The development of liquids from Latin to Campidanian Sardinian:
The role of contrast and structural similarity

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The analysis of the Sardinian neutralization of Latin L and R in consonant clusters (both tautosyllabic and heterosyllabic) is framed in the broader picture of how contrast between obstruents and sonorants is organized in the two languages. Sardinian is argued to have developed as a true S(onorant) V(oicing) system (*sensu* Avery 1996), where voiced obstruents and sonorants bear a relationship to one another. The constraints on consonant sequences active in this language indicate that the lateral participates in the voiced obstruent class, rather than in the sonorant class. This option is readily disclosed by a SV-type configuration.

Specific to the Campidanian dialect phonology is a sharpened Coda Condition that constraints the distribution of the rhotic in this syllabic position. This paper proposes an algorithm that estimates the likelihood of licensing the rhotic coda through the following heterosyllabic onset. The higher the similarity in terms of place and voicing specification, the higher the chance for the onset to license the preceding coda /r/.

0 Introduction

This paper focuses on the distribution of liquids in Campidanian Sardinian (Southern Sardinian, Romance) consonantal clusters. It first investigates the general process of neutralization of Latin L and R to the Sardinian rhotic within clusters. Subsequently, the perspective shifts to the synchronic sound system of Campidanian Sardinian, where the rhotic is systematically banned from the coda position within syllables. As we shall see, this ban is repaired in several ways, including total assimilation with the following onset consonant and metathesis.

In this paper, I specifically aim to answer the following questions: (i) Why are Latin L and R neutralized to Sardinian /R/ within consonant clusters? (ii) Why does the Campidanian...
phonological system ban /R/ from the coda position? (iii) How are the different repair strategies phonologically determined?

The historical part of the paper first illustrates the development of the obstruent-liquid clusters from Latin to Campidanian (section 1). It then exploits the phonological assumption that contrast in sound inventories can be organized in different ways in different languages by proposing that Latin L and R neutralize to /R/ in Sardinian within clusters because the latter, despite appearances, is a one-segment-only liquid subsystem (section 2). This hypothesis relies on phonological patterns of intervocalic /L/ and /R/. Phonologically, Sardinian /L/ patterns with obstruents, whereas /R/ patterns with sonorants, and thus /R/ is the only liquid among Sardinian sonorants. The possibility for /L/ to show non-sonorant behaviour stems from the way in which the Sardinian inventory encodes the contrast between sonorants and obstruents.

The synchronous investigation in section 3 addresses questions (ii) and (iii). It defines the constraints on coda segments in Campidanian and argues for the role of structural similarity in computing repair strategies. Final remarks conclude the paper.

1 Latin liquids in Campidanian clusters

One of the main features of the development from Latin to Campidanian is the neutralization of Latin L and R in morpheme-internal consonant clusters (Wagner 1941, Tagliavini 1956, Virdis 1978, Bolognesi 1998 among others). Within clusters, Latin L and R neutralized to the Campidanian rhotic /R/; Latin L did not reduce to Campidanian /R/ in other contexts (see 2.1.1 and 2.1.2 for details and data).

As the following data show, the neutralization takes place both in tautosyllabic (1) and heterosyllabic (2) consonant sequences (Virdis, 1978:58, 69). In particular, (1a) provides examples of consonant-L clusters, and (1b) instances of consonant-R clusters. Latin etyma throughout the paper are from Wagner (1941, and 1960-1964) and/or Virdis (1978).

(1)  
<table>
<thead>
<tr>
<th>Latin</th>
<th>Campidanian</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.²</td>
<td>PLUS</td>
<td>'prus</td>
</tr>
<tr>
<td></td>
<td>CLAVIS</td>
<td>'krai</td>
</tr>
<tr>
<td></td>
<td>FLOS, -ORE</td>
<td>'frɔɾi</td>
</tr>
<tr>
<td></td>
<td>FLAMMA</td>
<td>'fram:a</td>
</tr>
<tr>
<td>b.</td>
<td>CRAS</td>
<td>'krazi</td>
</tr>
<tr>
<td></td>
<td>PRIMUS</td>
<td>'primu</td>
</tr>
<tr>
<td></td>
<td>FRATER</td>
<td>'fraði</td>
</tr>
<tr>
<td></td>
<td>TRAHERE</td>
<td>'trairi</td>
</tr>
</tbody>
</table>

¹ In this paper I adopt the following graphic conventions: Latin words and sounds are given in small capitals, and Campidanian phonemes in capital letters between slashes. In the reconstructed forms for Campidanian listed in (2), (4) and (5), the capital letters convention is maintained but the slashes are omitted.
² The Latin obstruent-liquid clusters inventory shows the systematic gap of TL and DL. Latin also systematically avoids DR sequences (*DR > TR), except in borrowings (e.g. from Greek) (Vennemann 1988:19, among others).
³ There is a homophonous verb, derived from Spanish traer, meaning “to bring”.

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The reconstructed forms, listed in the second column (*Campidanian) in (2), are based on the historical survey by Wagner (1941), according to which the ban on coda /R/ is a later development of the Campidanian system (1941:175, 235).

(2) Latin *Campidanian Campidanian gloss

a. PALMA *paRma 'pram:a "palm"
DULCIS *duRfe 'drut:jì "sweet"
CALCINA *kaRţìna kra't:jìna "lime"
PALPARE *paRpare pra'p:i "to touch"
CALCANEUM *kaRkaneum kra'k:andʒu "heel bone"

b. PORCUS 'proku "pig", "pork"
TURMA 'trum:a "herd (horses)"
DORMIRE 'drom:i "to sleep"
CURVARE kru'βai "to bent"
FORMICA fro'miïya "ant"
VERVEX, -ECIS bre'βei "sheep"
*TORC(U)LARE trɔ'γai "to spin (a thread)"

The following data are complementary to the ones in (1). They show that even when the obstruent-liquid cluster was not originally at the left edge of the morpheme, it moves there, independently from stress (compare (3a) and (3b)):

(3) Latin Campidanian gloss

a. TEMPLA 1trempa "cheek"
PIGER, PIGRU 1pri(γ)u "lazy"

b. FEBRUARIU fri'aʒu "February"

As shown by the following cases, neutralization of R and L to the rhotic is systematic: it also involves tautosyllabic obstruent-L clusters derived through syncope of unstressed vowels. Campidanian obstruent-/R/ clusters then shift to the leftmost edge of the morpheme, as already seen in (3).

(4) Latin *Campidanian Campidanian gloss

<table>
<thead>
<tr>
<th>Latin</th>
<th>*Campidanian</th>
<th>Campidanian</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>COP(U)LA</td>
<td>*kopRa</td>
<td>1kroβa</td>
<td>&quot;pair, couple&quot;</td>
</tr>
<tr>
<td>MAC(U)LA</td>
<td>*makRa</td>
<td>1mraya</td>
<td>&quot;stain&quot;</td>
</tr>
<tr>
<td>PEDUC(U)LU(M)</td>
<td>*pedukRu</td>
<td>pri'oyu</td>
<td>&quot;lice&quot;</td>
</tr>
</tbody>
</table>

Often, these derived clusters are further reduced to [γ] after the loss of /R/ (Wagner 1941:164):

4 The development of Latin L to Campidanian /R/ in codas is attested in the more conservative varieties spoken in central and northern Sardinian (e.g. Nuorese sɔrtu < SOLTU "lazy", Wagner 1941:177).
5 The preference for the left edge has been noted and discussed in Bolognesi (1998). An in-depth analysis of all metathesis patterns is beyond the scope of the present work, which concentrates on the distribution of liquids in Campidanian clusters and on the historical development of this sonorant sub-system.
The neutralization of Latin L and R to /R/ within Campidanian clusters has been illustrated through some of the most relevant examples reported in the literature about Sardinian. Section 2 is concerned with the question of why this happened. The hypothesis I argue for is primarily based on phonological evidence, and considers the patterning of Campidanian /L/ and /R/ in intervocalic position, both morpheme- and phrase-internally.

2 Sardinian: a one-liquid system

In this section, I provide phonological arguments for referring to the Sardinian inventory as having a single liquid, namely the rhotic, within its sonorant subset.

The phonological assumption on which my hypothesis lies is that, while the principle of contrastiviness organizing phonemic inventories is universal, the outputs of contrastive organization (i.e., phonemic inventories) are language specific (see Dresher, Piggott and Rice 1994, and Dresher 2002, for instance). In such a framework, phonological patterns are the keys to the phonemic inventories.

In the case of Sardinian, /L/ does not behave phonologically as the other sonorants, and as such it does not belong to the sonorant subset of the inventory (the evidence provided in 2.1 is drawn from Campidanian). Evidence for Latin L and R forming together a subclass of sonorants can be drawn from L…R dissimilation patterns (see Kenstowicz 1994:35, for instance).

While the feature specification for sonorants takes scope over L R and N in Latin, it takes scope only over /R/ and /N/ in Sardinian (the inventories in (6) are simplified for illustrative purposes; thus, for instance, glides are not included in the sonorant sub-set). The Sardinian picture looks particularly interesting because in this inventory the feature specification for voiced obstruents and sonorants in this inventory appears to be the same, that is, Sonorant Voicing (Piggott 1992, Rice 1992, 1993, and Avery 1996; henceforth SV). As discussed in Rice and Avery, inventories exploiting SV for voicing show a three-way distinction on the obstruent-sonorant continuum—i.e., obstruents (no SV) vs. ‘sonorant obstruents’ (SV) vs. sonorants (SV + dependent thereof)—rather than a two-way contrast of the type obstruents vs. sonorants. In 2.2.1, I discuss the relevance of the contrast configuration attained by SV in the development of Sardinian.

How does the analysis of Sardinian /L/ not being a sonorant explain the neutralization of Latin L and R to Sardinian /R/ within clusters? In Sardinian, consonant cluster consist of an obstruent and a sonorant, in either order, not of two obstruents, /S/ excluded. If Sardinian /L/ is

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6 A feature specification can take scope over different elements of the inventory in different languages, and the sequencing through which the feature specifications implement contrast in the system can also vary language-specifically.
not a sonorant, its exclusion from clusters, and its neutralization to /R/, can be understood: it neutralizes to the only sonorant liquid within the inventory, that is /R/.

I am aware of two scholars who have made the claim that /L/ is an obstruent in Sardinian, namely Politzer (1954) and Contini (1987). Both of them argue that /L/ shifted to the obstruent set under the pressure of either strengthening processes (Contini) or analogy (Politzer).

According to Contini (1987), the geminate lateral shifts to the obstruent class due to a general strengthening process affecting the articulation of consonants in Sardinian. However, the existence of a ‘general’ strengthening in Sardinian is disputable. Politzer (1954) offers an alternative analysis based on analogy. He recalls that in some Romance languages (including Sardinian) the Latin voicing contrast was lost intervocally through the approximantization of both voiced and voiceless obstruents. The approximant outputs (Latin singletons) were then contrasted to phonetically long obstruents (Latin geminates and clusters). In those languages, Latin -L- develops as a retroflex geminate stop, [dʒ]. According to Politzer this happens in order for the pair [l]-[dʒ] to match the singleton approximant-geminate obstruent pairs in the system.

Politzer’s analysis leaves a question unanswered, namely, why the analogical pressure for an approximant-geminate contrast affects /L/ but not other sonorants, especially, for my purposes here, /R/. Studies on syllable well-formedness and phonotactics (e.g., Selkirk 1982, Vennemann 1988, van der Torre 2003) conclude that between the liquids /l/ and /r/ the former is less sonorant than the latter. This generalization appears to be respected by the differential patterning of /L/ and /R/ in the development of Sardinian.

For the purpose of this paper, I assume this generalization about the sonority asymmetry between /l/ and /r/ to be explanatorily adequate.  

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7 Across word boundaries, the consonantal fortition is due to raddoppiamento. It affects all segments in the central varieties, but only voiceless obstruents and sonorants in the southern varieties (with the voiced obstruent showing a typical lenition output in the same context!). Word-internally, postvocalic approximantization is systematic, while hardening (e.g., devoicing, gemination) is not recorded (see Frigeni 2003 for details).

8 Interpreting Politzer’s analysis from a pure phonological perspective does not make much sense, as I demonstrate below. I think he refers to a phonetic, rather than phonemic, contrast. Let us first adopt the phonological perspective. In Latin, the contrast in terms of length was active throughout the phonemic inventory. Latin L thus participates in the length contrast. In the Romance languages discussed in Politzer (Sardinian, Sicilian and Southern Italian varieties), the loss of the voicing contrast among obstruents redefines the scope of the length distinction among obstruents. Sonorants do not constitute a domain for such a restructuring. Sardinian /L/ still participates in the length contrast, as Latin L did. Why should Sardinian /L/ then shift to the obstruent set in order to respect the restructured length contrast, as Politzer (1954:327) seems to argue, if read in pure phonological terms? If we consider his perspective in terms of phonetic contrast, though, it is possible to make more sense of his analysis. He assumes that the relevant contrast is between a single approximant and a double stop. His question then is: why does the pair [l]-[ll] need to change in order to match the single approximant-double stop pattern, but not [r]-[rr] and [n]-[nn]? His answer is articulated as follows: he states that /r/ and /n/ show some phonetic characteristics of stops, and thus they already match the pattern and do not undergo any change. /l/, on the other hand, he proposes, can match the pattern only by becoming a stop. I think, however, that this hypothesis is problematic even on the phonetic level. In fact, while /l/ matches the single approximant-double stop schema with the pair [r] /l/-[r] /rr/, is /l/, by any chance, phonetically more an approximant or more an obstruent depending on its length? I believe that the right analysis (still to be found) is phonological, and that the relevant questions are: (i) did the shift within obstruents, from Latin to Sardinian and the other southern Italian varieties, occur from a voicing contrast to a contrast expressed in terms of length? (ii) If not, what happened in the obstruent subsystem after the loss of the voicing contrast? This is, however, beyond the scope of this paper.
2.1 Phonological patterns

Before discussing the phonological patterns of /L/ and /R/, it is worth explaining the transcription system I adopt from now on. I use the way of transcribing intervocalic consonants proposed by Virdis (1978) and illustrated in (7a), as it captures the fact that in Campidanian length is phonologically non-distinctive among obstruents (even if voiceless obstruents are phonetically long) while it is distinctive among sonorants. Both transcription systems, however, record the loss of voicing contrast among intervocalic obstruent singletons. That is, both Latin P and B are equal to [β] in Campidanian.

(7) a. Virdis (1978):

<table>
<thead>
<tr>
<th>Latin</th>
<th>C (singleton)</th>
<th>CC (geminate or cluster)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp. obs., e.g. P, B</td>
<td>β</td>
<td>p</td>
</tr>
<tr>
<td>Camp. son., e.g. N</td>
<td>n</td>
<td>nn</td>
</tr>
</tbody>
</table>

b. e.g., Bolognesi (1998), Molinu (1998), Ladd and Scobbie (2003):

<table>
<thead>
<tr>
<th>Latin</th>
<th>C (singleton)</th>
<th>CC (geminate or cluster)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp. obs., e.g. P, B</td>
<td>β</td>
<td>pp</td>
</tr>
<tr>
<td>Camp. son., e.g. N</td>
<td>n</td>
<td>nn</td>
</tr>
</tbody>
</table>

2.1.1 /L/ in intervocalic position


(8) a. /L/

<table>
<thead>
<tr>
<th>Latin</th>
<th>Campidanian</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLV</td>
<td>VβV<del>VwV</del>VrV</td>
</tr>
<tr>
<td>VLLV</td>
<td>VqV</td>
</tr>
</tbody>
</table>

While the length contrast is maintained for /R/ (8b), this is lost for /L/ (8a). In particular, intervocalic single /L/ is phonetically reduced to a wide range of different segments (see (13)). The variation depends upon geographical and social factors. Geminate /L/ is realized as a retroflex stop, [ŋ].

Let us now compare the outputs of /L/ and /R/ given in (8), with the ones of a prototypical obstruent (in this case /P/) and of a prototypical sonorant (in this case /N/) respectively.

(9) | Latin | Campidanian |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VLV</td>
<td>VβV<del>VwV</del>VrV</td>
</tr>
<tr>
<td>VPV</td>
<td>VβV</td>
</tr>
<tr>
<td>VLLV</td>
<td>VqV</td>
</tr>
<tr>
<td>VPPV</td>
<td>VP</td>
</tr>
</tbody>
</table>

(10) | Latin | Campidanian |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VRV</td>
<td>VrV</td>
</tr>
<tr>
<td>VNV</td>
<td>Vn</td>
</tr>
<tr>
<td>VRVR</td>
<td>Vrr</td>
</tr>
<tr>
<td>VNNV</td>
<td>Vnn</td>
</tr>
</tbody>
</table>

As shown in (9), /L/ behaves as the obstruent /P/: contrastive length is lost, and singletons are phonetically reduced. /R/, on the other hand, patterns with the sonorant /N/ in all respects, as given in (10). The relevant data are provided in (11) and (12).
(11) a. MALE 'ma [β ~ w ~ ʃ] i “badness/badly”
VOLEBAT (bo) [β ~ w ~ ʃ] ia “he wanted”
SOL, SOLE 'sɔ [β ~ w ~ ʃ] i “sun”
MALEHABITUS mo [β ~ w ~ ʃ] aðiu “sick”
b. VILLA 'biða “town, village”
NULLA 'nuða “nothing”
CABALLU ku’aðu “horse”
ECU ILLUM 'kuðu “this (close to the addressee)”

(12) a. CARUS 'karu “dear”
ARENA a’rena “sand”
FLOS, FLORE 'frori “flower”
*PARIC(U)LA pa’riña “pair, couple”
b. CARRUM 'karru “wagon”
TERRA 'tèrra “earth, soil”
MARRA 'marra “mattock”

The different phonetic realizations of Latin intervocalic single L characterize different dialects spoken in Southern Sardinia. While in (8a), (9) and (11a) I gave only the more widespread outputs, a complete list follows in (13) (Virdis 1978:55-60, Wagner 1941:120-131). Geographical coordinates in (13) are relative to the southern part of the island.

(13) a. [β/w] in most of the central and western area;
b. [ʃ] in the eastern area, and south-western area (Sulcis) (unstressed intervocalic L drops in these varieties);
c. [ʔ] in a small eastern area on the coast (Sarrabus), and in some villages in the eastern area;
d. [gʷ] in Gesturi (a village in the north);
e. [L] low/popular variety spoken in Cagliari (the capital), almost lost now

2.1.2/L/ in other contexts

In utterance-initial position, Latin word-initial L and R are maintained as such in Campidanian. Initial /R/ systematically requires a prothetic vowel, as shown in (14b).

(14) a. Latin Campidanian gloss
LONGUS 'lɔŋgu “long”
LUCERE lu'ʒiri “to shine”
b. Latin Campidanian gloss
ROSA ar'roza “rose”
RUBEUS ar'ruβju “red”

However, within a phrase, in post-lexical intervocalic position, word-initial /L/ manifests the same surface variants as word-internally (Virdis 1978:58), that is, [β w ʃ L gʷ] (see (13)).
Note that the [β w k ʔ L gʷ] realization of word-initial /L/, when post-vocalic within a phrase, is almost lost nowadays, under the strong influence of Standard Italian, and Tuscan dialects, where word-initial /L/ is maintained also in these contexts as [l]. In Campidanian, word-initial /L/ is realized as a long retroflex lateral approximant [lː] (Virdis 1978:65, 66; Contini 1987). For instance:

(15) [sa [вузи] is nowadays more common than [sa ԝузи] “the light”

Moreover, [β w k ʔ L gʷ] now alternate with a [lː] even in intervocalic morpheme-internal position, as shown in (16) (Virdis 1978:57; this is however not reported by Wagner 1941).

(16) ʼsɔβi ʻsɔ[ij] “sun”

It is interesting to notice that when the lateral is reintroduced in intervocalic context, it is produced as long. This might lead one to think that the lateral has been reintroduced in the sonorant system via Standard Italian and Tuscan. However, there is no contrast between singleton [l] and geminate [lː] in the system, as one would expect from a true sonorant (recall the oppositions [r]~[rr] and [n]~[nn], in the table in (10)). I thus argue that [lː] is, together with [β w k ʔ L gʷ], an allophone of singleton /L/, i.e. a singleton obstruent.9

2.2 /L/ in the obstruent subset

If the Campidanian /L/ is to be considered an element of the obstruent sub-inventory, on which dimension is the contrast among the elements of this sub-system implemented? For instance, if /L/ is differentiated from the other obstruents in terms of place features, how can we explain the variety of places of articulation that are found among its allophones?

(17) bilabial labiovelar retroflex velar uvular glottal
[β] [w], [gʷ] [lː] [l] [k] [ʔ]

The variation along the dimension of place of articulation indicates that contrast is not likely to have been implemented on this dimension. On which phonological dimension, then, could the following elements, [β w k ʔ L gʷ Lː] for /L/ and [d] for /LL/, be grouped together?

In order to answer this question, it may be relevant to consider the discussion around the phonetic and phonological nature of retroflex segments. Lahiri and Reetz (2003) suggest that the feature [retroflex] belongs to the dimension of tongue height, rather than place. They provide both acoustic and phonological arguments for their hypothesis.

Acoustically, as reported by Bhat (1974:237), “retroflexion cannot be identified or correlated with retraction,” that is, an operation on the dimension of place.

9 There are also other historical sources for the current Campidanian [lː]. These sources are: (i) Latin -LJ- and -LEV- (e.g. FILIA > ʼfil[α]a “daughter”; ALLIU > ʼa[лу] “garlic”); (ii) Catalan -L- [ʎ] (<Lat.-LJ-) (cullera [kuʎəɾa] > kuʎəɾa “spoon”; agulla [aguʎa] > aʼk[u]a “needle”); and (iii) Spanish -L- [ʎ] (<Lat.-LJ-): billa [biʎa] > ʼbiʎa “ball to play pool”. In these cases the adjacency to the approximant [j] (sonorant) might have prevented the Campidanian stop /L/ from undergoing the same intervocalic processes as singleton /L/ and geminate /LL/ (that is, [β, w, ʔ, k, l, gʷ] and [d] respectively).
As for phonological arguments, Lahiri and Reetz (2003) refer to Panini’s *ruki* rule (Sanskrit). Briefly, a retroflex allophone of /s/ always surfaces in the context of the segments [r, u, k, i] (thereafter the name of the rule). As Lahiri and Reetz point out, a feature along the front/back dimension cannot group these segments, whereas [high] seems a good candidate. Interestingly, along the same lines, Celata (2003) reports that Romance retroflection processes are not limited to back vowel contexts.

However, the hypothesis about the relevance of tongue height for the definition of obstruent /L/ in Campidanian needs to be verified. This paper just suggests a new perspective for the analysis of this problem.

2.2.1 Contrastive configuration: the role of S(onorant) V(oicing)

What does the obstruent sub-system look like in Sardinian? Which kind of obstruent is Campidanian /L/?

In previous work (Frigeni 2003), I claim that the voicing specification in the Sardinian system is expressed in terms of SV. Sonorants and voiced obstruents, in fact, pattern as a class within this system; for instance, they both trigger voicing assimilation. Both voiced obstruents and sonorants are thus specified by the SV node. In this perspective, Sardinian /L/ is a ‘sonorant obstruent’.

As anticipated in section 2, the contrastive configuration attained by the SV specification (as in (18)) implies that sonorants and obstruents form a class, whereas they do not in a system where the voice constrast among obstruents is realized through the specification of laryngeal features (as in (19)).

\[
\begin{array}{c|c|c}
\text{obstruents} & \text{‘sonorant obstruents’} & \text{sonorants} \\
/P/ /T/ /K/ & /B/ /D/ /G/ & /L/ /R/ /N/ \\
\end{array}
\]

\[
\begin{array}{c|c}
\text{obstruents} & \text{sonorants} \\
/P/ /T/ /K/ /B/ /D/ /G/ & \text{SV} \\
\end{array}
\]

The SV configuration in (18) predicts that it is enough to delink a feature dependent under the SV node in order for a sonorant to become an obstruent; moreover, it also predicts that the obstruent output is voiced. These predictions are matched by /L/.

2.3 Summary

In the first part of this paper the phonological status of the Campidanian phoneme /L/ has been discussed. The morpheme- and phrase-internal intervocalic patterns of Campidanian /L/, when compared to those of obstruents and sonorants, show that /L/ needs to be classified as an obstruent rather than a sonorant. The structure of the Campidanian phonemic inventory, thus,

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11 SV-systems and laryngeal-systems are systematically compared in Avery 1996.
may explain why /L/ neutralizes to /R/—that is, the only lateral sonorant in Campidanian—within consonant clusters, given the ban on obstruent-obstruent clusters in the language.

Section 2.2 has posed the question of how to fit /L/ within the obstruent sub-inventory. Since inventories are interpreted as instantiations of contrastive hierarchies (see Dresher 2002), the question reduces to which phonological dimension is responsible for /L/ contrasting with the other obstruents in the system. I argued that place of articulation is not a suitable candidate, and I suggested the option of the tongue height dimension. In 2.2.1, the relevance of SV for the Sardinian patterns has been briefly outlined.

3 Coda /R/ in Campidanian

In the next sections the analysis is strictly synchronic. The data show the intolerance of Campidanian phonology for /R/ in coda position. The conditions on coda segments in Campidanian are very strict and the banned sequence /R.C/ is systematically repaired, either through assimilation or metathesis. I argue that the different repair strategies are determined by the degree of structural similarity between /R/ in coda position and the following onset. This model thus refers to the Coda Licensing principle (Kaye 1990:331), which states that “Post-nuclear rhymal positions must be licensed by a following onset.” While the Coda Condition, first proposed by Steriade (1982) and elaborated by Itô (1986), requires licensing through the following consonant only for coda obstruents (“An obstruent can be syllabified as a coda only if it is segmentally linked to the following consonant”), Kaye extends it to all segments in coda position. The proposed model is essentially phonological, as similarity is not intended in physical terms (acoustic or perceptual), but rather in structural, representational terms.

3.1 Data

Within a disharmonic heterosyllabic sequence, where a coronal /R/ is followed by a non-coronal segment, the ban on /R/ in coda position is repaired through metathesis, with /R/ moving to the onset within the same syllable rather than to the following heterosyllabic onset.

![Data Table](image)

It is worth noticing that while the voicing contrast between /P/ and /B/ is neutralized intervocally (both segments reduce to [β]), the voicing contrast appears to be phonologically relevant when considering the obstruent onset once adjacent to /R/.

For vowel-initial morphemes, nothing happens, e.g., ARCUM > 'arku (Virdis 1978:60, among others), as metathesis is possible only if a word-initial onset consonant is present. However, when items of this type are preceded by the definite determiner su/sa “the.M/F.SG” or by a
demonstrative, /R/ moves onto the leftmost onset within the phrase (for instance, Bolognesi 1998:55), as shown in (19):

(21) /su 'arku/ > ['srak:u] “the bow”
/su 'orku/ > ['srok:u] “the ogre”
/kusta erba/ > [ku'streβa] “this grass”
/kus'a arða/ > [ku'sraða] “that tarantula”

From a survey of possible consonant-/R/ complex onsets, /LR/, /NR/, /JR/, /WR/ are not possible; /SR/, and /MR/, on the other hand, are attested.

Within a harmonic coronal sequence, where coda /R/ is followed by a coronal voiceless obstruent, the repair strategy is assimilation instead.

<table>
<thead>
<tr>
<th>Latin</th>
<th>*Campidanian</th>
<th>Campidanian</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALTUS</td>
<td>aRtu(^{12})</td>
<td>'at(\text{u})</td>
<td>“tall”</td>
</tr>
<tr>
<td>AUSCULTARE</td>
<td>askuRtai(^{13})</td>
<td>asku'tai</td>
<td>“to hear”</td>
</tr>
<tr>
<td>MORTUUS</td>
<td>'mot(\text{u})</td>
<td>“dead.M.SG”</td>
<td></td>
</tr>
<tr>
<td>FORTIS</td>
<td>'fot(\text{i})</td>
<td>“strong.M.SG”</td>
<td></td>
</tr>
<tr>
<td>CERTARE</td>
<td>tʃe(t\ai)</td>
<td>“to argue”</td>
<td></td>
</tr>
<tr>
<td>MARTIUS</td>
<td>'mrat(\text{f})u</td>
<td>“March”</td>
<td></td>
</tr>
</tbody>
</table>

When /R/ is followed by a voiced coronal, then a second type of metathesis takes place:\(^{14}\)

<table>
<thead>
<tr>
<th>Latin</th>
<th>Campidanian</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURDUS</td>
<td>'suðru</td>
<td>“deaf”</td>
</tr>
<tr>
<td>CARDU(U)S</td>
<td>'kaðru</td>
<td>“thistle”</td>
</tr>
</tbody>
</table>

3.2 Coda requirements

Why does the Campidanian phonological system ban the sonorant /R/ from the coda position?

In Frigeni (2003), I argue that voicing specification in Campidanian is banned from codas unless structure (in primis Place) is shared with the following onset. In this section I argue that the condition on coda /R/, a sonorant, follows from this general constraint on voicing specification in coda position.

Possible codas in Campidanian are given in (24):

(24)  a. homorganic nasals
      b. /S/ (in voiceless SC clusters only)
      c. the first half of geminates (always voiceless in the case of obstruents)

\(^{12}\) This form, with l > /R/ in coda, is reported by Wagner (1960-64:76) together with the one showing assimilation to [t]. In my fieldwork, I recorded only the assimilated form.

\(^{13}\) See Wagner 1960-64:134.

\(^{14}\) Notice moreover that the resolution of Latin RD clusters is subject to a certain degree of variability (see, for instance, Wagner 1947:176 and Bolognesi 1998:54). In this paper, I am referring to the varieties of Southern Sardinian spoken in Villasor, Sanluri, Serrenti, Samassi.
From the coda phonotactics, it appears that the segments in a coda must be structurally licensed by the following onset, by sharing place (24a), voicing (24b) or the complete set of features (24c).

In particular, the SV specification of nasals is tolerated in coda because the place specification is totally shared with the following onset. For the other two possible coda segments (/S/ and the first half of a voiceless geminate), SV specification is excluded, unless, as in the case of sonorant geminates, the complete set of features is shared across the syllable boundary.

3.3 Segment representations

In this section, I present the underlying feature structure for the relevant segments. I assume a simplified version of the feature geometry discussed in Rice (1992). The phonemic representations, upon which the degree of structural similarity is calculated, rely on principles of underspecification and minimality as postulated by Avery and Rice (1989) and further elaborated by Dresher, Piggott and Rice (1994) and Dresher (1998a,b and 2002).

Specifications for place of articulation are represented as features (namely, [cor(onal)], [lab(ial)], and [vel(ar)]) underneath the Place node.

A second organizing node is SV (voicing dimension). The SV node groups together sonorants and voiced obstruents (as seen in 2.2.1). Voiced obstruents present a bare SV node, while sonorants are further specified by dependents of SV, such as the feature [nasal] for /N/ and the feature [approximant] for /R/. /S/ is a coronal obstruent (no SV node, only Place node) specified for continuancy ([cont(inuant)]) directly attached to the Root node.

A sample of the segmental representations is displayed in (25).

(25) a. voiceless obstrs.  b. sonorant obstrs.  c. sonorants

```
 T  S  R  N  
 Root Root Root Root 
 Pl    Pl    Pl    Pl   
 [cor] [cor] [cor] [apx] 
```

/P/ and /K/ differ from /T/ with respect to the feature under the Place node. The same relationship holds between /B/ and /G/ versus /D/. /P, T, K/ and /B, D, G/ are distinguished by the presence of the SV in the latter but not in the former. Notice furthermore that /N/ does not bear specification as for place of articulation (evidence for this is drawn from homorganic nasals in coda position).

3.4 Computing repair strategies

How are the different repair strategies phonologically determined? In this section I put forward the idea that the repair strategies to satisfy the ban on voicing (SV) specification in coda position (which affects /R/ in this position) are computed according to the structural similarity between the coda and the following onset. The similarity in terms of place and SV specification between coda /R/ and the following onset appears to determine the repair strategies according the algorithm in (26). The algorithm estimates the likelihood of licensing /R/ (i.e., its voicing specification) through the following heterosyllabic onset. Place identity has more weight than SV
identity: SV identity is meaningful only if place identity holds. The higher the similarity, the higher the chance for the onset to license the preceding coda /R/.

(26) **Step 1:** Given R.C, assess identity between R and C as for place

```
Place identity       Place difference
  \downarrow        \downarrow
Step 2: Assess identity as for SV  Onset cannot license coda /R/
  SV identity       SV difference      Metathesis
  \downarrow        \downarrow
Complex onset       Delink SV
  [\delta r]       [\eta l]
```

Let us first consider the case of another segment violating the ban on voicing specification in coda position, that is the case of the sonorant nasal /N/ (please refer to the diagrams in (25) in order to visualize the processes). The presence of voicing structure SV in the coda is tolerated only if place structure can be shared completely, by spreading the feature under the Place node from onset to coda. This operation is possible precisely if the target (the coda) is not specified for place of articulation, as in the case of /N/. Place thus appears to be crucial in the resolution of the coda voicing constraint in Campidanian.

Now consider the different cases of /R/ in coda position in the light of structural similarity (algorithm in (26)). In the case of the place- and SV-harmonic sequence /R.D/, /R/ is licensed by /D/ in its same syllabic position, with no structure changing process (e.g., spreading, delinking) taking place. The output [\delta r] can be considered a complex onset. Comparing /R.D/ with /N.C/ clusters, /R/ and /D/ each have their own [cor(onal)] dependent. Thus, place structure, while identical, is not shared and /R/ cannot remain in the coda the way /N/ does. In the case of Place-harmonic sequences—i.e., coronal-harmonic sequences, such as /R.T/ and /R.S/—the voicing specification in coda position is eliminated by delinking the SV node. This operation respects the principle of structure preservation, as delinking SV creates a segment (T) already present in the underlying inventory. In the coronal-harmonic sequence /R.S/ (/T.S/ after delinking of SV), the feature [continuant] is further shared. In the case of place-disharmonic sequences—e.g., /R.P/, /R.B/ and /R.M/—the onset cannot share its place structure with the preceding coda, as /R/ is specified as [coronal] (in contrast with coda /N/), and thus the voicing specification on coda position cannot be tolerated. Metathesis of /R/ onto the tautosyllabic onset thus takes place.

The following synopsis collects all the cases discussed in this section. *SV\_o symbolizes the ban on voicing specification in codas; SV\_o, on the other hand, represents the presence of voicing specification in coda position. *Placeless C stands for the impossibility of a placeless segment that appears to drive repairs in case of clusters containing /N/. The symbol \neq means ‘different’.

<table>
<thead>
<tr>
<th>Case</th>
<th>Structural configuration</th>
<th>Effect on *SV_o</th>
</tr>
</thead>
<tbody>
<tr>
<td>NC &gt; [mp]</td>
<td>*Placeless C \rightarrow Place node spreading</td>
<td>SV_o tolerated</td>
</tr>
<tr>
<td>RD &gt; [\delta r]</td>
<td>= Place, SV</td>
<td>Complex onset</td>
</tr>
<tr>
<td>RT/S &gt; [\eta l/ss]</td>
<td>= Place</td>
<td>SV_o delinked</td>
</tr>
<tr>
<td>RP/RB/RM</td>
<td>\neq Place</td>
<td>metathesis</td>
</tr>
</tbody>
</table>
Conclusions

In this paper I addressed three questions about the phonological system of Sardinian in general and Campidanian Sardinian in particular. As far as the historical question is concerned ("Why are Latin L and R neutralized to Sardinian /R/ within consonant clusters?"), I showed that Sardinian has only one liquid sonorant segment, /R/. As /L/ phonologically patterns with the obstruents in this system and obstruent-obstruent clusters are impossible, /L/ never appears in clusters. The point theoretically significant in this first part of the paper is the relevance of SV specification in determining the nature of obstruent /L/.

In the second half of the paper, I claimed that /R/ is not a possible coda in Campidanian because voicing specification is not tolerated in this position in this grammar. The only voiced segment allowed in coda is /N/, because /N/ inherits the place specification from the following onset. The model for computing the different repair strategies for coda /R/ in the system relies in fact on the assumption of the Coda Licensing principle, that is: a coda must be licensed by the following onset. Whether the Coda Licensing principle can be fulfilled and how it is fulfilled depend upon the structural similarity between coda and onset.

References


