘muta cum liquida’ clusters and in Co-da position as outcome of the Latin lateral, as illustrated in (27):¹⁹

- (27) a. CL > Cr FLORE(M) > [ˈfrɔrɛ]/[ˈvrɔrɛ] vs [ˈfjɔrɛ] in other dialects ‘flower’
 b. -L > -r/ DULCE(M) > [ˈdurkɛ]/[ˈdurʔɛ] vs [ˈdulke] in other dialects ‘sweet’

Regarding assimilation, the behaviour of /r/ seems to make contradictory predictions about the lack of Place node: if the Sardinian outcome of the Latin heterosyllabic sequence -rs- is [s:] (Wagner 1984 [1941]: §276: MOR-SU(M)>[ˈmos:u] ‘bite’), the result of -rn- is [r:] (Wagner 1984 [1941]: §277: CARNE(M)>[ˈkar:ɛ] ‘flesh’).

In the former case, /r/ is subject to place assimilation and it seems placeless, while in the latter it fails to undergo assimilation and it rather triggers the assimilation process. However, the -rn- assimilation may be due to the VS node. As a matter of fact, nasal consonants have a bare SV given that they are the least marked of the class of sonorants (cf. (14)). Thus, the spreading of the feature Oral may account for the outcome /r:/, as shown in (28):



¹⁸ For a critical review of the role of markedness in a phonological system, we refer the reader to Rice 1999a, 1999b, 2005.

¹⁹ As a matter of fact this process is still productive as shown by loanwords adaptation (Molinu 1997: 147):

- i. [ˈprastik:a] it. *plastica* ‘plastic’
 ii. [ˈarkolu] it. *alcool*, ‘alcohol’ / [arkoliˈd:zau] it. *alcolizzato* ‘alcoholic’

Despite the absence of any process which may provide unambiguous evidence concerning the structure of /r/, I assume that the principle in (21) blocks the debuccalization of /f/ and /k/. It works as a filter avoiding an ill-formed configuration.

4.4 Repair strategies

In the dialect of Orgosolo, nevertheless, debuccalization occurs in the /kr/ cluster (Contini 1987; Molinu 1997) but the illicit cluster is ruled out by a repair strategy (Paradis 1988; Calabrese 2005). /r/ metathesis yields a heterosyllabic sequence consistent with the syllabic constraints at work in this variety:²⁰

(29) *Orgosolo*

| #_ | V_V | C[continuant]_ | RF_ | C[nasal]_ |
|------------|--------------|------------------|--------------|--------------|
| /krezja/ | /sa 'krezja/ | /sas 'krezjas / | /aC 'krezja/ | /iN 'krezja/ |
| [il'ʔezja] | [sa l'ʔezja] | [saza l'ʔezjaza] | [a l'ʔezja] | inj'krezja] |
| 'church' | 'the church' | 'the churches' | 'to church' | 'in church' |

Other Romance varieties also display repair strategies that remove the ill-formed sequences and modify syllabic or segmental structure by Place change (30a) or /r/ deletion (30b) or laryngeal deletion (30c) or vowel epenthesis (30c), as illustrated in the following examples with /fr/ clusters:

(30) a. *Central Calabrian* (Rohlfs 1966: 249)

| | | |
|-----------|----------------|--------------|
| [xriscu] | <i>fresco</i> | 'cool' |
| [xragula] | <i>fragola</i> | 'strawberry' |

b. *dialect of Germasino (province of Como) (Ibidem)*

| | | |
|---------|----------------|------------|
| [he'ga] | <i>fregare</i> | 'to cheat' |
| [hont] | <i>fronte</i> | 'forehead' |

c. *Gascon* (Allières, Ravier and Séguy 1967-1974: ALG, map 328, [frus'ti] 'to trample (the grapes)')

| | |
|------------|------------|
| [frus'ti] | ALG, 772 |
| [rus'ti] | ALG, 667NO |
| [hurus'ti] | ALG, 688SO |

²⁰ The dialect of Orgosolo exhibits the lateral [l] in lieu of [r] when it is followed by [ʔ] (Contini 1987: 126; Molinu 1997: 152 fn. 19): e.g. Orgosolo ['polʔu] vs Mamoiada ['porʔu] 'pig'. In all the other cases [r] is found: e.g. ['ʔurpa] 'fault', ['mortu] 'dead'. If the hypothesis of /r/ placelessness is right, then we are dealing with a dissimilation rule.

In Castilian Spanish, on the other hand, the principle in (21) seems to block debuccalization and deletion of /f/ in branching onsets (Rohlf's 1970: 146; Torreblanca 1984: 273; Mazzaro 2005).

(31) ['umo] < Latin FUMU(M) 'smoke' vs ['frio] < Latin FRIGIDU(M) 'cold'

It should be noted that in Tuscan varieties known for the *gorgia toscana* process (cf. among many others Giannelli and Savoia 1978; Bafile 1997; Marotta 2008), the /kr/ cluster can surface as [hr]; for example, /'lakrima/ 'tear' may be pronounced ['la:xrima], ['la:ɦrima], ['la:hɦrima] (Marotta 2008: 249).

Without going into further detail, I would like to point out that according to Rice (1992: 96 fn. 18), the principle in (21) may not be universal: for instance, Steriade (1982) argues that /tl/ clusters are tautosyllabic in Attic Greek.

Recall that I adopt the framework of Modified Contrastive Underspecification (Avery and Rice 1989; Dresher *et al.* 1994; Rice 2003, 2007; Dresher and Rice 2007; Dresher 2009) according to which contrastive features (nodes) are assigned by *language-particular* feature hierarchies and markedness relationship is *language particular* (Rice 2003, 2007). Thus, it might be supposed that in the Tuscan varieties referred to above, the rhotic has a Place node and that it does not violate the constraint on Place identity within branching onsets.

5. Conclusions

In this paper I tried to account for debuccalization of /f/ and /k/ or /f/ deletion that systematically affect the fricative in a simple onset but not when /f/ and /k/ appear in a branching onset: I argued that specific syllabic and segmental requirements determine the different outcomes of /f/ and /k/.

I adopted Rice's model (Avery and Rice 1989; Rice and Avery 1991; Rice 1992, 1993, 1994a, 1994b) which puts forward two fundamental principles (*government* and *binding*) to license the consonants in tautosyllabic or heterosyllabic sequences in structural terms. According to Rice, if the grammar of a language allows syllabic structures with branching onsets and codas, then it has to define the structural constraints regarding the segment classes and sequences able to fill these constituents.

Concerning the segment licensing within a branching onset, Rice (1992: 76) assumes that the sonority constraints cannot alone ensure their well-formedness. Indeed two consonants cannot be syllabified into an onset if they have identical Place structure.

The outcome of debuccalization of /f/ and /k/ is a laryngeal consonant, i.e. a placeless consonant and some evidences seem to show that /r/ does not have Place node either; therefore if the two adjacent consonants have identical Place structure like the /tl/ cluster, then they cannot be licensed in a branching onset.

The absence of debuccalization in /fr/ and /kr/ clusters shows that this process is blocked or repaired when it violates this principle on the structural relationships that holds within segments of branching onsets.

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