ASJU, 2023, 57 (1-2), 495-513
https://doi.org/10.1387/asju.25965

ISSN 0582-6152 – eISSN 2444-2992

Bringing phonological oddities to the fore: The Basque sibilants[1]

Iván Igartua*
University of the Basque Country (UPV/EHU)

ABSTRACT: The contrast between apical and laminal articulations in Basque dento-alveolar sibilant consonants has traditionally attracted linguists' attention. This distributedness distinction, as it has come to be known in the literature, was assumed to be very uncommon, a sort of typological oddity (perhaps the only one) of Basque consonantism, which, in all other respects, is not particularly remarkable in terms of its phonological characteristics. Many studies have been devoted to the articulatory and acoustic properties of sibilants in Standard Basque and several dialectal varieties. In this paper, written as a contribution to this well-deserved Festschrift in honor of José Ignacio Hualde, I compare the Basque system of sibilants and its features with other structurally more or less analogous systems, drawing on recent typological research, in order to gain a more nuanced understanding of the alleged uniqueness of the Basque sibilants.

KEYWORDS: sibilants; fricatives; affricates; apical; laminal; distributedness distinctions; contact area; phonological typology; typological *rara*.

1. Introduction

Nowadays, it seems fairly safe to say that Basque is a language widely known (or at least renowned) among linguists and even scholars in other fields. Its particular position within the European linguistic landscape, both as the only non-Indo-Euro-

[1] The support of the research group in Diachronic Linguistics, Typology, and the History of Basque (DLTB, IT1534/22), financed by the Basque Government, is gratefully acknowledged. This study corresponds to one of the main lines of investigation carried out by the group.

* ***Corresponding author:*** Iván Igartua. Ikasketa Klasikoak Saila - Letren Fakultatea (UPV/EHU). Unibertsitateen ibilbidea, 5 (01006 Vitoria-Gasteiz). – ivan.igartua@ehu.eus – https://orcid.org/0000-0003-2774-4985

How to cite: Igartua, Iván (2023). «Bringing phonological oddities to the fore: The Basque sibilants», *ASJU*, 57 (1-2), 495-513. (https://doi.org/10.1387/asju.25965).

Received: 2023-09-24; Accepted: 2023-11-17.

ISSN 0582-6152 - eISSN 2444-2992 / © UPV/EHU Press

pean language of Western Europe and as the only language with ergative case west of the Caucasus, has granted it a solid and long-lasting fame. The mystery of its origins has fueled the imagination of several generations of linguists, historians, and even geneticists, even though (or probably due to the fact that) the only sure thing we know about its genetic connections is the close relationship existing between Basque and the ancient Aquitanian language, which is fragmentarily attested in numerous inscriptions of the Roman era dating back to the 1st-3rd centuries CE (Gorrochategui 1984, 2018 [1987], 2022; Trask 1997: 398ff.).

Almost everyone even cursorily acquainted with the structure of the Basque language probably knows that its standard variety (and several dialects, for that matter) contrasts two pairs of sibilants (both fricatives and affricates) in the dento-alveolar region. Their mutual opposition has been traditionally captured in terms of an apical ~ dorsal contrast, although in modern times (since at least Trask 1997 and Hualde & Ortiz de Urbina 2003), the term laminal has been gaining ground and has even replaced that of dorsal in most studies (Iglesias *et al.* 2016; Beristain 2018; Egurtzegi & Carignan 2020; cf. also Ibabe *et al.* 2021). These sibilants have traditionally received the labels apico-alveolar for /s̪/ and /t͡s̪/ and lamino-alveolar for /s̻/ and /t͡s̻/ (although see below in this section). Whatever its names and articulatory definition, this contrast among sibilants, represented here in Table 1, strikes many linguists as rather unusual, "at least in Europe, and perhaps globally" (Trask 1998: 316), and this certainly tends to be one of the first questions the Bascologist is asked to talk about when (s)he visits foreign universities and research centers.[2]

A note on symbolization is in order at this point. The diacritics that will be used throughout the paper to represent the different sibilants attested in languages are the following (illustrated in each case with the voiceless fricative): /s̪/ for dentals, /s̺/ for apicals, /s̻/ for laminals, /s̠/ for retracted sibilants (post-alveolars), /ɕ/ for alveolopalatals, /ʂ/ for plain retroflex, and /s̺/ for subapical retroflex sibilants. Most of these diacritics come from IPA conventions. In order not to overload the set of graphic elements, when two features simultaneously characterize a segment in question (dental and laminal, for instance), only one diacritic will be used (in this case, either /s̪/ or /s̻/, depending on the feature being discussed).

Table 1

Sibilants in Standard Basque

	Dento-alveolar	**Alveolar**	**Palatal**
	Laminal	**Apical**	
Fricatives	s̻	s̺	ʃ
Affricates	t͡s̻	t͡s̺	t͡ʃ

[2] This may sound like a slight exaggeration, but it is actually what the present author has experienced at least a couple of times (the latest one during a research stay in 2022 at the Ohio State University, where undergraduate linguists with some knowledge of Basque were specifically —and unanimously— interested in this specific contrast of sibilants).

The examples in (1a-b) illustrate some minimal (or nearly minimal) pairs of words in which the threefold contrast among the Basque sibilants (Table 1) can be observed:

(1) a. *zu* [s̻u] 'you' ~ *su* [s̺u]'fire' ~ *xuri* [ʃuri] 'white', with expressive palatalization (from *zuri* [s̻u]), about which see Section 4 below;
b. *atzo* [at͡s̻o] 'yesterday' ~ *atso* [at͡s̺o] 'old woman' ~ *etxe* [et͡ʃe] 'house'

The distinction between alveolar and (pre)patalal sibilants is not particularly interesting (or at least worth noticing), since it is widely attested in the world's languages. What is actually salient, as already noted, is the contrast between an apical alveolar (sometimes described as postalveolar) and a laminal dento-alveolar series of sibilant consonants. This, specifically, will be the topic of this contribution to the well-deserved volume in honor of José Ignacio Hualde, a leading linguist who has devoted many of his influential studies to the analysis of Basque phonology (including, as it should come as no surprise, the Basque sibilants, vid., for instance, Hualde 1988, 2010 and, of course, his 1991 monograph). The present work seeks to cast some typological light, via cross-linguistic comparison, on the Basque opposition between laminal and apical sibilants, perhaps the most conspicuous phonological oddity of the Basque language, which, for the rest, does not have a particularly complex (let alone aberrant) phonological structure (see, in any event, Section 4). I hope that José Ignacio finds at least some of these findings not entirely tedious or unexciting.

2. The astounding sibilant space

Sibilant fricatives (and at least one affricate) are among the 20 most frequent phonological segments across languages, according to samples like that used by Maddieson (1984: 12). In subsequent databases, prominent among which is that of PHOIBLE 2.0 (Moran & McCloy 2019), with information from 3,020 phonological inventories and 2,186 languages, phonemes such as /s/, /ʃ/ and /t͡ʃ/ are again among those that have the greatest statistical presence, as shown in Table 2.

Table 2

Frequency of the most used consonants
(Moran & McCloy 2019)

Consonant	(%)	Consonant	(%)
1. m	96	11. ŋ	63
2. k	90	12. g	57
3. j	90	13. h	56
4. p	86	14. d	46
5. w	82	15. r	44
6. n	78	16. f	44
7. t	68	17. ɲ	42
8. l	68	18. t͡ʃ	40
9. s	67	19. ʔ	37
10. b	63	20. ʃ	37

https://doi.org/10.1387/asju.25965

Other studies dealing with the statistics of consonants cross-linguistically, also from a language-internal point of view regarding their usage (Everett 2018: 127), yield similar (or at least not very different) results.

From a general perspective, the sibilant and fricative space appears to be secondary with regard to other consonant subsystems. For example, there are languages with plosives but no sibilants (even with no fricatives whatsoever). The opposite does not hold: no languages have fricatives (including sibilants) but no stops (all languages have, in fact, some voiceless plosives). According to Maddieson's (2013) sample, 8.7% of languages lack fricatives (and therefore sibilants). There is a relatively large amount of such languages in Australia, Papua New Guinea, and the interior of South America.[3] Outside of these areas the absence of fricative consonants is sporadically found in Austronesian (Hawaiian and Kiribati, for instance) and Nilo-Saharan languages (such as Dinka and Lango). The Great Andamanese language (also called Pucikwar) and Aleut are also within this group of fricative-free languages.

Furthermore, fricatives are among the last phonemes acquired by infants in early childhood language development, or at least they are less easily discriminated than plosives and appear very late in the development of speech production (Vilain *et al.* 2019: § 2.1.7, with references). Despite this fact, fricative consonants have a wide presence cross-linguistically, and, as we have seen, only a small fraction of languages lack fricatives altogether. Far more uncommon is the absence of any sibilant in languages that have fricatives (after all, /s/, for instance, is the ninth most frequent consonant in the world). This lack of sibilants characterizes certain Polynesian languages (Maori, Tahitian, Rapa Nui, Marquesan and Tuamotuan), which have fricatives like /f/, /v/ or /h/. The same is true of the Volta-Niger language Ekue, whose only fricatives are /f/, /v/ and /h/ (Mielke 2008: 138).

As for the internal structure of sibilant subsystems, several phonological features can be involved, most of them shared with other consonants:

i) place of articulation, which distinguishes an alveolar /s/ from a post-alveolar or pre-palatal /ʃ/;
ii) manner of articulation, which in turn separates fricative and affricate sibilants;

[3] Some specific phonological traits of Australian languages (widespread lack of fricatives, reduced systems of vowels, generally poor in high-frequency vowels) have recently been related to the incidence of otitis media in the aboriginal population, which is far above the worldwide average (Butcher 2018). The argument is that, as a consequence of the disease, which results in partial deafness, the perceptual abilities of speakers have been severely limited, and that otitis affects primarily high frequency segments. Fricatives (and sibilants) would be some of the sounds in which the influence of otitis can be felt more distinctly. The hypothesis, fascinating as it may seem, has been subjected to serious criticism (see Fergus 2019), based on the fact that languages in other regions of the world also lack fricatives (with no otitis levels in the population comparable to that of Australia) and that not all Australian languages share these phonological characteristics: some of them do have fricatives, for example, and, according to Gasser & Bowern's (2014) survey, only 13% of Australian languages (earlier analyses increased this percentage up to 54%) have just the vowels /i, a, u/ (it should be clarified, though, that for the calculation of phonemic units they take into account the frequent presence of a length contrast, which, in their opinion, produces up to six different vowels, although not six vowel qualities; for different results, see Fletcher & Butcher 2014: 92-93).

iii) voice, according to which voiceless /s/ is opposed to voiced /z/;
iv) tongue shape, by virtue of which we can differentiate grooved /s, z/ and retroflex sibilants (both plain /ʂ, ʐ/ and subapical /ʂ̺, ʐ̺/), for example;
v) contact area (between the tongue and the upper side of the mouth), which is different in the production of laminal, apical and subapical sibilants.

In some languages, secondary articulations may apply as well (like palatalization in languages such as Polish, which will be examined below, and labialization in Bzhedukh, a Northwest Caucasian language that contrasts /ʂ̻/ and /ʂ̻ʷ/, see Colarusso 1988: 14).

The combination of at least some of these features produces different sibilant systems, which can eventually be fairly complex. The Dravidian language Toda, for example, has a four-way sibilant distinction that includes a dental sibilant /ʂ̪/, an apical retracted alveolar /s̠/, a laminal post-alveolar or pre-palatal /ʃ/, and a subapical retroflex /ʂ̺/. Some of these voiceless phonemes have voiced counterparts (/ʒ/ and /ʐ̺/), and there are also some affricates (Emeneau 1984: 11-13; Ladefoged & Maddieson 1996: 156-159). Polish and other Slavic languages add palatalization to the main distinctive features, yielding again a complex sibilant picture. Polish, which shows a basic threefold distinction between sibilants that is allophonically complexified in certain palatalizing environments, is illustrated in Table 3 (Rothstein 1993: 688-689).

Table 3

The Polish sibilants

	Dento-alveolar (non-pal.)		**Dento-alveolar (pal.)**		**Plain retroflex**		**Alveopalatal**	
Fricatives	ʂ̪	ʐ̪	[ʂ̪ʲ	ʐ̪ʲ]	ʂ	ʐ	ɕ	ʑ
Affricates	t͡ʂ̪	d͡ʐ̪			t͡ʂ	d͡ʐ	t͡ɕ	d͡ʑ

As can be seen, Polish has 12 distinctive sibilant phonemes and two palatalized allophonic variants of dento-alveolar sibilant fricatives (which are laminal, like the alveolo-palatal sibilants and in contrast to the apical plain retroflex sibilants). This abundance of sibilant articulations in Polish has traditionally struck even the ears of speakers of other Slavic languages as unusual and extremely hissing-hushing. But unbelievable as it may seem, there are (and have been) sibilant systems even more complex than that of Polish (see Section 3.1 below).

The feature that distinguishes laminal from apical articulations (contact area) is termed *distributedness* in some studies and is occasionally understood as *tongue shape*, which should probably be set aside as a different property. It is not the shape of the tongue itself that engenders the distinction, but rather "the area of the contact between the tongue and the dental-alveolar-palatal range" (Kokkelmans 2021: 11). The parameter has also been called Tongue-Tip Constriction Area (TTCA), as suggested by Gafos (1999). Another term to refer to the differences in the articulation of apical vis-à-vis laminal consonants is *tongue gestures* (Maddieson & VanBik 2004: 232). The area of contact in /s̠/ and /ʃ/ is usually larger than in /s/. Here, I will fol-

https://doi.org/10.1387/asju.25965

low Kokkelmans (2021: 11) in using laminal "to designate sibilants with large contact areas, even if the tongue tip is actively used", and apical to designate "sibilants with small contact areas, regardless of the implication of the tongue blade". According to this feature, laminal consonants are [+distributed], while apical consonants are [–distributed] (Hall 1997: 42).

Distributedness (or contact area) distinctions are, incidentally, not exclusive of sibilants. They can also be found among plosives and sonorants (nasals and laterals, for example). The contrast in stops is found in O'odham or Papago-Pima (an Uto-Aztecan language spoken in Arizona (US) and Sonora (Mexico), cf. Dart 1991: 39ff.), in Kumiai (formerly known as Diegueño, a Yuman language of California, cf. Mai *et al.* 2019: 234), in several (or many) languages of Australia (including Tiwi and Arrernte), in Dravidian languages like Malayalam and Toda, in a number of Austronesian languages (for instance, in Ndumbea), in the Cushitic language Dahalo (Kenya), and the Tibeto-Burman language Hakha Lai (Maddieson & VanBik 2004: 239). The distinction between apical and laminal articulation is common in Australian languages for nasals and laterals (as shown by Bardi and Arrernte, see Dixon 2019: 78). It is in fact one of the hallmark traits characterizing what Dixon (2002: 63, 548) calls the "canonical consonant system" of the Australian languages and Gasser & Bowern (2014) refer to as Standard Average Australian phonemic inventory (see also Fletcher & Butcher 2014: 102-103).

The differentiation of laminal and apical consonants as natural classes of segments is supported by cross-linguistic evidence, which is summarized here in Table 4 (adapted from Hall 1997: 43), with examples from Dravidian (Toda, Tamil) and Australian (Thargari, Anindilyakwa, Walmatjari, Lardil, Ngiyambaa and Guugu Yimidhirr) languages.

Table 4

Phonetic processes affecting apical and laminal segments differently

Language	Phenomenon
Toda, Tamil, Thargari, Anindilyakwa	Apical segments are barred from occurring in word- or stem-initial position.
Tamil	Rule of gemination only for apical consonants.
Toda, Walmatjari	Apicals are barred from occurring in the second member of a non-homorganic cluster.
Lardil, Ngiyambaa	Only apicals allowed in word-final position.
Guugu Yimidhirr	Neutralization of place of articulation contrasts in word-final position in laminals (e.g., dental / alveolo-palatal laminals > dental laminals).

Phonologists have identified a significant correlation between distributedness properties and place of articulation contrasts between dental and alveolar sounds. As noted by Hall (1997: 42), "[a]n important generalization pertaining to these two places of articulation is that alveolar sounds tend cross-linguistically to be apical, that

is, they are pronounced with the tongue tip, whereas dentals are laminal, i.e., they are articulated with the tongue blade". Only exceptionally is the converse correlation encountered: in Temne, a Mel language of the Niger-Congo family (spoken in Guinea and Sierra Leone), alveolar consonants are reportedly laminal while dentals seem to be apical (Ladefoged & Maddieson 1996: 23).

From this viewpoint, the mainstream description of Basque sibilants /s̻/ and /s̺/ as apico-alveolar and lamino-alveolar, respectively (see e.g., Trask 1997: 84, 1998: 316-317, and Hualde 2003: 22), may sound a little odd. It is beyond doubt that the alveolar zone is involved in both articulations, but it is also true that in the production of the apical sibilant there is some degree of retraction (Ibabe *et al.* 2021: § 1.1), which traditionally has been attributed only to Eastern variants (Trask 1998: 316). The most recent (and probably thorough) typological survey of sibilant systems (Kokkelmans 2021) distinguishes between dental (generally also laminal) and retracted (concomitantly apical) sibilants in the coronal region (which includes alveolar and palato-alveolar phonemes as well). In this database, Standard Basque aligns with languages contrasting dental and retracted sibilants (/s̻/ ~ /s̺/). Both phonemes have the distributedness characteristics (laminal vs. apical) that seem to correlate more frequently —almost exclusively— with certain places of articulation.

In the remainder of this paper, I discuss the phonological traits of the Basque sibilants in the light of the typological evidence at our disposal. My main task is to check the seeming oddness of the Standard Basque contrast between laminal and apical sibilants against some possible cross-linguistic parallels in order to gain a more nuanced understanding of the alleged uniqueness of the Basque system of sibilants. Thereafter, a separate section will also address other typologically uncommon phonological traits of Basque, this time with a special focus on some dialectal and even diachronic phenomena.

3. So how odd are the Basque sibilants, after all?

3.1. Cross-linguistic evidence

In his typology of sibilant systems, Kokkelmans (2021: 75ff.) distinguishes first between languages with one sibilant and languages with more than one sibilant. What can be called, respectively, *monosibilant* and *polysibilant* systems —the terms are introduced here, they are not used by him— are further opposed to *sibilantless* languages, which were already mentioned in the preceding section. Among the polysibilant languages, he identifies 2-unit, 3-unit, and 4-unit systems. Sibilant inventories are classified according to a hierarchy of three parameters:

i) the total number of places of articulation for sibilants;
ii) the precise places of articulation; and
iii) the presence of fricatives vs. affricates.

Voicing distinctions are not taken into account in the same way, since this would increase "considerably the number of observed sibilant inventories without adding much relevant information" (Kokkelmans 2021: 75). In the case of Standard Basque, voice is, in addition, a dispensable parameter as far as sibilants are concerned. In

https://doi.org/10.1387/asju.25965

some varieties, however, as is the case in Souletin (one of the main Eastern dialects, spoken in the French province of Soule), voiced sibilants —with certain gaps in affricates— are also found,[4] as can be seen in Table 5 (cf. Hualde 2003: 18):

Table 5

Voiceless and voiced sibilants in Souletin Basque

	Dento-alveolar		**Alveolar**		**Palatal**	
	Laminal		**Apical**			
Fricatives	s̪	z̪	s̺	z̺	ʃ	ʒ
Affricates	t̪s̪		t̺s̺	d̺z̺	t͡ʃ	

The first parameter in Kokkelmans's classification (the number of possible places of articulation for sibilants) leads to the following observation:

(2) Languages have between 0 and 4 contrasting places of articulation for sibilants (Hall 1997: 93; Kokkelmans 2021: 137).[5]

Instances of languages and even language areas with no sibilants were briefly referred to in Section 2. An example of a monosibilant system is Classical Latin, which had just /s/ (as it happens, the voiced variant /z/, which in any case would not count as a structurally different sibilant, entered Latin via loanwords from Greek and its functional load was rather low). Wolof, with its isolated retracted sibilant /s̠/, also belongs to this group of languages. Phonological systems that contrast just a fricative and an affricate sibilant (generally homorganic) are also classified as monosibilant phonological systems.

Polysibilant inventories show, as expected, a greater deal of variation. Two-sibilant inventories include Welsh (with /s/ and /ʃ/), but also Japanese (/s̠/, /t͡s̠/, /ɕ/, /t͡ɕ/) and Catalan (/s̺/, /t̺s̺/, /ʃ/, /t̺ʃ/), with both fricatives and affricates (and their voiced counterparts in languages like Catalan). When it comes to three-sibilant systems, two main types can be identified, one called retroflex and the other one non-retroflex. The former is represented by Mandarin Chinese and Polish (/s/, /ɕ/, /ʂ/), while the latter (the non-retroflex type) manifests itself in languages like Standard Basque (with no gaps at all within the system), Middle High German (with a gap at the retracted alveolar affricate), Old Spanish (with gaps at the dental fricative and the retracted alveolar affricate), and Mirandese (a language spoken in Miranda do Douro and other towns nearby, in Portugal, also with gaps, but exclusively among the affri-

[4] A recent theoretical and typological treatment of phonological gaps, understood as the absence of sounds that are expected because of the presence of their (generally voiceless) counterparts, is provided both in Wang (2019) and Nikolaev (2022).

[5] Languages with other fricatives alongside sibilants can exceptionally have up to five coronal places of articulation (Hall 1997: 92). One of the languages (or maybe the only one) instantiating this extreme system is Toda (a Dravidian language), whose sibilant system, with 4 places of articulation, will be discussed below. Apart from sibilants, Toda has an interdental fricative (/θ/) as well as a velar fricative (but the latter is, logically, not considered for the generalization about coronals).

cates). The Standard Basque sibilants were illustrated in Table 1. Tables 6, 7, and 8 contain the sibilants of Middle High German, Old Spanish and Mirandese, respectively.

Table 6

Sibilants in Middle High German

	Dental (laminal)	**Retracted (apical)**		**Palatal**
Fricatives	s̪	s̱	ẕ	ʃ
Affricates	t̪s̪			t͡ʃ

Table 7

Sibilants in Old Spanish

	Dental (laminal)		**Retracted (apical)**		**Palatal**	
Fricatives			s̱	ẕ	ʃ	ʒ
Affricates	t̪s̪	d̪z̪			t͡ʃ	

Table 8

Sibilants in Mirandese

	Dental (laminal)		**Retracted (apical)**		**Palatal**	
Fricatives	s̪	z̪	s̱	ẕ	ʃ	ʒ
Affricates					t͡ʃ	

Despite obvious differences in detail, three-sibilant systems have many properties in common: they "consist of an invariably dental sibilant, together with retracted alveolar and palatoalveolar sibilants (non-retroflex type) or alveopalatal and plain retroflex sibilants (retroflex type)". In both types, distributedness distinguishes one posterior segment from the other, "and the difference between the retroflex and the non-retroflex types resides in which segment is apical and which is laminal" (Kokkelmans 2021: 86). In the retroflex type the back sibilant is apical and the middle sibilant is laminal, while in the non-retroflex type (to which Basque belongs), things are the other way around (it is the middle sibilant that is apical).

Finally, extreme four-sibilant systems, which are exclusively of the non-retroflex type, can be found in languages like Toda (mentioned in the preceding section), the now extinct Northwest Caucasian language Ubykh, whose last speaker (Tevfik Esenç) died in 1992, and the closely related Akbhaz language, both in its literary (Abzhywa) and dialectal (Bzyp) variants. Bzyp Abkhaz has no gaps at all, whereas

https://doi.org/10.1387/asju.25965

Abzhywa Abkhaz shows a gap at the retracted alveolar fricative. Tables 9 and 10 illustrate the sibilant systems of Toda (Ladefoged & Maddieson 1996: 156-159) and Bzyp Abkhaz (Chirikba 2003: 12; cf. Hewitt 2013: 168), respectively. The Ubykh-Abkhaz subtype is a clear instance of what an exuberant sibilant system may look like.

Table 9

Sibilants in Toda

	Dental (laminal)	**Retracted (apical)**	**Palatal**		**Retroflex (subapical)**	
Fricatives	s̪	s̺	ʃ	ʒ	ʂ	ʐ
Affricates			t͡ʃ			

Table 10

Sibilants in Bzyp Abkhaz

	Dental (laminal)		**Retracted (apical)**		**Palatal**		**Retroflex (subapical)**	
Fricatives	s̪	z̪	s̺	z̺	ʃ	ʒ	ʂ	ʐ
Affricates	t͡s̪	d͡z̪	t͡s̺	d͡z̺	t͡ʃ	d͡ʒ	t͡ʂ	d͡ʐ

On the basis of this typology, and the presence of phonological systems instantiating each of the types, Kokkelmans (2021: 138) makes the following generalization:

(3) Languages are more likely to contrast fewer than 2 PoAs (Places of Articulation) than to contrast more than 2PoAs.

With its 3-sibilant system, Basque is clearly on the side of less frequent or likely phonological systems. But can we be more specific about the status of its sibilant system?

3.2. On the rarity of the Basque system of sibilants

Phonological systems that include the contrast between apical and laminal sibilants in any degree represent no more than 7.8% in Kokkelmans's (2021) sample of 258 languages, which is telling per se.[6] The details may of course vary. In some systems, distributedness distinctions are accompanied by mode of articulation contrasts: fricative sibilants are apical while affricate sibilants are laminal, as in Old French and Old Spanish. On the other hand, apical and laminal sibilants can be part of 2-, 3-, and 4-sibilant systems, which means that their structural position can also vary de-

[6] This confirms previous impressions about the restrictedness of such systems (see Peust 2008: 107ff., based on a more limited, 50-language sample).

pending on the quantity of contrasts and the internal configuration of each system. As mentioned before, Standard Basque has a 3-sibilant system. The languages with 3 sibilants and a distributedness (or contact area) distinction that resemble the phonological system of Standard Basque the most are Luiseño (Table 11) and Shona (Table 12).

Table 11

Sibilants in Luiseño

	Laminal	**Apical**	**Palatal**
Fricatives	s̻	s̺	ʃ
Affricates			t͡ʃ

Table 12

Sibilants in Shona

	Laminal		**Apical**		**Palatal**	
Fricatives	s̻	z̻	s̺	z̺	ʃ	ʒ
Affricates	t͡s̻	d͡z̻	t͡s̺	d͡z̺	t͡ʃ	d͡ʒ

In contrast to Basque, Luiseño, a Uto-Aztecan language of California, shows two gaps among the affricates, whereas the fricatives are quite close to those in Basque. In Shona, a Bantu language spoken in Zimbabwe and Mozambique, there is no such gap and the voicing contrast applies in all cases, thus producing 12 sibilant phonemes. Other 3-sibilant languages, such as Old Spanish, Mirandese and Tohono O'odham present more gaps (either in the fricative or the affricate series). Among the extant Romance languages, Mirandese is especially significant in that it retains the distributedness contrast between apical and laminal sibilant fricatives, which makes it relatively akin to Basque (see Leite de Vasconcellos 1900: 186, 189-190).

The presence of an apical vs. laminal contrast among sibilants can be regarded as rather unusual in general (although perhaps not as a typological *rarum*), but what seems to be highly infrequent is the specific sibilant structure that Basque displays. In the sample already referred to (Kokkelmans 2021), only 11 phonological systems (4.3%) exhibit a 3-sibilant structure including distributedness distinctions, and just 6 are languages spoken today (the rest being Old French, Old Spanish, Middle Spanish, Late Vulgar Latin and Early Gallo-Romance). If one rules out the old stages of development of the Romance languages (which, by the way, seem to introduce quite a strong genetic bias into the sample), the 3-sibilant phonological systems in which apical and laminal articulations contrast today are represented by 2.3% of languages in Kokkelmans's sample. This is certainly closer to what linguists usually conceive of as a typological *rarum* (see Cysouw & Wolhgemuth 2010: 2ff.).

Therefore, we can conclude that, even if not unheard of, the sibilant structure of Basque is still typologically rather marked because of its extremely low frequency (at least to the extent that the sample used for drawing such a conclusion is sufficiently

https://doi.org/10.1387/asju.25965

representative of the phonological diversity in the world's languages). In relatively recent times, the Western varieties of Basque have dramatically simplified the structure of sibilants, leading to a two-unit system in which the mode of articulation and the distributedness characteristics have merged: in Biscayan varieties, /s̻/ now generally contrasts with /ts̻/, and there is no apical/laminal opposition either in fricatives or in affricates. To put it another way, in these cases manner of articulation (concomitantly with place or articulation) has prevailed over distributedness. Contact with neighboring languages, which do not have any distributedness distinctions (although they used to have them in the past), seems to have caused or at least accelerated the loss of certain contrasts in Western Basque (Hualde 2010; Jurado Noriega 2011; Muxika-Loitzate 2017). In the face of this kind of result, the extent to which other Basque varieties, also in contact with Romance languages, have retained the inherited system of sibilants, without any perceptible damage to the contrast between apical and laminal phonemes, is very noticeable.

4. Any other oddities in Basque phonology?

As a system with a relatively low degree of complexity both in vocalism and consonantism, the phonological structure of Standard Basque does not abound in rarities. Vowels and consonants in Basque do not form large phonological systems, and it is well known —at least since Lindblom & Maddieson (1988)— that secondary articulations and complex segments tend to concentrate precisely in large phonological systems. Dialectally, however, we can find phonological phenomena that deserve some comment.

In the Souletin dialect, as well as in some neighboring varieties, the consonant inventory includes a glottal fricative (the aspiration /h/) and the aspirated stops /p^{h}, t^{h}, k^{h}/. Remnants of aspiration are still found in the other dialectal varieties of the French area (Low Navarrese and Labourdin). Additionally, voiced sibilants and nasal vowels are phonemically distinguished in Souletin (for voiced sibilants, see Table 4 above). According to some scholars (Hualde 2003: 25; Egurtzegi 2018), this dialect (as well as Mixean Lower Navarrese) may even have a phonemic contrast between a plain aspiration /h/ and a nasalized one /h̃/, which constitutes a really exceptional phenomenon (see some Souletin examples in 4), inasmuch as only a handful of such —or similar— systems have been found to date among the world's languages:

(4) *ehe* 'wash water' ~ *eh̃e* 'no!' (emphatic)
bihi 'grain' ~ *mih̃i* 'tongue'

Judging from this set of examples, one may conjecture whether the nasalization of /h/ should not be just regarded as the contextual consequence of the presence of nasal vowels ([ẽh̃ẽ], [mĩh̃ĩ]) and, as such, the allophonic —not phonemic— outcome of a rather trivial assimilative process that could qualify as a garden-variety instance of Ohala's (1993) *hypo-correction*. In these circumstances, the discussion may revolve around the relative primacy of either vowel or glottal nasalization, with mainly diachronic premises (e.g., some analogical processes). However, one serious problem for the argument in favor of a synchronically active phonemic contrast between the

plain and the nasalized aspiration is the virtual impossibility of separating /h̃/ from vowel nasalization contextually, i.e., there is no aspirated nasalization outside of the environments where nasal vowels are found (Hualde 2003: 25). If despite this we wanted to acknowledge the existence of such a phonologically minimal contrast (or, for that matter, just the presence of allophonic nasalized aspirations), there would be few typological parallels. So far only Kwangali, a Bantu language spoken in Namibia and Angola, Seimat, an Austronesian language (Papua New Guinea), Aguaruna, a Jivaroan language (Peru), and Arabela, a Zaparoan language (Peru), have been described as languages having such a distinction between plain and nasalized glottal fricatives, either at the phonological or allophonic level (see Egurtzegi 2018: 1354 with references). Therefore, the presence of both a nasalized the plain aspiration would be a somewhat uncommon trait of Souletin Basque (for more discussion on this, see Igartua 2020: 333-334).

The aspiration itself is of course not an unusual segment in phonological systems (it occupies the 13th position in the table illustrating the overall frequency of consonants worldwide, see Table 2 above). But, turning our attention for a while to diachrony, one of the sources of the glottal fricative can indeed be characterized as relatively rare: in intervocalic position, and provided the right conditions are met (commonly at the onset of the second syllable, cf. Michelena 1950: 447-450, 1977: 208ff., 302), the aspiration usually comes from a *lenis* alveolar nasal (see the examples in 5a-c, which include loanwords from Latin and a comparison of closely related nouns in Aquitanian and Basque).

(5) a. Latin *anate(m)* 'duck' > Basque *ahate* (Souletin *ãh̃ãte*)
b. Latin *(h)onore(m)* 'honor' > Basque *ohore* (Souletin *ũh̃ũ(r)e*)
c. Aquitanian SENI- (SENICCO) 'child', cf. Basque *sehi* 'boy, servant'

This is, no doubt, a typologically marked phonological development,[7] even if not unique, since other languages may have undergone such a change (including Scottish Gaelic and the Owerri dialect of Igbo in Nigeria; see Igartua 2008: 182-183, 2015: 641-642). This perceptually conditioned change is said to be due to a special affinity between glottality and nasality (both in terms of articulatory movements and, most importantly, acoustic effects), which Matisoff (1975) termed *rhinoglottophilia*. A somewhat puzzling condition of this development is the lack of an aspirated reflex of the other nasal sonorant in Basque. The bilabial nasal does not result in *h* (or *h̃*) anywhere. One possible reason to explain this divergence is the recentness and scarcity of /m/, which has commonly not been reconstructed for Proto-Basque (see, however, Blevins 2018: 43-53). But even in that case, one would have to deal with the fact that the bilabial nasal had already entered the Basque lexicon when the /n/ > /h̃/ change took place (tentatively, in the first centuries CE, shortly after the Aquitanian period),[8] in spite of which /m/ (if it could have a *lenis* realization) did not develop

[7] In Hurch's (1988) survey on aspiration, Basque alone is cited as instantiating this kind of evolution.

[8] The segment /m/ is occasionally found between vowels in Aquitanian and Vasconic (the language or languages reflected in ancient inscriptions south of the Pyrenees). The examples include the well-known VMME 'child' from the Lerga inscription (Navarre), which can be compared to Aquita-

https://doi.org/10.1387/asju.25965

into an aspiration. An alternative approach may be to ascribe the differential evolution of /n/ and /m/ at the onset of the second syllable to intrinsic durational differences, with /m/ probably being longer than /n/, as is the case in other languages as well (see Cresci 2019: 80). In Basque, the *fortis* alveolar nasal was in all likelihood also longer than its *lenis* counterpart, which can explain their divergent development.

Lastly, a typologically noteworthy (albeit not necessarily rare) process in Basque is expressive or affective palatalization (Iverson & Oñederra 1985; Oñederra 1990, 2002; Hualde 2015; see in general Alderete & Kochetov 2017), a derivational process by means of which dental and alveolar consonants are replaced by palatals to convey diminutiveness and affectiveness, as in the words *zezen* /ʂeʂen/ 'bull' → *xexen* /ʃeʃen/ 'little bull', *sagu* /ʂagu/ 'mouse' → *xagu* /ʃagu/ 'little mouse', *tanta* /tanta/ 'drop (of a liquid)' → *ttantta* /caɲca/ 'little drop', and even *lagun* /lagun/ 'friend' → *llagun* [ʎagun], with palatalization affecting a liquid here (a relatively rare phenomenon compared to what happens among obstruents). Similar patterns of expressive palatalization can be found in different languages (Georgian, Japanese, Marathi, Greek, generally or exclusively in child-directed speech). These are all instances of phonic symbolism, mostly unknown in the languages surrounding Basque (at least in this guise) but with possible attestations of the same phenomenon in the Aquitanian inscriptions (Gorrochategui 1984: 187, 2018 [2003]: 180-181): cf., for instance, the alternation between SEMBE, SEMBUS 'son' and XEMBUS (with x- likely indicating a palatalized sibilant), both names apparently related to the Basque noun *seme* 'son' (Gorrochategui 1995: 45, see also Igartua, forthcoming).

Expressive palatalization has lexicalized in nouns such as *txori* [t͡ʃori] 'bird', from *zori* [ʂori] 'fate' (Michelena 1957: 119, fn. 10; Trask 1997: 148-149; Hualde 2015: 520; Lakarra *et al.* 2019: 580-581). This kind of affective palatalization can even have morphological and grammatical repercussions: in Eastern Low Navarrese, for instance, palatalized verbal forms have been assigned grammatical function (Rebuschi 2003: 860) within an addressing politeness scale according to which speakers differentiate between familiar (*joanen hiz* 'you will go'), polite (*joanen zira*) and more affective forms (*joanen xira*). The expressive palatalization affects the last two auxiliar forms (/ʂíra/ ~ /ʃíra).

5. Conclusion

The linguistic assessment of Basque as the most exotic, un-Indo-European-like language in Western Europe has ranged historically from an enthusiastic and probably excessive proclamation of its structural oddness, which was somehow supported

---

nian OMBE- (OMBECCO, OMBEXONIS), and the isolated Aquitanian name SOMENARIS, for which no lexical parallels have been identified so far (Gorrochategui 1984: 272, 2018 [1987]: 43). In both cases, the bilabial nasal has been regarded as secondary, the former being due to the development of the sequence /nb/ > /mb/ > /m/ (similarly in ADIMELS and possibly SOSIMILUS), and the latter to a hypothetical nasal assimilation provoked by the following /n/ (cf. already Michelena 1954: 453). As for Vasconic names like ORDUMELES and TURTUMELIS (formerly considered Iberian), *-meles*/*-melis* seems to be a nasal variant of *-beles*. Michelena suggested, though on admittedly shaky grounds, that *-m-* could be the result of a nasalization of the plosive after the vowel /u/ (the same would hold for UMARBELES and other compounds with UMAR-; *ibid.*, 452; see now Igartua, forthcoming).

by the unsolved mystery of its origin (and its phylogenetic isolation), to the characterization of its phonology and grammar as rather average linguistic systems in which nothing particularly abnormal occurs. Either consideration is of course dependent on the observer's previous knowledge, expectations about what can be deemed linguistically rare, and even taste. Thanks to the advances in typology, the era of impressionistic portrayals has been replaced by more objective, quantity-based analyses that help situate certain linguistic phenomena within the general space of typological, cross-linguistic variation. Now the phonological and grammatical properties of Basque can be given a more accurate and fine-grained depiction against the background of what we know about existing (and even possible) linguistic systems.

From this perspective, Standard Basque may certainly be quite unique in having a complete non-retroflex 3-sibilant system, with all fricatives and affricates present, i.e., no gaps at all, whereas the majority of phonological systems displaying this number of phonological distinctions among sibilants tend to have gaps here and there (either among the fricatives or the affricates, or even in both subsets). Its closest parallel —with no gaps— is the sibilant system in Shona. This case, however, differs from that of Basque in having both voiceless and voiced phonemes (although it can be recalled that voicing contrast is not one of the main parameters for classifying sibilant systems). Similarly, the retroflex type of 3-sibilant system that characterizes Polish is not structurally far from the Basque system, even though here again there is a contrast between a consonantism with both voiceless and voiced sibilants and another one that includes just voiceless sibilants. More importantly, Polish has a retroflex 3-unit sibilant system, whereas Basque is of the non-retroflex type. As for the distributedness contrast (apical vs. laminal segments), it has been found among sibilants in several languages worldwide, but only a tiny minority of them share the particular phonological configuration of Basque.

All in all, it certainly cannot be claimed that Basque is *a langue à part dans le monde* (Inchauspe 1892: 19) as far as its sibilant system is concerned, but it is also undeniable that Standard Basque (and several Basque dialects, for that matter) has an extremely uncommon sibilant structure that makes it stand out among the languages of the world, despite the fact that the distributedness (or contact area) contrast between laminal and apical sibilants (and also other consonants) is far from being unparalleled.

References

Alderete, John & Aleksei Kochetov. 2017. Integrating sound symbolism with core grammar: The case of expressive palatalization. *Language* 93(4). 731-766.

Beristain, Ander. 2018. The acoustic realization of /s̻/ and /tʂ̻/ by L1 and L2 Basque speakers. In Lorea Unamuno, Asier Romero, Aintzane Etxebarria & Aitor Iglesias (eds.), *Linguistic variation in the Basque language and education*. Vol. III, 60-72. Bilbao: UPV/EHU.

Blevins, Juliette. 2018. *Advances in Proto-Basque reconstruction with evidence for the Proto-Indo-European-Euskarian hypothesis*. London: Routledge.

Butcher, Andrew. 2018. The special nature of Australian phonologies: Why auditory constraints on the sound systems of human languages are not universal. *The Journal of the Acoustical Society of America* 144(3). 1939 (1-16). https://doi.org/10.1121/1.5068481.

https://doi.org/10.1387/asju.25965

Chirikba, Viacheslav. 2003. *Abkhaz* (*Languages of the World/Materials* No. 119). München & Newcastle: Lincom Europa.

Colarusso, John. 1988. *The Northwest Caucasian languages. A phonological survey*. New York: Garland.

Cresci, Michela. 2019. VN > V in Camuno: An alternative historical pathway to nasal loss. *Italian Journal of Linguistics* 31(1). 61-92.

Cysouw, Michael & Jan Wohlgemuth. 2010. The other end of universals: Theory and typology of rara. In Jan Wohlgemuth & Michael Cysouw (eds.), *Rethinking universals: How rarities affect linguistic theory*, 1-10. Berlin & New York: De Gruyter Mouton.

Dart, Sarah N. 1991. *Articulatory and acoustic properties of apical and laminal articulations* (*UCLA Working Papers in Phonetics* 79). Los Angeles: UCLA.

Dixon, R. M. W. 2002. *Australian languages. Their nature and development*. Cambridge: Cambridge University Press.

Dixon, R. M. W. 2019. *Australia's original languages. An introduction*. Sydney, Melbourne, Auckland & London: Allen & Unwin.

Egurtzegi, Ander. 2018. On the phonemic status of nasalized /h̃/ in Modern Zuberoan Basque. *Linguistics* 56(6). 1353-1367.

Egurtzegi, Ander & Christopher Carignan. 2020. An acoustic description of Mixean Basque. *The Journal of the Acoustical Society of America* 147(1). 2791-2802. https://dx.doi.org/10.1121/10.0000996.

Emeneau, Murray B. 1984. *Toda grammar and texts*. Philadelphia: American Philosophical Society.

Everett, Caleb. 2018. The similar rates of occurrence of consonants across the world's languages: A quantitative analysis of phonetically transcribed word lists. *Language Sciences* 69. 125-135.

Fergus, Anelisa. 2019. *Lend me your ears: Otitis media and aboriginal Australian languages*. Ms. Yale University. https://ling.yale.edu/sites/default/files/files/Anelisa%20Fergus.pdf (19/12/2023).

Fletcher, Janet & Andrew Butcher. 2014. Sound patterns of Australian languages. In Harold Koch & Rachel Nordlinger (eds.), *The languages and linguistics of Australia* (*The world of linguistics* Vol. 3), 91-138. Berlin: Mouton de Gruyter.

Gafos, Adamantios I. 1999. *The articulatory basis of locality in phonology*. New York: Garland.

Gasser, Emily & Claire Bowern. 2014. Revisiting phonotactic generalization in Australian languages. *Supplemental proceedings of the 2013 Annual Meeting on Phonology* 1. 1-10. https://doi.org/10.3765/amp.v1i1.17.

Gorrochategui, Joaquín. 1984. *Onomástica indígena de Aquitania*. Bilbao: UPV/EHU.

Gorrochategui, Joaquín. 1995. Basque and its neighbors in antiquity. In José Ignacio Hualde, Joseba A. Lakarra & Robert L. Trask (eds.), *Towards a history of Basque*, 31-63. Amsterdam & Philadelphia: John Benjamins.

Gorrochategui, Joaquín. 2018 [1987]. Die vorrömische Onomastik Aquitaniens. In Blanca Urgell & José M. Vallejo (eds.), *Opera selecta. I. Aquitanica / Akitaniera*, 35-46. Vitoria-Gasteiz: UPV/EHU.

Gorrochategui, Joaquín. 2018 [2003]. Las placas votivas de plata de origen aquitano halladas en Hagenbach (Renania-Palatinado, Alemania). In Blanca Urgell & José M. Vallejo (eds.), *Opera selecta. I. Aquitanica / Akitaniera*, 165-200.Vitoria-Gasteiz: UPV/EHU.

Gorrochategui, Joaquín. 2022. The relationship between Aquitanian and Basque: Achievements and challenges of the comparative method in a context of poor documentation. In Thiago Acosta Chacon, Nala H. Lee & W. D. L. Silva (eds.), *Language change and linguistic diversity. Studies in honour of Lyle Campbell*, 105-129. Edinburgh: Edinburgh University Press.

Hall, T. Alan. 1997. *The phonology of coronals*. Amsterdam & Philadelphia: John Benjamins.

Hewitt, George. 2013. Language. In George Hewitt (ed.), *The Abkhazians: A handbook*, 167-175. London: Routledge.

Hualde, José Ignacio. 1988. On Basque affricates. *ASJU* 22(2). 379-389.

Hualde, José Ignacio. 1991. *Basque phonology*. London: Routledge.

Hualde, José Ignacio. 2003. Segmental phonology. In Hualde & Ortiz de Urbina (eds.), *A grammar of Basque*, 15-65. Berlin: Mouton de Gruyter.

Hualde, José Ignacio. 2010. Neutralización de sibilantes vascas y seseo en castellano. *Oihenart* 25. 89-116.

Hualde, José Ignacio. 2015. Affective palatalization in Basque. In Peter O. Müller, Ingeborg Ohnheiser, Susan Olsen & Franz Rainer (eds.), *Word formation. An international handbook of European languages,* vol. 1, 517-523. Berlin: De Gruyter Mouton.

Hualde, José Ignacio & Jon Ortiz de Urbina (eds.). 2003. *A grammar of Basque*. Berlin: Mouton de Gruyter.

Hurch, Bernhard. 1988. *Über Aspiration: ein Kapitel aus den natürlichen Phonologie*. Tübingen: Gunter Narr.

Ibabe, Alexander, Rosa Miren Pagola & Itziar Túrrez. 2021. Caracterización articulatoria de las fricativas sibilantes alveolares del euskera: primera parte. *Loquens* 7(2). e073. https://doi.org/10.3989/loquens.2020.e073.

Igartua, Iván. 2008. La aspiración de origen nasal en la evolución fonológica del euskera: un caso de *rhinoglottophilia*. *ASJU* 42(1). 171-189.

Igartua, Iván. 2015. Diachronic effects of rhinoglottophilia, symmetries in sound change, and the curious case of Basque. *Studies in Language* 39(3). 635-663.

Igartua, Iván. 2020. Basque among the world's languages: A typological approach. In Ekaitz Santazilia, Dorota Krajewska, Eneko Zuloaga & Borja Ariztimuño (eds.), *Fontes Linguae Vasconum 50 urte. Ekarpen berriak euskararen ikerketari. Nuevas aportaciones al estudio de la lengua vasca*, 329-349. Pamplona: Government of Navarre.

Igartua, Iván. Forthcoming. Algunos rasgos de la onomástica vascónico-aquitana a la luz de la tipología lingüística. In Álvaro Arrizabalaga, Joaquín Gorrochategui & Estíbaliz Ortiz de Urbina (eds.), *Entre el Ebro y el Garona. Espacios, sociedades y culturas durante la Prehistoria y la Antigüedad* (Supplements of *Veleia*). Vitoria-Gasteiz: UPV/EHU.

Iglesias, Aitor, Iñaki Gaminde, Leire Gandarias & Lorea Unamuno. 2016. Euskararen txistukariak aztertzeko indize akustikoez. *Euskalingua* 28. 6-18.

Inchauspe, Emmanuel (Le chanoine). 1892. Le peuple basque, sa langue, son origine. In *Association française pour l'avancement des sciences. Congrés de Pau*, 1-19. Paris.

Iverson, Gregory K. & Miren Lourdes Oñederra. 1985. On Basque palatalization. *Folia Linguistica* 19. 51-61.

Jurado Noriega, Mirari. 2011. Caracterización de sibilantes fricativas vascas y su percepción en el sistema fonético español. *ASJU* 45(1). 81-137.

https://doi.org/10.1387/asju.25965

Kokkelmans, Joachim. 2021. *The phonetics and phonology of sibilants. A synchronic and diachronic OT typology of sibilant inventories*. Verona: University of Verona doctoral dissertation.

Ladefoged, Peter & Ian Maddieson. 1996. *The sounds of the world's languages*. Oxford: Blackwell.

Lakarra, Joseba A., Julen Manterola & Iñaki Segurola. 2019. *Euskal hiztegi historiko-etimologikoa (EHHE-200)*. Bilbao: Euskaltzaindia.

Leite de Vasconcellos, João. 1900. *Estudos de philologia mirandesa*, vol. I. Lisboa: Imprensa Nacional.

Lindblom, Björn & Ian Maddieson. 1988. Phonetic universals in consonant systems. In Charles Li & Larry M. Hyman (eds.), *Language, speech and mind: Studies in honour of Victoria A. Fromkin*, 62-78. London: Routledge.

Maddieson, Ian. 1984. *Patterns of sounds*. Cambridge: Cambridge University Press.

Maddieson, Ian. 2013. Absence of common consonants. In Matthew S. Dryer & Martin Haspelmath (eds.), *The world atlas of language structures online*. Leipzig: Max Planck Institute for Evolutionary Anthropology. http://wals.info/chapter/18 (18/12/2023).

Maddieson, Ian & Kenneth VanBik. 2004. Apical and laminal articulations in Hakha Lai. In Marc Ettlinger, Nicholas Fleisher & Mischa Park-Doob (eds.), *Proceedings of the thirtieth annual meeting of the Berkeley Linguistics Society*, 232-243. Berkeley: Berkeley Linguistics Society.

Mai, Anna, Andrés Aguilar & Gabriela Caballero. 2019. Ja'a Kumiai. *Journal of the International Phonetic Association* 49(2). 231-244.

Michelena, Luis. 1950. De fonética vasca: la aspiración intervocálica. *BAP* 6. 443-459 (Repr. in *OC* 7, 3-20).

Michelena, Luis. 1954. De onomástica aquitana. *Pirineos* 10. 409-455 (Repr. in *OC* 5, 197-243).

Michelena, Luis. 1957. Las antiguas consonantes vascas. In Diego Catalán (ed.), *Estructuralismo e historia. Miscelánea homenaje a André Martinet,* vol. 1, 113-157. La Laguna: Universidad de La Laguna (Repr. in *OC* 7, 57-91).

Michelena, Luis. 1977. *Fonética histórica vasca*. 2nd edn. San Sebastián: Gipuzkoa Provincial Council (1st edn., 1961; repr. in *OC* 6).

Michelena, Luis. 2011. *Obras completas* (*Supplements of ASJU* 54-68), 15 vol. San Sebastián & Vitoria-Gasteiz: "Julio Urkixo" Basque Philology Seminar, Gipuzkoa Provincial Council & UPV/EHU (ed. by Joseba A. Lakarra & Iñigo Ruiz Arzalluz).

Mielke, Jeff. 2008. *The emergence of distinctive features*. Oxford: Oxford University Press.

Moran, Steven & Daniel McCloy (eds.). 2019. PHOIBLE 2.0. Jena: Max Planck Institute for the Science of Human History.

Muxika-Loitzate, Oihane. 2017. Sibilant merger in the variety of Basque spoken in Amorebieta-Etxano. *Languages* 2(25). 1-19. https://doi.org/10.3390/languages2040025.

Nikolaev, Dmitry. 2022. A typology of consonant-inventory gaps. *Linguistic Typology* 26(1). 161-186.

Ohala, John J. 1993. The phonetics of sound change. In Charles Jones (ed.), *Historical linguistics. Problems and perspectives*, 237-278. London & New York: Longman.

Oñederra, Miren Lourdes. 1990. *Euskal fonologia: palatalizazioa. Asimilazioa eta hots sinbolismoa*. Bilbao: University of the Basque Country Press.

Oñederra, Miren Lourdes. 2002. Palatalization revisited: bustidura adierazgarriaren estatusaz ohar batzuk. In Xabier Artiagoitia, Patxi Goenaga & Joseba A. Lakarra (eds.), *Erramu boneta. Festschrift für Rudolf P. G. de Rijk*, 499-509. Leioa: UPV/EHU.

Peust, Carsten. 2008. On consonant frequency in Egyptian and other languages. *Lingua Aegyptia* 16. 105-134.

Rebuschi, Georges. 2003. Basque. In Thorsten Roelcke (ed.), *Variationstypologie. Ein sprachtypologisches Handbuch der europäischen Sprachen in Geschichte und Gegenwart / Variation typology. A typological handbook of European languages past and present*, 837-865. Berlin & New York: Walter de Gruyter.

Rothstein, Robert A. 1993. Polish. In Bernard Comrie & Greville G. Corbett (eds.), *The Slavonic languages*, 686-758. London: Routledge.

Trask, Robert L. 1997. *The history of Basque*. London: Routledge.

Trask, Robert L. 1998. The typological position of Basque: Then and now. *Language Sciences* 20(3). 313-324.

Vilain, Anne, Marjorie Dole, Hélène Lœvenbruck, Olivier Pascalis & Jean-Luc Schwartz. 2019. The role of production abilities in the perception of consonant category in infants. *Developmental Science* 22 (6). e12830. https://doi.org/10.1111/desc.12830.

Wang, Sheng-Fu. 2019. The organization of sound inventories: A study on obstruent gaps. *Proceedings of the Society of Computation in Linguistics* 2. 195-204. https://doi.org/10.7275/pbe-zf60.

https://doi.org/10.1387/asju.25965