



Geminate Consonants in Lycian: A Twofold Interpretation

Florian Réveilhac

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Annick Payne / Šárka Velhartická /
Jorit Wintjes (eds)

Beyond All Boundaries

Anatolia in the First Millennium BC

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BEYOND ALL BOUNDARIES

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Annick Payne, Šárka Velhartická and Jorit Wintjes

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GEMINATE CONSONANTS IN LYCIAN

A twofold interpretation¹

Florian Réveillac

Abstract: This paper proposes a new distribution of the Lycian consonants, which is less uniform than described hitherto. Indeed, whereas the word-initial and intervocalic positions allow either the simplex or the geminate consonant, only the simplex is attested for every consonant after a nasal and before a sonorant, and the geminate generally appears for most consonants after an obstruent and a liquid. In order to interpret the status of the consonantal length in Lycian, the sources of the geminates are explored. It emerges that word-initial and intervocalic geminates come from vowel syncope, assimilation, lengthening under stress, or reinterpretation of heteromorphemic sequences, while after an obstruent or a liquid they are synchronically automatic, indicating that the consonant was perceived as longer than between vowels. It is argued that the post-consonantal geminates are linked to the syllabification and reflect post-coda consonants.

Keywords: Lycian, Anatolian, phonology, phonetics, consonantal length

1 INTRODUCTION

As is well known, Lycian uses a lot of consonantal graphemes. Some of them are doubled, which sometimes leads to surprising consonantal sequences (e.g. *xttba* ‘harm’ or *Ddapssm̃ma*, personal name). This topic

1 I would like to thank the audience of the conference, and in particular Alwin Kloekhorst, David Sasseville, and Xander Vertegaal, for their helpful comments. The paper has greatly benefitted from suggestions by Adèle Jatteau, H. Craig Melchert, Enrique Nieto Izquierdo, and Anthony Yates, to whom I am obliged. I am also very grateful to Annick Payne and Šárka Velhartická for improving the style of this article. I am of course responsible for any remaining errors. The abbreviations and symbols used in the paper are the following: V = vowel, C = consonant, O = obstruent, R = liquid, N = nasal, [.] = syllable boundary, and # = word boundary.

in particular aroused the interest of many early scholars, who tried to figure out what the origins of these geminates and their phonetic nature might be. Over the last decades, several interpretations have been proposed, but they rarely succeed in offering a complete and satisfying explanation. I therefore propose to investigate this issue, starting with a reanalysis of the data.

First, I will propose a new distribution of the simplex and geminate consonants in the Lycian corpus, describing the different positions that allow geminates and those that do not. The description will reveal that geminates have a double status according to the different positions they appear in. I will thus describe, on the one hand, geminates in initial and intervocalic position, while, on the other, I will propose a new interpretation of geminates after a consonant, whose use is synchronically automatic and corresponds to the perception of consonantal length, in connection with syllabification.

2 DISTRIBUTION OF THE LYCIAN CONSONANTS

2.1 State of the art

From the moment the first inscriptions in Lycian were published, scholars became interested in the Lycian consonantal system, especially in geminate consonants. Considering how little we knew at the time about the Lycian language, finding an adequate interpretation of them was quite a challenge. The first scholar to describe the Lycian geminates was Schmidt (1868: vi–vii, and Pl. B): not only did he arrange them according to their position within the word; he also drew up an inventory of consonants which led to a doubling of the next consonant. Thanks to a comparison with Cretan forms like Ττῆνα (= Attic Ζῆνα) < **dyēna*, for which he regards the initial geminate as [tj] or [dj] sequences, Schmidt concludes: “the repetition of consonants, which follow immediately another consonant and consequently begin a new syllable, will indicate the sound *y*”.

More than two decades later, Pedersen (1899: 85–87) formulated a simple law explaining the different types of consonant clusters and double consonants in Lycian: every consonant is geminated after another consonant. According to him, there are three exceptions to this rule: 1) there is no doubling after a nasal; 2) the liquids as well as *b*

(corresponding to [v], as reported by Pedersen) are not doubled after a plosive, a fricative or *m*; 3) post-consonantal nasals are not doubled before a consonant or at the end of the word.

When he published the first corpus of inscriptions in Lycian, Kalinka dedicated a part of the introduction to double consonants (Kalinka 1901: 4–5). He followed what Pedersen had written two years before, but he considered it a tendency (*norma quaedam*) rather than a law.

When H. Craig Melchert published his *Anatolian Historical Phonology* (1994), the corpus of inscriptions in Lycian had substantially expanded, so that some analyses had to be corrected or at least clarified. Regarding consonant gemination in clusters, he suggested that, in some cases, it could reflect the spreading of the consonant across a syllable boundary, e.g. *hrm̃mã* = [hr̃m.mã], even if, as he himself admitted, “the spreading of the stop across the syllable boundary does not seem as natural as that of continuants” (Melchert 1994: 295–296). He therefore supposed that such clusters are pronounced with an anaptyctic vowel, e.g. /pðẽ/ = [pəð.ðẽ]. This hypothesis, however, is contradicted by the fact that no such anaptyctic vowel occurs in any of the numerous adaptations of Lycian proper names in Iranian and Greek, e.g. *Xpparama* > Κπαραμω, and not **Καπαραμω *vel sim*.

The crucial paper by Theo van den Hout (1995) studied very carefully the distribution of some simplex and geminate consonants within the word, in order to determine whether the doubling is a graphic or a phonetic norm. The author concluded “that — except for a position in Anlaut — the double or single writing of consonants is subject to specific rules, that is, restricted to specific phonetic environments” and “that single writing of consonants is the rule: geminates are found only following liquids and certain consonants” (van den Hout 1995: 129).

Alwin Kloekhorst (2008), considering the distribution of all consonants other than liquids, confirmed this analysis. He came to the conclusion “that the difference between single and geminate spelling of consonants is only significant in word-initial position”, while “in all other positions the choice between the two is automatically determined by the environments” (Kloekhorst 2008: 127–128). As a result, for most consonants, the single or geminate writing would match an allophonic phenomenon, with an automatic lengthening after some obstruents and all liquids.

Two problems arise from this interpretation. First, it would be surprising to find a graphic rendering of allophones in such a young writ-

ing system as Lycian, which one would expect to be phonemic,² unless the allophones involved are noted by graphemes otherwise used to note real phonemes. Perhaps this interpretation should be qualified, for a more accurate description. Moreover, typological studies show that it is extremely rare to have a phonological contrast between single and geminate consonants in word-initial position only: generally, if a language has initial geminates, it implies the existence of medial geminates, which are much more common.³ Consequently, van den Hout's and Kloekhorst's interpretations have to be re-examined, starting from the description itself of the distribution between single and double consonants within the word.

Between the publications of van den Hout's and Kloekhorst's papers, Ignasi-Xavier Adiego proposed a diachronic study (2003) of Lycian geminates in order to explain their development: this will be discussed below (§ 3.1.).

2.2 Lycian consonants and the so-called deviant cases

First of all, it is useful to remind ourselves of the inventory of Lycian consonant phonemes:⁴

<p> /p/	<t> /t/	<k> /c/	<x> /k/	<q> /kw/	<K> ?
	<z> /ts/	<τ> /tj/			
	<θ> /θ/ ⁵	<s> /s/			<h> /h/

2 On this question, specifically for Greek dialects, see Méndez Dosuna 1993 and Méndez Dosuna 2017.

3 Muller (2001: 207–235) has recorded twenty-nine languages allowing word-initial geminates, and mentions five that do not allow word-medial geminates: Ngada, Nhaheum, Pattani Malay, Yapese, and Sa'ban. However, some of these exceptions may only be apparent counter-examples (Dmitrieva 2012: 195–196). See also Kraehenmann 2011: 1126.

4 This inventory is mostly based on Melchert (2004b: 592), with some modifications such as <q> = /kw/, where I follow Kloekhorst (2006: 97–101). For a slightly different inventory, cf. Kloekhorst 2008: particularly 128.

5 The sign transliterated by <θ> probably noted the voiceless fricative [θ], *contra* Kloekhorst 2008: 124. This is particularly visible in borrowings from Old Persian, where Lyc. <θ> is used as an equivalent of OPers. <θ> = [θ] (Skjærvø 2000: 58, and Isebaert/Tavernier 2012: 306): e.g. **Miθrapāta* → *Miθrapata*, personal name — beside *Mizrpata*, which shows a nativized pronunciation — or **xšaθrapā* → **xssaθrapa* 'satrap' (cf. verb *xssaθrapaza* 'rule as satrap') — beside *xssadrapa* 'satrap', with a substituted [ð], probably because of the voicing assimilation of the following [r]. See also the plausible association of Lyc. *θurtta* with

 /β/	<d> /ð/	<g> /ɣ/
<m> /m/	<n> /n/	
	<l> /l/	<r> /r/
<w> /w/	<j> /j/	

Theo van den Hout (1995: 125–127) quite rightly left out of his study some deviating cases, which consist of obvious spelling mistakes, such as *tllaxñta* ‘payment, salary’ (N 320, 19–20) instead of **tllaxñta*, clearly derived from *ttlei-* ‘to pay’. However, in order to more accurately describe the distribution of all Lycian consonants, some of the minor graphic deviations previously excluded have to be reconsidered, and a description of the liquids has to be added:

- <tt> in intervocalic position: twelve attestations already in van den Hout (1995: 124), that is *ebette* (eight times; *passim*), *ebettehi* (N 324.23), *epatte* (TL 40d.2), *epēnetijatte* (TL 48.7), (*sede*=) *tti* (TL 111.6);
- <t> after <r>, all of them in proper names: *Artuñpara*/*Artuñpara* (M 231a–c), *Āmartite* (M 13), *Ddawāpartah* (TL 101.1), *Ertaxssir-azahe* (TL 44b.59–60), *Ertelijeseh* (TL 120.1), *Erteme/i-/Ertēme/i-* (TL 44c.8; N 311.1; 312.5), *Pertinah* (TL 82), *Pertinamuwa* (TL 66.1), *Spparta°* (TL 44b.27; 44b.64; 44c.2–3?), *Urtaqijahñ* (TL 25.6), and *Xertubi* (TL 108.2);
- <θ> in intervocalic position in the probable divine name *Ebuθis*;⁶
- <θθ> after <r>: in the place name *Kerθθi* (TL 44b.10?; 49; 55) and its derived adjective *Kerθθis* (TL 82)⁷;
- two attestations of <dd> after <r>, in the personal names *Prddewā* (TL 126.1) and *Wataprddata* (TL 40d.1?; 61.2);
- <KK> after <r> in the name *A/ErKKazuma-* (N 320.8, 18, 24–25, 28–29);
- simple <K> in word-initial position in the personal name *Kadunimi* (TL 44a.39–40);
- <z> after <r>: beside *Krzz[ā]nase* (TL 44b.53), *hrzze/i-* (*passim*), *Krzzubi* (TL 83.5) and *Trzzube/i-* (TL 111.4), variant pairs *Parzza*

some epichoric personal names attested in Greek inscriptions from Lycia: e.g. Σορταίμης, Σορτίας, Σορταλῖς, and Ερμα-σορτας (Schürr 2016a: 710; but the meaning ‘uncle’ is uncertain, cf. Melchert 2004: 75, and Neumann 2007: *s.u.* *θurtta*).

6 This form was found, some years ago, in an epitaph from Korba (Neumann 2000: 184–185).

7 Cf. Mil. *Kridesi* < **Karidasi* (Eichner in Borchhardt/Eichner/Schulz 2005: 36–37).

- (TL 44c.2) vs. *Parza* (TL 44c.14; 44d.1–2?), *przze/i-* (TL 29.3; 44a.28; 44a.33?) vs. *przis* (TL 26.10), and especially *xurzazē* (TL 44b.44), *xurzide* (TL 44b.43), and the personal name *Erzesinube* (TL 111.1);
- <zz> in intervocalic position: in variants *wazzisñ* (TL 29.5) beside *wazisñ* (TL 44b.13) and *wazisse* (TL 104a.3), and *Wazzije* (TL 87.5) beside *Wazijeje* (TL 52.1), but also in *azzala-* (TL 44b.59; 44c.10), *Idazzala* (TL 32v; N 306.1; = Εἰδασσαλα), *Kizzaprñna-* (TL 44c.11, 14 and 15; Iran. *Çiçaḫarnā), *Pizzi* (TL 98.1), *Plezzijeheje* (TL 138.2–3), *Wezzeimi* (TL 51.3), and acephalous **jezze* (TL 35.8);
 - <hh> in initial position is probably anomalous: its single attestation is the verbal form (*eseri*) *hhati* (N 320.41) vs. about ten other attestations of the verb *ha-* (*passim*);⁸
 - <l> in initial position is consistent, albeit rare;
 - <l> and <ll> in intervocalic position: many attestations of simple <l>, however the geminate is attested in *erixalle* (TL 44a.5–6; 11), *Mullijeseh* (TL 105.2; = Μολλίσιος), *Pilleñni* (TL 25.6), and *Urebillaha* (TL 11.2);
 - <l> is consistent after obstruent;
 - <l> and <ll> after <r>: simple <l> only in *dderlidi* (TL 35.17), where as the geminate appears more frequently: *Kuprllē/i-*⁹ (M 25; 124a; 126; 204a; 205; 301a; TL 44a.2, 21, 30–31; N 324.2?), *Turllē/i-* (TL 29.15, 32q.2, 41.2), and *Aprlla°* (M 111 [*Aprll*]; Spier 1987: 36);
 - geminate <rr> is never attested.

2.3 A new distribution

With these elements taken into account, it is possible to present the following table which shows the distribution of the Lycian consonants. For greater clarity, additions and modifications to the table by Kloekhorst (2008: 126–128) – an extended version of that by van den Hout (1995: 129) – are underlined.

⁸ Pace Kloekhorst 2008: 127.

⁹ The isolated variants *Kuprli* (M 125) and *Kuplli* (M 124b) are the result of spelling mistakes (van den Hout 1995: 116).

	#_	V_V	O_	R_	N_	_OO	_R/N
<p>	<i>p-, pp-</i>	<i>-p-</i>	<i>-pp-</i>	<i>-pp-</i>	<i>-p-</i>	<i>-p-</i>	<i>-p-</i>
	—	<i>-b-</i>	<i>-b-</i>	<i>-bb-</i>	—	—	<i>-b-</i>
<t>	<i>t-, tt-</i>	<i>-t-, -tt-</i>	<i>-tt-</i>	<i>-t-, -tt-</i>	<i>-t-</i>	—	<i>-t-</i>
<θ>	<i>θ-, θθ-</i>	<i>-θ-, -θθ-</i>	<i>-θθ-</i>	<i>-θθ-</i>	—	—	<i>-θ-</i>
<d>	<i>dd-</i>	<i>-d-</i>	<i>-d-, -dd-</i>	<i>-dd-</i>	—	—	<i>-d-</i>
<k>	<i>k-</i>	<i>-k-</i>	—	—	<i>-k-</i>	—	<i>-k-</i>
<x>	<i>x-</i>	<i>-x-</i>	<i>-xx-</i>	<i>-xx-</i>	<i>-x-</i>	<i>-x-</i>	<i>-x-</i>
<q>	<i>q-</i>	—	<i>-qq-</i>	<i>-qq-</i>	—	—	<i>-q-</i>
<K>	<i>K-</i>	—	—	<i>-KK-</i>	—	—	—
<g>	—	<i>-g-</i>	—	—	—	—	—
<s>	<i>s-, ss-</i>	<i>-s-</i>	<i>-ss-</i>	<i>-ss-</i>	<i>-s-</i>	<i>-s-</i>	<i>-s-</i>
<z>	<i>z-, zz-</i>	<i>-z-, -zz-</i>	<i>-zz-</i>	<i>-z-, -zz-</i>	<i>-z-</i>	<i>-z-</i>	<i>-z-</i>
<h>	<i>h-</i>	<i>-h-</i>	—	—	—	<i>-h-</i>	<i>-h-</i>
<n, ñ> ¹⁰	<i>n/ñ-, ñn-</i>	<i>-n-, -ñn-</i>	<i>-ñn-</i>	<i>-ñn-</i>	<i>-ñn-</i>	—	—
<m, ñm> ¹⁰	<i>m/ñm-, ñm-</i>	<i>-m-, -ñm-</i>	<i>-ñm-</i>	<i>-ñm-</i>	<i>-ñm-</i>	—	<i>-m-</i>
<l>	<i>l-</i>	<i>-l-, -ll-</i>	<i>-l-</i>	<i>-l-, -ll-</i>	<i>-l-</i>	<i>-l-</i>	<i>-l-</i>
<r>	—	<i>-r-</i>	<i>-r-</i>	—	<i>-r-</i>	<i>-r-</i>	<i>-r-</i>

A possible reason why some cells in the table are empty is the fragmentary nature of the Lycian corpus. Either way, the distribution of the consonants is decidedly less uniform than previous studies have shown. Once we discard the consonants that do not seem affected by doubling, i.e. <k>, <g>, <h>, <r>, as well as the glides <w> and <j>, it is possible to classify the others according to the positions in which they can appear as geminates:

10 For complete analyses of the data on nasals, especially on the syllabic variants *ñ* and *ñ̃*, the behaviour of which is beyond the scope of this paper, see Adiego 2005 and Kloekhorst 2008: 121–123.

	<ñm>	<ñn>	<zz>	<θθ>	<tt>	<pp>	<dd>	<ss>	<xx>	<qq>	<ll>	<bb>	<kk>
R_	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
O_	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×
#_	✓	✓	✓	✓	✓	✓	✓	✓	×	×	×	×	×
V_V	✓	✓	✓	✓	✓	×	×	×	×	×	✓	×	×

Several remarks need to be made regarding this data. First, the fact that doubling involves stops, fricatives, nasals, and liquids without affecting /h/ or the glides is typologically justified (Maddieson 2008: 1929). Secondly, some positions are clearly more conducive to gemination than others: thirteen signs are doubled after a liquid, whereas there are only five between vowels. It is even possible to identify certain tendencies:

- every geminate consonant appears as such at least after a liquid;
- every consonant which is geminate word-initially appears as such also after a consonant;
- except for [l:], every consonant which is geminate between vowels appears as such also word-initially.

Some positions allow both the simplex and the geminate for a number of consonants:

- word-initial position: /p t θ s ts m n/;
- intervocalic position: /t θ s ts m n l/;
- after an obstruent: /ð/;
- after a liquid: /t ts l/.

However, while only the singleton is attested for every consonant after a nasal and before a sonorant (liquid or nasal), the geminate generally appears for most consonants after an obstruent or a liquid. All these facts must therefore be described in a coherent way.

2.4 What is a geminate consonant?

Before going any further, it may be worthwhile to describe geminate consonants from a phonetic and a phonological point of view. As already argued by van den Hout (1995: 127), there is no reason to believe that graphic doubling is not a reflection of pronunciation.

Even if some scholars used to oppose phonologically geminate and long consonants, the *communis opinio* is now to associate them. Stuart Davis (2011: 837), for example, writes that “the term ‘geminate’ in pho-

nology normally refers to a long or ‘doubled’ consonant that contrasts phonemically with its shorter or ‘singleton’ counterpart”.

Phonetically speaking, consonantal length, linked to segmental duration, varies without always being perceptible. Phonologically, on the other hand, some languages distinguish between short and long vowels or consonants. Among languages with a phonological contrast between geminates and singleton consonants, the length, in the case of stops, corresponds to the acoustic duration of closure. It appears that long stops are characterized by closure duration between one and a half and three times as long as simple stops.¹¹ In Italian, for example, where there is a phonological contrast between simplex and geminate consonants, minimal pairs like *fatto* ‘fact’ vs. *fato* ‘fate’ or *palla* ‘ball’ vs. *pala* ‘shovel’ can be found.

While intervocalic geminates are not very problematic, since they represent the most frequently attested type, word-initial geminates are typologically quite rare (Kraehenmann 2011: 1125–1131). Indeed, even if the exact number of languages having initial geminates varies from one study to another, Jennifer Muller, for instance, in her dissertation dedicated to the phonetics and phonology of geminates, counts twenty-nine languages, including three belonging to the Indo-European family, that is Breton, Cypriot Greek, and Swiss German in its Bernese and Thurgovian varieties (Muller 2001: 204–233). As a matter of fact, word-initial geminates are not common, but they do exist.

Typological studies also point out that in languages with a consonant duration contrast, adjacent consonants (pre- and post-consonantal) are significantly rarer than intervocalic ones as well, and that medially post-consonantal geminates are more common than pre-consonantal ones (Dmitrieva 2012: 159–160, 165). As regards Lycian, according to the data, it appears that post-consonantal geminates are not phonologically contrastive, so that this language probably had contrastive word-initial and intervocalic geminates, like some other languages.¹²

In order to better understand the nature of Lycian geminates, it is necessary to know their sources. Consonantal doubling can be created by several phenomena, which are well attested from a typological perspective. Thus, Juliette Blevins (2004: 170–178) established at least seven pathways that could lead to the creation of a geminate:

11 See, with examples, Ladefoged/Maddieson 1996: 91–92.

12 For instance Iraqi Arabic, Kiribati, Mele-Fila, Piro, Ponapean, and Selayere (Dmitrieva 2012: 170).

- assimilation in a consonant cluster;
- assimilation between a consonant and an adjacent vowel or glide;
- vowel syncope;
- lengthening under stress, including expressive lengthening;
- boundary lengthening;
- reinterpretation of a voicing contrast;
- reanalysis of identical consonant + consonant sequences.

Given the distribution described above, it appears necessary to distinguish between, on the one hand, word-initial and intervocalic geminates, which are contrastive and, on the other, post-consonantal geminates, which are not.

3 SOURCES OF WORD-INITIAL AND INTERVOCALIC GEMINATES

Lycian geminates in these positions have at least three different sources: syncope between identical consonants, assimilation in consonant clusters, lengthening under stress, and reinterpretation of identical consonant sequences. It should be pointed out that several initial and intervocalic geminates are not yet explained with any certainty. It cannot be excluded that some of them are the result of a scribe's error, although this remains a default explanation, as the forms in which they appear are still often misunderstood.¹³

3.1 Vowel syncope between identical consonants

Vowel syncope is at the origin of several geminates created by coalescence: e.g. *tteri* 'city' (dat. sg.) and *ttaraha* (gen. adj. acc. n. pl.) beside *teteri* (nom. sg.), where the initial geminate is the result of the junction between two identical consonants after the syncope of the /e/.

Some verb-initial geminates originated from previously reduplicated forms, after syncope: e.g. *tti*- 'cause to pay' < **k^weyk^wey*- (cf. Mil. *kiki*-

13 Very recently, David Sasseville (2020: 105 and n. 38) has proposed to interpret the geminate in *epenētijatte* (TL 48.7) as the result of a syncope of *epenētijat(e)=te*, that is a verbal form with the enclitic particle =te. He concedes, however, that this explanation cannot apply to *epatte* (TL 40d.2), for this verb is not clause initial, and hence proposes to amend it to *epp'tte*, based on the parallel form *apptte* (*ibid.*: 281). However, the spelling *e/apptte*, with its two pairs of consecutive geminates, is anything but satisfactory. These forms are therefore still to be elucidated.

‘*id.*’: TL 55.5; Heubeck 1985: 40; Hajnal 1995: 156–157 n. 157; Melchert 2004: 65); *ppuweti* ‘he writes’ (N 320.23) and *ppuwēti* ‘they write’ (TL 83.7, 12–13; N 320.34) < probably **pupuwa-*, beside *puweti* ‘he writes’ < **puwa-*, all forms going back to the root **ph₂u-*.¹⁴

3.2 Assimilation in consonant clusters

In some cases, vowel syncope brought into contact two different consonants, which then underwent regressive assimilation: e.g. ethnics **Pinaléweñne-* > **Pinléwñne-* > *Pilleñne-* ‘Pinarean’, and **Pinaléwe/i-* > **Pinléwe/i-* > *Pillewe/i-* ‘Pinarean’. In both examples, the geminate [l:] goes back to a former sequence [nl].

The geminate <θθ>, which probably represents [θ:], results from an assimilation in a sequence of a dental + /h/, after syncope. This is attested in word-initial position: e.g. *θθēn-* ‘altar’ < **dasó-m* < PIE **d^hh₁-s-ó-* (cf. HLuw. /*tasa-* ‘cult stele’, Lyd. *tasa-* ‘column’).¹⁵ Within the word, the same phenomenon is well attested in several genitival adjectives in the last syllable of which the stem contains a dental consonant. Indeed, after the adjunction of the *-a/ehe/i-* suffix (cf. Mil. *-ese/i-*, Luw. *-assa/i-*) and the syncope of its first vowel, the dental consonant and the /h/ became adjacent, creating then the geminate [θ:]: e.g. *lada-* ‘wife’ → **ladahe/i-* > **ladhe/i-* > *laθθe/i-* ‘in-law (of husband)’ or *ted(e)i-* ‘father’ → **tedehe/i-* > **tedhe/i-* > *teθθe/i-* ‘paternal’.

The word-initial geminate in the appellative *ñme/i-* ‘installation’ and its derivatives is probably the result of the assimilation of **Tm°* < PIE **dem-* ‘to build’ (cf. Lyc. *tama-* ‘building’, HLuw. /*tama-* ‘to build’). Lastly, some words with initial *dd°* may result from the assimilation of a former *ñt°* sequence, if one accepts to consider *ddewē* (TL 44c.6) as a variant of the adverb *ñtewē* ‘opposite’.¹⁶

14 On reduplicated verbal forms, see Heubeck 1985: 42–43; Melchert 2004: 54, and Dempsey 2015: 247–257, 325–327; *contra*, van den Hout 1995: 125. For a discussion about Luw. *puwa-* and its cognates, see Giusfredi 2009.

15 On the Lycian form, see Eichner 1983: 59–62, and Melchert 1994: 316. About its Anatolian cognates, see Giusfredi 2016: especially 306–307, and Payne/Sasseville 2016: 76; *pace* Schürr 2016b.

16 This correlation has been suggested to me by Ilya Yakubovich (personal communication) and is also assumed by Yakubovich 2015. On the etymology of *ñtewē*, see Boroday/Yakubovich 2018: 18–19.

3.3 Lengthening under stress

From a typological perspective, it is quite common for a stressed syllable to be longer than a segmentally identical unstressed syllable. This lengthening can trigger the gemination of the post-tonic consonant, whose length is then reinterpreted as contrastive. This principle is at the basis of the famous ‘Čop’s Law’ for Luwian, which can be summarized as follows: $*\acute{e}.C_1 > aC_1.C_1$.¹⁷ A. Kloekhorst has convincingly shown that the dative-locative plural form *ebette* matches HLuw. *á-pa-ta-za*, thereby indicating that ‘Čop’s Law’ was common to both Luwian and Lycian (Kloekhorst 2014: 571–574, followed by Melchert 2020: 264 n. 3). As a consequence, some intervocalic geminates may correspond to a lengthening under stress.

3.4 Reanalysis of heteromorphemic consonant clusters

Heteromorphemic sequences with adjacent identical consonants can be the source of geminates: e.g. *epññēne/i-* ‘younger brother’ < *epñ* ‘after’ + *nēne/i-* ‘brother’. In that example, the first <ñ> represents a syllabic nasal, as can be seen in the corresponding personal name attested in Greek Επηννης.

4 ANALYSIS OF POST-CONSONANTAL GEMINATES

This new investigation of Lycian data reveals that only some word-initial and intervocalic geminates are contrastive, unlike post-consonantal ones, which seem to be generally automatic. Actually, it is difficult to understand the nature of geminates within consonant clusters, due to the variety of forms in which they occur: in inherited clusters (e.g. *trbbe* ‘opponent’; cf. Luw. /tarp/ba/ ‘to tread, to trample’), in secondary clusters resulting from syncope (e.g. *pddē* ‘before, in front’ built on *ped(e)* ‘foot’),¹⁸ and in clusters from borrowings (e.g. *Spparta*° ← Gk. Σπάρτη).

17 Čop 1970; Melchert 1994: 266; Melchert 2020: 264.

18 The connection of *pddē* with *ped(e)* instead of Hitt. *pēda-* ‘place’ inferred by Schürr 2007: 122 n. 22 is now widely accepted. See, for example, Yakubovich 2017: 9–10. H. Craig Melchert (*per litteras*, 10. 09. 2020) retains, however, the statement that *pddāt-* reflects a distributive form of the word for ‘place’.

4.1 Discussion of Adiego's hypothesis

In his previously mentioned study, Adiego (2003: 10–14) proposes distinguishing between two types of doubling for these consonant clusters:

- gemination in consonant clusters beginning with an obstruent, which constitute secondary clusters (e.g. *pddē* 'before, in front' built on *ped(e)*- 'foot'), or clusters in borrowings (e.g. *sttala*- 'stele' ← Gk. στήλη);
- gemination in consonant clusters beginning with a liquid, mostly inherited (e.g. *trbbe*- 'opponent'; cf. Luw. /tarpa-/ 'to tread, to trample').

Throughout the history of the Lycian language, some consonant clusters are unstable, as can be seen in the well-known examples **esti* and **estu* > *esi* '(he/she) is' and *esu* '(he/she) shall be' respectively, or in the iterative suffix **-sk-* > *-s-* (Melchert 1994: 304, 313–314). Adiego (2003: 11–12) hypothesises that, after simplification of such clusters in Lycian, the vowel syncope created secondary clusters, of which the second element underwent a gemination, corresponding to a preventive fortition.

Adiego's observation about the automatic nature of gemination in secondary clusters is certainly correct. His explanation, however, has to be reconsidered, since it presupposes that Lycian speakers were aware of the weakening of some consonant clusters and decided to modify their articulation, which is quite hard to accept. It seems more plausible, at first, to consider that, once those consonant clusters had been created due to a syncope effect, their evolution was simply not the same as for inherited clusters. Among secondary clusters, one can cite different examples: **askēti* (iterative) > *astti* '(he/she) does', **Patara*¹⁹ > *Pttara*, or *xddaza*- 'slave' (lit. 'the hasty one', cf. CLuw. *huda*- 'haste'). Therefore, gemination appears to be a collateral effect of syncope: after the syncope of the vowel between consonants, the second consonant underwent an automatic gemination.

Word-initial consonant clusters are more problematic, especially in inherited stems. Words like *hpn̄terus*- '?' and *httēmi*- 'anger' have both an initial *hCC* sequence generally associated to a **sC°*-stem, respectively **spend*- 'to pour', and **steh₂*- 'to stand' (Melchert 2004: 24, 26). Adiego (2003: 10–14) assumes for those stems the development of an anaptyctic vowel, which would then be syncopated, finally causing the doubling of

19 This place-name is probably to be linked to the mountain-name HLuw. /patara-/ (YALBURT fr. 4, § 1): cf. Poetto 1993: 31, and Carruba 1996: 32, 39.

the second consonant: *sC- > *sVC- > sCC > hCC. Although Adiego writes that the last two steps can be reversed, this seems to be contradicted by the equation Mil. *stt[ē]ni* ‘he becomes angry’ ~ Lyc. *httēmi* ‘anger’ (Schürr 1997: 62–64). In any case, several problems emerge from such a reconstruction. First, it is not very economical and, most importantly, the development of an anaptyctic vowel in an initial sC-cluster is unexpected: from a typological perspective, prothesis is more frequent than anaptyxis in these clusters (Fleischhacker 2001). Neither is this reconstruction satisfactory from a phonetic point of view, because an initial pre-consonantal s should not weaken to h, but remain stable in Lycian. Indeed, while heterosyllabic intervocalic *sC clusters become s (e.g. **h₁és.ti* > *esi* ‘he is’), a *sC- cluster in an onset is supposed to remain stable: e.g. **steh₂-* > *stta-* ‘to stand’.²⁰ Therefore, the form *httēmi* cannot go directly back to **steh₂-*: it is necessary to assume a stem with a pre-vocalic *s, as in *hpn̄terus-*. That word is indeed linked to HLuw. (CAELUM.*286.x)*sá-pa-tara/i-i-sa* (KARKAMIŠ A 2+3, § 17a), transcribed by Yakubovich as /sappantall(i)-/ and meaning ‘libation-priest’, and goes back to */sVpentero/i-/ (Hajnal 1995: 133–134; Yakubovich 2009: 555; Melchert 2016: 191).²¹

As can be seen, syncope itself is not sufficient to explain all cases of gemination after an obstruent, some of which suggest a generalization. This is obvious in the borrowings, where OCC sequences are found: e.g. Iran. *xšaθrapā* → *xssadrapa-* ‘satrap’, *xssaθrapaza-* ‘rule as satrap’, Gk. Ἀλέξανδρος → *Alaxssañtra*, *Alixssā[ñtra]*, and Gk. στήλη → *sttala* ‘stele’. Following Adiego, such forms show that in Lycian, for most consonant clusters, OC-sequences are prohibited, so that the second consonant is automatically doubled. The situation is clear and has been known for a long time: after an obstruent, for most consonants, only the geminate is allowed. Although the phenomenon of generalization is undeniable, especially in borrowings, the origin of this tendency has to be questioned.

Adiego (2003: 13), meanwhile, regards RCC clusters as different from OCC ones, on the basis that they are inherited and heterosyllabic, since

20 Melchert (2018: 30): assumption of Jasanoff (2010: 143–145) deriving Lyc. *stta-* from reduplicated **s(t)i-sth₂-* “is phonologically impossible, since it requires syncope of an *accented* vowel”. An alternative view is to consider the verb *stta-* and the appellative *sttala-* as borrowings from Greek (Schürr 2014), but against this hypothesis see the objections by Oreshko 2020: 20 and 24. On the problem of syllabification in #OCC sequences, see below § 3.2.

21 On the origin of the first vowel, see the competing hypotheses of Yakubovich (2009); Yakubovich (2016) and Melchert (2016).

he believes that OCC clusters are probably tautosyllabic (*ibid.*: 17). However, as Adiego himself notices, some RCC clusters in Lycian are not inherited but arise from borrowings, such as Gk. Ἀρπαγος²² → *Arppaxu-* or OIran. **ṛtambara-* → *Arttuṃpara-*. This question therefore deserves further investigation.

4.2 A new analysis

Melchert (1994: 295) rightly starts from the exceptions to the rule of post-consonantal gemination. The liquids /l/ (e.g. *Perikle* ← Gr. Περικλῆς) and /r/ (e.g. *trisñne/i-* ‘three-year-old’ < **tri-* ‘three’) are never doubled after an obstruent, whereas the fricatives /β/ and /ð/ know both treatments (e.g. *esbe-* ‘horse’ < PIE **ékwo-* vs. *trbbe-* ‘to tread’, cf. Luw. /tarp/ba-/ ‘id.’). It should be pointed out that the liquids are not geminated after /m/ even word-initially (e.g. *Mrexisa-*, *mlatraz-* ‘?’) and that the tautosyllabic character of these clusters is confirmed by the adaptation of some personal names in Greek, where such sequences were not natural²³ (unlike initial [mn]): *Mlejeuse/i-* → Μλαουσος and the variant Βλευαουσ, more conform to the Greek phonology. For /ð/, the sequence [Cð], less frequent than [Cð:], shows up in words with obscure etymology and meaning (e.g. *kduñ*, *esde*, or *Pagda*), and is thus difficult to comment on, but such a sequence could be tautosyllabic. To describe the double behaviour of /β/, on the other hand, two explanations are *a priori* possible: either the syllabification or the origin of the phoneme. Indeed, the examples *esbe-* and *trbbe-* both seem to syllabify differently ([e.sβe] vs. [tr.β:e]) and to present a /β/ going back to various phonemes (*w for *esbe-*²⁴ vs. *p/b for *trbbe-*). Nevertheless, the syllabification approach seems to be preferred thanks to other cases, if one accepts the connection of *Xba*^o (in *Pddē-xba-* and Mil. *Xbaladā*) with the divine name *Hebat*²⁵ or *xbaitē* (N 320.14) with CLuw. *hap(a)i-* ‘to bind’.²⁶ At least in the case of /β/, syllabification seems to play a role in the consonant doubling: when part of a branching onset it is never geminated, where-

22 This form is the Greek adaptation of the hypocoristic Iranian name **Arbaka*, derived from the adjective **arba-* ‘little, young’. The Greek reinterpretation of the Median general’s name is based on a pun with the appellative ἡ ἀρπαγή ‘pillage, plunder’.

23 See, for instance, the famous example **mṛtó-* → βροτός ‘mortal’.

24 About the obstruent + clusters, see lastly Martínez-Rodríguez 2019.

25 Neumann 2007: 114–115, with references.

26 Schürr (forthcoming).

as in post-coda position it is geminated. It is also plausible that <bb> is used to note the voiced contextual variant of /p/, [b], after the voiced sonorant,²⁷ as illustrated by the compound personal name *Natr-bbijēme/i-* (lit. 'given by Natri'; translation of the Gk. PN Ἀπολλό-δοτος 'given by Apollo'), whose second member represents the participle of the verb *pije-* as in *Mahane-piljeme/i-*.²⁸

The question is therefore whether the conclusion drawn above about /β/ can be extended to other consonants: in other words, is the post-consonantal geminate indicative of a heterosyllabic sequence? This is of course possible word-internally as in *θurtta-* or *lytta-*, which may correspond respectively to [θur.ta] and [ikt.ta], as Adiego (2003: 17) already pointed out alongside other possibilities. This would then mean that synchronically a post-coda consonant is always geminated. The difficulty arises mainly in word-initial clusters, such as *pddē*, *sttala-*, or *xddaza-*, which would tend to be considered tautosyllabic, for such onset clusters are typologically common. However, another hypothesis must be proposed since it does not explain the difference in behaviour between the liquids and /β/, on the one hand, and the other consonants, on the other: as mentioned before (§ 1.1), the presence of an anaptyx vowel is unlikely, but the first segment of the consonant sequence may be considered as an extrasyllabic appendix. This extrasyllabic appendix is well known in several languages like Italian, where initial obstruent-liquid clusters work like complex onsets, while initial sibilant-obstruent clusters such as *sp* are heterosyllabic, as shown by the use of the allomorphic forms of the definite article: e.g. *il treno* 'the train' vs. *lo scudo* 'the shield'.²⁹ As in other languages that are rich in consonant clusters, word-initial clusters in Lycian might have extrasyllabic segments or semisyllables licensed by the prosodic word,³⁰ which would lead to the gemination of the consequently post-coda consonant.

It would be tempting to explain Lycian gemination in the frame of Syllable Contact Laws theory, which lists all kinds of changes induced

27 Martínez-Rodríguez 2019: 222 n. 7, also suggests this idea.

28 About these names, whose formation is probably borrowed from Greek, see Melchert 2013: 47–48 and Réveillhac 2018: 438.

29 See, *inter alia*, Kaye 1992 and Hermes/Mücke/Grice 2013.

30 In the frame of the Optimality Theory, such segments are sometimes called 'semisyllables', especially for word-initial onset clusters that would otherwise be exceptions to the Sonority Sequencing Principle. For a general presentation of this phonological principle, see Parker 2011, with references; for a discussion about semisyllables in Georgian, Polish, and Bella Coola, see Cho/King 2003.

to segments on either side of the syllabic border, in order to preserve the contact (Murray/Vennemann 1982; Vennemann 1988). Geminataion is one of those types, but only for the first segment of the contact, not the second: A.B > A.AB (e.g. Lat. [lab.rum] > Ital. [lab.bro] 'lip' or Lat. [af.ri.ka] > Ital. [af.fri.ka] 'Africa'). Actually, the gemination of the second segment does not at all improve syllable contact but is the result of a phonotactic constraint, as can be seen in borrowings (e.g. Gk. Ἀρπάγος → *Arppaxu* and Iran. **Humarga* → *Humrxxa*, Mil. *Umrgha*³¹) and in Lycian compounds (e.g. *Natr-bbijēme/i*-).

Since gemination affects almost all types of consonants after a consonant (the exceptions are studied below), it must depend on phonotactics. In other words, a consonant after a consonant must have been perceived with a longer duration than in other positions. Therefore, as a consonantal length contrast existed word-initially and between vowels and was graphically represented, it was possible to use the geminate in that context in order to render consonantal duration. This can be compared to Italian: any Italian consonant has a length contrast in intervocalic position or between a vowel and a liquid, but some scholars admit that there are four consonantal degrees, like those defined by Castellani ([1956] 1980: 58–59).³¹ It is interesting to note that, in this study, the degree of stops, /m/, /n/, /f/, /v/, /l/, and /s/ in post-consonantal position is middle-strong (*grado medio-forte*), that is just before the strong degree represented, for instance, by double consonants in intervocalic position (e.g. *fatto* 'fact'). This so-called consonantal degree corresponds in fact to consonantal duration, that is the closure duration for stops and the duration of the consonant itself for other types of consonants. Whatever the exact duration corresponding to each identified degree is, from a phonological point of view, the only relevant opposition is between consonants of weak and strong degrees, simple and double respectively. But it is also the case that some consonants have a longer duration in a post-consonantal position than between vowels. This is consistent with the fact that the post-coda position is cross-linguistically strong, just like the word-initial one.³² Yet, several medieval Italian spellings reflect this particularity by geminating some consonants after a liquid or a nasal:

31 Jones (1967: 125) had already noted that a [t] preceded by a [n] in a post-tonic syllable (e.g. *Dante*, PN) was longer than a [t] preceded by a stressed syllable (e.g. *date* 'given'), with a length almost identical to an intervocalic [t:] (e.g. *fatto* 'fact').

32 These two positions have been grouped under the designation of 'Coda-Mirror' (Ségéral/Scheer 2001).

e.g. *trentta* ‘thirty’, *partte* ‘part’, *Bonacorsso* (PN), *parlla* ‘speaks’, *enffiare* ‘to inflate’ (Larson 2010: 1530). Since the double spelling was used in intervocalic position and between a vowel and a liquid to indicate a long consonant contrasting with the short counterpart, the same spelling was used to represent consonants that were contextually longer than simple ones. An analogous phenomenon might, therefore, explain what happened in Lycian, except that consonants after a nasal are not affected by gemination: given that, in Lycian, a length contrast existed word-initially and between vowels, and was graphically represented by the opposition *simplex* vs. *geminate*, it was possible to use the geminate spelling to represent contextually longer consonants than the singleton as well. In other words, because Lycian phonology had a consonantal length contrast word-initially and in intervocalic position, geminate spellings were generalised in positions where speakers perceived some consonants as longer than others.

There are, nevertheless, some exceptions to this rule: /t/ and /ts/ show up either simplex or geminate after /r/. Extending the parallel previously developed with Italian, one can see that the geminate spelling after a liquid or a nasal was not consistent in medieval texts. However, most of the discrepancies can be explained as due to prosody. In Giacomo da Lentini’s texts (12th century), for instance, <rtt>-spelling occurs in post-tonic position, whereas <rt> does in pre-tonic position: e.g. *partte* [parte] vs. *partenza* [partentsa] (Antonelli 2008: c). As a matter of fact, in such examples, consonantal length is correlated to the stress of the preceding syllable. Regarding accent as a factor of lengthening of the following consonantal segment is not very new and has been examined already in previous studies, since there is a general association between stress and phonetic duration.³³ Nevertheless, what might be less common is that the lengthening affects the second consonantal segment in a cluster. Not much is known about Lycian accent, but some aspects of it can easily be deduced from historical phonology. It is indeed quite evident that all the vocalic loss effects, which are characteristic of Lycian, are caused by a strong stress. Thus, aphaeresis is attested in several proper names that have variants (e.g. *Seimija* vs. *Eseimija*; *Sedepl̥mi* vs. *Esedepl̥me/i*), in some derivatives (e.g. *r̥mazata*- ‘monthly offering’ < *Arr̥ma*- ‘Moon’), but also in borrowings (e.g. Ἀπολλωνίδης → *Pulenjda*; Ἀθηναγώρας → *Tēnagure*, *Tēnegure*). Syncope, then, is also

33 From a typological perspective, and with references, see Blevins 2004: 173–174. For Italian, see particularly Payne 2005.

well documented, albeit difficult to describe with precise rules: the only certain thing is that several unaccented vowels were lost in Lycian, either post-tonic (e.g. **ládahe/i-* > *laθθe/i-* ‘in-law’; **Pinaléweñne/i-* > *Pilleñne/i-* ‘of Pinara’), or pre-tonic (e.g. **dasó-m* > *θθēn-* ‘altar’).³⁴ In many cases, one can assume that the stress not only causes syncope, but also has a phonetic manifestation by lengthening the second consonantal segment, as in verbal forms such as *astti* and *asñne*, where the post-consonantal geminate is most likely post-tonic. Relating post-consonantal geminates to stress could also explain some contradictory facts. For instance, the Greek divine name Ἄρτεμις is attested in Lycian in the dative forms *Ertēmi* (N 311.1) and *Ertemi* (N 312.5), as well as in the genitival adjective *Ertemehi* (TL 44c.8), always with a singleton [t], whereas the personal name derived from this name, *Erttimeli* (N 320.5; → Gk. Ἀρτεμηλῖς), has a [t:]. Would these forms then indicate an accent shift? The linking between accent and gemination is however quickly swept away by the fact that post-consonantal geminates are found word-initially and, even if one admits the extrasyllabic nature of the first consonantal segment, the latter cannot, by definition, be stressed, and accordingly in a word like *pddē* the geminate cannot be post-tonic.

How to explain, then, the discrepancy between *Erteme/i-/Ertēme/i-* and *Erttimele/i-*? The simplest assumption is that the simplex consonant is used in the divine name in order to reflect better the Greek [t], but when this name has been entirely integrated into Lycian, and serves as a basis for derivation, like *Erttim-eli*, [t] undergoes the typical Lycian lengthening after [r]. In fact, contrary to what I claimed before (Réveilhac 2018: 385), I believe now that a lot of exceptions to gemination after [r] concern non-Lycian forms, some of them being Greek, such as *Spparta°* and *Erteme/i-/Ertēme/i-*, others being Iranian, such as *Artuñpara-/Artuñpara-*, *Ertaxssiraza-*,³⁵ and probably *Ddawāparta-*, *Ertelijese(i)-*, *Pertina-*, *Pertinamuwa-*, *Urtaqija-*, *Xertube(i)-*, and *Erzesinube-*.³⁶ In fact, apart from the inevitable scribal errors (e.g. *przis* or

34 See tentative definition of syncope rules by Melchert (1994: 318–321) and Hajnal (1995: 175–188), the latter being more speculative.

35 On both names, see Schmitt 1982: respectively 18–19 and 21–22.

36 All these forms can be connected to an Iranian name or stem: *Ddawāparta-* to **brta-* ‘carried’ (cf. Tavernier 2007: 580; e.g. **Baga-brta-*); *Ertelijese(i)-* to **Rta-* ‘Arta’ as in *Ertaxssiraza-*; *Pertina-* and *Pertinamuwa-* to the name **Prtēna-* (cf. *Pirtēna* in Babylonian), derived from **prt-* ‘warrior, battle’ (*ibid.*: 277 and 601), *Pertina-muwa* being then a hybrid name; *Urtaqija-* to **vrta-* ‘hero’ (cf. *ibid.*: 614; e.g. **Vrtaka-*); *Xertube(i)-* to **krta-* ‘done, made’ (*ibid.*: 595; e.g. **Krtaka-*); *Erzesinube-* to **arza-* ‘battle’ (cf. *ibid.*: 577; e.g. **Arzaraθaima-*) or **rza-* ‘honest’ (cf. *ibid.*: 604;

dderlidi), it is likely that the use of a singleton [t] or [ts] after [r] is an indication of borrowing. The fact that this affects only [t] and [ts] and not the other consonants (e.g. *Arppaxu*) must be somehow related to the homorganic nature of both of the segments within the consonant cluster, as already suggested by Adiego (2003: 13–14) about [rt]-clusters.

5 CONCLUSIONS

Revision of the distribution of Lycian consonants showed that there was a length contrast for at least /p t ts θ s m n/. This length opposition is phonologically relevant only in word-initial and intervocalic positions. Because of the fragmentary nature of the Lycian corpus, it is quite difficult to find minimal or quasi-minimal pairs for each of the previously mentioned phonemes, but it is possible to cite as an example the following pair: *teri* /teri/ ‘when’ vs. *tteri* (dat. sg.) /t:eri/ ‘city’. Word-initial and intervocalic geminates have several sources: vowel syncope, assimilation, lengthening under stress, and reinterpretation of heteromorphemic sequences.

Most geminates after an obstruent or a liquid are synchronically automatic, as can be seen in some borrowings from Greek or Iranian, except for those involving a coronal consonant after [r]. The gemination in such contexts indicates that the consonant was perceived as longer than between vowels. The occurrence of geminates after a consonant does not seem linked to a prosodic context, but is better explained as a syllabic phenomenon: a post-coda consonant is always geminated, whereas when part of a branching onset (obstruent or /m/ + liquid or /β/) it is never geminated. This therefore implies considering word-initial clusters such as *stt-* etc. as beginning with an extrasyllabic appendix.

It appears, therefore, that Lycian geminates have two different statuses according to their position within the word: there is a phonologically relevant length contrast in word-initial and intervocalic positions, whereas after an obstruent and a liquid, the geminate occurs automatically for most consonants.

**Rzabarā-*). Lycian documents manifestly contain more Iranian names than those listed in Schmitt 1982 and Réveillhac 2018: 140–145. I will explore this issue further in another article in the near future.

Phonotactic rules on this respect can be summarized as follow:³⁷

- in word-initial position, /β/, /ɣ/, and /r/ are not permitted;³⁸
- in word-initial and intervocalic positions, there is a length contrast for most consonants. Exceptions are the dorsals, /β/, /ð/, /h/, and /r/;
- after a nasal, geminates are never found, except for /m/ and /n/ after a nasal vowel;³⁹
- after an obstruent, only a geminate is permitted, except in the case of liquids and /β/;
- after a liquid, only a geminate is permitted, except in the case of the coronal phonemes /t/ and /ts/ for which the simplex also appears.

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³⁷ For more, see Melchert 1994: 297–299.

³⁸ Only examples of initial <r> result from an aphaeresis and show a syllabic /r/, as *rñmazata-* (TL 131.4) ‘monthly offering’ < **arñmazata-*, and *RKKazumaha-* (N 320.24–25) ‘of Arkesimas’ < **A/ErKKazumaha*.

³⁹ See references in note 10.

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