

# Word-Initial Gemimates in Sardinian\*

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## *Abstract*

It is reported to be uncommon for a language to display phonological contrasts between simplex and geminate obstruents: Italian and Japanese are among the few that do (Tsujimura 2007; Davis 2011). It is even less common for languages to display a phonological contrast of this kind in word-initial position. In this contribution, Sardinian is shown to be one such language. Word-initial gemimates are identified through a range of diagnostics and are given an analysis in terms of the CVCV Theory (Lowenstamm 1996; Scheer 2004).

*Keywords:* Sardinian, Strict CV Theory, Phonology, Word-Initial Gemimates

## *1. Introduction*

Southern Sardinian displays a great number of word-initial consonantal sequences with different phonological identities. Most of them are consonant clusters of the kind stop-plus-liquid and sC clusters (Lai 2013a and 2014). Others, even though they surface as consonant sequences (i.e. sr, tsr, tʃr, mr, and lr), can in fact be shown to be complex segments (Lai 2013b, forthcoming).

In addition, I will argue that Sardinian also tolerates word-initial gemimates. The purpose of this work is, first, to identify the word-initial gemimates with the tools offered by the CVCV theory (Lowenstamm 1996; Scheer 2004 and following works) and, second, to show how these gemimates interact with the whole of the Sardinian phonological system.<sup>1</sup>

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<sup>1</sup> As far as I know, the only examples reported in the literature of languages with length contrasts in word-initial position are the following: Cypriot Greek, Pattani Malay (Austronesian language), Tashlhiyt Berber and Thurgovian (Swiss German). See Ridouane and Hallé (2008) and references cited therein. Cases of word-initial gemimates are discussed and analysed in Topintzi (2010).

## 2. Theoretical Framework: the CVCV Approach

The analysis will be developed within the CVCV theoretical approach (Lowenstamm 1996; Scheer 2004). This framework assumes that syllabic structure can be reduced to strict sequences of onsets and nuclei. This implies that segments analysed as coda consonants in more traditional frameworks are now seen as onsets of empty nuclei. Similarly, consonant clusters are interpreted as a sequence of two consonants that enclose an empty vocalic position. The same holds of geminates. In (1) below you find the CVCV representations of final codas, internal codas, geminates and sC clusters:

(1) CVCV representations of codas and consonant clusters																
a. final codas					b. internal codas				c. geminates				d. sC clusters			
C	V	C	V	...	C	V	C	V	C	V	C	V	C	V	C	V
									\	/						
t	a	s	Ø	#	m	Ø	p	a	t	a			s	Ø	p	a

(adapted from Scheer 2004: Section 9)

A strict CV representation permits to maintain the traditional structural information, but seen in a different light. All different syllable structures such as long vowels, geminates, sC clusters and even branching onsets are thus represented as a strict sequence of onsets and nuclei.

### 2.1 Government and Licensing

In CVCV, two lateral relations (i.e. government and licensing) express all syllable-related processes (Scheer 2004: 3ff). Government and licensing have opposite effects. The former has a negative effect, while the latter supports its target (Scheer 2004: 134ff, 160ff). They both apply from right to left. Government accounts for the distribution of the empty vocalic positions.

### 2.2 Coda Mirror Theory

Government and licensing have been instrumental in developing an innovative analysis of strengthening and weakening: the so-called Coda Mirror Theory. This theoretical proposal was first introduced in Ségéral and Scheer (1999; 2001) and further developed in Scheer (2004: 117ff), Ségéral and Scheer (2008a; 2008b), and Scheer and Ziková (2010). The basic claim of this theory is that strengthening and weakening can be interpreted in the light of positional effects: the lateral relations of government and licensing explain the processes that affect segments.

### 2.3 Empty Category Principle

To explain better the mechanism underlying the distribution of empty nuclei, CVCV adopts the Empty Category Principle. This principle was first elaborated in Kaye, Lowenstamm, and Vergnaud (1990). The Empty Category Principle states that a nucleus may be left empty if and only if it is properly governed. The governor must always be a filled nucleus; thus, sequences of two empty vocalic positions cannot exist for government reasons. The alternation must be between a full vocalic position and an empty one. In this work, I will adopt a revised version of the Empty Category Principle by Scheer (2004: 14): “an empty nucleus may remain unexpressed if it is a) properly governed or b) word-final”. Thus, in CVCV, an empty vocalic position is justified only if one of the two conditions is satisfied.

### 3. External Sandhi and Word-Initial Clusters in Sardinian

Sardinian has a number of phonological processes in external sandhi that can shed light on the nature of word-initial segments in Sardinian. Lenition is one of the most extensively covered in the literature.<sup>2</sup> Sardinian lenition affects voiceless obstruents and voiced ones when in intervocalic position.<sup>3</sup> Voiceless obstruents became voiced as exemplified in (2) below:

- (2) Voiceless obstruents in external sandhi
- |    |       |           |                       |
|----|-------|-----------|-----------------------|
| a. | pala  | sa 'βala  | 'the shoulder'        |
| b. | taula | sa 'ðaula | 'the plank (of wood)' |
| c. | kani  | su 'ɣani  | 'the dog'             |
| d. | ʃiða  | sa 'dʒiða | 'the week'            |

Voiced obstruents fall as shown in (3):

- (3) Voiced obstruents in external sandhi
- |    |          |            |                  |
|----|----------|------------|------------------|
| a. | buka     | sa 'uka    | 'the mouth'      |
| b. | domu     | sa 'omu    | 'the house'      |
| c. | gaŋga    | sa 'aŋga   | 'the throat'     |
| d. | dʒenneru | su 'enneru | 'the son in law' |

(data are from Lai 2009 and 2011)

In post-consonantal position, lenition does not apply and thus the same obstruents are not affected, e.g. [is palas] 'the shoulders', [is taulas] 'the planks (of wood)', [is kanis] 'the dogs', etc.

<sup>2</sup> See Wagner (1941, 1959, and 1960-64), Viridis (1978), Contini (1987).

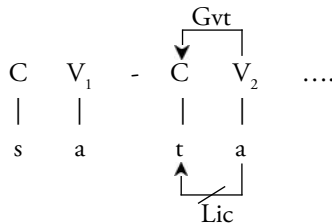
<sup>3</sup> The data presented in this paper are from Tertenia Sardinian (Campidanese Sardinian dialect from the Ogliastra area). Data are my own.

Sardinian lenition applies systematically only in external sandhi, while word-internal lenition is no longer productive. In the past, lenition was an active process even in internal sandhi: it systematically affected every intervocalic obstruent and obstruents in intervocalic stop plus liquid clusters.<sup>4</sup> In other words, lenition applied systematically both within words and at word boundaries.<sup>5</sup>

In CVCV theory, intervocalic consonants are represented as follows:

(4) Intervocalic Consonant

governed and unlicensed



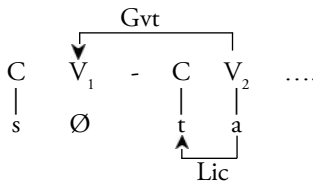
(adapted from Scheer Ziková 2010)

Intervocalic consonants are governed by the following vowel since the vowel that precedes (represented as  $V_1$  in 4), being a filled nucleus, escapes government. Thus, intervocalic consonants appear governed but unlicensed (Scheer and Ziková 2010).

As already said, word-initial obstruents when preceded by a final consonant do not experience lenition. The CVCV theory represents these obstruents as follows:

(5) Post-coda consonant

ungoverned but licensed



(adapted from Scheer 2004: 140)

<sup>4</sup> See Lai (2013a and 2014). On this point, see also Section 3.1 in this paper.

<sup>5</sup> Sardinian dialects differ from one another with respect to lenition. Synchronically, Logudorese and Campidanese Sardinian display intervocalic lenition, but only at word-boundaries (Wagner 1941: 117ff). In fact, in internal sandhi, lenition is a process that does not apply anymore. In Central Sardinian, lenition is not observed even at word-boundaries (Wagner 1941: 119). Contini (1987: 479, note 19) remarks that some exceptions have been found in some Central Sardinian areas (Baronia and Barbagia regions). See also Wagner (1959 and 1960-64), Viridis (1978), Contini (1987), a.o.

In this case, the word-initial consonant *t*- occurs after the empty nucleus of a final consonant (represented as  $V_1$  in 5). Note that the word-initial consonant in (5) (i.e. *t*-) is a strong consonant: this results from the fact that it escapes government thanks to the presence of the empty nucleus that requires to be governed (see Sections 1.1 and 1.2).

### 3.1 Word-Initial Clusters

Sardinian displays different types of word-initial clusters. Broadly, word-initial clusters are either stop plus liquid clusters or sC clusters.<sup>6</sup> The former clusters are peculiar because in many languages (Sardinian among them) the obstruent of the cluster behaves in many respects like a simplex obstruent. For example, in Sardinian, the obstruent in a stop-plus-liquid is affected by lenition like any intervocalic obstruent. Compare the behaviour of the items listed below. (6) lists items with word-initial stop-plus-liquid clusters, while in (7) one finds items with word-initial simplex obstruents. Both experience lenition when in intervocalic position:

#### (6) Lenition in stop plus liquid clusters

a.	prassa	'court'	sa 'βrassa	'the court'
b.	trassa	'plot'	sa 'θrassa	'the plot'
c.	krastula	'tile'	sa 'γrastula	'the tile'
d.	fradi	'brother'	su 'vradi	'the brother'

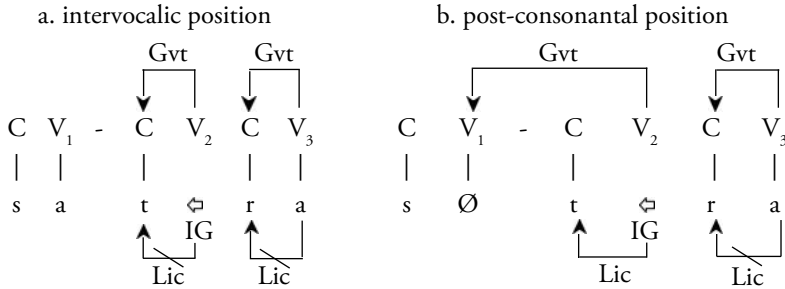
#### (7) Lenition in simplex obstruents

a.	padd̥ʒi	'peace'	sa 'βadd̥ʒi	'the peace'
b.	taula	'plank (of wood)'	sa 'θaula	'the plank (of wood)'
c.	kaff̥ʃa	'box'	sa 'γaff̥ʃa	'the box'
d.	famini	'hunger'	su 'vamini	'the hunger'

To explain the common behaviour of the stop in a stop-plus-liquid and a simplex stop, Brun-Trigaud and Scheer (2010) resort to the notion of Infrasegmental Government (IG). They represent stop-plus-liquid clusters as in (8) below:

<sup>6</sup> For all ends and purposes, /f/ patterns with stops in /f/ plus liquid clusters (cf. Lehmann 2010). Throughout this paper, “stop plus liquid” will have to be understood as shorthand for “stop or /f/ plus liquid”.

## (8) Representation of stop plus liquid cluster

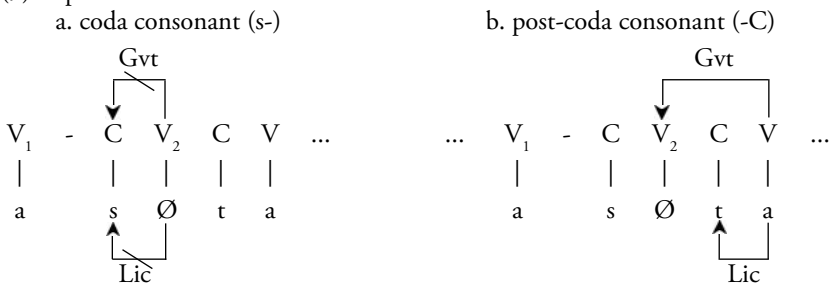


(adapted from Brun-Trigaud and Scheer 2010)

As one can see from (8), the two members of the cluster are related by Infrasegmental Government (IG). Infrasegmental Government is a lateral relation within a consonant cluster that is responsible for the cohesion between the liquid and the stop.<sup>7</sup> Note that the representation of stop-plus-liquid clusters theorised in Brun-Trigaud and Scheer (2010) assumes that the stop of the cluster has the same phonological status of a simplex consonant. In fact, they experience the same lateral relations both in intervocalic and post-consonantal position (Compare 4 and 5 with 8).

Word-initial clusters in Sardinian can also be sC clusters. The two members of an sC cluster, unlike stop-plus-liquid clusters, act as independent consonants. This means that no relation holds among them. The CVCV theory represents their syllabic structure as follows:

## (9) Representation of sC clusters



<sup>7</sup> See Scheer (2004: 37, 162) and Brun-Trigaud and Scheer (2010: 17). This relation does not have any segmental effect, negative or positive, on its target, unlike Government and Licensing (cf. Scheer 2004: 162).

In (9), /s/ from an sC cluster is represented as a coda consonant (see Kaye 1992). In CVCV /s/ is re-interpreted as the onset of an empty vocalic position. /s/ in (9a) is neither governed nor licensed. The obstruent of an sC cluster is in a strong position (ungoverned and licensed), because of the empty nucleus that precedes it, (see 9b).

Besides stop-plus-liquid and sC clusters, one further type of word-initial cluster must be added to the phonological inventory of Sardinian. As we will see in the next Sections, Sardinian displays a small group of consonants whose behaviour is not as expected of simplex consonants. The tools offered by the CVCV theory together with the knowledge of Sardinian phonology will be of help in defining the real structural identity of these consonants.

#### 4. Vowel-Zero Alternation in Sardinian

In Sardinian, when a heterosyllabic cluster (e.g. sC clusters, geminates) is preceded by a consonant-final word, a vowel appears before the cluster, e.g. /in skɔla/ → [ini skɔla] ‘at school’. By contrast, if the same cluster is preceded by a word ending in a vowel, the epenthetic vowel does not surface, e.g. /sa skɔla/ → [sa skɔla] ‘the school’.

In other words, the epenthetic vowel appears only if there is no other vowel to its left, otherwise the alternation site is still empty. This behaviour shows that Sardinian, like other languages,<sup>8</sup> displays the so-called “vowel-zero alternation” between full and empty vocalic positions.

Kaye *et al.* (1990) account for this kind of alternations by resorting to the Empty Category Principle (see Section 2.3). As already seen, in a string of syllables an empty nucleus can only alternate with a full nuclear position (i.e. with an expressed vowel). Thus, a sequence of two empty nuclei is illicit.

The reason for such behaviour, as stated by the Empty Category Principle, is that a sequence of two empty nuclei is banned for government reasons (see Section 2.3). As one can see below, in the CVCV theory, empty nuclear positions are found in the following contexts: after a coda, within a geminate, and after /s/ in an sC cluster. Empty positions are boldfaced.

#### (10) Empty nuclear positions in CVCV theory

final codas		internal codas				geminates				sC clusters						
C	V	C	V	...	C	V	C	V	C	V	C	V	C	V	C	V
p	a	s	Ø	#	m	Ø	p	a	p	Ø	p	a	s	Ø	p	a

(adapted from Scheer 2004: Section 9)

<sup>8</sup> See Scheer (2004).

In Sardinian if one of the clusters in (10) is preceded by a consonant-final word, an epenthetic vowel surfaces to avoid a sequence of two empty nuclear positions. Some examples are provided below.<sup>9</sup> Data are from Tertenia Sardinian.

- (11) Word-initial heterosyllabic clusters preceded by a final consonant
- a. /sɔi in skɔla/ → [sɔi ini skɔla] 'I am at school'
  - b. /sɛs sbentiada/ → [sɛzi rbentiada] 'you are absent-minded'
  - c. /dʒai nd ddu at de kɔsa/ → [dʒai ndi ddu aḏ e ʧɔza] 'there is definitely a lot of stuff'

As mentioned, epenthesis surfaces only if the word-initial cluster that follows a consonant-final word is a heterosyllabic cluster. Word-initial clusters of the type stop-plus-liquid do not admit epenthesis.<sup>10</sup> Analogously, in the case of words that begin with a simplex consonant, no epenthesis occurs. Compare the examples in (11) above with those in (12) and (13) below:

- (12) Word-initial simplex consonants preceded by a final consonant
- a. /sɔi in domu/ → [sɔi in domu] 'I am at home'
  - b. /sɛs torrada/ → [sɛs torrada] 'You are back'
  - c. /dʒai nd at tentu de kɔsa/ → [dʒai nd at tentu e ʧɔza] 'She/He definitely got a lot of stuff'
- (13) Word-initial stop-plus-liquid clusters preceded by a final consonant
- a. /sɔi in prassa/ → [sɔi in prassa] 'I am in the court'
  - b. /sɛs trassada/ → [sɛs trassada] 'You look like a mess'
  - c. /is krɔbus/ → [is krɔbus] 'The crows'

Data in (12) and (13) list word-initial simplex consonants and stop-plus-liquid clusters, respectively. In both cases, epenthesis does not occur. By contrast, sC clusters trigger the epenthesis: in (11) a vowel surfaces in the final empty nucleus of the preceding consonant-final word.

This is the case for a reason. Recall from the previous Sections that an alternation site can only be empty if it is governed by an expressed vocalic position, which follows it. This means that a sequence of two empty nuclei is ill-formed and requires to be repaired.

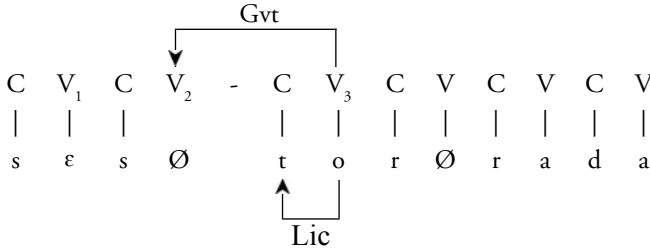
<sup>9</sup> In the above-mentioned sentences several other processes appear. Note that voiceless stops become voiced fricatives (e.g. /de kɔsa/ → [de ʧɔza]) and voiced stops delete (e.g. /at de kɔsa/ → [aḏ e ʧɔza]). /s/ before voiced stops becomes [r] (e.g. /sɛs sbentiada/ → [sɛzi rbentiada]).

<sup>10</sup> For details on the peculiar behaviour of stop-plus-liquid as well as for their structural properties see Brun-Trigaud and Scheer (2010). A few notes on stop-plus-liquid clusters are also presented in Section 2 (this paper). Stop-plus-liquids in Sardinian are discussed in Lai (2013a, 2013b, 2014), Scheer (2014).



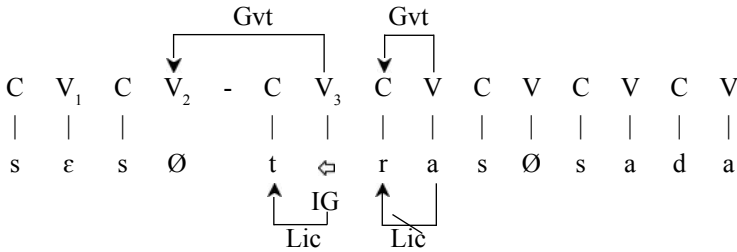
By contrast, if one looks at the representation of simplex consonants and stop-plus-liquid clusters in (14) and (15) below, it is clear that when preceded by a word-final consonant, they do not show a sequence of two empty nuclei:<sup>11</sup>

(14) Simplex consonant preceded by a final coda



/ses torrada/ → [ses torrada] ‘You are back’

(15) Stop-plus liquid preceded by a final coda

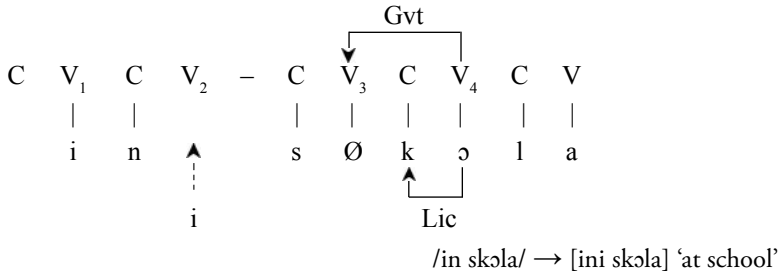


/ses trassada/ → [ses trassada] ‘You look like a mess’

The resultant sequences in (14) and (15) are perfectly licit: every nucleus is governed. By contrast, in (16) heterosyllabic clusters (which enclose an empty vocalic position) are preceded by another empty position, i.e. the empty nucleus of the final consonant. This creates an ill-formed structural configuration, because of the two nuclei in sequence (V<sub>2</sub> and V<sub>3</sub> in 16). Only the empty nucleus within the heterosyllabic cluster can be governed. Government cannot reach the empty nucleus of the consonant-final word that precedes (V<sub>2</sub> in 16).

<sup>11</sup> As argued for in Section 3.1, Infrasegmental Government silences the empty nucleus within the stop-plus-liquid cluster. Therefore, the only nucleus to be governed is the final empty nucleus of the word-final consonant, i.e. V<sub>2</sub> in (15). For further details on stop-plus-liquid in CVCV see Lowenstamm (2003), Ségéral and Scheer (2005), Brun-Trigaud and Scheer (2010), Lai (2013a and 2014), Scheer (2014).

## (16) Heterosyllabic cluster preceded by a final coda



To attain the correct structural conformation and thus avoid the sequence of two empty nuclei, an epenthetic vowel surfaces in the empty position that cannot be governed: the vocalic slot of the final coda (V<sub>2</sub> in 16 above). By contrast, in (14) and (15), there is only one empty nucleus to be governed and thus epenthesis does not occur.

The vowel-zero alternation in Sardinian is an invaluable tool to establishing the structural identity of word-initial segments and it is thus decisive in distinguishing between a simplex consonant and a heterosyllabic cluster in word-initial position.

### 5. Sardinian Gemimates

As already mentioned, Sardinian displays a small group of consonants who behave in a peculiar way. Their behaviour does not conform to those of simplex consonants and there are several reasons to believe that in fact we are faced with word-initial gemimates. The consonants that in my view can have a geminate identity word-initially are the following: r, ʃ, ʧ, d and s.<sup>12</sup>

The issue of gemimates in Sardinian is controversial and, their existence word-internally has often been called into question.<sup>13</sup> The trouble is that in

<sup>12</sup> As far as I know, Bolognesi (1998) was the first to suggest that Sardinian displays word-initial palatals with a geminate identity. His analysis (in Optimality Theory) and data can be found in Bolognesi (1998). Bolognesi's data refer to another Sardinian dialect: Sestu Sardinian. The data here are from Tertenia Sardinian. While both dialects belong to the Campidanese group, they differ in nontrivial ways. As we will see in Section 7, the list of word-initial gemimates can be extended to other segments (at least for Tertenia Sardinian). Note that in Romance languages word-initial gemimates are rare and debated. One example is Faetar (Franco-Provençal language). I thank an anonymous reviewer for bringing this language to my attention.

<sup>13</sup> For further discussion on Sardinian gemimates, see Wagner (1941: §428), Contini (1987: 55, note 12, 59ff, 101ff), Lőrinczi (1996), Bolognesi (1998: 158ff, 411), Molinu (2015). Ladd and Scobbie (2004) report that durational differences can be detected word-internally with experimental phonetic analysis. A recent work on the phonetics of

Sardinian, word-internal obstruents do not have a short counterpart as happens in Italian or Japanese.<sup>14</sup> In fact, these languages display minimal pairs of this kind listed in (17) and (18). Japanese data are from Tsujimura (2007).

## (17) Italian

a. papa	pappa
‘Pope’	‘pap’
b. bruto	brutto
‘brute’	‘ugly’
c. bako	bakko
‘silkworm’	‘Bacchus’

## (18) Japanese

a. saka	sakka
‘hill’	‘author’
b. kata	katta
‘shoulder’	‘won’

Unlike those languages, Sardinian does not have length contrasts in obstruents.<sup>15</sup> Speakers do not perceive any difference between simple and geminate obstruents. An obstruent is usually pronounced long but alternative short realisations (for the same segment in the same context) are also acceptable.<sup>16</sup> Therefore, a given speaker may produce variable results for the same stop. For example, a word such as *maccu* ‘fool’ (from Latin *MACCU(M)*) can be pronounced either [makku] and [maku]. In the lack of the kind of opposition mentioned for Italian and Japanese, the difference between long and short consonantal duration is phonologically meaningless.

This point is worth emphasising because in the past, many scholars have analysed the phonology of Sardinian through the lens of their own (Italian) phonological system, thus overstating the phonological import of consonantal duration. This is especially true if the scholar was a native speaker of Italian for whom the kind of alternation reported in (17) has a phonological meaning. Thus in Sardinian it is crucial to distinguish between the underlying representation of a segment and its surface realization.

voiceless stops in Campidanese Sardinian states that “Voiceless stops do not show length as a distinctive feature but present a significant lengthening which could be triggered by prosodic conditions” (De Iacovo and Romano, forthcoming).

<sup>14</sup> On Italian geminates, see Chierchia (1986); Burzio (1989); Loporcaro (1996); Wiltshire and Maranzana (1998); Davis (1999 and 2011), a.o. For Japanese geminates, see Tsujimura (2007); Kobozone *et al.* (2009); Davis (2011); Kawahara (2007, forthcoming). Word-initial geminates are also reported for Salentino (Romano 2003a and 2003b).

<sup>15</sup> In Sardinian, consonant length is not distinctive within words (cf. Viridis 1978; Contini 1987; Jones 1988). Distinctive consonant length is restricted only to certain consonants, namely /r/ - /rr/, /n/ - /nn/, /l/ - /ll/ (see Viridis 1978: 90).

<sup>16</sup> The lack of phonological length contrast for obstruents also reflects on the variety of Italian spoken in Sardinia. As written by Contini (1987: 59), “Les Sardes en général ne distinguent pas, en parlant italien, entre les géminées et les non géminées”. For further details and references, see Loi Corvetto (1983); Contini (1987); Lörintzi (1996); Schirru (2000), a.o.

Let us look at the issue from an historical perspective. In the evolution from Latin to Sardinian, simple voiceless stops became voiced fricatives, while Latin geminate voiceless stops are still voiceless stops and are usually pronounced long. This can suggest that Sardinian retains the Latin geminates, whose counterparts are the voiced fricatives. If this was certainly true at the time when lenition took place, (i.e. in internal sandhi, a diachronic lenition affected only simplex voiceless stops leaving unaffected the geminates), nowadays no tool can be exploited to prove the underlying identity of these internal segments. The fact that in internal sandhi native speakers lack any intuitions on the matter and phonological processes are no longer active, means that one is not in the position to definitively argue for a geminate or a simplex identity.

As for word-initial segments, the situation is completely different. In external sandhi a great number of phonological processes are still in place and can be of help in understanding the underlying structure of segments (see Sections 3 and 4).

### 6. *Word-Initial Geminates in Sardinian*

In the previous Section, I have emphasised that, unfortunately, native intuitions cannot be of help in determining the nature of a segment. One must thus resort to other tools. In Sardinian, if one pays attention to a small group of segments in external sandhi, their behaviour appears unusual. I am thinking of the following segments: *s*, *ʃ*, *ʃʃ*, *ɖ* and *r*.

In fact, it happens that in a given position the same segment results in a different output depending on the lexical item involved. Consider the different behaviour of the voiceless alveolar fricative in intervocalic position:

#### (19) Voiceless alveolar fricative in intervocalic position

##### a. Items affected by lenition

[sonu]	[su zonu]	'the sound'
[sərri]	[sa zərri]	'the sister'
[sɛdɖa]	[sa zɛdɖa]	'the saddle'

##### b. Items that resist lenition

[suyu]	[su suyu]	'the neck'
[sia]	[sa sia]	'the aunt'
[sukuritu]	[su sukuritu]	'the hiccup'

As one can see, /s/ surfaces in intervocalic positions with two different outputs. In (19a), /s/ undergoes lenition while in (19b) it appears insensitive to lenition.

The words with word-initial /s/ that resist lenition are uncommon. The expected behaviour is that in intervocalic position the voiceless alveolar fricative should surface as voiced.

The same situation can be observed with the voiceless palato-alveolar affricate. Some words respond to lenition, while others do not:

(20) Voiceless palato-alveolar affricate in intervocalic position

a. Items affected by lenition

[ʃiða]	[sa dʒiða]	‘the week’
[ʃɛna]	[sa dʒɛna]	‘the dinner’
[ʃɛrβeddu]	[su dʒɛrβeddu]	‘the brain’

b. Items that resist lenition

[ʃfentezimu]	[su ʃfentezimu]	‘the cent’
[ʃfentru]	[su ʃfentru]	‘the centre’
[ʃfellulari]	[su ʃfellulari]	‘the mobile phone’

Note that even for the voiceless palato-alveolar affricate the common output in intervocalic position is the lenis one, in which the voiceless affricate surfaces as voiced.

The underlying criterion for the observed distribution is easy to identify, at least for the affricate.<sup>17</sup> As noted by Bolognesi (1998), the distinction across the two lexical groups results from the fact that items in (20a) are from the native lexicon while those in (20b) are late loanwords from Italian. Initial palato-alveolar affricates in recent loanwords are analysed differently from initial segments in words inherited from Latin directly.<sup>18</sup> Here it is important to note that in isolation the segments surface in the same way. Anyway, as we will see, other contexts suggest that we might not be dealing with the same segment.

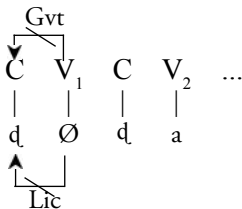
### 6.1 Sardinian Word-Initial Geminates and the Vowel-Zero Alternation

In order to argue that Sardinian displays word-initial geminates one needs a valuable diagnostic to identify the nature of the syllabic structure of the segments in question.

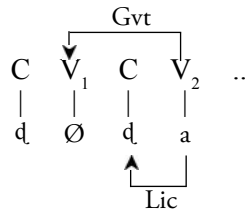
In CVCV, geminates occupy two consonantal slots, which enclose an empty vocalic position. They are represented as depicted below:

(21) Representation of geminates

a. 1<sup>st</sup> half of a geminate



b. 2<sup>nd</sup> half of a geminate



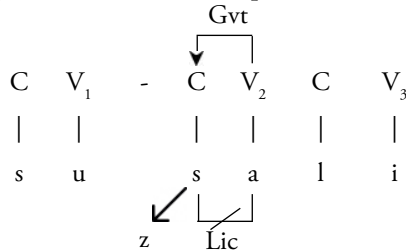
<sup>17</sup> For the other segments, see Section 8.

<sup>18</sup> For further discussion, see Section 8.

The first half of a geminate appears neither governed nor licensed while the second half is ungoverned and licensed. Note that the lateral relations experienced by the two half of a geminate coincide with those of the two members of coda-onset clusters and sC clusters. Geminate can thus be considered heterosyllabic clusters for all hands and purposes. Note also that like in other heterosyllabic clusters, no relation holds between the two members of the geminate unlike what happens in stop-plus-liquid clusters.<sup>19</sup>

In this Section, lenition gave us a clue that the segments in question may not be simplex segments. In fact, data in (19) and (20) reveal a divide between two classes of the same segment. In (19a) and (20a), the segments go through lenition while in (19b) and (20b) the segments appear unaffected even though the conditions for lenition seem to be met. The items that respond to lenition are represented in CVCV as follow:

(22) Simplex /s/ in intervocalic position



/su sali/ → [su zali] ‘the salt’

The case exemplified in (22) is exactly what is expected from an intervocalic consonant in Sardinian. Due to its intervocalic position, the consonant in question experiences the negative influence of government, thus surfacing as [z], its lenited counterpart. As already said in Section 3, this is true of every simplex obstruent in intervocalic position. Thus, the items that underwent lenition in (19a) and (20a) represent the regular output of a Sardinian obstruent in (weak) intervocalic position.<sup>20</sup>

By contrast, the segments that resisted lenition, namely (19b) and (20b) do not conform to the behaviour expected from a simplex intervocalic obstruent. For instance, let us look at the alveolar fricative. In (19b), lenition cannot affect what seems to be the same segment as in (19a). Compare e.g. /su/ [sali] → [su zali], \*[su sali] ‘the salt’ with /su/ [sipiri] → [su sipiri], \*[su zipiri] ‘the rosemary’.

<sup>19</sup> Recall from Section 3.1 that branching onsets are related by Infrasegmental Government, thus their structural situation differ with respect to heterosyllabic clusters.

<sup>20</sup> See Section 2.2, this paper.

A way to explain this contrasting behaviour is to speculate that the mentioned segments are not affected by lenition because of a structural conformation that makes lenition impossible. Only simplex obstruents in a governed condition can be targeted by lenition.<sup>21</sup> This leads us to hypothesise that we are looking not at a simple obstruent in weak position but at a cluster, namely a geminate.<sup>22</sup>

However, lenition is not the only tool that Sardinian has for determining the identity of a segment. Further evidence comes from another diagnostic: the vowel-zero alternation.

As said above, Sardinian displays various phonological processes in external sandhi. The most useful for our purposes is the alternation between zero and an epenthetic vowel in the empty vocalic slot of a word-final consonant. Recall that the insertion of the epenthetic vowel is possible only when a heterosyllabic cluster follows a word-final consonant. Simplex consonants do not trigger epenthesis.

To argue beyond doubt for the existence of initial geminates, one needs to look more in depth at the behaviour of the same segments when preceded by a word-final consonant and then compare the observed outputs with those of their lenited counterpart.

For the sake of simplicity, I will focus again on the voiceless palato-alveolar affricate and the voiceless alveolar fricative. The third column in (23) and (24) reports our segments in post-consonantal position:

(23) Voiceless alveolar fricative in post-consonantal position

a. Items affected by lenition

after a vowel	word-initial	after a consonant	
[su zonu]	[sonu]	/is/ [sɔnuʃ]	‘the sounds’
		[is sɔnuʃ]	
[sa zɔrri]	[sɔrri]	/is/ [sɔrriʃ]	‘the sisters’
		[is sɔrriʃ]	
[sa zɛdɖa]	[sɛdɖa]	/is/ [sɛdɖaʃ]	‘the saddles’
		[is sɛdɖaʃ]	

b. Items that resist lenition

after a vowel	word-initial	after a consonant	
[su suɣu]	[suɣu]	/is/ [suɣuʃ]	‘the necks’
		[izi suɣuʃ]	
[sa sia]	[sia]	/is/ [sias]	‘the aunts’
		[izi sias]	
[su sukuritu]	[sukuritu]	/is/ [sukurituʃ]	‘the hiccups’
		[izi sukurituʃ]	

<sup>21</sup> See Brun-Trigaud and Scheer (2010).

<sup>22</sup> Sardinian underlying geminates sheer many properties with the underlying geminates analysed in Ségéral and Scheer (2001b). Analogously to our Sardinian facts, phonetics did not offer any clue to identify what had to be classified as underlying geminates (cf. Ségéral and Scheer 2001b).

## (24) Voiceless palato-alveolar affricate in post-consonantal position

## a. Items affected by lenition

after a vowel	word-initial	after a consonant	
[sa dʒið̃a]	[ʃið̃a]	/duas/ [ʃið̃as]	‘two weeks’
		[duaʃʃið̃as]	
[sa dʒena]	[ʃena]	/is/ [ʃenas]	‘the dinners’
		[iʃʃenas]	
[su dʒerʃed̃ɔ]	[ʃerʃed̃ɔ]	/is/ [ʃerʃed̃ɔs]	‘the brains’
		[iʃʃerʃed̃ɔs]	
[sa dʒiʃud̃ɔ]	[ʃiʃud̃ɔ]	/duas/ [ʃiʃud̃ɔs]	‘two onions’
		[duaʃʃiʃud̃ɔs]	
[su dʒivarɔ]	[ʃivarɔ]	/is/ [ʃivarɔs]	‘kind of bread’
		[iʃʃivarɔs]	
[sa dʒerezia]	[ʃerezia]	/duas/ [ʃerezias]	‘two cherries’
		[duaʃʃerezias]	

## b. Items that resist lenition

after a vowel	word-initial	after a consonant	
[su ʃentezimu]	[ʃentezimu]	/is/ [ʃentezimus]	‘the cents’
		[izi ʃentezimus]	
[su ʃentru]	[ʃentru]	/is/ [ʃentrus]	‘the centres’
		[izi ʃentrus]	
[su ʃellulari]	[ʃellulari]	/is/ [ʃellularis]	‘the mobile phones’
		[izi ʃellularis]	
[sa ʃabata]	[ʃabata]	/is/ [ʃabatas]	‘the slippers’
		[izi ʃabatas]	
[su ʃinema]	[ʃinema]	/is/ [ʃinemas]	‘the cinemas’
		[izi ʃinemas]	
[sa ʃambella]	[ʃambella]	/is/ [ʃambellas]	‘the donuts’
		[izi ʃambellas]	

As one can see, only words whose initial segments resist lenition require the epenthesis.<sup>23</sup> In the other examples, the vowel does not surface: on the contrary, it would be ungrammatical if it appeared (e.g. /is/ [sɛd̃ɔs] → [is sɛd̃ɔs], \*[izi zɛd̃ɔs], \*[izi sɛd̃ɔs]). Inversely, when preceded by a word-final consonant, the items that resist lenition require epenthesis: outputs like \*[is sias] in place of [izi sias] are ungrammatical.<sup>24</sup>

<sup>23</sup> Note that in the (24a), third column, the palato-alveolar affricate when preceded by /s/ becomes a palato-alveolar fricative. A thorough discussion of the matter is beyond the purpose of this work.

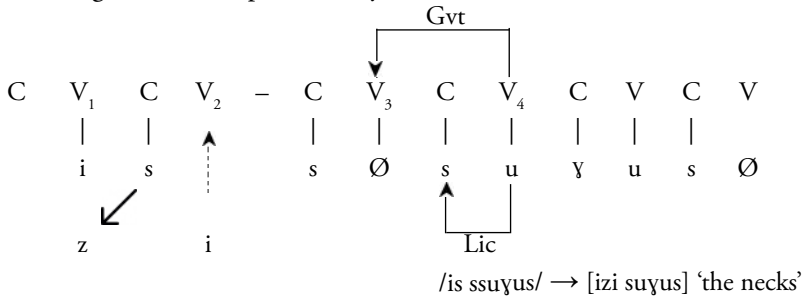
<sup>24</sup> It is also worth noticing that the epenthetic vowel that fills the final coda of the article (i.e. /is/ → [izi] ‘the’) makes it the case that the initial segment appears in intervocalic position. Thus, it seems to create the context for lenition. However, lenition does not apply.



The insertion of the epenthesis is further evidence for the fact that we are faced with word-initial geminates. Positing an underlying geminate identity for these initial segments is the only way to account for both a) the lack of lenition and b) the surface of the epenthetic vowel in the alternation site of the word-final consonant.

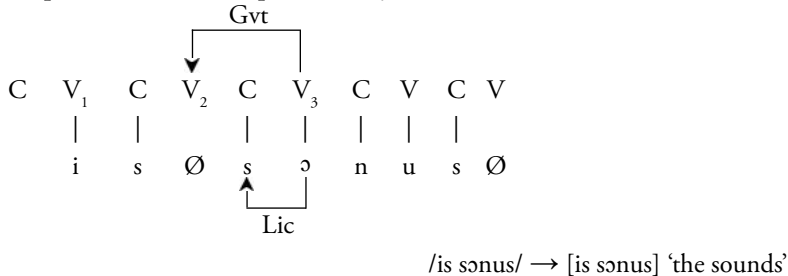
Sardinian initial geminates translated in a CVCV representation appear as follow:<sup>25</sup>

(25) Initial geminate /ss/ preceded by a final coda



If one compares the representation of an initial geminate in (25) with that of an initial simplex segment in (26), the structural reasons for their different behaviour are clear.

(26) Simplex consonant /s/ preceded by a final coda



Recall from Section 4 that when a final coda precedes a heterosyllabic cluster, an epenthetic vowel surfaces in the empty vocalic slot of the final coda (e.g. /sɔi in∅ skɔla/ → [sɔi ini skɔla], 'I am at school'). This epenthetic

This is expected, since geminates never undergo lenition. In fact, the right form is [izi sias] 'the aunts' while a lenited output such as \*[izi zias] is ungrammatical.

<sup>25</sup> For in-depth theoretical discussion on geminates, refer to Ségéral and Scheer (2001b).

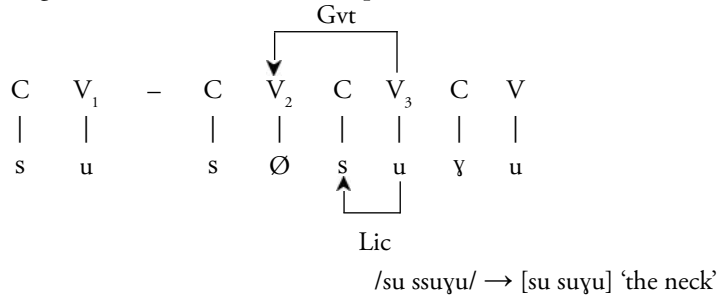
vowel obligatory occurs if and only if a heterosyllabic cluster follows the final coda.

This is precisely what happens in (25) above. In (25) the word-initial [s] is an underlying geminate (i.e. /ss/). Therefore, its structural configuration is that of heterosyllabic clusters. Consequently, when the geminate is preceded by a word-final consonant the resulting sequence of two empty nuclei is ill-formed and is resolved by epenthesis in the empty vocalic position that is not governed, i.e.  $V_2$  in (25).

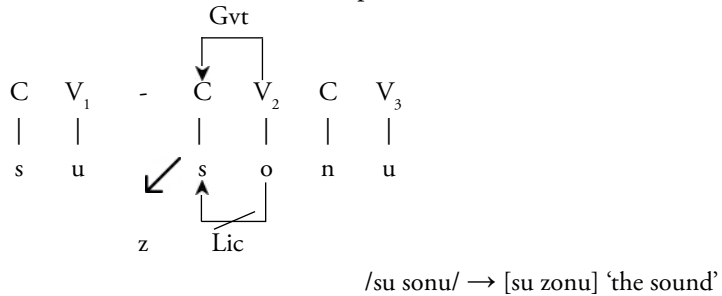
By contrast, simple consonants never trigger epenthesis (e.g. /sɔi in domu/ → [sɔi in domu], \*[sɔi ini domu], ‘I am at home’). In fact, the fricative [s] in (26) is a simplex segment, so even if it is preceded by a final coda, there is only one empty nucleus to be governed, i.e.  $V_2$  in (26).

Compare also the representation of a word-initial geminate in intervocalic position with a simplex consonant in an analogous context:

(27) Initial geminate /ss/ in intervocalic position



(28) Simplex consonant /s/ in intervocalic position



The intervocalic simplex consonant in (28) is preceded and followed by filled nuclei. Thus, the negative effects of government directly apply to /s/, which appear in its lenited counterpart [z]. By contrast, in (27) government is required to govern the empty nucleus within the geminate.

7. *Word-Initial Geminates: f, r and d*

(29) presents the relevant data for the other obstruents for which I posit underlying geminate identity, namely: 1. voiceless palato-alveolar fricative, 2. alveolar trill, and 3. voiced retroflex stop. Data are from Terrenia Sardinian. It must be borne in mind, though, that Sardinian dialects may differ with respect to the phonological identity of the segments listed.

		(a) word-initial position	(b) intervocalic position	(c) post-consonantal position
1. voiceless palato-alveolar fricative				
<i>scimbulu</i>	'fringe (of a scarf)'	ʃimbulu	su ʃimbulu	/is/ [ʃimbulus] [izi ʃimbulus]
<i>scimpra</i>	'a moron (fem.)'	ʃimpra	sa ʃimpra	/is/ [ʃimpras] [izi ʃimpras]
<i>scenti</i>	'apprentice'	ʃienti	su ʃienti	/is/ [ʃientis] [izi ʃientis]
2. alveolar trill				
<i>ricetta</i>	'recipe'	riʃɛta	sa riʃɛta	/is/ [riʃɛtas] izi riʃɛtas
<i>regola</i>	'rule'	reɣola	sa reɣola	/is/ [reɣolas] izi reɣolas
<i>ristoranti</i>	'restaurant'	ristoranti	su ristoranti	/is/ [ristorantis] izi ristorantis
3. voiced retroflex stop				
<i>ddu</i>	CLIT.3.SG.M 'it'	dɖu	/pɔ/ [dɖu] <i>Fui</i> [pɔ dɖu] <i>lassai</i> <sup>26</sup>	/nd/ [dɖu] <i>Giai</i> [ndi dɖu] <i>at de bentu</i> <sup>27</sup>
<i>dda</i>	CLIT.3.SG.F 'it'	dɖa	/ka/ [dɖa] <i>Soi intrada</i> [ka dɖa] <i>appu 'itta</i> <sup>28</sup>	/nɣ/ [dɖa] <i>Si</i> [nɣi dɖa] <i>papat</i> <sup>29</sup>

As for the other segments listed in the previous Section, the syllabic status of *f*, *d* and *r* can be read off its environment. In (29), all segments are presented in different contexts. Data in (29a) list the surface forms of the items at hand in isolation, unaffected by phonological processes. (29b) lists the same segments

<sup>26</sup> *Fui po ddu lassai.* /fui pɔ dɖu lassai/ → [fui pɔ dɖu lassai], 'I was about to leave it'.

<sup>27</sup> *Giai nd ddu at de bentu.* /ɖgai nd dɖu at de bentu/ → [ɖgai ndi dɖu aɖi e βentu], 'It's definitely windy'.

<sup>28</sup> *Soi intrada ka dd'appu 'itta.* /sɔi intrada ka dɖa appu bitta/ → [sɔi intrada ka dɖ appu itta], 'I came in because I saw her'.

<sup>29</sup> *Si nci dda papat.* /si nɣ dɖa papat/ → [si nɣi dɖa βapaða] 'he/she eats it'.

in intervocalic position while in (29c) the items are shown in post-consonantal position to see if the structural condition for the vowel-zero alternation is met.

If one looks at (29) as a whole, it is evident that the behaviour of the relevant segments does not conform to the behaviour expected from simplex consonants. Every segment displays an epenthetic vowel to its left when preceded by a word-final consonant.

Therefore, data suggest that also for the voiceless palato-alveolar fricative, the alveolar trill and the voiced retroflex stop, one can assume an underlying word-initial geminate.

#### 8. *Further Observations and Some Provisos*

In the previous Sections, I have emphasised that our geminates do not form a uniform group. Only two of them contrast with their simplex counterpart, namely the voiceless palato-alveolar affricate and the voiceless alveolar fricative. Examples are the following:

- |  |                                |
|--|--------------------------------|
| (30) Voiceless palato-alveolar affricate |                                |
| a. simplex                               | b. geminate                    |
| /sa tʃiða/ → [sa tʃiða]                  | /su tʃinema/ → [su tʃinema]    |
| /is tʃidas/ → [iʃ tʃidas]                | /is tʃinemas/ → [izi tʃinemas] |
| (31) Voiceless alveolar fricative        |                                |
| a. simplex                               | b. geminate                    |
| /sa sɔrri/ → [sa zɔrri]                  | /su ssuyu/ → [su suyɯ]         |
| /is sɔrris/ → [is sɔrris]                | /is ssuyus/ → [izi ssuyɯs]     |

Like in the Sestu Sardinian discussed in Bolognesi (1998), in our dialect voiceless palato-alveolar affricates can be divided in two groups based on the lexicon: words with the initial geminate /tʃ/ are loanwords, while simplex /tʃ/ are the regular evolution of Latin C+i, e.

In fact, Sardinian displays a lexical stratification, with separate treatments of native vocabulary and foreign vocabulary (cf. Ito and Mester 1999). This means that seemingly identical segments undergo different phonological rules according to the lexical stratum to which they belong.

The voiceless alveolar fricative, like the voiceless palato-alveolar affricate, occurs as a simplex segment and as a geminate. Simplex /s/ can be from loanwords as well as the outcome of Latin S. Its geminate counterpart includes words of unknown etymology (e.g. /ssipiri/ ‘rosmary’, cf. Wagner 1960-64), the evolution of Latin T+j and some recent loanwords from Italian that started with ts (e.g. Italian /tsukkero/<sup>30</sup> → [tsukkero] ‘sugar’, Tertenia Sardinian /ssukuru/ \* [sukuru] ‘sugar’).

<sup>30</sup> Italian has the following initial geminates: p j t s d z ʎ (Chierchia 1986).

In the previous Section, we also dealt with the following initial geminates: voiceless palato-alveolar fricative, alveolar trill, and voiced retroflex stop.

The voiceless palato-alveolar fricative /ʃʃ/ does not have a simplex counterpart. It can be both from loanwords and native lexicon.

The alveolar trill in word-initial position can only be geminate and from loanwords. It is important to note that in our dialect as well as in all Campidanese Sardinian dialects, word-initial alveolar trills are banned. Every Latin word with an initial rhotic was reanalysed with the insertion of a word-initial vowel, and the subsequent rhotic appears geminated, e.g. Latin ROTA became /orrɔða/ in our dialect. This was a diachronic process. A similar process is also available synchronically. A word-initial alveolar trill from a loanword is reanalysed as geminate and in the circumstances analysed in Sections 6 and 7 an epenthetic vowel surfaces.<sup>31</sup>

The voiced retroflex stop is the last word-initial geminate listed (see 29.3). The voiced retroflex stop is the result of Latin LL. It is common word-internally but not word-initially. The only examples that I could find were the following clitics: *ɖɖa-s*, *ɖɖu-s*.<sup>32</sup>

## 9. Conclusion

In this overview of Sardinian geminates, several points have been discussed. First, we focused on how in the case of Sardinian geminates appearances can be deceptive, both word-internally and word-initially. However, word-initially, one can resort to a different tool. In the case of Sardinian, the structural identity of an initial segment can be detected by taking into account its environment. In fact, Sardinian still has a number of phonological processes in external sandhi that can suggest which kind of segment we are dealing with. Therefore, by looking at these phonological processes through the lens of CVCV theory, one can identify the structural representation of word-initial segments and clusters.

Apparently, Sardinian tolerates initial geminates and these geminates behave precisely like heterosyllabic clusters. Sardinian geminates are not realised long in initial position. However, by looking at their environment, it is clear that Sardinian manifests a phonological contrast between simplex and geminate obstruents in word-initial position, at least for the voiceless palato-alveolar affricate and the voiceless alveolar fricative. Even though both surface as simplex consonants, their phonological identity differs: namely, some are simplex segments while others are underlying geminates.

<sup>31</sup> Synchronically, the epenthetic vowel is [i].

<sup>32</sup> On Sardinian clitics, see Jones (1993), Manzini and Savoia (2005), a.o.

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