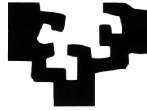eman ta zabal zazu

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Towards a phonetically grounded diachronic phonology of Basque

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Abstract

Abstract (English)

Over half a century after its original release in 1961, *Fonética Histórica Vasca* (Michelena 1977 [2011]) continues to be the main reference in the field of Basque historical phonology and Basque historical linguistics more generally. Though some authors have suggested that Michelena's work left little for future researchers to tackle (e.g. Trask 1997), this dissertation aims to demonstrate that significant developments in phonetics, phonological typology, and theories of sound change over the past several decades allow for new contributions and insights in the field of Basque historical phonology.

This dissertation analyzes Basque diachronic phonology within a phonetically informed approach to sound patterns and sound change similar to that of Evolutionary Phonology (cf. Blevins 2004, 2006, 2008, 2014). It assesses Basque phonological developments in terms of cross-linguistic typological tendencies, and incorporates recent experimental results from laboratory phonology, recognizing the importance of phonetics in phonology (Ohala 1981, 1993, 2012), and the role of phonetics in explaining instances of sound change (Ohala 1974, 2003). In addition, the role of contact is considered for some of the developments detailed; though Basque is an isolate, it has had contact with Celtic, Germanic and Romance languages, and any account of Basque historical phonology must take this into account.

The general hypothesis is that typologically common sound changes and sound patterns are precisely those with well understood phonetic origins (Blevins 2004, 2006), while rare sound patterns may result from rare evolutionary pathways, rule telescoping, or analogy. Thus, great importance is given to typological parallels of processes with a potential phonetic origin. The importance of the use of typology and phonetics in the study of the historical phonology of isolates like Basque is highlighted. At the same time, unique sound changes in the history of Basque are studied closely, in an attempt to understand how they can inform theories of phonetically based sound change. Sound changes which,

in contrast, constitute areal features, are assessed with respect to potential influence of surrounding phonological systems (Blevins to appear).

In this dissertation I propose new analyses of already described phonological processes as well as original analyses of sound patterns that have not been treated in detail by previous authors. Sound patterns discussed in this dissertation include: the development of the different Basque accentuation systems, including systems based on word-level stress and phrase-level pitch accent; the evolution of Basque laryngeals /h/ and /h̃/; the evolution of dialectal /y/ and phonetic conditions inhibiting /u/-fronting; the development of contrastively nasalized vowels in Basque dialects, explanations for their distribution, and a phonetic account of [ð]-raising; and a study of distinct metathesis types in the history of Basque, many of which have clear phonetic bases. In addition to detailed analyses of these processes, I attempt to provide chronologies of these sound changes, and to highlight cases where contact may play a role. Typological parallels and phonetic bases provide a deeper understanding of Basque historical phonology and illuminate the important contributions isolates can make to theories of sound change.

Abstract (Basque)

1961an Fonética Histórica Vasca (Michelena 1977 [2011]) argitara eman zenetik mende erdi bat igaro dela, euskal fonologia historikoan eta orokorrean euskal hizkuntzalaritzan daukagun erreferentzia lan nagusia izaten jarraitzen du. Zenbait egilek (e.g. Trask 1997) Mitxelenaren lanak etorkizuneko ikertzaileei ezer gutxi utzi diela ikertzeke iradokitzen badute ere, honako tesiak azkeneko hamarkadetan fonetikan, tipologia fonologikoan eta soinu aldaketa teorietan egondako garapen nabarmenak euskararen fonologia historikoan ekarpen eta ikuspegi berriak lor ditzakeela frogatu nahi du.

Tesi honek euskal fonologia diakronikoa eredu eta aldaketa fonologikoekiko hurbilketa fonetiko baten bitartez aztertzen du, fonologia ebolutiboaren (cf. Blevins 2004, 2006, 2008, 2014) ildo berean. Euskararen garapen fonologikoak joera tipologiko interlinguistikoen bitartez ikertzen dira eta laborategi-fonologian lortutako emaitza esperimental berriak gehitzen zaizkio, fonetikak fonologian (Ohala 1981, 1993, 2012) nahiz aldaketa fonologikoen azalpenetan (Ohala 1974, 2003) duen garrantzia nabarmenduz. Halaber, azaldutako zenbait prozesutan kontaktuaren eragina kontuan hartuko da. Euskara hizkuntza isolatua izanagatik ere, hizkuntza zelta, germaniar eta

erromantzeekin kontaktuan egon da, beraz hori gogoan hartu beharrekoa da euskal fonologia historikoaren edozein ikerketan.

Hipotesi orokorra tipologikoki arruntak diren aldaketa fonologikoak jatorri fonetiko ezagunak dituztenak direla da (Blevins 2004, 2006), horren arruntak ez diren eredu fonologikoak, berriz, eboluzio bide bakanen, arauen metaketaren edo analogiaren ondorio izan daitezke. Hori dela eta, jatorri fonetiko potentziala duten prozesuen paralelo tipologikoei garrantzia handia emango zaie. Euskara bezalako hizkuntza isolatuen fonologia diakronikoa ikertzerakoan tipologia eta fonetikaren erabilerak daukan garrantzia nabarmenduko da. Era berean, euskararen historian gertatutako aldaketa fonologiko bereziak sakonean aztertuko dira fonetikan oinarritutako aldaketa fonologikoaren teoriei egin diezaieketen ekarpena ulertzeko. Bestalde, ezaugarri arealen ondorio diren hots aldaketak inguruko sistema fonologikoen eragin potentzialaren arabera aztertuko dira (Blevins to appear).

Tesi honetan aurretiaz deskribatutako prozesuen analisi berriak, nahiz aurreko egileek sakonean landu ez dituzten eredu fonologikoen analisi originalak proposatzen ditut. Analizatutako eredu fonologikoen artean honakoak aurki daitezke: euskal azentuera sistema ezberdinen garapena, hitz-mailako azentuan oinarritutako sistemak eta esaldi-mailako doinu-azentuan oinarritutakoak barne hartzen dituela; /h/ eta /h̃/ euskal laringalen eboluzioa; /y/-ren eboluzioa zubereraz eta /u/ aitzineratzea saihesten duten balditza fonetikoak; kontrastiboki sudurkaritutako bokalen garapena euskalki ezberdinetan, horien distribuzioari buruzko azalpenak eta [õ] igoeraren azalpen fonetikoa; eta euskararen historian zehar gertatutako metatesi ezberdinei buruzko ikerketa, horietako askok oinarri fonetiko garbia dutela. Prozesuon analisi sakonaz gain, prozesu horieen kronologiak eskaini eta kontaktuaren eragina izan dezakeen kasuak nabarmendu ditut. Paralelo tipologikoek eta oinarri fonetikoek euskal fonologia historikoaren ulermen sakonagoa eskaintzen dute eta hizkuntza isolatuek aldaketa fonologikoaren teoriei egin diezaieketen ekarpen esanguratsua agerian uzten dute.

Abstract (Spanish)

Más de medio siglo después de su publicación original en 1961, *Fonética Histórica Vasca* (Michelena 1977 [2011]) sigue siendo la principal referencia en el campo de la fonología diacrónica vasca y de la lingüística histórica vasca en general. Aunque algunos autores sugiriesen que el trabajo de Michelena dejo poco que hacer a futuros

investigadores (e.g. Trask 1997), esta tesis pretende demostrar que desarrollos significativos en fonética, tipología fonológica y teorías del cambio fonológico durante las últimas décadas permiten nuevas contribuciones y perspectivas en el campo de la fonología histórica vasca.

Esta tesis analiza la fonología diacrónica vasca desde una aproximación a los patrones y cambio fonológico basada en la fonética similar a aquella de la fonología evolutiva (cf. Blevins 2004, 2006, 2008, 2014). Se analizan los desarrollos fonológicos del euskera a través de tendencias tipológicas interlingüísticas y se incorporan resultados experimentales recientes de la fonología de laboratorio, reconociendo la importancia de la fonética en la fonología (Ohala 1981, 1993, 2012), así como el rol de la fonética en la explicación de los casos de cambio fonológico (Ohala 1974, 2003). Así mismo, se tendrá en consideración el papel del contacto en algunos de los desarrollos detallados. Aunque el euskera es una lengua aislada, ha estado en contacto con lenguas célticas, germánicas y románicas y esto debe ser tenido en cuenta por cualquier análisis de la fonología histórica del euskera.

La hipótesis general es que los cambios fonológicos tipológicamente comunes son precisamente aquellos con orígenes fonéticos conocidos (Blevins 2004, 2006), mientras que los patrones fonológicos menos comunes pueden ser consecuencia de evoluciones poco frecuentes, de la acumulación de reglas o de analogía. Por consiguiente, se dará gran importancia a los paralelos tipológicos de procesos con potencial origen fonético. Se destacará la importancia del uso de la tipología y la fonética en el análisis de la fonología diacrónica de lenguas aisladas como el euskera. Al mismo tiempo, se estudiarán en detalle cambios fonológicos particulares en la historia del euskera, con la intención de comprender cómo pueden beneficiar a las teorías del cambio fonológico basado en la fonética. Por otro lado, los cambios fonológicos que puedan presuponer características areales serán estudiados en relación con la potencial influencia de los sistemas fonológicos circundantes (Blevins to appear).

En esta tesis propongo nuevos análisis de procesos fonológicos previamente descritos así como análisis originales de patrones fonológicos que no han sido tratados en detalle por anteriores autores. Los patrones fonológicos analizados incluyen el desarrollo de los diferentes sistemas de acentuación del euskera, incluyendo sistemas basados en acento de intensidad a nivel de palabra y sistemas basados en acento tonal a nivel de frase; la evolución de las laringales vascas /h/ y /h̃/; la evolución de /y/ en dialecto suletino y las condiciones fonéticas que inhiben la anteriorización de /u/; el desarrollo de vocales

fonológicamente nasalizadas en los dialectos vascos, explicaciones de su distribución y una explicación fonética del cierre de [õ] en /u/; así como un estudio de los distintos tipos de metátesis en la historia del euskera, muchos de los cuales tienen clara base fonética. Además de detallados análisis de estos procesos, se ofrecen cronologías de los mismos y se destacan casos en los que el contacto ha podido influir. Los paralelos tipológicos y bases fonéticas contribuyen a una mayor comprensión de la fonología histórica vasca e iluminan la importante contribución que las lenguas aisladas pueden hacer a las teorías del cambio fonológico.

Foreword

This dissertation has been written during the years 2012-2014, under the supervision of Juliette Blevins and Joseba Lakarra and as a part of the Linguistics doctoral program of the University of the Basque Country (UPV/EHU). I began working on this dissertation after I came back from a year in Madrid in 2012, where I was lucky enough to have the opportunity to learn at the master's program on Phonetics and Phonology offered by the Phonetics Laboratory of the Consejo Superior de Estudios Científicos (CSIC). Some ideas date back to my previous time in Vitoria-Gasteiz, but most of the research in this dissertation was developed during my time in New York City in 2013 and polished in Vitoria-Gasteiz in 2014.

This dissertation is composed of very different chapters with a clear common bond, namely the implementation of typologically and phonetically informed research in the historical phonology of the Basque language. Each chapter is meant to be largely self-contained, so that a reader could consult only the chapter on the segment or process of his or her interest. Nonetheless, cross-references to other chapters are regularly provided. In order to make the text lighter, additional information on the historical/etymological origin of many of the examples found throughout the dissertation is offered in Appendix II. The examples are marked with [E] (for *Etymologies*) or [LW] (for *Loanwords*), and listed in Appendix II under the appropriate list in alphabetical order. More details on the nature of this dissertation can be found in the first two chapters.

Acknowledgments

Iván Igartua, who shared many useful comments with me; to Aritz Irurtzun, who helped me steadily when troubles showed up; to Daniel Kaufman (and Amalia, Dalia and Amiel), who made me feel at home in NYC; to Jeff Mielke, who gave me many good ideas regarding the chapters on metathesis and /u/-fronting; to Rubén Pérez, who helped me make prettier spectrograms; to Ekaitz Santazilia, who offered me recordings of Zuberoan speakers; to Koldo Ulibarri, with whom I discussed our dissertations and to all the Basque musicians I have listened to while writing this dissertation (Mikel Laboa, Negu Gorriak, Dut, Lisabö...), all of whom walked this path with me. I also want to thank the people I had the opportunity to learn from in Gasteiz, Barcelona, Tarragona, Madrid, Leipzig, Cagliari, New York City, Berkeley, Poznan or Baiona.

Special thanks and all my love go to my family, for all their love and support. To my mother Nekane, who was a linguistic amateur since she was a child. I probably don't appreciate as much as I should the importance she had in sowing in me the interest for linguistics that has brought me where I am today. To my father Martxel, who kept emphasizing the importance of things I see as important now. He also helped me edit the final version to make it look as it does now. To my sister Argia and my brother Aitor; we grew together and nurtured our intellectual interests together, although we don't see each other that much right now. And, above all, to B, who has been with me through all the process, both the good and the bad parts of it, and has been my inspiration more often than she realizes.

Finally, a last special thank you goes to you, reader, because you are the primary reason why we keep writing, although we tend to forget it sometimes.

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Abbreviations:

Abl.	Ablative		masc.	masculine
abs.	Absolutive		Maz.	Mazovian (Pol.)
adv.	adverb		Med.	Medieval (Bsq.)
all.	allative		Mid.	Middle
alloc.	allocutive		Mix.	Mixean (LN)
Aq.	Aquitanian		Mod.	Modern
Arch.	Archaic (Bsq., B)		Nav.	Navarrese (Rom.)
Arm.	Armenian		Occ.	Occitan
Ast.	Asturian [Astur-Leonese]		per.	person
Bay.	Bayonnese (Gsc.)		PIE	Proto-Indo-European
Baz.	Baztanese (HN)		pl.	plural
Brn.	Béarnese (Gsc.)		Pol.	Polish
Bsq.	Basque		Por.	Portuguese
Cam.	Campidanese (Sar.)		Recons.	Reconstruction
Cat.	Catalan		Rom.	Romance
Cel.	Celtic		Sar.	Sardinian
Cl.	Classic (L)		sg.	singular
col.	colloquial		Sp.	Spanish
com.	comitative		Std.	Standard (Bsq., Sp., etc.)
comb.	combination (form)		Trans.	Transcription
comm.	common		Var.	Variant
Cr.	Creole		Vlg.	Vulgar (Lat.)
dat.	dative			
def.	definite			
Dial.	Dialectal (Bsq.)		Basque Dialects:	
dim.	diminutive			
Dzc.	Donzacese (Gsc.)		A	Alavese
Eng.	English		AE	Aezkoan
erg.	ergative		B	Bizkaian
exc.	except		G	Gipuzkoan
fem.	feminine		HN	High Navarrese
Fr.	French		L	Lapurdian
G-P.	Galician-Portuguese		LN	Low Navarrese
Gal.	Galician		R	Roncalese
gen.	genitive		Z	Zuberoan
Ger.	Germanic		S	Salazarese
Got.	Gothic			
Gsc.	Gascon			
Hit.	Hitite		Cover terms for segments:	
IE	Indo-European			
indef.	Indefinite		R	Sonorant
ines.	Inessive		L	Liquid
Ir.	Irish		N	Nasal
J-Sp.	Judeo-Spanish		T	Stop, voiceless stop
Kor.	Korlai (Cr. Por.)		D	Voiced stop
Lat.	Latin		S	Sibilant, fricative sibilant
lit.	literally		TS	Affricate
Lit.	Literary (Z)		H	Aspirate

1 Introduction

Fifty years after its original release in 1961, *Fonética Histórica Vasca* (Michelena 1977 [2011]) continues to be the main reference insofar as Basque historical phonology and Basque historical linguistics overall are concerned. Though some authors have suggested that Michelena's work left little for future researchers to tackle,[1] this thesis aims to demonstrate that, given the significant developments in phonetics and phonology over the past several decades, many new contributions can be made to the field of Basque historical phonology.

Given that phonological theory has been highly dynamic in the last decades, *Fonética Histórica Vasca* offers a vast fertile ground able to produce many new results by revisiting it from diverse perspectives. I will adhere to a very specific frame in my discussion of Basque diachronic data: I will analyze Basque diachronic phonology from a phonetic perspective, highly grounded on linguistic typology and taking linguistic contact into account. My approach is not far from that adopted by Blevins (2004, 2006, 2008, 2014) in her *Evolutionary Phonology*. The importance of phonetics (Ohala 1981, 1993, 2012), not only in modern phonological research, but also in historical linguistics (Ohala 1974, 2003), will be highlighted throughout this dissertation.

My approach not only calls for the inclusion of phonetic explanations for the historical processes of the Basque language, it also aims to find potential typological parallels in genetically unrelated languages, in order to shed light on the processes under analysis. This aim is derived from the assumption that typologically common sound patterns are precisely those with phonetic origin (Blevins 2004). Thus, a great importance

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1   "Since Michelena, little remains beyond tidying up the details" (Trask 1997: 6).

will be given to typological parallels of processes with a potential phonetic origin.

This concern for typological parallels is far from being novel. Michelena himself, the author that carried out the reconstruction of the Basque language that is now standard (and essentially carried the weight of Basque historical linguistics during the second half of the last century), alluded to phonetic (which in his time were mostly articulatory) and typological explanations (by offering examples from languages not related to Basque) when the occasion required them. For the sake of illustration, Michelena (1977 [2011]: 330) used the distribution of Welsh laryngeals as a basis for his hypothesis on the location of old Basque stress. It is due to Michelena's wide understanding of the fields of historical linguistics and philology and his knowledge of the history of Basque and its dialects that *Fonética Histórica Vasca* still preserves its great value.

The work of Michelena is the most significant milestone in the history of Basque diachronic phonology, and will remain one of the greatest contributions to Basque historical linguistics. Even so, there is a great deal to be learned by updating Michelena's proposals in light of advances in phonetic science, new data on Basque dialects, and modern comprehensive theories of sound change.

1.1 Modern Basque: Dialects and standardization

When we speak of modern Basque we have to distinguish between the modern dialects of the language, spoken in the regions they originated in, and Unified or Standard Basque (or *Euskara Batua* 'Unified Basque'). Standard Basque is the unified language developed in 1968. It has been increasingly used as a written language ever since, both for administrative purposes[2] as well as in day-to-day life. Standard Basque was developed from the combination of Literary Gipuzkoan and the Lapurdian literary tradition. Standard Basque has a standardized orthography —followed throughout the dissertation— whose phonological equivalences are as follows:

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2   Standard Basque is an official language and it is widely used for administrative purposes in the Basque Autonomous Community of Spain. Nevertheless, it is used only in the north of Navarre and it is not official in the French side of the Basque Country.

(1.1)   Standard Basque orthographic equivalence

	Grapheme	**Transcription**
Voiceless stops	<p, t, k, tt>	/p, t, k, c/
Voiced stops	<b, d, g, dd>	/b, d, g, ɟ/
Voiceless fricatives	<f, s, z, x, h>	/f, s̺, s̻, ʃ, (h)/
Voiceless affricates	<ts, tz, tx>	/ts̺, ts̻, ʧ/
Nasals	<m, n, (i)n/ñ>	/m, n, ɲ/
Liquids	<l, (i)l, r, rr>	/l, ʎ, ɾ, r/
Glides	<j/i, u>	/j, w/
Vowels	<i, e, a, o, u>	/i, e, a, o, u/

The aspirate /h/ is not produced in the peninsular Basque Country (except in Zugarramurdi, Kintoa and Luzaide), but it is nevertheless orthographically transcribed in the standardized language.[3] In contrast to Spanish or English, nasal stops preceding an oral obstruent are regularly transcribed <n> in Basque. They are produced with the same place of articulation as the following segment.

1.1.1 Modern phonological inventory

Modern Basque dialects vary to some extent in their phonemic inventory. Nevertheless, a more or less common inventory would include the phonemes usually linked to Standard Basque. These segments are presented in Figure 1.1 and Figure 1.2, together with some other added sounds, which correspond to those found in only a limited number of dialects (or even in one single dialect). Segments not found in all dialects are represented in parentheses.[4]

From a typological point of view, an unusual distinction within the Basque consonantal inventory is the phonemic opposition between six different voiceless sibilants: an apical, a laminal and a post-alveolar, along with their affricated counterparts. In Zuberoan and some Low Navarrese varieties, there is also a series of voiced fricative

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3   /h/ is only partially transcribed in Standard Basque: it is transcribed word-initially and intervocalically, but not when it follows a sonorant. Aspirated stops are not transcribed in Standard Basque. Nevertheless, both /h/ after a sonorant and the aspirated stop series were regularly transcribed in the northern tradition since 1545 until roughly 1970.

4   Hualde (2003a: 15) offers a simpler table containing only the segments found in Standard Basque. In addition, he includes a table with the phonemic inventory of the easternmost dialect, Zuberoan (2003a: 18), usually described as the most deviant variety of the Basque language.

sibilants —and even an apico-alveolar affricate— which are phonemically distinct (cf. Hualde 1993b). Some Bizkaian varieties possess voiced palato-alveolar fricative or affricate sibilants.

When carefully studying the segments which are present in only a few varieties, the historical linguist must distinguish between the segments which represent an innovation and those present in an older stage of the language but which are only peripherally present today after having become lost in most of the modern dialects.

		labial		apical		laminal (alveolar)	predorsal		postdorsal	laryngeal
		bilabial	labio-dental	apico-dental	apico-alveolar		palato-alveolar	palatal		
stop	voiceless	p		t				c	k	
	aspirated	(pʰ)		(tʰ)				(cʰ)	(kʰ)	
	voiced	b		d				ɟ	g	
Fricative	voiceless		f		s̺	s̻	ʃ		(x)	(h)
	voiced				(z̺)	(z̻)	(ʒ)	(ʝ)		(h̃)
affricate	voiceless				t̺s̺	t̻s̻	tʃ			
	voiced				(d̺z̺)		(dʒ)			
	nasal	m			n			ɲ		
	lateral				l			ʎ		
	tap				ɾ					
	trill				r					
	glides							j	w	

Figure 1.1. Modern Basque consonant inventory

	front		central	back
high	i (ĩ)	(y) (ỹ)		u (ũ)
mid		e		o
low			a (ã)	

 Falling diphthongs: au̯, eu̯, ai̯, ei̯, oi̯[5]
Figure 1.2. Modern Basque vowel inventory

While some segments may appear in any position, the distribution of other segments is limited. Rhotics /r, ɾ/ are absent from word-initial position, and neutralized

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5   Rising diphthongs are analyzed as /j, w/+/V/. *-ui-* is considered a rising diphthong /wi/ (cf. Michelena 1977 [2011]: 71).

to /r/ in coda. Affricates /t̪s̪, t̺s̺/ are absent from word-initial position.[6] Fricative sibilants are uncommon stem-finally, but found in high-frequency words (e.g. *ez*[E] 'no'). The only possible stops in coda are /t, k/ and only occur word-finally.[7] /h/ is present in only syllable onset position and is limited to the first two syllables of the word in modern continental Basque dialects.

The syllabic structure of modern Basque is represented as $C^2_0VC^2_0$ by Jauregi (2007, 2008). This implies that up to two segments may occur in both onset and coda, but none of them is required. Only onomatopoetic words such as *krausk!* 'crack!' fill all syllabic positions. However, older stages of the language lacked tautosyllabic onset consonant clusters, and tautosyllabic coda clusters are only found word-finally (e.g. *bortz*, *bost*[E] 'five'). Initial consonant clusters are found only in recent loans (as *tranpa*[LW] 'trap' or *froga*[LW] 'trial, proof') or sound symbolic vocabulary (*pluf!* 'splash!'). Word-medial heterosyllabic clusters are either /S, R/ + /T/ (cf. *asto*[E] 'donkey', *arto* 'corn') or /R/ + /TS/ (*hertsi*[E] 'to close', *entzun*[E] 'to hear') and occur as tautosyllabic in final position (*hartz*[E] 'bear'). Given the late adoption of onset /TL/ clusters, medial C.CC clusters are uncommon in the language.

Compounding was a productive process in earlier forms of the language. At the compound boundary, the initial member of a compound undergoes a range of weakening processes illustrated in (1.2) including final vowel reduction, final vowel loss, final consonant neutralization, and final consonant loss (cf. Michelena 1977 [2011]; Hualde 2006b, 2007; Oñederra 2013).[8] These processes have given rise to short "combination forms" for the first members of compounds in the modern language.

---

6   Only a couple of sound-symbolic words such as *tzar* 'bad' show the alveolar affricates word-initially, and only in the continental varieties.

7   Word-final (voiceless) stops are secondary (cf. *bart*[E] < *barda* 'last night'); stops were only present in syllable onsets in the proto-language (cf. Artiagoitia 1993).

8   In the first member of a compound, final non-high vowels are reduced to -*a* in disyllabic words, while high vowels in disyllabic words and all final vowels in longer words are loss. After vowel loss, all oral stops and -*h* (but not /h̃/) are neutralized to -*t*. When followed by another stop, final -*t* is lost and the following stop is devoiced.

(1.2)   *Processes at the compound boundary* (Michelena 1977 [2011]: 281ff.)

a)   Final vowel reduction

Full form	Comb. form	Gloss	Example	Gloss
baso	*basa-*	'forest'	*basajaun*	'Lord of the forest'[9]
arto	*arta-*	'corn'	*artaburu*	'stupid' (lit. 'corn-head')
etxe	*etxa-*	'house'	*etxandre*	'lady of the household'

b)   Final vowel loss + consonant neutralization

Full form	Comb. form	Gloss	Example	Gloss
ardi[E]	*art-*	'sheep'	*artile*	'wool' (lit. 'sheep-hair')
argi[E]	*art-*	'light'	*artizar*	'bright star' (lit. 'light-star')
behi[E]	*bet-*	'cow'	*betzain*[E]	'cowboy' (lit. 'cow-guard')

c)   Final vowel loss + consonant loss

Full form	Comb. form	Gloss	Example	Gloss
ogi[E]	*ot-*	'bread'	*okin* (-*gin*)	'baker' (lit. 'bread-maker')
errege[LW]	*erret-*	'king'	*errepide*[E] (*bide*)	'highway' (lit. 'king-road')
begi[E]	*bet-*	'eye'	*bepelar* (*belar*)	'eyelash' (lit. 'eye-grass')

Consonant clusters are environments for a range of phonetic processes including: deaspiration of voiceless stops after a sibilant (**S.Tʰ);[10] voicing of sibilants /s̺, s̻/ to [z̺, z̻] before a nasal; nasal coarticulation to a following obstruent. In addition, stops have been devoiced after a sibilant and sibilants have undergone affrication after tauto-syllabic sonorants. All of the sound changes just mentioned appear to be independent of syllable structure and apply across a syllable boundary.

Other automatic phonetic processes present in most modern Basque dialects include nasalization of vowels flanking a nasal consonant; spirantization of /b, d, g/ to [β, ð̞, ɣ] after a vowel or /s̺, s̻, r, l/ with the exception of /d/ after /l/; /l/ coarticulation to a following dental stop /t, d/; neutralization of rhotics /ɾ, r/ to [r] in coda; palatalization of /n, l, t/ to [ɲ, ʎ, c] after a front off-glide; voicing of /h/ to [ɦ] after a vowel or a sonorant in the dialects which preserve it.

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9   This is a Basque mythological creature, similar to a forest genie.
10   In addition, /h/ may become /k/ when preceded by a sibilant. Examples of this process include **baraz-hari > barazkari > bazkari*[E] 'lunch', **ametz-heta > Amezketa* '(place name)' (Lakarra, p.c.).

1.1.2 Historical and modern dialects

Modern Basque dialects are considerably different (although mutually intelligible). However, it was not so long ago that Basque dialects were not very different from each other. According to Michelena (1981 [2011a]), all modern dialects can be carried back to a *koiné* that existed around the beginning of the Middle Ages, namely Common Basque.

Since Bonaparte's (1863, 1869 [1991]) first dialectological studies, there have been several different descriptions of the Basque dialects. The dialectal division that I will follow through the dissertation encompasses ten different dialects, as shown by Figure 1.3 and example (1.3). Three of the dialects are currently extinct (namely Alavese, Roncalese and Salazarese). This division is based on that established by Michelena (1977 [2011]). Trask (1997) and Hualde and Ortiz de Urbina (2003) use the same division and terminology. Martínez-Areta (2013a) uses a different terminology and distinguishes between Northern and Southern High Navarrese and Western and Eastern Low Navarrese, following Bonaparte's fourth (and last) dialectal classification. The terminology used by previous authors is shown in (1.3).

Figure 1.3. Historical dialectal division of Basque (19th century)

(1.3)   Terminology used by the different authors

Michelena	**Trask**	**Martínez-Areta**	**Egurtzegi**
Aezcoano	Aezkoan	Aescoan	Aezkoan
Meridional	Southern	Alavese	Alavese
Vizcaíno	Bizkaian	Biscayan	Bizkaian
Guipuzcoano	Gipuzkoan	Guipuscoan	Gipuzkoan
Alto navarro	High Navarrese	High Navarrese	High Navarrese
Labortano	Lapurdian	Labourdin	Lapurdian
Bajo navarro	Low Navarrese	Low Navarrese	Low Navarrese
Roncalés	Roncalese	Roncalese	Roncalese
Suletino	Zuberoan	Souletin	Zuberoan
Salacenco	Salazarese	Salazarese	Salazarese

The most recent synchronic dialectal classification of the modern Basque dialects is that by Zuazo (1998, 2008). In this classification, Zuazo distinguishes between 5 different dialects, namely Western (Bizkaian and Alavese), Central (Gipuzkoan), High Navarrese, Lapurdian-Navarrese and Zuberoan. A sixth dialect, Eastern Navarrese (Salazarese and Roncalese), became extinct during the end of the 20th century.

The area where Basque is spoken has progeressively become smaller over time, especially in the southern limit. The comparison between Figure 1.3 (19th century) and Figure 1.4 (21st century) shows a recession in the spread of the language. This recession is clearer after comparing the area covered by Basque in the Middle Ages to the much more limited spread of the language in recent times. Figure 1.4, which is based on figure 1.2 by Trask (1997: 4), shows the approximate spread of the language in four different centuries.

Figure 1.4. Recession of the language

1.2 An introduction to the history of Basque

In order to appreciate the discussion that follows, a brief overview of the history of Basque is presented in this section. Here I will discuss the old attestations of the language (Aquitanian and Medieval/Archaic Basque), the contact to other languages and the two main reconstructions of Proto-Basque: the reconstruction by Michelena and that by Lakarra.

1.2.1 External history

The oldest attestations of a language related to Basque appear in documents written in Latin (cf. Luchaire 1874, 1877, 1879). This language is referred to as Aquitanian (cf. Michelena 1964 [2011b]: 20ff.; Gorrochategui 1984, 1995, 2009). The attestations of this language date from the beginning of the Common Era (1st-3rd century). Aquitanian can either be an old stage of Basque or a language related to it (Campbell 2012). Aquitanian attestations have been found precisely in the French region of Aquitania. Similar attestations from the same period have been found south of the Pyrenees as well, in Navarre, Alava and Soria. Some Aquitanian names with modern Basque equivalents

include those in (1.4):

(1.4)   Aquitanian names with modern Basque equivalents (Ulibarri 2013: 93)

Aq.	Mod. Bsq.	Gloss	Found in
Nesca-to	*neska-to*[E]	'girl', 'dim. suffix'	Aquitaine
Sembe-	*seme*[E]	'son'	Aquitaine
Cison	*gizon*[E]	'man'	Aquitaine
Seni-	*sehi*[E] / *seiñ*	'servant / child'	Aquitaine
Andere-	*and(e)re*[E]	'woman'	Aquitaine
Bihox-	*bihotz*	'heart'	Aquitaine
Vmme-sahar	*ume*[E], *zahar*[E]	'child', 'old'	Navarre
Sesen-	*zezen*[E]	'bull'	Soria (Castilla y León, Spain)

Medieval attestations begin around the 10th century in Navarre, and continue later in La Rioja and Burgos (cf. Michelena 1964 [2011b]: 27ff.). The first medieval attestations in the continental side are even more recent. Until much later, these attestations consist of names, nicknames and place names of peninsular origin. Examples of medieval nicknames include those in (1.5a). Of special importance are the *Emilian Gloses*, part of the *Cartulary of San Millán* (10th-11th century), which, in addition to including a long list of place names (cf. 1.5c), contain the words *jçioqui dugu* and *guec ajutueçdugu* in (1.5d), which remain of difficult interpretation until today. Also important are the General Privilege of Navarre (13th century), the word-list compiled by Aymeric Picaud in *Guide for the traveler* (*Iter pro peregrinis ad Compostellam*, book V of the *Codex Calixtinus*, written around 1140) as well as the word-list by the German Arnold von Harff (15th century), both represented in (1.5b).

(1.5)   Medieval attestations of Basque (Michelena 1964 [2011b])

a)   Nicknames

Example	Std. Bsq.	Gloss
Andia	*Handia*[E]	'the big one'
Chipia	*Txikia*[E]	'the little one'
Arçaia	*Artzaina*[E]	'the shepherd'
Unaia	*Unaia*[E]	'the cowboy'

b)   Common vocabulary items

Example	Std. Bsq.	Source	Century	Gloss
ogui	*ogi*[E]	Picaud	12th	'bread'
aragui	*haragi*[E]	Picaud	12th	'meat'
araign	*arrain*[E]	Picaud	12th	'fish'
gasta	*gazta*[E]	von Harff	15th	'cheese'
gasa	*gatza*[E]	von Harff	15th	'the salt'
bat	*bat*[E]	von Harff	15th	'one'

c)   Place names

Example	Mod. Bsq.	Source	Year
Goiahen	*Goiain*	San Millán	1025
Essavarri	*Etxabarri*	San Millán	1025
Naffarrate	*Nafarrate*	San Millán	1025
Zuhazu	*Zuhatzu*[11]	San Millán	1025
Hillarrazaha	*Ilarratza*	San Millán	1025

d)   Short sentences

Example	Source	Gloss
jçioqui dugu	Emilian Gloses, 10th century	-
guec ajutu eç dugu	Emilian Gloses, 10th century	-
Lope Jaun Ortire semea	Iratxe, Navarre, 1125	'Lope, son of Sir Orti'[12]

According to Lakarra's periodization (Lakarra 1997; Lakarra & Gorrochategui 2001: 429), Archaic Basque includes the first (lengthy) documents written in the language, from 1545 to 1600. More recently, Lakarra and Mounole (in press) proposed that Archaic Basque spanned the period from 1400 to 1600. Nevertheless, this state of the language may not be far from that found in the attestations from the Late Middle Ages. These early documents include a Navarrese letter (1415), a Navarrese popular prayer (< 1425), a letter in Bizkaian (by the bishop Fray Juan de Zumarraga in Mexico, 1537), as well as some short documents, such as *Arrasateko Erreketa* (1448), cf. Michelena (1964 [2011b]).

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11   The orthographic <h> is not pronounced in the modern form.
12   The modern Basque equivalent of this sentence would be *Lope, Orti Jaunaren semea*, with a different genitive suffix (*-re* vs. *-ren*) and different word order (*Jaun Ortire* 'Sir Orti-gen.sg. vs. *Orti Jaunaren* 'Orti Sir-gen.sg.').

The early attestations of the Basque dialects are highly asymmetrical (Lakarra 1997). The first book written in Basque, Bernat Dechepare's *Linguæ Vasconum Primitiæ* (1545 [1980]) is also the first attestation of the Low Navarrese dialect. However, we have to wait around 250 years for the second attestation of this dialect. Other attestations of the Basque dialects from the 16ᵗʰ century include the following: *Dictionarium Linguæ Cantabricæ* by Niccolao Landucci (1562 [1958]), Lazarraga's manuscript (1567-1605 [2013], discovered in 2004) and the doctrine by Juan Perez de Betolaza (1596 [1998]) for Alavese; Garibay (ca. 1592; cf. Urquizu 1989; Zubiaur & Arzamendi 1976) and *Refranes y Sentencias* (anonimous 1596 [1996]) for Bizkaian; and Joannes Leiçarraga's New Testament (1571 [1900]) for Lapurdian.[13] Thus, there is a lack of documentation of the central (Gipuzkoan and High Navarrese) and easternmost dialects (Roncalese and Zuberoan) until the 17ᵗʰ century. Recently, some correspondence between a Roncalese and a Zuberoan speaker has been found (dating from 1616-1617, cf. Bilbao et al. in prep.). For a comprehensive review of the early attestations of Basque and its dialects written in English, see Ulibarri (2013).

1.2.2 Contact with other languages

As far back in history as one can go, Basque has always been in contact with at least one other language. There is no direct documentation written in Basque until the end of the Middle Ages; older attestations appear in texts written in Latin or Romance. Indo-European languages that may have had contact with Basque include Celtic and Germanic varieties in addition to Latin. Nevertheless, loanwords from languages predating Latin are difficult to find. Michelena (1972 [2011c]: 279f.) suggests that Latin and Romance borrowings took the place of the loanwords of previous Indo-European languages, given the 2000 years of contact —beginning around the 2ˢᵗ century BC— that Basque has had with Latin/Romance languages. See Michelena (1964 [2011c]) and Gorrochategi (1987) for further information on the Basque contact with Celtiberic and Gaulish. Non-Indo-European languages that may have been in contact with Basque include Iberian and Arab,[14] although this is far from clear.

The contact with Latin is clear in Basque. Studies that have analyzed Latin

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13   Although Leiçarraga's New Testament was written in Old Lapurdian —with sporadic Low Navarrese and Zuberoan characteristics—, it also included a short Zuberoan glossary.

14   Most, if not all, Arabic loanwords in Basque are assumed to have entered the language through Spanish.

influence in Basque include Rohlfs (1927), Michelena (1972 [2011c], 1974 [2011c]), Echenique (1997, 2008, 2012) and Lakarra (2012), as well as the informative work by Knörr (1995). Following the Latin period, other Romance languages have been in contact with Basque. These include Navarro-Aragonese, Castilian and Gascon, and the two most dominant contact languages today, Spanish and French (cf. Haase 1990, 1992, 2002; Peillen 1992, 1998; Coyos 2001, 2006, 2011, 2012; Gorrochategi 2012).

Due to the continued contact with foreign languages, one of the greatest problems of Basque historical linguistics is the difficulty to discern between loanwords and inherited words. I define inherited words as words with no known foreign origin that conform to the sound patterns (and morphological patterns) of Basque outlined in this dissertation, or are sound-symbolic.

1.2.3 Michelena's proto-language

In fact, as we go back in time, we find a very different scenario: Common Basque (cf. Michelena 1981 [2011a]) from the beginning of the Middle Ages (5th-6th centuries), and Proto-Basque (cf. Michelena 1977 [2011]), which preceded Roman contact (last centuries BCE). Fewer than half of the segments found today had a phonemic status at those early stages, and most of these only after having suffered significant changes (cf. Martinet 1950 [1974]; Michelena 1977 [2011], 1951 [2011a]). As a matter of fact, according to Michelena (1977 [2011]), the Proto-Basque system was not grounded on the opposition between voiced and voiceless stops or fricative and affricate sibilants, but on a more general fortis versus lenis distinction that involved almost the entire consonantal inventory.

As Figure 1.7 shows, the reconstructed vowel inventory contains the same vowels found in modern times. The sixth vowel from Zuberoan (the front high rounded vowel /y/) as well as the nasalized series are both regarded as innovations not found in Common Basque, although they have a very different chronology. The consonant inventory in Figures 1.5 and 1.6, on the other hand, looks very different shape in the stages of the language reconstructed by Michelena from the modern one, with an opposition dividing the system into two groups —the aforementioned fortis and lenis— in an almost regular way. However, this is still incomplete given the lack of the labial fortis in the inherited lexicon, as discussed by Michelena (1977 [2011]: 215; cf. Egurtzegi 2013a: 148).

The first proposal for such an opposition comes from Martinet (1950 [1974]), who

hypothesized that Proto-Basque may have had a system analogous to that of the Danish language. He proposed an opposition between two series —namely fortis and lenis— that had different phonetic realizations according to the position of the word in which they were produced. The fortis series was produced as aspirated and voiceless in a prominent position and as plain voiceless preceding an unstressed vowel, while the "soft" or lenis stops were realized as devoiced stops in a prominent word-initial position and as voiced fricatives in an unstressed position. Figure 1.8 illustrates the hypothesized phonetic realization of the stops, according to Martinet (1950 [1974]: 533).

	stop			sibilant		sonorant		
	lab	dent	vel	apical	laminal	nasal	lateral	rhotic
fortis	(P)	T	K	t͡s̺	t͡s̻	N	L	R
lenis	p	t	k	s̺	s̻	n	l	r

Figure 1.5. Consonants involved in the fortis/lenis opposition[15]

	labial	palatal	post-dorsal	laryngeal
fricative	(f)			h
nasal	(m)			
glide		(j)	(w)	

Figure 1.6. Consonants absent from the fortis/lenis opposition

	front	central	back
high	i		u
mid	e		o
low		a	

Diphthongs: au̯, eu̯, ai̯, ei̯, oi̯

Figure 1.7. Vowels and diphthongs reconstructed for Proto-Basque

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15   Here I follow Michelena's notation (1977 [2011] and elsewhere), using uppercase letters to denote the fortis and lowercase for the lenis series. Michelena used a different notation for the sibilants, not based on the IPA: he used *s* and *c* for the laminal fricative /s̻/ and affricate /t͡s̻/ and *ś* and *ć* for their apical counterparts /s̺/ and /t͡s̺/. He represents the more recent postalveolar sibilants /ʃ/ and /t͡ʃ/ with the symbols *š* and *č*.

Phonemes	Initially (stressed)	Intervocalically (unstressed)
/b/	[b̥-]	[-β̝̊-]
/t/	[tʰ-]	[-d̥-]
/d/	[d̥-]	[-ð̥-]
/k/	[kʰ-]	[-g̊-]
/g/	[g̊-]	[-γ̝̊-]

Figure 1.8. Hypothesized phonetic realization of stops

Taking this system as a starting point, Martinet proposes a word-initial lenitive process involving the fricativization of the aspirated stops. This is followed by a subsequent debuccalization that could have resulted in the complete loss of the segment —i.e. /tʰ-/ > /θ-/ > /h-/ (> Ø)—, along with an initial voicing of the lenis series, which the author attributes to neighboring Romance pressure, since "in Latin pronunciation, the articulatory energy was equitably distributed along the chain" (1950 [1974]: 54 [my translation, AE]). Michelena (i.a. 1951 [2011a], 1977 [2011]) accepts and expands this system with the addition of the sonorant segments to which, interestingly enough, he does not attribute any kind of contextual divergence in their phonetic realizations.

To the consonants in Figure 1.8, two different groups of consonants may be added. First, the aspirate /h/, which was most probably part of that stage of the language, even though it did not form part of the opposition proposed by Martinet (1950 [1974]) and expanded by Michelena (1951 [2011a], 1977 [2011]). Secondly, the segments /m/ and /f/ along with the glides yod and wau and the aforementioned /P/ were not as frequent as the other segments and were probably of later introduction. While the former was almost undoubtedly part of the previous stages of the language, the latter labial segments seem to have been secondary in older times (some maybe even marginal), and it is possible that they were mostly present in the borrowed lexicon.

Michelena (1977 [2011]: 305) cites the adaptation of Latin and Romance medial voiced stop clusters as evidence of a tense/lax contrast in opposition to the modern voiced/voiceless contrast. The fact was that all geminates and heterorganic voiced stop groups were adapted to voiceless stops with the place of articulation of the prevocalic segment, as in Lat. *abbas* > *apaiz*[E] 'priest' or Old Sp. *cobdiçia* > *gutizia*[LW] 'desire, whim'. An alternative account, however, would be that medial voiced stops were realized as approximants —as they are in the modern language and already were in the 12th century (cf. Egurtzegi 2013a: 147)— and that voiced stop clusters could be perceived as voiceless

stops —the only existing intervocalic phonetic stops—, rather than intervocalic voiced approximants. Along the same lines, Gavel (1920: 303ff.) cites the adaptation of Latin /f/ as Basque /b/.[16] However, the latter may have been the only labial consonant available in the language and thus the only suitable option, given the lack of /p/, as proposed by Michelena himself.

1.2.4 Lakarra's proto-language: Old Proto-Basque

If we move into even older times, some centuries before the time estimated by Michelena for Proto-Basque (approx. first centuries BCE) we encounter a very different state of the Basque language, which we can label Old Proto-Basque. This stage has mainly been reconstructed by Lakarra (1995, 2005, 2011a, etc.), and is a direct consequence of his research on the old canonical root structure, which he found to be a monosyllabic CVC, lacking any consonantal clusters or diphthongs (cf. Lakarra 1995 and elsewhere).

Thus, reconstructed Old Proto-Basque has much simpler phonotactics than the following stages of the language, allowing only two possible consonantal positions (i.e. C_1VC_2) instead of the initial/medial/final distinction made in both Proto-Basque and modern Basque. Thus, we distinguish between onset and coda consonants in Old Proto-Basque, as illustrated in Figure 1.9.

	stop			**fricative**			**sonorant**		
	lab	**dent**	**vel**	**apical**	**laminal**	**glottal**	**nasal**	**lateral**	**rhotic**
onset	b	(t), d	(k), g	s̺	s̻	h	n	-	-
coda	-	-	-	s̺	s̻	-	n	l	ɾ

Figure 1.9. Consonants in Old Proto-Basque according to their syllabic position

It is uncertain what the total number of proposed stops should be, or what was the nature of the plosive series. The reconstructed monosyllabic roots involving voiceless stops (such as *t^hor or *k^har) are scarce, but cannot be derived from other segments either.

Little research has been carried out on the Proto-Basque vocalic system, and thus it is even harder to know the shape of that system in previous stages of the language. Until

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16 Nevertheless, as a consequence of prolonged contact to Romance languages (and the different layers of loanwords created by it) alongside secondary developments within Basque, Lat. /f/ may be represented by Bsq. /b/, /m/, /f/, /p$^{(h)}$/, /h/ or zero (cf. Michelena 1977 [2011]: 218), cf. the word for 'fig' in the different Basque dialects: AE *biku*; A *fiku*; L *fiko*; HN, G, LN, S *piko/u*^{E}; Z *phiko*; B *iko*.

new results are found, a 5-vowel inventory is reconstructed by default, since it is the one found in the modern stages of the language and in any written document, except for those written in the Zuberoan dialect, with a late front high rounded vowel (§5.2). Some dialects show as a nasalized series as well (§6.2). In any case, both /y/ and the series of contrastively nasalized vowels are secondary.

1.3 General literature on Basque (historical) phonology

As stated at the beginning of the chapter, the seminal work by Michelena (1977 [2011]), *Fonética histórica vasca*, remains the main reference of the discipline more than half a century after its first edition in 1961. Other general diachronic and phonological works, both older and more recent, include Uhlenbeck (1903); Gavel (1920); Hualde (1991a); Hualde, Lakarra and Trask (1995); Trask (1997); Hualde and Ortiz de Urbina (2003) and Martínez-Areta (2013a).

Works on more specific phonological topics include Lafon (1937 [1999], 1962a [1999], 1962b [1999]) on /y/; Martinet (1950 [1970]), Michelena (1957 [2011a]), Trask (1985), Hualde (1999b), Martínez-Areta (2006) and Lakarra (2011b) on the Proto-Basque consonant system; Michelena's (1950 [2011a]), Igartua's (2001, 2006, 2008) and Lakarra's (2009a, 2009b, 2014) research on laryngeals; Michelena's (1957-58 [2011a], 1972 [2011a]), Hualde's (1993a, 1997a, 2003c, 2007, 2012; Hualde et al. 2008), Elordieta's (1997, 2011a) and Gaminde's (1998a) work on the Basque accentuation systems; Elordieta (1998, 2007a) on intonation; de Rijk (1970) on Bizkaian vowel assimilation; Oñederra's (1990) dissertation on palatalization; Atutxa and Zuloaga (2014) on the sibilant neutralization; Artiagoitia (1990, 1993) and Jauregi (2007) on syllabic structure; Lakarra's research on Proto-Basque canonical root (1995, 2006a, 2006b, 2013; Gorrochategui & Lakarra 1996, 2001); as well as Guiter's (1989), Múgica's (1996) and Lakarra's (2011 [2014]) works on the relative chronology of the language. Although there is a lack of phonetic literature on the Basque language, Larrasquet's work on Zuberoan (1928, 1934, 1939) has certainly proven to be useful. Other works on Basque phonetics worth mentioning include Etxebarria (1990) on the acoustics of Zaldibia Basque vowels or Mounole (2004) on the aspirated stop series. All of these works have much to offer, and have contributed, to different extents, to the discussion in this dissertation.

Different dictionaries or glossaries have been consulted for the development of the

corpora used for the analysis of the different sound patterns discussed through the dissertation. Most examples have been found in the *General Basque Dictionary* (*Orotariko Euskal Hiztegia*, Michelena & Sarasola 1987-2005). Other useful dictionaries include Azkue's cross-dialectal *Diccionario vasco-español-francés*, the *Dictionnaire basque-français* by Lhande (1926-1938) which includes examples from the eastern continental dialects and the lexicon in *Le Basque de la Basse-Soule Orientale* by Larrasquet (1939) for Zuberoan, which contains about 6500 entries. Standard Basque forms can be checked in Euskaltzaindia's (2010) *Hiztegi Batua*.

2 Theoretical framework

2.1 Contextualizing this study

As noted in the introduction (§1), the present dissertation is grounded in phonetically informed approaches to sound patterns and sound change as well as cross-linguistic typologies of sound patterns informed by studies in laboratory phonology. As much of this work post-dates Michelena's major contributions to Basque historical phonology, the thesis can be seen as both updating Michelena's proposals with facts that allow us to understand these phenomena at a deeper level, as well as offering original analyses in areas that were not studied in detail by Michelena (e.g. the evolution and distribution of nasalized vowels in some Basque dialects).

Before turning to the theoretical approaches that have had the greatest influence on this work, it is worth highlighting the importance of typology and phonetics in the study of the historical phonology of isolates like Basque. The comparative method of historical reconstruction is used to reconstruct not only the phonology of ancient languages, but also the phonetics of those same languages. Detailed phonetic proposals are made on the basis of attested phonetics of daughter languages and theories regarding the nature of sound change. For example, it is widely agreed that the sound reconstructed as *m for Proto-Germanic, Proto-Slavic, and Proto-Indo-Iranian was pronounced as [m] (at least word-initially) as this is the reflex of this sound in all daughter languages; *m is reconstructed for Proto-Indo-European, and assigned the same phonetic value [m], on the basis of the values for each sub-group. For isolates, the situation is different. Once a Proto-Basque (or, maybe more accurately, a Common Basque) is reconstructed on the basis of historical

records and modern dialects, yielding a phonological system like that shown in section 1.2.3, there is nothing to compare the segments in the inventory to. Potential phonetic values can be assumed based only on the same data used to reconstruct the phonological categories, making the process one and the same. For isolates, better hypotheses about aspects of the proto-phonetics and historical development are possible, however, when compared with parallel systems and developments in other languages. For example, positing a process like Grassmann's Law (§4.4.5) where, in a sequence of aspirates, the first instance of aspiration is lost, is reasonable given that the process has a parallel in the history of Greek, and further phonetic details of the process may be discovered by looking at the many modern languages (e.g. Mayan, Pomoan) that show evidence of similar sound patterns. At the same time, phonetic work on Basque dialects themselves may also hold answers to questions regarding Basque historical phonology. Wherever possible, such studies have been used to inform hypotheses about earlier stages of the language.

Section 2.2 presents an overview of the theoretical approach and the assumptions that have had the greatest influence on this dissertation: the importance of phonetic explanations in phonology, the phonetically based theoretical approach used throughout the dissertation, the phonetic bias in sound change and contact-induced changes are briefly discussed. The main ideas in each subsection below are all linked to the central topics approached in the following chapters.

2.2 Theoretical approaches to historical phonology: phonetics of sound change

The history of Basque has been commonplace in description with little explanation of the forces underlying observed sound change. In this dissertation, I attempt to integrate findings from the history of Basque sound patterns into the field of modern historical phonology, where typology and phonetic explanation play a central role (Blevins 2004, 2006, 2014; Honeybone & Salmons 2014; Yu 2013).

The majority of recurrent sound changes have clear phonetic origins (Blevins 2004). The task of the historical phonologist then is both to characterize these phonetic origins and to detail how phonetic tendencies give rise to regular sound patterns, a process known as *phonologization* (cf. Hyman 1975, 1976, 2013). Phonologization is the process that transforms automatic phonetic patterns into language-specific phonological patterns,

and recent work has shown it to be non-trivial. Factors that play a role range from independent structural aspects of the phonology of a language (Blevins 2004, 2005, 2009) to lexical competition (Blevins & Wedel 2009), to inherent biases at the phonetic level associated with human speech perception and production (Ohala 1993; Blevins 2004; Garrett & Johnson 2013).

2.2.1 Phonetic explanations in phonology

Ohala was the first to integrate phonetic explanations in phonology, and his insights gave rise to the modern field of Laboratory Phonology (cf. Cohn et al. 2012). In contrast to earlier approaches integrated into the neogrammarian, structuralist or generativist traditions which categorize sound changes into either articulatory or perceptual changes, Ohala (1981, 1993, 2012) proposes to base sound change on a trilateral distinction among perceptual confusion, hypocorrection and hypercorrection.

In Ohala's approach, sound change has a crucial perceptual component and the listener is the main driving force of sound change (cf. Ohala 1981, 1993, 2012). The role given to the speaker is that of sending out a statement with the intention of being understood. However, differences in the production and perception of these sequences of speech create a "pool of variation" (Ohala 1989), which can result in listener-based reinterpretation. Non-etymological reinterpretation by the listener is linked to a failure to recover the intended sequence due to the position of the production in the hyper- to hypoarticulation scale, among other factors.

In this way, Ohala (1993) explains sound change by grounding it in the correction or normalization that the listener tries to apply to variation in the speech signal. The speech signal will always contain a certain degree of coarticulation that the listener has to correct in order to recover the intended production. If the listener interprets any of the coarticulated sounds as phonological, a hypocorrective change occurs. *Hypocorrection* results in assimilation.

The listener can also correct an element that did not require any normalization. If this happens, the listener "de-coarticulates" a feature that used to be phonological. This change is known as *hypercorrection* and produces dissimilation.

In addition, the listener may fail to recover the phonetic cues that distinguish a segment from a similar segment found in the language, yielding *confusion of acoustically*

similar sounds.

Phonetic explanations in sound change are central to understanding the /n/ > /ñ̃/ development, the central focus of chapter 4. Subsequent developments of aspiration, including dissimilation (§4.4.5) and metathesis (§4.4.4, §8.2.1), can be explained as instances of listener-based hypo- and hypercorrection. Phonetic explanation is also central to thorough understanding of the distribution of /y/ (§5.2) in eastern dialects. While the innovation of this phoneme was likely a consequence of contact (§5.3.3), environments where it was inhibited (§5.2.1) are determined by a phonetically natural class of sounds that defy phonological classification. An area where a great deal of typological and phonetic information is available is in the study of nasalized vowels. This information is used to address the little studied cases of phonemically nasalized vowels in Basque dialects (§6), and strengthens the hypothesis that nasalized vowels were allophones of oral vowels subsequent to /n/ > /ñ̃/ change (§4.2.3). Chapter 8 on historical metathesis explores a range of distinct phonetic sources, in line with work by Blevins and Garrett (1998, 2004) and Garrett and Johnson (2013).

2.2.2 Comprehensive theories of sound change

This dissertation is written within the general framework of Evolutionary Phonology (Blevins 2004). Evolutionary Phonology intends to address the question of the reason behind the particular distribution of different sound patterns. Why do some sound patterns occur rarely (if ever) while others are common to a large number of genetically unrelated languages? What structural or functional factors may facilitate or inhibit phonetically motivated sound change? How do sound patterns spread areally? Within this model, synchronic sound patterns are partially explained in terms of their diachrony.

The central premise of Evolutionary Phonology is that diachronic explanations of sound patterns are preferred to synchronic accounts. In addition, recurrent synchronic sound patterns are assumed to have their origins in recurrent phonetically motivated sound change (Blevins 2004: 8).

Important to this model is the observation that any of these types of phonetically motivated sound change can be inhibited or facilitated by structural factors. For example, the misperception of /H/ in a non-historic position (/H/-metathesis, cf. §4.4.4, §8.2.1) never violates the pre-existing phonotactic which demands that /H/ be prevocalic.

With respect to phonetically motivated sound change, Blevins (2004) proposes a tripartite classification integrating misperception, mislocalization and articulation-based recategorization.

Sound changes grouped under CHANGE refer to processes in which a perceptual bias results in reinterpretation of a segment. In cases of perceptual similarity, the signal may be misheard by the listener, as in sound patterns such as [ki] > [ʧi] or [θ] > [f].

Sound changes grouped under CHANCE are those based on the intrinsic phonological ambiguity produced by certain segments or features in the phonetic string. Segments that produce this kind of ambiguity have one (or more) stretched-out features bearing elongated phonetic cues (cf. Ohala 1993, 2012). Elongated phonetic cues occur in multiple segments in the phonetic string. This mechanism of sound change includes processes such as metathesis, dissimilation, segmentalization or copying.

The third and last mechanism described by Blevins (2004), CHOICE, is due to articulatory variability. According to Blevins (2004), the different phonetic variants of each phonological form can yield the reinterpretation of an exemplar as a prototype of a different category and, subsequently, give rise to sound change. This mechanism encompasses reduction, syncope, vocalic shifts, assimilation (umlaut, etc.), stop debuccalization and final devoicing.

Though there are few well-articulated theories regarding evolution of pitch accent, nevertheless, in chapter 3 typological comparison and laboratory phonology studies of F0 contours are used to support the analysis of accentogenesis.

2.2.3 Phonetic bias in sound change

One of the most recent advances in the study of phonetically based sound change is the typology introduced by Garrett and Johnson (2013). Garrett and Johnson's premise is not very different from that of Blevins (2004, 2006, 2008, 2014). They observe that the typology of sound change is asymmetrical, and thus creates asymmetrical phonotactic patterns. The asymmetry of sound change implies that sound change may occur in one direction but not necessarily in the opposite: [k] > [ʧ] is a common sound pattern before front vowels, but [ʧ] > [k] is not attested in that environment (Garret & Johnson 2013: 52). Similar asymmetries include intervocalic stop voicing or word-final [t] > [ʔ], with unattested mirror-image processes. Thus, according to Garrett and Johnson, phonetic bias

factors condition sound change and the classification of the different kinds of sound change will follow from the identification of the speech component that produces each bias.

According to the authors (2013: 59), bias factors in production and perception may emerge from four elements: motor planning, aerodynamic constraints, gestural mechanics (including inhibition and blending), and perceptual parsing.

Motor planning (cf. Garrett & Johnson 2013: 59ff.) is the process of constructing or retrieving speech motor plans. The influence of planned elements (syllables, segments, gestures, etc.) on one another through priming, inhibition or coactivation can give rise to errors. These errors may produce sound changes if they are incorporated into a language. Motor planning errors may be due to *priming* (which includes *anticipation*, *interchange* and *perseveration*) or *inhibition*.

Garrett and Johnson (2013: 61f.) mention two aerodynamic constraints. The first is the *aerodynamic voicing constraint* (Ohala 1983), which stipulates that, in order to produce vocal-fold vibration, subglottal air pressure must be greater than supraglottal air pressure. The aerodynamic voicing constraint implies that stops are the hardest segments to voice, while vowels are the easiest. This constraint can yield sound patterns such as spirantization or prenasalization of voiced stops. The second constraint stipulates that frication requires a minimum air pressure behind the place of constriction. This constraint introduces a bias against fricative voicing, given that vocal fold vibration reduces oral pressure. The loss of oral pressure can transform voiced fricatives in glides.

Gestural mechanics can produce two kinds of articulatory bias. First, *gestural overlap* produces a new asymmetry, given that articulatory gestures do not need to have similar relative timings. In cases of articulation of anterior and posterior gestures, for instance, it is usually the posterior that prevails over the anterior even to the point of obscuring it. This is exemplified by debuccalization, where a glottalized coda may become a glottal stop (Garret & Johnson 2013: 62f.). Second, in *gestural blend*, the phonetic plan for an utterance makes competing demands upon a single articulator (Garrett & Johnson 2013: 63). Gestural blend tends to have language-specific outcomes, given that vowel gestures interact with consonant gestures as much as consonant gestures interact with vowel gestures.

The last bias, *perceptual parsing* (Garret & Johnson 2013: 63ff.) includes the set of sound changes popularized by Ohala (1981, 1993): *Hypocorrection*, *hypercorrection* and

confusion of acoustically similar sounds (see §2.2.1 supra).

The category of Garrett and Johnson's typology that I refer to (cf. §8.3) is what they define as motor-planning errors or, more specifically, motor-plan priming. Basque historical phonology provides a new kind of example of this category. The process I call reciprocal metathesis (§8.3) can be analyzed as an instance of a motor-planning error that has been phonologized.

2.2.4 *Contact-induced sound change*

Areal sound patterns are recognized throughout the world (Blevins to appear). As Basque is an isolate, in all cases where it shares a characteristic sound pattern with neighboring languages, the role of potential contact must be investigated.

In the case of Basque pitch-accent, distinct from any known Romance prosody, contact does not appear to be relevant. The evolution of /y/ in the easternmost dialects (§5), on the other hand, appears to be clearly related to Romance influence. Although the sound change of /n/ > /h̃/ (§4.2.3) may be related to neighboring non-Vasconic languages, the output of the sound change, the nasalized aspirate, is clearly a Basque internal development. At the level of the phoneme inventory (§1.1.1), the gradual nativization of an expanded consonant inventory likely reflects continued contact with Romance languages from the earliest Latin contact onwards.

Within Blevins' (to appear) model, the lateral spread of sound patterns is a consequence of combined effects of perceptual saliency and the perceptual magnet effect as a general property of phonological categorization. An interesting property of this model is the difficulty the historical linguist has in differentiating directly inherited sound patterns from those acquired through contact. The Basque data offers an interesting case for expansion of this theory since details of the /u/-fronting pattern (§5.2.1) are unique to Basque.

3 A history of the Basque accentual systems

3.1 Introduction

This chapter[17] aims to present a historical sequence that results in the development of the main accentual systems found in the modern Basque dialects. In addition, I aim to ground this chronology on phonetic, geographic and historical evidence. According to the most recent and deepest classification (cf. Hualde 1997a), there are three main kinds of accentuation in the modern Basque dialects: Eastern accentuation, Central-western accentuation and Northern Bizkaian accentuation. In the East, stress falls in the penultimate syllable in the unmarked pattern, its base being the word or the stem. In the Central-western accentual system, stress falls on the peninitial syllable of the word, with the exception of marked words (i.e., words that are lexically marked and do not follow the standard pattern). In Northern Bizkaian, the accent is not inherent to all words. It is assigned to the last syllable of the phrase when the words involved are not accentually marked. Whenever a word is accentually marked, the accent is assigned prior to the last syllable.

Although the aforementioned stress systems will be discussed in detail in the next section, the need for the establishment of a relative chronology should already seem clear to the interested reader. More specifically, I want to underline the importance of determining which system is the oldest and how and why the other prosodic systems split from it.

There have been proposals on this, namely those by Martinet (1955 [1970]),

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17   Although it has many additions, this chapter is mainly based on Egurtzegi and Elordieta (2013).

Michelena (1957-58 [2011a], 1972 [2011a], 1977 [2011]) and Hualde (1995, 2003c, 2007). Nevertheless, as shown by Elordieta (2011a), previously proposed models do not apply to Proto-Basque, but only to later stages of the language. Elordieta (2011a) was the first to propose an evolution of the Basque accentual systems starting from Proto-Basque, suggesting a relative chronology as well as a split of the systems. In Egurtzegi and Elordieta (2013) —and in this chapter— I partially revise the analysis by Elordieta (2011a), changing the chronological order between the Eastern and Central-western accentuation systems, following some observations by Egurtzegi (2013a). On top of that, I have added the south-western Navarrese system to the chronology (cf. Hualde 2007, 2012).

This chapter does not address the historical development of the subsystems that evolved from the main three accentuation patterns. The main objective of this research is to provide a diachronic account of the three main unmarked accentuation patterns. For the development of accentuation subsystems not discussed here, see Hualde (1997a, 2003c, 2006a).

3.2 Modern Basque accentuation systems

First I will describe the main three Basque accentual systems, listed under (3.1). This classification is basically that presented by Hualde (1997a), who revisited Michelena's (1957-58 [2011a]) classification. Each accentuation system encompasses several subsystems. Alongside these subsystems there are intermediate systems as well (Hualde 1997a, 1999a; see also Gaminde & Hualde 1995 and Gaminde 1998a).

(3.1)   Modern Basque accentuation systems (Hualde 1997a)

(Type I):   Eastern accentuation (§3.2.1)

(Type II):   Central-western accentuation (§3.2.2)

(Type III):   Northern Bizkaian accentuation (§3.2.3)

3.2.1 Eastern accentuation

In this kind of accentuation unmarked stress falls on the penultimate syllable of the base. The base is the word in Zuberoan and the stem in Roncalese. Thus, in Zuberoan, stress is generally assigned to the penultimate syllable of the word. This placement of the

stress is so pervasive in this dialect that it may be proposed that all Zuberoan words had penultimate stress in an older stage of the dialect. Examples of this include those in (3.2):

(3.2) *Accentuation in Zuberoan* (Michelena 1977 [2011])

Example	**Trans.**	**Gloss**
gízun[E]	/ˈgis̺un/	'man'
gizúna	/giˈs̺una/	'the man'
néska[E]	/ˈnes̺ka/	'girl'
alhába[E]	/alˈhaba/	'daughter'
kuntzentzía[LW]	/kunts̺enˈts̺ia/	'conscience'
kuntrebandíxte[LW]	/kuntɾebanˈdiʃte/	'smuggler'

Nevertheless, this accentuation system includes marked words as well. Marked words have the stress in the last syllable. These special cases are the consequence of the development of diphthongs or the blending of two vowels in the last syllable. Examples of word-final stressed diphthongs include those in (3.3a) and cases of vowel blending include those in (3.3b).

(3.3) *Development of marked stress in Zuberoan*

a) **Word-final stressed diphthongs**

Recons. form	Example	Gloss
*ardano > *ardáh̃o >	*ardǎu*	'wine' (cf. Mod. Z *ardǔ*, Std. Bsq. *ardo*[E])
*anari > ah̃ári[E] *>*	*ahái*	'ram'

b) **Word-final stressed monophthongs**

Recons. form	Example	Gloss
*organa > *orgáh̃a > *orgǎ̃.a	*orgǎ̃*[E]	'cart'
*alhabá-a[18] *>*	*alhabá*[E]	'the daughter'
*neská-a >	*neská*[E]	'the girl'

In addition to words involving an older vowel cluster in the last syllable, words

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18   The oldest forms that can be reconstructed are **alhaba+ha*(*r*) and **neska+ha*(*r*), but they are likely not relevant for this discussion. The stress shift did not occur after the loss of **h* but it probably occurred after the simplification of the vocalic cluster formed by the last -*a*- of the stem and the -*a* of the determined singular.

bearing some monosyllabic suffixes (cf. *-ñí, -xkót, -liár, -tiár, -(t)ár, -kór* or the borrowed *-ús*; but not *-dün, -tto* or *-ka*) and compounds whose second member is monosyllabic (*gibel*[E]*-mín* 'bile, gall', *giza-txár* 'bad man') are also oxytones (cf. Hualde 1997a: 76f.). Nevertheless, each member of the compound is an accentual unit (Hualde 1997a: 78).

Type I is mainly found in Zuberoan, Roncalese and Salazarese, but also in the valleys of Erro and Esteribar, in Luzaide, Baztan and Ultzama (cf. Hualde 1997a). However, there are differences between the different dialects and varieties, such as the basis for the assignment of stress, which can be assigned based on the stem or based on the word. In any case, the stress is assigned to the penultimate syllable of the base in unmarked words.

3.2.2 Central-western accentuation

In this accentuation system stress is generally assigned to the second syllable of the word. However, in some subtypes of this system, stress is systematically placed on the initial syllable in disyllabic words ending in a vowel. (3.4) shows examples of this accentuation system:

(3.4) *Stress in the Central-western system* (Hualde 1997a)

a)   **Unmarked peninitial stress:**

Example	Trans.	Gloss
emákume[E]	/e'makume/	'woman'
alába[E]	/a'laba/	'daughter'
gizóna[E]	/gi's̪ona/	'the man'
mutíla[LW]	/mu'tila/	'the boy'

b)   **Initial stress in disyllabic words:**

Example	Trans.	Gloss
gízon	/'gis̪on/	'man'
mútil	/'mutil/	'boy'
néska	/'nes̪ka/	'(the) girl'
óna[E]	/'ona/	'the good'
bíde[E]	/'bide/	'way'

In addition, there are lexically marked words that bear word-initial stress. The group of words lexically marked for stress is mainly composed of borrowings and compounds. Examples of these include these in (3.5):

(3.5)   Marked stress in the Central-western system (Hualde 1997a)

a)   Loanwords with initial stress:

Example	**Trans.**	**Gloss**
básoa	/ˈbas̪oa/	'the glass'[19] (indef. *báso*)
dénborea	/ˈdenboɾea/	'the time' (indef. *dénbora*[LW])
líburue	/ˈlibuɾue/	'the book' (indef. *líburu*[LW])

b)   Compounds with initial stress:

Example	**Trans.**	**Gloss**
léngusua	/ˈlengus̪ua/	'the cousin' (indef. *léngusu*[LW])
béstea	/ˈbes̪tea/	'the other' (indef. *béste*[LW])
égia	/ˈegia/	'true' (indef. *égi*)

Finally, some marked suffixes also trigger marked accentuation. Marked accentuation in the Central-western system consists in accent retraction from the peninitial syllable to the initial syllable. The following examples (3.6) are from the variety of Beasain (Hualde 1997a: 130ff.):

(3.6)   Unmarked vs. marked suffixes in Central-western accentuation (variety of Beasain)
(Hualde 1997a: 130ff.)[20]

Indef.[21]	**Unmarked**	**Gloss**	**Marked**	**Gloss**
zakúr[E]	*zakúrr-ak*	'the dog (erg.)'	*zákurr-ek*	'the dogs (erg.)'
gizón[E]	*gizón-ai*	'to the man'	*gízon-ai*	'to the men'
mendí[E]	*mendí-tik*	'from the mountain'	*méndi-tatik*	'from the mountains'
polítt[LW]	*polítt-e*	'pretty (adj.)'	*pólitt-egi-e*	'too pretty'
azkár	*azkárr-a*	'fast (adj.)'	*ázkarr-en-a*	'the fastest'

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19   From Sp. *vaso*, cf. the native *basóa* 'the forest' (indef. *báso* 'forest'), Lat. *témpŏra* and Lat. *líbru*(*m*).
20   Many suffixes that trigger accent retraction in Type 2 carry accent in Type III as well (such as plural inflectional suffixes, *-egi*, *-en*, *-ki*, *-tzen*, etc.). A partial list of suffixes that trigger accent retraction can be found in examples (3.10-11).
21   In the variety of Beasain, accent retraction, although possible, is not mandatory in disyllabic words (Hualde 1997a: 133). Thus, disyllabic words may be produced as oxytones or paroxytones (cf. *méndi*[E] ~ *mendí* 'mountain (indef.)' and *búru* ~ *burú* 'head (indef.)').

Indef.	**Unmarked**	**Gloss**	**Marked**	**Gloss**
txerrí[E]	*txerrí-e*	'the pig'	*txérri-ki-e*	'the pork'
-	*etórr-i*[E]	'to come'	*étor-tzen*	'coming'

The accentuation Type II described above is the most widespread: It is found in most of Gipuzkoa, in the south-east of Bizkaia and in the west of Navarre nowadays. In addition, Type II has been commonly addressed as the accentual system common to all Basque dialects following Michelena (1977 [2011]: 329ff.).

3.2.3 Northern Bizkaian accentuation

Type III is based on pitch accent. In this system, the accent is assigned morphologically. There is a lexical distinction between accented and unaccented words. Unaccented words are formed by the combination of unaccented morphemes. Most native stems and singular affixes are unaccented. When combined with unaccented morphemes, the accent surfaces phrase-finally when these words precede the verb or when they are produced in isolation (3.7a). When unaccented words do not precede the verb, they do not have accent (3.7b) (cf. Hualde 1989, 1997a, 1999a, 2003c; Hualde & Bilbao 1992, 1993; Hualde et al. 1994; Gaminde 1998a, among others):

(3.7) *Unaccented words in Northern Bizkaian* (Hualde 1997a, i.a.)
a)   *laguné etorri de*   'the friend has come'
b)   *lagune berandú etorri de*   'the friend has come late'

Accented words have at least one accented morpheme, which can be either the stem or an affix. Compounds and plural inflectional suffixes are accented, as well as most derived words and loanwords.[22] Compounds are exemplified in (3.8), those in (3.8a) being older non-transparent compounds and derived stems (according to Hualde) and those in (3.8b) being more modern compounds (cf. Hualde 1989, 1993a, 1997a, 2000, 2003c for examples). Loanwords are exemplified in (3.9). A partial list of plural inflectional suffixes

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22   Not all derivative suffixes trigger accentuation. In Gernikaldea, for instance, suffixes such as *-garri* '(worth doing)', *-tasun* '(abstract nominalizer)', and *-keri* '(pejorative)' do not create accented words (Hualde 1997a: 180). Other suffixes, such as *-lari* '(agentivizer)', in addition to not being accented, "cancel" the accent of accented words (Hualde 1997a: 181).

and derivative suffixes that trigger accentuation can be found in (3.10) and (3.11), respectively. Many of the suffixes listed in (3.10-11) also trigger accent retraction in the Central-western system, but the exact list may vary locally, even within a system.

(3.8)   Accented compounds and derived stems in Northern Bizkaian (Hualde 1997a)

a)   Old compounds and derived stems:

Example	Trans.	Gloss
béste[E]	/'beʂte/	'other'
bélarri[E]	/'belari/	'ear'
éurre	/'eu̯re/	'wood'
átze[E]	/'aʦ̱e/	'back'
tóki[E]	/'toki/	'place'
egúski[E]	/e'guʂki/[23]	'sun'

b)   Transparent compounds:

Example	Trans.	1st member	2nd member	Gloss
burú-gogor[E]	/bu'rugogor/	'head'	'hard'	'stubborn'
begí[E]*-gorri*	/be'gigori/	'eye'	'red'	'red-eyed'
sagú-sar[E]	/ʂa'guʂar/	'mouse'	'old'	'bat'

(3.9)   Accented loanwords in Northern Bizkaian Basque (Hualde 1997a)

Example	Trans.	Lat./Rom.	Gloss
léku[LW]	/'leku/	*locum*	'place'
ganbára[LW]	/gan'baɾa/	*cambra*	'loft, attic'
kipúla[LW]	/ki'pula/	*cēpulla*	'onion'
libúru[LW]/*líbru*	/li'buɾu/	*librum*	'book'
aiskóra[LW]	/aiʂ'koɾa/	*asciola*	'ax'

(3.10)   Accented plural inflectional suffixes (Hualde 1997a)

Suffix	Trans.	Gloss	Example	Gloss
-ak	/[']ak/	'(abs. pl.)'	*gizónak*	'the men (abs.)'
-ek	/[']ek/	'(erg. pl.)'	*gizónek*	'the men (erg.)'
-(e)kas, -(e)kin	/['](e)kaʂ/, /['](e)kin/	'(com. pl.)'	*gizónekas*	'with the men'

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23   In Modern Bizkaian the fricativess /ʂ, ʂ̱/ are neutralized to /ʂ/ and the affricates /ʦ̱, ʦ̱/ to /ʦ̱/.

Suffix	Trans.	Gloss	Example	Gloss
-ei	/[']ei/	'(dat. pl.)'	*gizónei*	'to the men'
-(e)tan	/['](e)tan/	'(ines. pl.)'	*mendíetan*	'in the mountains'
-(e)tatik	/['](e)tatik/	'(abl. pl.)'	*mendíetatik*	'from the mountains'
-(e)tara	/['](e)tara/	'(all. pl.)'	*mendíetara*	'to the mountains'
-en	/[']en/	'(gen. pl.)'	*mendíen*	'of the mountains'

(3.11)   Accented derivative suffixes (Hualde 1997a)

Suffix	Trans.	Gloss	Example	Gloss
-ago	/[']ago/	'(comparative)'	*báltzago*	'blacker'
-en	/[']en/	'(superlative)'	*askárren*	'fastest'
-egi	/[']egi/	'(too much)'	*lodíegi*	'too fat'
-ki	/[']ki/	'(part of)'	*txarríki*	'pork'
-tze/-te	/[']ʦe/, /[']te/	'(verbal nominalizer)'	*egíte*	'deed'
-txu	/[']ʧu/	'(diminutive)'	*katútxu*	'kitty'
-(t)ar	/['](t)ar/	'(demonym)'	*Gerníkar*	'from Gernika'
-ti	/[']ti/	'(adjectivizer)'	*bildúrti*	'fearful'
-sto	/[']s̺to/	'(pejorative adjectivizer)'	*sorrísto*	'lousy, dirt bag'
-tzaile	/[']ʦ̺ai̯le/	'(agentivizer)'	*begiratzaile*	'watcher'

The accent is assigned to the syllable preceding the lexically accented morpheme in most varieties (as in the variety that goes from Getxo to Gernika), and in the penultimate or the third from last syllable in a few varieties (as in that from Lekeitio-Ondarroa-Markina). See the examples in (3.12), and the references cited above for more examples.

(3.12)   Assignment of marked accent in Northern Bizkaian Basque (Hualde 1997a)

	Example	Accent	Gloss
a)	**lagúnek** *etorri dire(s)*	[lagun]-['ak] > *lagú.nek*	'the friends have come'
b)	**kalíetan** *ikusi doras*	[kale]-['eta-n] > *kalí.e.tan*	'I have seen them in the streets'

The accent is realized as a H*+L falling tone contour in the accented syllable. In contrast to the other Basque prosodic systems, each word does not necessarily carry an accent. An unaccented word that does not precede the verb does not show prosodic prominence (i.e. accent), and forms a prosodic phrase with the following word or words, in

which a single accent is assigned. The prosodic differences between accented and unaccented words can be appreciated in Figure 3.1, which reflects an utterance produced by a speaker from the local variety of Lekeitio (reproduced from Elordieta 2011b: 51):

Figure 3.1: Phonetic realization of accentuation Type III (cf. 3.11)

The two sentences in Figure 3.1 (*lagunen amúma ikusi dot* 'I have seen the friend's grandmother' and *lagúnen amúma ikusi dot* 'I have seen the friends' grandmother') are segmentally similar. The only difference between them is found in the first word being the unaccented *lagunen*[E] 'of the friend' or the accented *lagúnen* 'of the friends'. In the first sentence, the genitive singular form *lagunen* is lexically unaccented, and it surfaces without accent when it is not directly preceding the verb. The word *amúma*, Std. Bsq. *amama*[E] 'grandmother' is lexically accented and has a falling tone in the penultimate syllable in both sentences. There is no prosodic boundary between the first two words of the first sentence. Since the first word has no accent, the first two words are produced within the same prosodic phrase, with a single accent, the one on the accented word *amúma*. However, in the second sentence, the genitive plural form *lagúnen* is lexically accented, and this accent is shown by the falling accent in the penultimate syllable of the word.

In addition to accent, prosodic groups have another important characteristic: the first syllable of the phrase bears a low tone, and a tone rise occurs in the second syllable of the phrase. Once the pitch has risen, a high tone is maintained until the accent, which is realized by means of a falling tone. The phrase-initial tone rising and the high tone plateau can be observed in the first sentence in Figure 3.1.

The prosodic constituency of Northern Bizkaian Basque, and most notably the one

of the variety of Lekeitio, has been described and analyzed phonetically and phonologically with multiple examples in the following literature: Hualde, Elordieta and Elordieta (1994); Elordieta (1997, 1998, 2003, 2007a, 2007b, 2007c); Jun and Elordieta (1997); Hualde et al. (2002); Gussenhoven (2004); Selkirk and Elordieta (2010) and Elordieta and Hualde (2014).

Following the Autosegmental-Metrical model that is standard for the analysis of intonation, in the work cited above the initial pitch rise at the beginning of a prosodic phrase is analyzed as a sequence of a low boundary tone %L and a phrasal H tone associated to the second syllable. The falling pitch accent is labeled as H*+L, with a peak on the tonic syllable followed by a fall within it. Thus, the sentences in Figure 3.1 would be analyzed intonationally as in (3.13) (see the references above for more examples and intonational analyses):

(3.13)   Accentuation Type III in accented words (Elordieta 2011b)

a)   *la/gunen* (sg.) *amú\ma ikusi dot*   'I have seen the friend's grandmother'

    | | |

    %L H   H*+L

b)   *la/gú\nen* (pl.) *a/mú\ma ikusi dot*   'I have seen the friends' grandmother'

    | | | |

    %L H*+L   %L   H*+L

As mentioned above, unaccented words only surface with stress on their final syllable when they occur immediately preceding the verb or in isolation. Thus, the corresponding singular forms of the accented words in (3.12) above would receive stress on the final syllable, as shown in (3.14). Like all words starting a prosodic phrase in Northern Bizkaian Basque, there is a tone rise from the first syllable to the second syllable. This rise is sustained on the following syllables until the syllable with the pitch accent, where a fall occurs (see the references mentioned above for more details).

(3.14) Accentuation Type III in unaccented words (Elordieta 2011b)

a)   <u>la/guné\ etorri de</u>   'the friend has come'

| | |

%L H H*+L

b)   <u>ka/lién\ ikusi doras</u>   'I have seen them in the street'

| | |

%L H H*+L

3.3 Old accentuation: proposals

Three different hypotheses have been presented regarding the reconstruction of the oldest Basque accentuation. First, Martinet (1955 [1970], 1981) reconstructed a word-initial demarcative stress [σ́ σ]. Shortly after this proposal, the hypothesis proposed by Michelena (1957-58 [2011a], 1972 [2011a], 1977 [2011]) placed the stress in the second syllable [σ σ́]. Later, Hualde (1995) proposed the phrase level system [σ σ] [σ σ́] found in modern Northern Bizkaian Basque to be the comparatively oldest. In this section I will review these hypotheses and look for a potential chronology that may yield a more complete proposal.

3.3.1 Martinet (1955 [1970], 1981)

Martinet (1955 [1970], 1981) observed that, in words with two voiceless stops, the first of these stops is systematically aspirated, as in the case of Bsq. *phika*[LW] 'magpie' and Bsq. *phintakoste*[LW] 'Pentecost, Whitsun', and he linked this distribution to stress. Likewise, he linked the stress to the distribution of fortis and lenis consonants. According to his hypothesis, fortis consonants occurred word-initially, associated to the presence of word stress on the initial syllable. Martinet (1950 [1970]: 227) compared the stop system of Proto-Basque to that of Danish and Chinese. According to the author, in Danish the stop system is divided into two series: a fortis and a lenis series of stops. Fortis stops are realized as aspirated stops [pʰ, tʰ, kʰ] in "strong" position and as plain voiceless [p, t, k] in "weak" position, while lenis stops would be realized as devoiced stops [b̥, d̥, g̊] in "strong" position and as approximants [β̞, ð̞, ɣ̞] in "weak" position. In Danish, "strong" position was

found word-initially and in the onset of stressed syllables and "weak" position in the onset of unstressed syllables. Given that Martinet (1950 [1970]: 227) considered that "strong" position was equivalent to initial position in Basque, he proposed an automatic word-initial stress.

In this paper, Martinet's hypothesis is discarded from the beginning, given that there is not enough evidence to propose a stage with word-initial stress. It remains unclear how marked and unmarked words were distinguished if the unmarked stress ever were located in the initial syllable. Observations made by Martinez-Areta (2004) and Elordieta (2011a) are relevant here.

In many Basque prosodic systems, there are accentually marked words that take a special accentuation pattern instead of following the unmarked pattern. In most varieties with marked words, loanwords fall under the marked class —with the exception of etymologically oxytonic words in Northern Bizkaian. Martinet is reconstructing a stage of the language in which Basque was in contact to Latin, and some old borrowings date from this period —such is the case with Bsq. *kipula*[LW] 'onion', Bsq. *leku*[LW] 'place', Bsq. *liburu*[LW] 'book' and Bsq. *denbora*[LW] 'time'. These borrowings are marked in all varieties in which marked stems and suffixes occur.

In the modern varieties with marked stems, marked words show accent retraction: they carry the stress at least a syllable before the syllable where the unmarked words assign it (see Hualde 1997a for the specific realization of marked stress in each prosodic system). What is more, there were words with word-initial stress in Latin, such as disyllabic words bearing paroxytonic stress (cf. Lat. *lócu*(*m*) > Bsq. *léku* 'place', Lat. *líbru*(*m*) > Bsq. *líburu* 'book', Lat. *ténda*(*m*) > Bsq. *dénda* 'shop') as well as trisyllabic words with proparoxytonic stress (cf. Lat. *témpŏra*(*m*) > Bsq. *dénbora* 'time', Rom. *cámbra* > Bsq. *gánbara* 'loft, attic'). It is difficult to explain how these words diverged from the unmarked set if the stress of unmarked words was also assigned to the first syllable. Thus, loanwords create difficulties to the initial syllable stress hypothesis (see Martinez-Areta 2004 as well).

In addition, as observed by Igartua (2001), the examples used by Martinet —which involve words with the structure T[h]VTV— are the result of the devoicing of the first stop when followed by a voiceless stop in the next syllable (Michelena 1977 [2011]). This devoicing occurred after a regular process of word-initial voicing affected all word-initial voiceless stops in Latin loanwords (Michelena 1977 [2011]). Examples of this process

include *gathe* > *khate*[LW] from Lat. *catēna* 'chain' or *bikhe*[24] > *phike* from Lat. *pĭcem* 'pitch, tar'. Thus, words like *phika*[LW], *phintakoste*[LW], *khate*[LW] or *phike*[LW] involve modern dialectal variants and do not go back to Common Basque.

3.3.2 Michelena (1957-58 [2011a], 1972 [2011a], 1977 [2011])

Michelena (1957-58 [2011a], 1972 [2011a], 1977 [2011]) also linked stress to the distribution of laryngeals. As a matter of fact, he observed that in the modern eastern dialects that have maintained /H/ until today, its distribution is limited to the first two syllables of the word. Laryngeals do not occur in a later syllable. This restriction also applies to the series of aspirated stops, as well as to the nasalized /h̃/ originating from an intervocalic alveolar nasal stop (cf. Igartua 2008; §4.2.3). The intervocalic /n/ was lost when it was located after the second syllable, cf. Lat. (*h*)*onōre*(*m*) > Bsq. *ohore*[LW] 'honor' but Lat. *ballaena*(*m*) > Bsq. *balea*[LW] 'whale'.

In addition, Michelena stated that words with a laryngeal in the second syllable were older than those with /h/ in the first syllable, inferring that words such as *behar* 'must', *akher*[E] 'billy-goat', *bikhe*[LW] 'pitch, tar', *bekhatu*[LW] 'sin' or *gathe* 'chain' are older than *pharka*(*tü*) 'to forgive', *khorputz* 'body', *khate*[LW] 'chain' or *phiper*[LW] 'pepper'.

Last, Michelena related a systematic dissimilation of laryngeals present in the language to peninitial stress. In fact, in compounds with a monosyllabic first member in which both members had an initial /h/, it was regularly the second stem the one that maintained the laryngeal in its initial syllable, which was the second syllable of the whole compound.[25] This dissimilation of laryngeals that only permits one in each stem is not very

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24   Word-initial stop voicing was regular in Latin loanwords. Both *gathe* and *bikhe* are attested forms. Other examples of this voicing include *bake*[LW] from Lat. *pācem* 'peace', *baradizu* from Lat. *paradīsum* 'paradise' (cf. Mod. Bsq. *paradisu*[LW]) or *gurutze*[LW] from Lat. *crŭcem* 'cross'.

25   However, in sequences of two voiceless stops, only the first stop shows aspiration, and not the second (cf. *pharka*(*tü*) 'to forgive', *khorputz* 'body', *khatea*[LW] 'chain' or *phiper*[LW] 'pepper'). Nevertheless, comparatively older forms of these words show word-initial voiced stops and voiceless aspirated medial stops (cf. *barkha*(*tü*)[LW], *gorphutz*[LW], *gathea* and *bipher*). Previous approaches have analyzed this alternation as a devoicing and aspiration of the first stop and a subsequent dissimilation of the aspiration in the second stop. This dissimilation would occur in the unexpected direction (cf. §4.45). I suggest that this alternation may be explained by a metathesis of the aspiration (or long VOT) of the second stop to the stop in the first syllable. This would make the first stop voiceless and aspirated while the second stop remains voiceless but loses its aspiration. Under the account of perceptual metathesis (Blevins & Garrett 2004; §8.2), the speaker would intend /gatʰea/ and produce [gat̪e̪a]. From that production, a listener may hear something similar to [gat̪e̪a] and reconstruct it as /kʰatea/. This view accounts for why all DVTʰV sequences became TʰVTV without proposing a dissimilation process in the unexpected direction. Given that this process implies a feature moving away from the second syllable, it may have preceded the development of peninitial stress and thus be older than aspirate dissimilation.

different from Grassmann's Law of the Indo-European tradition (Grassmann 1863). This sound pattern is found in Ancient Greek and Sanskrit, as well as in many other languages:

(3.15)   Grassmann's Law in compounds (Michelena 1977 [2011])[26]

1ˢᵗ member	Gloss	2ⁿᵈ member	Gloss	Compound	Gloss
hil	'dead'	+ *herri*	'village'	> *ilherri*	'graveyard'
hil	'dead'	+ *hots*	'sound'	> *ilhots*	'elegy'

3.3.3 Hualde (1995, 2003c, 2007)

According to Hualde (1995, 2003c, 2007), phrase-level stress with accented and unaccented words —only conserved in Northern Bizkaian today— must be older than word-level stress, and the two word-level stress systems mentioned above should have been derived from it. This statement was based on the greater complexity of the Bizkaian accentual system in comparison to the other two systems.

As a matter of fact, the accentuation system present in modern Northern Bizkaian is very marked within the typology of prosodic systems. A similar system is found in the stress pattern of Tokyo Japanese (Hualde 1988; cf. Pierrehumbert & Beckman 1988; Kubozono 1993). Central-western and Eastern Basque accentual systems are prosodically simpler, since there is no distinction between unaccented and accented words in these, nor is there such a distinction between marked and unmarked stems and suffixes. In principle, all words are stressed in the other two systems.

In addition, Hualde mentions that morphologically determined stress contrasts were widespread in other varieties of Basque, which favors the antiquity of the third accentuation system presented in the previous section. The system described for Basque by Larramendi (1729) is as follows: stress falls in the last syllable of the word in indefinite forms and in definite singular forms, as in examples (3.16a); but in plural, stress falls in the last syllable of the stem, as in (3.16b). In derived words, stress falls in the penultimate syllable of the derived stem, with no distinction between singular and plural, cf. (3.16c). As noted by Hualde (1991c) —and, previously, by Michelena (1977 [2011])—, this pattern does not deviate to a great extent from that found in Northern Bizkaian pitch-accent based

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26   This dissimilation is not regular in all varieties: While some varieties use *ilherri* and *ilhots*, *hilerri* and *hilots* are attested as well. Given that these are transparent compounds, analogy and other factors may be playing a role.

varieties.[27]

(3.16) Accentuation system in Larramendi (Hualde 1991c)

a)   Word-final stress in singular:

Example	Trans.	Std. Bsq.	Gloss
egún	/e'gun/	*egun*	'day'
escú	/es̠'ku/	*esku*[E]	'hand'
arrí	/a'ri/	*harri*[E]	'rock'
guizonác	/giʃo'nak/	*gizonak*[E]	'the man (erg.)'
guizonarí	/giʃona'ɾi/	*gizonari*	'to the man'
echeán	/etʃe'an/	*etxean*[E]	'in the house, at home'

b)   Stem-final stress in plural:

Example	Trans.	Std. Bsq.	Gloss
guizónac	/gi'ʃonak/	*gizonak*	'the men (abs.)'
guizónai	/gi'ʃonai/	*gizonei*	'to the men'
echéetan	/e'tʃeetan/	*etxeetan*	'in the houses'

c)   Stem-penultimate stress in derived stems:

Example	Trans.	Std. Bsq.	Gloss
beguiratzálle	/begiɾa'ʦaʎe/	*begiratzaile*	'observer'
begiratzálleari	/begiɾa'ʦaʎeaɾi/	*begiratzaileari*	'to the observer'
begiratzálleac	/begiɾa'ʦaʎeak/	*begiratzaileak*	'the observers'

Michelena also described a distinction between accented and unaccented words for his native variety of Errenteria (cf. Michelena 1957-58 [2011a], 1972 [2011a], 1977 [2011]: 452f.; Echenique 1988). However, Irurtzun (2003) concluded that this distinction is already lost nowadays in Errenteria Basque.

According to Hualde (2003c), the system involving word-level peninitial stress developed from this system. There are two potential ways of explaining this development. The first way is straightforward: The main phonetic cue of the accent is pitch movement (falling or rising, as well as more complex movements involving falling and rising or rising

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27   It is not clear whether he is describing the variety from his hometown, that from where he grew up (Andoain and Hernani) or a third variety.

and falling, cf. Lehiste 1970; Beckman 1986), and it is a reasonable hypothesis to think that the pitch rise between the first and second syllables could have been reanalyzed as the main stress.

The second path requires several steps. I have discussed that, in the varieties from Markina and Ondarroa, phrase-level accent falls in the penultimate syllable instead of the last one, as in the case of other Northern Bizkaian varieties. In Markina, for instance, we find *lagunantzáko ekarri dot* 'I brought it for the friend', while *lagunentzakó ekarri dot* is used in the varieties from Lekeitio or Gernika. Hualde (2003c) relates this development to the stress pattern found in Antzuola and Bergara, since in these varieties the accent is assigned to the penultimate syllable in singular. Additionally, Hualde relates it to the accentuation system in Urolaldea. In this region, the accent falls on the third syllable of the word of singular forms, which means that the position of the accent is calculated from the beginning of the word. According to Hualde, this reinterpretation occurred in words with four syllables (in words such as *lagunána* 'of the friend' the location of the accent can be interpreted either as the third syllable from the beginning or the penultimate from the end). In Urolaldea, the accent of trisyllabic words falls in the second syllable, given the extrametricality of the last syllable (in the varieties around Markina and Bergara the accent cannot fall in the last syllable): *gizóna*[E] 'the man', *mutílla*[LW] 'the boy', *burúe* 'the head', etc. If we consider that all these words have the accent a syllable earlier in plural than they have it in their singular forms (*itturríxe*[E]-*ittúrrixek* 'the fountain-the fountains', *medikúe*[E]-*medíkuek* 'the physician-the physicians', *alargúne*[E]-*alárgunek* 'the widow(er)-the widow(er)s', etc.), peninitial stress has a great presence, and it is easy to develop a system where peninitial stress is the norm, as it is the case of the Central-western system, from there.

In any case, the diachronic explanation provided by Hualde is not complete, since it does not explain how the phrase-level accentuation of Northern Bizkaian Basque was created (cf. example 3.11a), and no account is offered for the development of the pitch rise after the first syllable and the high tone plateau which characterize this old system, that is, the L /H̅ ̅H̅ ̅H̅*\ pattern. This is specifically what Elordieta (2011a) tried to explain, as will be summarized in section §3.4.

Finally, Hualde (2006b, 2007) also proposed a source for the marked stress in the phrase-level accentuation system. According to Hualde (2007: 297ff.), the source of

marked stress is found in compounding, and it later spread to plural suffixes and clitics.[28] More precisely, the source of marked stress is found in a glottal gesture that was introduced between the two members of a compound. As in other languages, glottal constriction would have resulted in phonological tone (Kingston 2003). According to Hualde's proposal, glottalization would also account for the reduction processes that affect the final syllable of the first member of a compound in Basque. These processes include final non-high vowel neutralization in disyllabic words and loss in longer words, final high vowel loss and, after vowel loss, neutralization of oral stops and /h/ in /t/ (Michelena 1977 [2011]: 281ff.; see example 1.2 in §1.1.1). Hualde (2007: 298) suggests that "[v]owels followed by glottalisation would acquire nonmodal voicing, ultimately tending to be devoiced and lost. If lost, the glottalisation affected the preceding consonant, devoicing it: *ardi'alde> *ard'alde > artalde. The greater acoustic resemblance of a glottal stop with /t/ may also explain the change from /g/ to /t/ as in *begi'azal >*beg'azal > betazal".

3.3.4 Martinez-Areta (2004)

Lastly, Martinez-Areta (2004), following work by Michelena (1957-58 [2011a], 1977 [2011]), distinguishes three ancient kinds of accentuation that reflect the three main accentuation systems found in the modern dialects:

(3.17)   *Ancient types of accentuation according to Martinez-Areta* (2004)

   I. Ancient Western: Corresponds to Type 1 as described by Michelena and includes Gipuzkoan Basque, Bizkaian Basque as well as "some Navarrese varieties close to Gipuzkoa" (which may be the varieties around Goizueta).

   II. Ancient Central: Corresponds to Type 4 as described by Michelena and encompasses the varieties from the valley of Bidasoa, Bortziri and Coastal Lapurdian.

   III. Ancient Eastern: Corresponds to Michelena's Type 2. This was the origin of the accentual systems found in modern Zuberoan and the extinct Roncalese.

This proposal, which is in debt to that of Michelena, maintains some of its problems

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28   Hualde (2007: 298) assumes that, at the relevant historical point, compounds, clitic groups and stem+pl. sequences had similar morphological structure.

as well. First, Martinez-Areta assumes, without further discussion, that the (Ancient) Central system is older than the (Ancient) Western system, contra Hualde (1995, 2003c). In other words, that the system involving word-level peninitial stress is older than the phrase-level system. Second, in the same way as Michelena, it has difficulties with explaining how a much more complex system developed from a simpler one, as Martinez-Areta himself admits (2004: 198ff.).

3.4 The evolution of the Basque accentual systems: new proposal

3.4.1 From Proto-Basque accent to phrase-level accentuation

Following Elordieta (2011a), I see Hualde's proposal as the most correct among the three hypotheses (putting together the proposals by Michelena and Martinez-Areta) for the oldest Basque accentuation system presented in §3.3. Or, more precisely, Hualde appears to be right in proposing that the accentuation system maintained until today in Northern Bizkaian, namely Type III in (3.1), is older than the (nowadays) Central-western accentuation system or Type II. It would not be easy to argue how Basque developed a complex accentuation system in which the accent had morphological value and the accent was assigned by lexically accented morphemes (in the syllable preceding them) from a much simpler accentuation system without morphological value in which the peninitial syllable was systematically stressed. In the same way, it is difficult to explain how Basque developed a phrase-level accentuation system with unaccented words that form prosodic phrases with the words following them from a simple word-level stress system.

Even if we were to accept the previously mentioned problems, an important fact still needs to be clarified. As mentioned in the end of section §3.3.3, Hualde does not explain the development of phrase-level accentuation, or the creation of the phrase-initial tonal rise and the high tone plateau. How did the L $/\overline{\text{H H H*}}\backslash$ pattern evolve?

Elordieta (2011a) tried to fill these gaps by proposing a hypothesis for the creation of the prosodic pattern formed by unaccented words in the Northern Bizkaian system. Elordieta goes back in the history of Basque, until the time of the Old Proto-Basque researched by Lakarra (1995, 2005, 2006a). In this stage of the language, roots were

monosyllabic, with a CVC structure. CV-CVC words were created by means of reduplication, as in *zen > ze-zen*[E] 'bull' or *gor > go-gor*[E] 'hard'. It is not clear whether the reduplication followed a CV- pattern from the beginning or it was reduced from a *CVC- form after the loss of the coda consonants in the predictable morpheme (i.e., *zen-zen > zezen*, *gor-gor > gogor*). In any case, this morpheme was not maintained as a full copy of the root and had a weaker structure (see also the prefixes *gi-, *la-* and *sa-* reconstructed by Lakarra 2005: 427f.). In addition, when the word-initial consonant was *d-*, it was regularly dropped in the reduplicated part (apud Lakarra 2011a, 2013: 183, 218f.): *dol > *do(l)-dol > odol*[E] 'blood', *dar > *da(r)-dar > adar*[E] 'horn'. The reduplicated part was predictable and probably phonologically weaker than the root. Contextual predictability implies low entropy values and can yield high degrees of articulatory reduction (Jurafsky et al. 2001; Bell et al. 2003; cf. Blevins 2005; 2012: 290). Stressed syllables tend to be cross-linguistically stronger and less susceptible to processes of lenition or assimilation. The accented syllable was thus the second (and last) syllable, i.e. the syllable that contained the root in both prefixed and reduplicated forms. Given that the syllable of the root was closed (i.e. it had a coda), we may reconstruct an iambic foot with a [(C)V.'CVC] pattern (i.e., [σ.σ́]) for this stage of the language.

The clearest and most general feature of the accent in the world's languages is the fundamental frequency (F0), i.e., the pitch or tone (cf. Hyman 1977; Beckman 1986). Elordieta (2011a) proposed that Proto-Basque accent was realized by a high tone or a tone rising, that is, through a H* tone, preceded by a low tone (L) in the first syllable. In a more economic manner, as proposed for Proto-Bantu (cf. Nash 1992; Kaji 1996), only H (and not L) would be phonologically specified. L would only be realized later. Thus, the word melody reconstructed by Elordieta would be [0 H*]. (3.18) shows the realization of a sequence of two words when produced in an intonational phrase. External square brackets show phrasal boundaries, while internal square brackets show word boundaries:

(3.18)   Intonational realization of a sequence of words in Proto-Basque (Elordieta 2011a)
$$[[0 \ H*]_{\text{word}} \ [0 \ H*]_{\text{word}}]_{\text{phrase}}$$

Then, the high tone of the first word spread to the first syllable of the second word, which was unspecified for tone, as a consequence of this syllable being surrounded by two

H*. This process gave homogeneity to the intonational phrase [[0 H*] [H H*]]. This process is shown in (3.19):

(3.19) *Development of the high tone plateau* (Elordieta 2011a)

      [[0 H*] [0 H*]]   >   [[0 H*] [H H*]]

Three additional changes are required to develop the prosodic system found in Northern Bizkaian today (cf. Elordieta 2011a; Egurtzegi & Elordieta 2013): (i) a low tone is realized in the first syllable of the intonational phrase (as happened in some Bantu languages), (ii) phrase-final H* is reinterpreted as the accent after the loss of the accented status of the first H* of the intonational phrase, and (iii) the high tone is maintained from the phrase initial rising until the accent as a feature of the phrase, instead of being an independent tonal feature of each word. These three steps are depicted in (3.20), which continues from (3.17):

(3.20) *Development of the Nothern Bizkaian accentuation system* (Egurtzegi & Elordieta 2013: 173)

      [[0 H*] [H H*]] > (i) [[L H*] [H H*]] > (ii) [[L H] [H H*]] > (iii) [L H^n H*]

Elordieta (2011a) finds the motivation for step (ii) in the concept of accent culminativity, that is, having a single accent where there (formerly) were two accents. In addition, the accent in the last syllable becomes demarcative, not regarding the word, but regarding the whole prosodic phrase. The words have no accent of their own any longer and form a phrase with accent in its last syllable. The fact that the last accent of the phrase becomes more prominent may be a projection to the phrase level of word-final prominence of the previous stage, i.e., from word-final prominence to phrase-final prominence (Elordieta 2011a). Last, a plateau is developed from the H in the second syllable to the final H* by maintaining the high tone until the accent. The symbol H^n in (iii) refers to this spread, which involves multiple syllables. In this way, we arrive at the system still present in Northern Bizkaian, namely [L H^n H*].

In addition, a tonal contrast is required in order for the last tone to be prosodically prominent, given that the accent is realized by means of tonal contours. This contour is found in the low tone that marks the first syllable of the next intonational phrase. This

means that, in a [L Hⁿ H*] [L Hⁿ H*] sequence, the accent is realized by the falling contour which results from the combination of the H* in the end of the first intonational phrase and the L in the beginning of the next phrase (Egurtzegi & Elordieta 2013).

This is the main contribution in Elordieta (2011a), presenting a pathway from which the comparatively older accentuation system (according to Hualde 1995, 2003c, 2007), only present in Northern Bizkaian today, could have developed.

3.4.2 From phrase-level accentuation to peninitial syllable stress

According to Hualde, the other Basque accentuation systems developed from the Northern Bizkaian system. Hualde (2003c) offers two possible ways for this system to evolve into the Central-western system (Type II), as discussed in §3.3.3. The first possibility involves the reinterpretation or reanalysis of the pitch rise between the first and the second syllable as an accent. In fact, in the variety from Bilbao, located in the North of Bizkaia, the stress falls on the second syllable of the word (cf. Gaminde 1995, 1998a, 1998b). According to Hualde (2003c), the pitch rise in the second syllable found in the Northern Bizkaian system was reinterpreted as stress, potentially due to the influence of Castilian Spanish, which has a wide presence in Bilbao. In Castilian Spanish, the main phonetic cue of stress is pitch rising, at least in prenuclear accents (longer duration and higher intensity, although realized, do not seem to be necessary, cf. Navarro Tomás 1944 [1974]; Quilis 1993 [1999]: 399f.; Sosa 1999; Face 2002; Estebas-Vilaplana & Prieto 2010; among others). Hualde's hypothesis is that the phonetic realization of stress as a pitch rise influenced the reinterpretation of the position of stress in the variety of Bilbao. The reinterpretation of the accent in Bilbao is recent. The nowadays widespread Central-western system may as well have originated in a similar way, but long time before the innovation affected the variety of Bilbao. Elordieta and Hualde (2003) empirically tested this pathway by means of a perception test. In their experiment, Elordieta and Hualde found that speakers of Gipuzkoan Basque and Standard Basque tend to interpret the pitch rise in the second syllable from Northern Bizkaian speakers as the accent.

The second way to arrive at the Central-western accentuation system proposed by Hualde (2003c) is shown by the accentuation systems found in the varieties between Northern Bizkaian and the varieties with the Central-western system. In Markina and Ondarroa, phrase-level accent falls on the penultimate syllable instead of the last one.

According to Hualde, this pattern is also found in Antzuola and Bergara, where the stress falls on the penultimate syllable in singular forms. In contrast, the position of stress is calculated from the beginning of the word in the neighboring region of Urolaldea. In Azpeitia, Urrestilla and Azkoitia, for instance, stress falls on the third syllable of the word in singular forms. According to Hualde, this reinterpretation originated in words with four syllables such as *lagunána* 'of the friend', in which the position of the stress can be viewed as being on the third syllable of the word or on the penultimate. The shift from the third to the second syllable (from the beginning of the word) may come from Urolaldea as well. In these varieties of the Gipuzkoan dialect, stress falls on the second syllable in trisyllabic words, due to the extrametricality of the last syllable (as in other varieties, such as these from Markina or Bergara). In addition, the stress falls a syllable earlier in the plural than it does in the singular in Urolaldea and thus stress falls on the second syllable in plural forms with four syllables (*itturríxe-ittúrrixek* 'the fountain(s)', *mendikúe-mendíkuek* 'the physician(s)', *alargúne-alárgunek* 'the widow(er)(s)', etc). Thus, Hualde argues for a great presence of peninitial stress, and that this position of the stress could have been generalized to a second-syllable stress system. This is, precisely, the Central-western system described in §3.2.2.

The short path that goes from Type 3 (§3.2.3) to Type 2 (§3.2.2) is described as follows: First, the pitch rising found in the second syllable of the phrase (H) is reinterpreted as being the accent (H*). This reinterpretation implies the loss of the earlier phrase-accent —namely phrase-final H*— due to only one accent being possible in each phrase. This process is shown in (3.21):

(3.21)   Reinterpretation of the pitch rising in the second syllable as the accent (Egurtzegi & Elordieta 2013: 174)

[L̲/$\overline{\text{H H H*}}$\]   >   [L̲/$\overline{\text{H* H H}}$\]

It may seem that the change in (3.21) is in the opposite direction to that depicted in (3.20-ii). However, the reinterpretation in (3.20-ii) was the outcome of two competing accents, while the much more recent process in (3.21) implies the reinterpretation of a pitch rise as stress.

Another argument for the movement of the stress to the beginning of the word may be mentioned as well. Lakarra (2005, 2006a) proposed that Basque underwent a big

typological change. While Proto-Basque was a prefixing language with the root in the end of the word, modern Basque has suffixes that leave the root at the beginning of the word. Lakarra (as well as Jauregi 2007) link this shift to the position of the accent, following what Donegan and Stampe (1983) proposed for the understanding of the typological differences between the Austroasiatic families Mon-Khmer and Munda: Proto-Basque had "final" accent and it moved towards the beginning of the word. This hypothesis provides an additional possibility for the accentual shift, alongside the reinterpretation of the pitch rise in the second syllable as the accent (Hualde 1995, 2003c, 2007).

An issue that remains to be discussed is what happened to the H tones that followed the first H* in the second syllable. The pitch rise in the second syllable was enough to make the accent clear. A low tone in the syllable following H* would not be necessary. Contiguous pitch rising and lowering would only make the position of the accent ambiguous, given that both are potential ways of realizing the accent phonetically. Thus, two possibilities may be expected: One involves maintaining the H tones, although with a lower pitch than that of accented H*. The second involves the phonological loss of the H tones following the accent, which would become phonologically unspecified for accent. A process of phonetic interpolation would apply from the accented H* to the L tone starting the next prosodic phrase. In the first case the pitch would slowly lower from the second syllable until the end of the word and in the second case the pitch lowering would be faster and more noticeable. The first possibility is found in the Bizkaian variety of Mallabia (cf. Hualde 2003c). The second possibility can be observed in the modern Central-western system (see Elordieta & Hualde 2014).

This paper does not have anything to add to the second possibility for the development of the Type II accent proposed by Hualde (2003c): In some varieties with phrase-level accent, the accent moved to the second to last syllable of the phrase, and that (ultimately) produced the reinterpretation of the accent as being calculated from the beginning of the word instead of from the end.

A second syllable accentuation system would have conditioned the modern distribution of laryngeals in Basque (§4.3.2), as argued by Michelena (1977 [2011]), as well as the metathesis processes that occurred after this accentuation shift (cf. Egurtzegi 2011, §4.4.4), which correspond to Lakarra's (2009b) $h_3 > h_1$. Laryngeals (cf. Michelena 1977 [2011]; Igartua 2001, 2006) and aspirated stops (Michelena 1951 [2011a]) are

restricted to the first two syllables of the word in the continental Basque dialects that have maintained them until modern times (§4.3.2). Given that both Grassmann's Law and the mirror-image process that affected aspirated stops (cf. Michelena 1951 [2011a]; §4.4.5) occurred within this domain, the accentuation shift that gave rise to the restriction of aspiration to the first two syllables is probably older than the laryngeal cooccurrence restrictions. Michelena (1977 [2011]: 330) was the first to link the restricted domain of the laryngeals to a peninitial stress, by looking at the history of Welsh. In fact, after the shift that moved stress from the last syllable to the second to last syllable in Welsh, all post-tonic /h/s were dropped (i.e., these in the last syllable). Now I can provide further evidence to this claim, given that typological and phonetic research has established a link between aspiration and stress in multiple languages (cf. Miller 2012: 127). Section 3.6.3 discusses the changes in the distribution of the /H/ in the history of the language (cf. also §4.3).

3.4.3 From peninitial stress to the Eastern system

Last, the Eastern accentuation system (Type I) would develop from the Central-western system (Type II). Following Michelena (1977 [2011]), this shift occurred in trisyllabic words, after peninitial stress was reinterpreted as originating from the second to last syllable —instead of the second from the beginning of the word. This reinterpretation is represented in (3.22):

(3.22) *Reinterpretation of peninitial stress as penultimate*
  $[\sigma \; \acute{\sigma} \; \sigma \; (\sigma^n)]$ > $[(\sigma^n) \; \sigma \; \acute{\sigma} \; \sigma]$

There is also a marked pattern in the Eastern accentuation system: oxytonic stress. This stress pattern developed after several diphthongizations (Mod. Z *ahái* [aˈñai̯] < Lit. Z *ahári*[E] 'ram') and vowel losses (Mod. Z *alhabá*[E] < *alhabá-a* 'the daughter', Mod. Z *orgã́*[E] < *orgaha* < *organa* 'cart', Mod. Z *ardṹ*[E] < *ardaho* < *ardano* 'wine') occurred in hiatuses between the second to last and the last syllable of the word (cf. §3.2.1). These vowel encounters are the consequence of the loss of /H/ in the third and following syllables —as well as the much more recent loss of the flap in the 19th century. Heterosyllabic vowel clusters created after the loss of /h/ gave rise to a marked stress pattern involving stressed diphthongs or vowels in the last syllable of the word. In addition, /ñ̃/ loss in the final

syllable has created a group of oxytonic words with a final contrastively nasalized vowel in Zuberoan (cf. Hualde 1997a: 76; §6.2.1). Many loanwords from Bearnese Gascon that shared this structure have greatly increased the number of words in this group (Z *salū́*[LW] 'living room', Z *arratū́*[LW] 'mouse', from Brn. Gsc. *salon* and *arraton*, respectively; cf. §6.2.1). These borrowings are much more recent than the borrowings found in the group of marked words in accentuation Types II and III, which came from Latin. Loanwords from Latin that have marked accentuation in the other varieties are integrated into the set of words with unmarked accentuation in Type I. Another factor pointing towards the more recent status of this set of marked words is that most (if not all) lost syllables may be reconstructed by adding a tap or a laryngeal in the middle of the (former) vowel cluster. Thus, after the reinterpretation that made peninitial stress (Type II) penultimate (Type I), all words —marked and unmarked— had paroxytonic stress for some time, until a new class of marked oxytones evolved. In short, in the Eastern accentuation the class of marked words present in Types II and III was "reset" and a new group of marked words developed afterward.

The reinterpretation of the stress as being calculated from the end of the word —instead of it being calculated from the beginning of the word— and the development of a new class of marked words from vowel-cluster simplification created a new accentuation system. Now, most words are stressed in the penultimate syllable of the word in the eastern Basque dialects, while some have the stress in the last syllable of the word. Incidentally, this is precisely the stress system found in Bearnese Gascon (Rohlfs 1977), the Romance language that has historically been in close contact with Zuberoan. Note that, by the time this reinterpretation occurred, Zuberoan and Roncalese not only were much more similar than they were in later stages, but they probably were a single dialect (cf. Camino 2011 [2014]; Lakarra 2011 [2014]). Thus, the contact to Bearnese Gascon may have played a role in the development of accentuation Type I in the eastern Basque dialects.

Finally, I want to state that the eastern dialects had Type II accentuation —i.e. peninitial stress—, which would give rise to the modern distribution of laryngeals in these dialects (cf. Egurtzegi 2013a), and that, later, stress moved to the penultimate syllable and accentuation Type I developed. This development would account for the restricted distribution of laryngeals and aspirated stops in modern continental dialects, which are limited to a domain encompassing the first two syllables of the word. If this hypothesis is

correct, eastern dialects such as Zuberoan —which maintains both laryngeals as well as aspirated stops to this day— developed the domain-dependent distribution of laryngeals when they possessed accentual Type II —i.e. second-syllable stress—, which is found in the central dialects today. The opposite chronology —with Type I stress older than Type II — would not account for this distribution. If we were to pose that Eastern accentuation is older than the Central-western model, we would need to reconstruct the same accentuation system in two different periods to account for the domain-dependent distribution of /H/. Elordieta (2011a) did not take this into account and proposed a more complex branching, discussed in the following section.

3.4.4 Historical branching of the Basque accentuation systems

Elordieta (2011a) proposed a different diachronic evolution of Basque accentuation systems, as represented in (3.23). The oldest stage with monosyllabic or disyllabic words with final stress (i.e., stage I) gave rise to two different accentuations, one in the west and one in the east (i.e., stages IIa and IIb, respectively). The first one represents the system with unmarked phrasal stress, found nowadays only in Northern Bizkaian but which was once widespread in the West. The second one represents the Eastern system, with word-level stress on the penultimate syllable. Then, the Western type of accentuation derived onto the Central-western type stage (III), with word-level peninitial stress:

(3.23)   Branching of the Basque accentuation systems according to Elordieta (2011a)

$$\text{I. } [\sigma \; \acute{\sigma}]$$

$$\text{II. a. } [\sigma^{n}] \; [\sigma^{n} \; \acute{\sigma}] \qquad \text{II. b. } [\sigma^{n} \; \acute{\sigma} \; \sigma]$$

$$\text{III. } [\sigma \; \acute{\sigma} \; \sigma^{n}]$$

As mentioned above, this proposal has the disadvantage that it takes the Eastern type of accentual system —IIb in (3.23)— to be older than the Central-western type —III in (3.23)—, and hence it cannot directly associate the presence of /H/ in the first two syllables of the word with stress on the second syllable of the word. It would have to

assume that stage IIb also develops into a stage like III and then derive into a system equivalent to IIb again.

Here (and in Egurtzegi & Elordieta 2013) I propose a simpler path, in which each accentuation system develops into one new accentuation system. In addition, each accentuation system is represented currently by a modern variety of Basque. The figure in (3.24) depicts the evolution of the Basque accentuation systems; the up-down direction shows the chronology and left-to-right shows the dialectal distribution. The modern systems that evolved from the different accentuation patterns are represented in the lower part of the figure.

(3.24)   Branching of the Basque accentuation systems after Egurtzegi & Elordieta (2013)

Old accentuation
(word-level, last syllable)
[σ σ́]

Phrase-level accentuation
(phrase-level, last syllable)
[σ^n] [σ^n σ́]

Word-level accentuation
(word-level, second syllable)
[σ σ́ σ^n]

Word-level accentuation
(word-level, penultimate syllable)
[σ^n σ́ σ]

Northern Bizkaian   Central-western   Eastern

3.5 The accentuation system of Goizueta

Another branch may be added to the figure in (3.24). As discussed by Hualde and Lujanbio (2008), Hualde et al. (2008) and, especially, Hualde (2012), in the south-western High Navarrese variety of Goizueta the accent can fall in either of the first two syllables of the word. In addition, there are two different accents. Thus, Hualde and Lujanbio (2008) discern 4 different accentual classes based on the accent (accent 1 or accent 2) and the syllable that bears it (either the peninitial syllable or the initial syllable of the word).

In most indefinite and definite singular nouns and adjectives the accent falls in the second syllable of the word. This first accent is realized by means of a falling tone (H*+L). Examples of the unmarked pattern (accent 1 in the second syllable) include these in (3.25):

(3.25) Class 1 accentuation (+2, H*+L) in Goizueta Basque (Hualde 2012: 1341; Hualde & Lujanbio 2008: 381)

Goizueta Bsq.	Trans.	Std. Bsq.	Gloss
saré	/s̺a'r̺e/	*sare*	'net'
besó	/be's̺o/	*beso*	'arm'
alába	/a'laba/	*alaba*[E]	'daughter'
emákume	/e'makume/	*emakume*[E]	'woman'
arrántzale	/a'ran̺t̺s̺ale/	*arrantzale*	'fisherman'
basérritarra	/ba's̺eritara/	*baserritarra*	'the farmer'
basó	/ba's̺o/	*baso*	'forest'

Some words have the accent in the first syllable instead of the second, and it is realized by the same type of pitch fall. Some of these are shown in (3.26):

(3.26) Class 2 accentuation (+1, H*+L) in Goizueta Basque (Hualde 2012: 1341; Hualde & Lujanbio 2008: 381)

Goizueta Bsq.	Trans.	Std. Bsq.	Gloss
áma	/'ama/	*ama*	'mother'
átta	/'aca/	*aita*[E]	'father'
mátte	/'mace/	*maite*[LW]	'loved, dear'
séme	/'s̺eme/	*seme*[E]	'net'
úme	/'ume/	*ume*[E]	'child'
sáltsa	/'s̺alt̺s̺a/	*saltsa*[LW]	'sauce'

Goizueta Bsq.	Trans.	Std. Bsq.	Gloss
nólabitte	/'nolabice/	*nolabait*	'somehow'

Additionally, there is a second kind of accent (or accent 2), which is realized by a low tone (L*) or a pitch fall with an earlier peak (analyzable as H+L* in the Autosegmental-Metrical framework; cf. Egurtzegi & Elordieta 2013).[29] Accent 2 (L*/H+L*) can fall on the first or the second syllable and is found in loanwords as well as some native words. Examples in (3.27a) show accent 2 in the second syllable (Class 3) while (3.27b) presents examples of accent 2 in the first syllable (Class 4):

(3.27)   Accent 2 in Goizueta Basque (Hualde 2012: 1341; Hualde & Lujanbio 2008: 381)

a)   Class 3 (+2, L*/H+L*)

Goizueta Bsq.	Trans.	Std. Bsq.	Gloss
eskòla	/es̺'kola/	*eskola*[LW]	'school'
basèrri	/ba's̺eri/	*baserri*	'farmhouse'
borròka	/bo'roka/	*borroka*	'fight'
attàiarra	/a'cajara/	-	'father-in-law'
belàrri	/be'lari/	*belarri*[E]	'ear'
azkànarro	/as̺'kanaro/	*azkonar*[E]	'badger'

b)   Class 4 (+1, L*/H+L*)

Goizueta Bsq.	Trans.	Std. Bsq.	Gloss
sàlto	/'s̺alto/	*salto*[LW]	'jump'
kàfe	/'kafe/	*kafe*[LW]	'coffee'
fàbrika	/'fabrika/	*fabrika*[LW]	'factory'
lèngusu	/'lengus̺u/	*lehengusu*[E]	'cousin'
àurre	/'au̥re/	*aurre*[E]	'front'
àtze	/'ats̺e/	*atze*[E]	'back'
èuzki	/'eu̥s̺ki/	*eguzki*[E]	'sun'
bàso	/'bas̺o/	*baso*[LW]	'glass'

Stems with three or fewer syllables show this accentuation in plural forms or when

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29   Hualde (2012) uses the term "falling accent" to refer to this accent, but the images he provides show that the pitch lowering begins in the previous syllable. Thus, H+L* seems the most appropriate notation within the Autosegmental-Metrical model.

they are followed by certain derivative suffixes. Examples in (3.28) show that the addition of these suffixes changes the type of pitch accent of the word to accent 2:

(3.28)   Marked suffixes in Goizueta Basque (Hualde 2012, i.a.)

a)   Accent in the second syllable (Class 1 → Class 3)

Accent 1	Gloss	Accent 2	Gloss
mendía[E]	'the mountain (abs. sg.)'	*mendìk*	'the mountains (abs. pl.)'
gizónari[E]	'to the man'	*gizònari*	'to the men'
auzó[E]	'neighborhood'	*auzòtar*	'neighbor'
beldúrra[E]	'fear'	*beldùrtia*	'fearful'

b)   Accent in the first syllable (Class 2 → Class 4)

Accent 1	Gloss	Accent 2	Gloss
úmek[E]	'the child (erg. sg.)'	*ùmek*	'the children (erg. pl)'
ámakin	'with the mother'	*àmakin*	'with the mothers'
béltza[E]	'black'	*bèltzagi*	'too black'

Accent 2 —low or falling accent on the initial syllable— is considered as marked by Hualde (2012). Interestingly enough, many of the words that bear these accentuations in the variety from Goizueta are also marked in Northern Bizkaian. Although the match is not exact, Hualde (2012) proposes that marked accentuation developed in Goizueta in the same manner as in Northern Bizkaian: through old compounds, in which main stress was on the last syllable of the first member and through certain derivative suffixes, which assigned the accent to the last syllable of the word (see Hualde 2007: 298). Marked accentuation was also used with plural forms, implying that plural suffixes were added by composition to some extent (see Michelena 1981 [2011a]): **gizon+aga*[30] > *gizònak* 'the men'. Finally, Hualde (2012) suggests that the unmarked accent in the variety from Goizueta, with a falling accent on the second syllable, originated in a similar way as the Central-western type of accentuation, namely from a reinterpretation of the pitch rise occurring on the second syllable in the once widespread phrasal accentuation (cf. section 3.4.2).

Thus, the accentuation pattern (or patterns) found in Goizueta show that the system currently restricted to the Northern Bizkaian area was more widespread across the Basque

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30   More recently reconstructed as *-ha(r)+ga* (Lakarra 2013b).

dialects in older times (see §3.6.1 as well). It seems reasonable to assume that the stress system in Goizueta is probably older than the Central-western type, as Goizueta has a four-way stress pattern, with a two-way difference in stress location (first or second syllable) and a two-way distinction in type of pitch accent (late fall and low or early fall). This system is certainly more complex than the one found in the Central-western Type II. If we were to add the accentuation pattern of south-western High Navarrese to the figure in (3.24), it would be placed between phrase-level final accent and word-level second-syllable stress.

As anticipated in the introduction, this chapter does not address the historical development of other accentuation subsystems. For a discussion of the special accentuation subsystems found between the Northern Bizkaian and Central-western systems, namely these of southern Bizkaia (Arratia), Bergara and Urolaldea, see Hualde (1997a, 2003c, 2006a).

3.6 Evidence supporting the hypothesis

Different types of evidence can be found to sustain the presented proposal. In this section, geographic evidence, evidence based on marked words, and segmental evidence will be presented.

3.6.1 Geographic evidence

I have discussed that the distinction between marked and unmarked words, which is limited to the prosodic system present in today's Northern Bizkaian, was spread through the central Basque dialects in older times, as demonstrated by the writings by Larramendi (1729) in the 18th century (see Michelena 1977 [2011]; Hualde 1997a, 2007). Likewise, a variant of the Northern Bizkaian accentuation can be found in the High Navarrese variety of Goizueta even today (cf. Hualde & Lujanbio 2008; Hualde et al. 2008, Hualde 2012). In this variety, the pitch accent is not realized at a phrase-level but in each word.

In addition, it is worth mentioning that, according to the relative chronology proposed in this paper, new kinds of accentuation were developed eastwards. According to these general isoglosses, the most archaizing systems are maintained in the western varieties, while more recent patterns developed in the central dialects and the most recent

kind of accentuation was developed in the easternmost dialects of Basque.

3.6.2 The evidence of marked words

As pointed out by Hualde (1997a, 2006a, 2007), the system based on the distinction between marked and unmarked words shows a great homogeneity below its superficial diversity. As a matter of fact, many of the accented words and affixes that trigger marked accentuation in Northern Bizkaian by placing the accent in the penultimate syllable of the word also trigger marked stress in the central dialects by assigning the stress a syllable before than in unmarked lexical items (cf. Hualde 1997a).

The following example (3.29), offers a list of words and affixes that trigger marked accentuation both in a variety of Northern Bizkaian Basque (Getxo) as well as in a central variety (that of Beasain, more specifically).

(3.29) Words and affixes that trigger marked accentuation (Hualde 1997a)

Northern Bizkaian (Getxo)	**Central Basque (Beasain)**	**Gloss**
bélarri[E]	*bélarri*	'ear'
líb(u)ru[LW]	*líburu*	'book'
lodí[E]*-ena*	*lódi-ena*	'the fattest'
arín[E]*-egi*	*árin-egi*	'too fast'

In addition, systems based on marked words are found in varieties of Basque located far from Bizkaia. This is the case of varieties from the east of Gipuzkoa (cf. Irurtzun 2003) or the High Navarrese variety of Goizueta (cf. Hualde & Lujanbio 2008, Hualde et al. 2008, Hualde 2012), which show similar systems to that found in Northern Bizkaian Basque.

3.6.3 Segmental evidence

It has already been mentioned that Michelena based his reconstruction of Old Basque peninitial stress on the distribution of aspirates and aspirated stops in the modern language. Michelena (1957-58 [2011a]) observed that laryngeals and aspirated stops occurred only in onsets of the first two syllables of a word, and he associated this

distribution to the placement of stress on the second syllable of the word. He proposed this restriction based only on the modern eastern dialects of the language, which are the only modern dialects that maintain /h/ (cf. Hualde 2006b, 2007). /h/ does not occur outside of the first two syllables of the word in these dialects:

(3.30)   *Distribution of* /h/ *in the modern continental dialects*

Example	**Trans.**	**Gloss**
hamar[E]	/hamar/	'ten'
zuhaitz[E]	/ʂuhai̯tʂ/	'tree'
haur[E]	/hau̯r/	'baby'
bihar[E]	/bihar/	'tomorrow'
harri[E]	/hari/	'stone'
uharte[E]	/uharte/	'island'
hiru[E]	/hiɾu/	'three'
behar	/behar/	'must'

Nevertheless, Michelena did not take into account the place names found in the south-western medieval document *Reja de San Millán*, which predates the loss of /H/ in the western Basque dialects. In this document, /h/ can occur in the onset of any given syllable (cf. Igartua 2002: 380f.; Egurtzegi 2013a). These attestations show that the domain-dependent distribution of laryngeals found in modern Basque was not common to all dialects (cf. Hualde 2007: 316; §4.3). Some of the place names in the *Reja de San Millán* (Michelena 1964 [2011b]) are given in example (3.31):

(3.31)   *Distribution of* /h/ *in medieval western dialects* (Michelena 1964 [2011b]: 31ff.)

11th century form	**Modern form**
Hilarrazaha	*Ilárraza* (cf. modern *-tza*)
Hascarzaha	*Ascarza*
Udalha	*Udala*
Aialha	*Ayala* (deserted from the 14th Century)
Bahaheztu	*Maeztu*
Hurizahar	Sp. *Peñacerrada*[31]

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31   Cf. the modern words Std. Bsq. *huri*[E], *hiri* 'city' and Std. Bsq. *zahar*[E] 'old'.

11th century form	**Modern form**
Harhaia	*Araia*
Hagurahin	Sp. *Salvatierra* / Bsq. *Agurain*
Hereinzguhin	*Erenchun*
Hararihini	*Arraráin* (deserted)
Adurzaha	*Adurza*
Gastehiz	(*Vitoria-*)*Gasteiz*

We can find even more meaningful examples when comparing modern words as attested in eastern Basque dialects to their Latin counterparts, their medieval attestations or the reconstructions proposed for them. As a matter of fact, several words from eastern dialects have /h/ in a non-etymological position in their modern form, after a process of metathesis conditioned by a stress shift. This process is shown by example (3.32):

(3.32)   Historical metathesis of /h/

Old form	**Mod. form**	**Trans.**	**Gloss**
Lat. *arēna* > **areha* >	Bsq. *harea*[LW]	/haɾea/	'sand'
Lat. *leōne*(*m*) > **leohe* >	Bsq. *lehoi*[LW]	/lehoi̯/	'lion'
Med. Bsq. *ibahi*[32] >	Bsq. *hibai*[E]	/hibai̯/	'river'

In fact, a few of these words can be found in western medieval toponymy, and they show /h/ in its etymological position not restricted to the first two syllables in the word. The clearest example of this may be the word for 'river' in (3.33):

(3.33)   Sound changes in the Basque word for 'river'

Med. Bsq.(1)	**Med. Bsq.(2)**	**Mod. Bsq.**	**Gloss**
ubahi[33] >	*ibahi* >	*hibai*	'river'

The reconstructed form and older attestations in example (3.33) correspond to any variety that maintained laryngeals as contrastive segments but had not developed the

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32   Cf. *Sagibahia* in the Becerro Galicano from 1128 (Manterola, p.c.).
33   Cf. *Muruvahy* (La Rioja 1251), apud Aznar Martínez (2009). Other attestations of this word such as *Morafay*, *Murafay* (1156), *Morufay* (1156) or *Murufay* (1209) show an /f/ that can be traced back to /h/, given that /w/, /b/ became /f/ when followed by a laryngeal in the next syllable (cf. Hualde 1997b: 422f.; Egurtzegi 2013a: 153f.), as in the case of **gau-hari* > *afari*[E] 'dinner' and *auher* > *alfer*[E] 'idle'.

Central-western accentuation system. The phonotactic restriction limiting the distribution of /H/ to the first two syllables —as well as the metathesis of /H/ in later syllables, as seen in examples (3.32-33), cf. also §4.4.4— would be a consequence of the stress shift to the second syllable of the word (cf. Egurtzegi 2013a, 2013b).

The aforementioned process of metathesis has been analyzed as an instance of perceptual metathesis (cf. Blevins & Garrett 1998, 2004) in previous works (cf. Egurtzegi 2011, 2013a, 2013b, §8.2.1). This process implies the reanalysis of segments bearing elongated phonetic cues (cf. Ohala 1981, 1993) in a non-etymological sequential position. As a matter of fact, some phonetic cues not only occur in the position of the phonic string corresponding to the segment which requires them to be produced, but affect the neighboring segments as well. A laryngeal, for instance, produces a rise in energy and noise (cf. Ladefoged et al. 1988) that spreads to all vowels around it thereby making them breathy voiced (Egurtzegi 2013b illustrates this process with spectrograms of Basque words, cf. also §4.6.4). It is not always an easy task for the listener to recover the position in which the speaker intended to produce these segments, given that their phonetic cues occur in more than one slot of the speech chain. In cases where the listener assigns a non-etymological position to one such segment instead of the intended one, an instance of metathesis occurs. This may, in turn, phonologize (cf. Hyman 1976) over time.

In addition, this process can be related to the following cross-linguistic bias described by Ultan (1978: 395), namely the tendency shown by segments that would otherwise have been lost to metathesize to a phonotactically acceptable position after a major phonotactic change in the language (see Egurtzegi 2011). As a matter of fact, this process occurred in a near-systematic way after the accentual shift that gave rise to peninitial stress in the central and eastern dialects, which created the phonotactic restriction that limits /H/ to the first two syllables of the word. This stress system never developed in the western dialects, and thus neither the modern distribution of laryngeals nor the systematic process of metathesis affecting them are expected to have occurred there.

3.7 Conclusions

The proposed chronology in §3.5 accounts for the historical development of the three main accentuation systems found in the modern Basque dialects. This proposal has been grounded on segmental, historical and geographic evidence. It has made use of the

advances by previous scholars (Michelena, Hualde) by integrating their main proposals into a greater hypothesis.

3.7.1 Relative chronology of the accentuation systems

Following the theory of the monosyllabic Proto-Basque root by Lakarra, I have proposed a prosodic system for this older stage from which the modern accentuation systems could have been derived.

On the one hand, I have accounted for the changes in the distribution of laryngeals by defining the distribution of /h/ present in the *Reja de San Millán* as a comparatively older sound pattern and by regarding the restricted distribution found in modern eastern dialects of the language as an innovation. On the other hand, I have argued that the prosodic system maintained in the High Navarrese variety of Goizueta alongside the systems based on marked words found in some Gipuzkoan varieties argue for the comparatively older status and much wider spread of the prosodic system currently limited to Northern Bizkaian Basque.

3.7.2 Towards an absolute chronology of the Basque accentuation systems

Although the concrete periods of development of the different accentuation systems cannot be specified, some notions can be inferred from the analysis presented in this chapter. The first system, Elordieta's (2011a) reconstruction of the old accentuation (§3.4.1), involves an iambic foot (i.e., [σ.σ́]) with a [(C)V.'CVC] structure. Given that this system is based on the stage of the language when the first disyllabic words developed, this system should have developed within Proto-Basque.

The system that developed from it, namely phrase-level accentuation (Type 3, §3.2.3), possesses a marked stress pattern that incorporated Latin loanwords dating from the beginning of the Common Era. In addition, all accentuation systems present in modern dialects can be derived from the phrase-level accentuation system. This makes it the perfect candidate for the accentuation system of Common Basque, which Michelena (1981 [2011a]: 540f.) placed around the 5th-6th centuries. Thus, phrase-level accent should have developed prior to the end of the contact with Latin and lasted until the development of the Basque dialects during the first half of the Middle Ages.

The chronologically next accentuation system, peninitial stress (Type 2, §3.2.2), probably developed within the first half of the Middle Ages. While there are attestations of the 10th century that predate the loss of /H/ in High Navarrese, none of them show /h/ outside the domain of the first two syllables. Although not conclusive, these attestations are consequent with the development of peninitial stress within the Early Middle Ages, not long after the division of Common Basque into dialects.

The approximate date of the development of Eastern accentuation system (Type 1, §3.2.1) may be difficult to estimate given the lack of Zuberoan or Roncalese texts from before 1616. Nevertheless, it may be reasonably proposed that the time span of Type 2 accentuation in the dialects with Type 1 accentuation may have been short. This proposal is inferred from the observation that hiatuses tend to be unstable in Basque, resulting in diphthongization or simplification instead. Eastern oxytonic marked accentuation pattern (§3.4.3) evolved from the diphthongization of the hiatuses developed from the loss of /H/, which was due to peninitial stress. Given that the hiatuses from the loss of the flap in 19th century Zuberoan became diphthongs and were simplified in less than a century —with the affected words being integrated into the group of marked oxytones—, the time that peninitial stress spanned in the easternmost dialects may not have been much longer. However, since the time of the development of peninitial stress in the easternmost dialects cannot be established, I cannot suggest any concrete period for the development of penultimate stress.

3.7.3 *Patterns of marked accentuation*

According to Hualde (2007), the origin of pre-boundary accent in marked words of the Type 1 system is found in a glottal gesture that was added between the two members of a compound. This marked accentuation later spread to words with morphological structure similar to that of compounds, such as stem+pl. sequences or words bearing clitics.

In some Gipuzkoan varieties with Type 2 accentuation, marked words are stressed on the initial syllable, while in unmarked words stress falls on the second. This is explained by the prosodic system of nearby places such as the Northern Bizkaian variety from Markina, which these varieties shared until recent times (Hualde 2007). In the variety from Markina, there is a pitch rise in the first syllable of marked words, while unaccented words have a pitch rise in the second-syllable of the phrase. These pitch rises have been

reinterpreted as word-level stress, yielding initial stress in marked words and peninitial stress in previously unaccented words (Hualde 2007).

I have argued that the set of marked words in the Eastern accentuation (Type 1) is more recent than that found in the Northern Bizkaian system (Type 3) as well as that in the central varieties (Type 2). In contrast to marked words in other varieties, marked words in eastern varieties underwent clear phonological processes of vowel merger or of diphthongization after consonant loss. The set of marked words and affixes found in the other two accentuation systems is integrated into the set of unmarked words in the Eastern accentuation system.

3.7.4 Final remarks

Although Hualde (1993, 2007) proposed phrase-level accentuation to be the accentual system of Proto-Basque, I have argued that, instead, this system is the accentuation of Common Basque —the stage of the language from which modern Basque dialects derived. Following Elordieta (2011a) I have suggested that Proto-Basque had a much simpler accentuation system with prosodic prominence in the root, which was usually in the last syllable of the word. The proposed chronology shows that the innovations in the Basque accentuation systems have been developed eastwards — Northern Bizkaian system > Central-western system > Eastern system— after the development of the Basque dialects in the Middle Ages.

4 The evolution of Basque laryngeals

4.1 Introduction

The aspirate /h/ has historically been a troublesome segment within the field of the Basque historical linguistics. Processes whose existence is unlikely to be refuted, such as /n/ > /h/ /V_V (cf. Michelena 1950 [2011a]: 8f., 1977 [2011]: 171),[34] have been brought into question more than once (by Schuchardt 1906: 23 and Trask 1997, among others) and even the very phonemic nature of historical /h/ has been repeatedly put into question in comparative work, in papers by Schuchardt (1908: 6) and Gavel (1920: 266, footnote 2), among others.[35] The work of Gavel has had great impact on many Bascologists (including Michelena), and his ideas on the status of /h/ are accepted by modern Iberianists such as Orduña (2011).

This chapter focuses on the evolution of the two laryngeals (/H/) of the Basque language /h/ and /h̃/ and their modern phonetic realization. It aims to justify the etymological status of Basque aspirates by analyzing their diverse historical origins and grounding each of the reconstructed processes in phonetically driven explanations as well as in typological parallels. Another goal is to analyze the different modern realizations of /h/ and /h̃/ and link them to the processes from which they originated —as well as to the segments from which they were derived.

Along the same lines, an analysis of the speech of several informants of eastern dialects (mainly Zuberoan) has been conducted, from which different tendencies have been

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34   This process is analyzed as /n/ > /h̃/ /V_V in this dissertation (cf. §4.2.3).
35   A recent paper disregarding *h is Forni (2013). See Gorrochategi and Lakarra (2013) for criticism of this paper.

inferred regarding the production of /h/ in relation to its position in the word.

Evidence for metathesis and dissimilation of aspirates is also presented. The processes are argued to be a consequence of innocent errors biased by the phonotactic structure of the language.

4.2 The evolution of /H/

Michelena (1977 [2011]: 171f.) was the first one to defend the presence of *h in Proto-Basque. He distinguished four different sources of /h/ in addition to identifying the non-etymological instances of this segment: "La aspiración sería etimológica [...] cuando es el continuador de: 1) una antigua *h* protovasca, 2) lat. *f-*, con o sin mediación románica, 3) una antigua *-n-* intervocálica, 4) antiguas oclusivas sordas o fuertes en posición inicial."[36] (Michelena 1977 [2011]: 171).

In this paper two different Basque laryngeals will be distinguished: /h/ and /h̃/, the latter being present only in Zuberoan today (cf. Hualde 1993b, 2003a: 31). I will also separately address the examples whose etymological origin has been determined in previous studies and thus may be carried back to an older segment, be that within Basque or in a different language in the cases of loanwords with known origins from those instances of /h/ that may be non-etymological.

Let us start, in this manner, with the inherited *h (§4.2.1), reconstructed for the protolanguage by Michelena (1977 [2011]: 171f.). I will then discuss the laryngeals with traceable origins within the history of the Basque itself, as it is the case of /h-/ < *P-, *T-, *K- (§4.2.2) or that of /h̃/, which is reconstructed as an intervocalic *n in older stages of the language (§4.2.3). The potentially non-etymological instances of /h/ include the few instances of addition of /h/ (§4.5.1) and the /h/s originated in compounds whose monosyllabic first member has a final rhotic (§4.5.2), often called parasitic or adventitious. With regard to the borrowed /h/s, I will discuss those coming indirectly from Latin /f-/, with Romance mediation (§4.5.4).

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36   "An aspirate is etymological when it follows: 1) an old Proto-Basque *h*, 2) Lat. *f-*, with or without Romance mediation, 3) an old intervocalic *-n-*, 4) old voiceless or fortis stops word-initially.", my translation (A.E.).

4.2.1 Inherited /h/

Proto-Basque —as reconstructed by Michelena (1977 [2011]: 171f.)— has *h. Although /h/ is not present in the modern peninsular dialects, it can be found in modern eastern dialects, as well as in medieval western varieties. Some of these laryngeals can be traced back to a different segment (such as *n), but many cannot be derived by any of the processes and are found in words commonly regarded as inherited. Although some authors have disregarded the phonemic status of this segment (cf. Trask 1997), a segment present in more than a peripheral dialect of a language is likely to have been present in the common proto-language as well. Areas that preserve such features are usually known as *relic areas*, and areas that produce the innovation are known as *focal areas*:

> *Innovations within one grammar can leave the old forms intact in certain categories, or in corners of the grammar [...]. Similarly, innovations in prestige dialects may never reach the periphery of the dialect continuum. In dialect geography one speaks of a focal (central) area and a relic (marginal) area. If a focal area radiates subsequent innovations their geographical spread may show the corresponding stratification* (Antilla 1989: 294)*.*

In addition to being preserved in modern eastern dialects, laryngeals are found in Aquitanian as well as in the oldest attestations of eastern and western dialects (examples 4.5 and 4.6 in §4.3). Example (4.1) shows the distribution of <h> in Aquitanian (Michelena 1977 [2011]: 169; cf. Gorrochategi 1984), which is not far from that found in the *Cartulary of San Millán* (cf. example 4.5 in §4.3.1):

(4.1)   *<h> in Aquitanian* (Michelena 1977 [2011]: 169)

#_V	*Halsco, Harbelex, Harsus* (cf. Bsq. *hartz*[E] 'bear'), *Hotarris* (gen.).
V_V	*Aherbelste* (dat.), *Bihoxus* (cf. Bsq. *bihotz* 'heart'), *Lohitton* (cf. Bsq. *lohi*[E] 'mud, dirty' and older 'body').
VR_V	*Belheiorix, Lelhunno* (dat.), *Erhexoni* (dat.), *Bar[h]osis, Berhaxsis*.
Th	*Baisothar...*, *Hontharris* (gen.).
_V_	*Hahanni, Hahanten*(*n*).

4.2.2 T > h

Of the potential sources of Bsq. /h/, old fortis stops (*P, *T, *K > /h/ /#_, as reconstructed by Martinet 1950 [1974]) are probably the oldest. Michelena accepts this development (1977 [2011]: 171), although he does not give many convincing examples to

ground this process. One of the usual examples involves dialectal variation shown by the demonstrative pronouns —Std. Bsq. *hau*[E] [hau̯] 'this (one)', Std. Bsq. *hori* [hoɾi] 'that (one)', Std. Bsq. *hura*[E] [huɾa] 'that (distant)' in contrast to R *kau* [kau̯], *kori* [koɾi], *kura* [kuɾa], etc. This argument was refuted by Lakarra (2011 [2014]), who argued for a late chronology of the Roncalese variants. The second example involves Pre-Basque root **karr-* from which the modern *harri*[E] [hari] 'stone' would result, an idea that is often discussed but has not been satisfactorily proven. Last, and most importantly, some Aquitanian attestations seem to alternate voiceless stops and /h/. The clearest example of this alternation involves the first segment of the name Aq. *Talsco* vs. Aq. *Halsco*. Michelena himself showed some doubts about this process (especially regarding the voiceless velar stop) in an older paper:

> *No me parece, sin embargo, que la teoria que ve en esa h- el resto de una oclusiva dorsal perdida sea indiscutible. Mejor dicho: la considero de poco valor practico en tanto no sea posible indicar qué consonante se ha perdido o en qué condiciones precisas ha tenido lugar la perdida. Porque no se ve muy bien por qué k- se ha conservado o sonorizado en tantas ocasiones y se ha perdido, pasando por h-, en otras* (Michelena 1950 [2011a]: 6).[37]

4.2.3 The development of the second laryngeal /h̃/

The most productive process insofar as the development of word-internal laryngeals is concerned is that affecting the intervocalic alveolar nasal stops, which systematically became laryngeals (cf. Michelena 1950 [2011a]: 8f., 1977 [2011]: 171; Igartua 2008). In contrast to Michelena, I do not consider this aspirate passively nasalized due to the nasalized vowels that surround it (cf. Larrasquet 1932: 168). Following Hualde (1993b: 294f., 2003a: 31), I define /h̃/ (here and elsewhere, cf. Egurtzegi 2013a, 2013b) as a nasalized segment which induces phonetic nasalization in the neighboring vowels. Contextual nasalization is a consequence of these vowels being in a nasal environment similar to that found in sequences such as *ona*[E] [õnã] 'the good' or *ama* [ãmã] 'mother'. Example (4.2) shows this development in Latin loanwords (4.2a) as well as in the inherited vocabulary (4.2b):

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37   "Nevertheless, the theory that sees the rest of a dorsal stop in that *h-* does not seem indisputable to me. Or, more precisely: I consider it of low practical value until it is possible to specify which one is the consonant that was lost or under which specific conditions happened the loss. It is not easy to see why *k-* has been preserved or voiced so many times and it has been dropped, after becoming *h-*, in others", my translation (A.E.).

(4.2) **n > /h̃/ /V_V*

a) **Latin loanwords:**

Lit. Z	Trans.	Lat.	Gloss
uhure (Std. Bsq. *ohore*[LW])	/uh̃uɾe/	*honōre*(*m*)	'honor'
ahate[LW]	/ah̃ate/	*anăte*(*m*)	'duck'
pühüllü[LW]	/pyh̃yʎy/	*faeniculu, *fenu*(*i*)*clu*	'fennel'[38]

b) **Inherited lexicon:**

Lit. Z	Trans.	Recons. form	Gloss
ahari[E]	/ah̃aɾi/	**anari*	'ram'
ihi[E]	/ih̃i/	**ini*	'rush, reed'
ihes[E]	/ih̃es̺/	**enes*	'to escape, run away'
sehi[E]	/s̺eh̃i/	**seni*	'servant' (cf. Mod. B. *sein* /s̺ein̪/ 'boy')

This process was considered aberrant by multiple scholars, who preferred to speak about an epenthetic /h/ to break the hiatus created after the loss of the intervocalic nasal stop (see Lakarra 2009a: 574f. and especially 588f. against this view). Nevertheless, this process possesses abundant typological parallels and even a highly plausible phonetic explanation (cf. Igartua 2008 for the Basque case).

Processes affecting intervocalic /n/ are found not only in Basque, but also in some Romance languages. Galician-Portuguese, for instance, shows loss of the intervocalic /n/ with nasalization of the previous vowel. Entwistle (1936: 288f.) places this loss between the 10th and 11th century and proposes that the hiatuses developed from it did not diphthongize until the 14th century (Nobiling 1903: 146; cf. Jungemann 1955: 108f.). This vowel nasalization is lost in most modern Galician varieties, but some Portuguese words maintain it even today:

(4.3) *Intervocalic /n/ loss in Galician-Portuguese*

a)	**Lat.**	**G-P.**	**Por.**	**Por. Trans.**	**Gal.**	**Gloss**
	lānam	*lãa*	*lã*	/ˈlẽ/	*la*	'wool'

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38   Different variants are attested in all Basque dialects: B, G, HN *milu*; R *mullu*; L, LN *mehula*, etc. The word listed here is probably an early loan from Romance **fenu*(*i*)*clu*, cf. Gsc. *holh, henolh*, Occ. *fenolh*, Cat. *fonoll*, Fr. *fenouil*.

a)	**Lat.**	**G-P.**	**Por.**	**Por. Trans.**	**Gal.**	**Gloss**
	uentānam	*ventãa*	*venta*	/ˈvẽtɐ/	*ventá*	'window'
	plānum	*chão*	*chão*	/ʃẽw̃/	*chao*[39]	'flat'
	plēnum	*chẽo*	*cheio*	/ˈʃɐju/	*cheo*	'full (masc. sg.)'
	tenebrās	*tẽevras*	*trevas*	/ˈtɾɛvɐʃ/	*tebras*	'darkness'
	bonum	*bõo*	*bom*	/bõ/	*bo*	'good (masc. sg.)'
	bonam	*bõa*	*boa*	/ˈboɐ/	*boa*	'good (fem. sg.)'
	lūna	*lũa*	*lua*	/ˈluɐ/	*lúa*	'moon'

b)	**Lat.**	**G-P.**	**Por.**	**Por. Trans.**	**Gal.**	**Gloss**
	regīnam	*raĩa*	*rainha*	/ʁɐˈiɲɐ/	*raíña*	'queen'
	vicīna	*vizinna*	*vizinha*	/viˈziɲɐ/	*veciña*	'neighbor (fem.)'
	farīna	*farinna*	*farinha*	/faˈɾiɲɐ/	*fariña*	'flour'
	uīnum	*vĩo*	*vinho*	/ˈviɲu/	*viño*	'wine'
	gallīna	*galĩa*	*galinha*	/gɐˈliɲɐ/	*galiña*	'hen'

Although I am not aware of any traces of /h/ in Galician-Portuguese, intervocalic /n/ was regularly lost, as shown by (4.3), although it reemerged as a palatal nasal stop after /i/, cf. (4.3b). Words such as Lat. *uīnum* 'wine' and Lat. *gallīna* 'hen' are attested with and without restitution of the nasal stop in Galician-Portuguese: compare G-P. *vĩo* and G-P. *galĩa* to G-P. *galinna* and G-P. *vinno*. This segmentalization developed in Galician-Portuguese after 1325, according to Williams (1938: §78.4).

A similar process can be observed in Gascon (cf. examples (6.12-13) in §6.4), but this case is even closer to the process described for Basque: laryngeals in the expected positions are attested in personal names in preliterary Gascon (cf. Michelena 1950 [2011a]: 9). The examples in (4.4) date from the 11th-12th centuries (Luchaire 1879: 211). The last example in (4.4) shows <h> in the expected position:

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[39] The form preferred by the Royal Galician Academy is *chan*, with restitution of the /n/. This coda restitution occurs in more contexts in Galician, and not only after /i/: compare Por. *mão* and Gal. *man* 'hand', Port. *gado* and Gal. *gando* (< *gãdo* < G-P. *gãado*) 'catter', etc.

(4.4)   Loss of -n- in medieval Gascon (Luchaire 1879: 211)

Lat.	Gsc.	Gloss
Dominicus	*Domeeg*	(personal name)
gallīnas	*garias*	'hen (pl.)'
abellan-ētum	*Aueraed*	'hazelnut grove'
camināre	*camiar*	'to walk'
Salīnas	*Salies*	(place name)
Donātum	*Doat*	(place name)
Castanētum	*Castahied*	(place name)

The chronology of this process is unclear. Zauner (1898) observed that /n/-loss cannot be one of the oldest processes in the transition from Latin to Gascon, given that, according to him, it was preceded by several syncopes (cf. Meyer-Lübke 1921: 562).

4.2.4 Rhinoglottophilia: the relationship between glottality and nasality

Rhinoglottophilia or the relationship between glottality and nasality has been extensively studied since Matisoff (1975) gave it such an original name. Rhinoglottophilia has been invoked to explain nasalization in contexts involving aspiration in a range of languages including: the Tai languages Thai and Lao, the Tibeto-Burman languages Lahu and Lisu, the Semitic East Gurage (Hetzron 1969: 71), Bantu languages such as Nyole (Schadeberg 1989) or the Mijikenda languages Digo and Mijikend (Blevins & Garrett 1993: 230), Pirahã, the Germanic Yiddish and British English (in the upper classes, cf. Matisoff 1975: 269), and the Celtic Irish and Scottish Gaelic, in addition to being reconstructed in the history of Micronesian Ponapean (cf. Blevins & Garrett 1993).

The reverse process, which involves an aspirate evolving from a nasal segment or feature, was called *glottorhinophilia* by Ó Maolalaigh (2003). Since this term is not widely used, I will not use it either. Most authors refer to all such processes as rhinoglottophilia regardless of the direction of the change. Although not as common, aspiration evolving from nasality can be found in many languages as well: it is found in the Owerri dialect of Igbo, the Algonquian languages Cree and Menominee (Bloomfield 1946: 88ff.), in languages from New Caledonia, in southern dialects of Thai, in Slavic languages, as well as in Irish and Scottish Gaelic, in addition to the aforementioned Basque process. The case

of the Owerri dialect of Igbo is especially interesting, since it involves a nasal segment producing nasalization as well as aspiration in the contiguous vowels (Blevins 2004: 135).

Rhinoglottophilia is a curious development from the articulatory standpoint, given that the velic movements are independent from the vocal fold activity —Blevins (2004: 135f.) speaks of it as "extremely odd from an articulatory perspective". However, it is not that unexpected with regard to acoustics, since aspiration and nasalization have similar acoustic effects in the vocalic spectrum (Ohala 1975: 303), and these similarities can lead to the reinterpretation of the aspiration as nasality (Blevins 2004: 46). Ohala explains that the open glottis, which comes with the phonation of [h] or breathy voice, affects the spectrum of surrounding vowels raising the frequency of the formants (especially that of F1), augmenting their bandwidth, creating anti-resonances and lowering the general amplitude of the vowel (1975: 303). These similarities could contribute to reinterpretation by the listener, a case of hypocorrection à la Ohala (1993: 258). Blevins (2004: 135) also adds that this phonological change occurs at the featural level, and that it is bidirectional: audible aspiration gives rise to audible nasalization and vice versa.

In the Basque case, intervocalic /h̃/ < *n is maintained currently only in Zuberoan dialect. It has undergone further changes in its quality and position within the word. Regarding the qualitative changes, it is possible to discern three different outcomes in the evolution of this segment —along with its neighboring vowels— in the dialects that have lost it:

1- In the dialects which have lost the opposition between oral and nasalized vowels but maintain the laryngeal —e.g. current Lapurdian and Low Navarrese—, /h̃/ has merged with the non-nasalized aspirate /h/.

2- In the dialects where laryngeals were lost before /h̃/ merged with /h/ and contrastive vowel nasalization is maintained —as in the now defunct Roncalese or the Bizkaian dialect from 16th century—, there are nasalized vowels and diphthongs in the positions formerly in contact with /h̃/ (cf. the case of the emergence of nasal vowels after the loss of coda /-n/ in French or Gascon, see §6.2 on nasalized vowels).

3- There are diphthongs or hiatuses in the dialects where neither laryngeals nor contrastively nasalized vowels are maintained —such as the modern western dialects.

4.3 Split in the distribution of /H/

During the Middle Ages, the distribution of the laryngeals split into two different patterns, one similar to that found in Aquitanian (§4.2.1) was maintained in the western dialects (§4.3.1) until the unconditioned loss of /H/ in these dialects and a domain-dependent pattern, similar to that found in the modern eastern dialects, was created in the central-eastern varieties (§4.3.2).

4.3.1 /H/ in medieval western dialects

Although they are only present in eastern dialects nowadays, laryngeals were common to all Basque varieties some centuries ago. The fact that /h/ has suffered a clear decline is indisputable. This segment has become less frequent not only recently but also since the end of medieval times. It was found in the Spanish territory —in addition to Zugarramurdi, Kintoa and Luzaide, where it has lasted until modern times— at least until the 14th century (cf. Michelena 1977 [2011]: 147, 169; cf. Salaberri 2013 on Alavese toponymy), but it was already absent from written documents of central or meridional varieties from the 15th and 16th centuries. However, this segment is fairly common in the first written documents which include Basque toponomastics, and, in particular, in the well-known *Glosas Emilianenses* from the *Reja de San Millán* originally dating from 1025.[40] In this document, <h> is probably used to represent both /h/ and /h̃/. Given that these documents were written in the monastery from San Millán de la Cogolla, in La Rioja (southernmost region of the Basque-speaking area estimated for that time, far from the area where Basque can be found today), a southern origin can be attributed to the place names written on it. Most of the villages mentioned in the document belong to the modern region of Álava or are found nearby, such as the toponyms in (4.5) (cf. Michelena 1964 [2011b]: 31ff.):

(4.5)　　*Place names from Álava from the 11th century* (cf. Michelena 1964 [2011b]: 31ff.)

11th century form	**Modern form**
Hilarrazaha	*Ilárraza* (cf. modern *-tza*)

40　Manterola (2006, 2008) has identified the final sequence *-ha* —very recurrent in the placenames in (4.5)— as a Medieval form of the article Std. Bsq. *-a*, which grammaticalized from the demonstrative **har* (cf. Michelena 1977 [2011]: 175; Trask 1997: 199). Other works on the Basque of San Millán include Gárate and Knörr (1982) and Irigoyen (1997).

11th century form	Modern form
Hascarzaha	*Ascarza*
Udalha	*Udala*
Aialha	*Ayala* (deserted from the 14th century)
Bahaheztu	*Maeztu*[41]
Hurizahar	Sp. *Peñacerrada* (Std. Bsq. *huri*, *hiri* 'city'; *zahar* 'old')
Harhaia	*Araia*
Hagurahin	*Salvatierra / Agurain*
Hereinzguhin	*Erenchun*
Hararihini	*Arraráin* (deserted)
Adurzaha	*Adurza*
Gastehiz	(*Vitoria-*)*Gasteiz*

The distribution of /H/ in the western documentation from the Middle Ages differs from that found in the eastern dialects in two points: First, laryngeals can appear after the second syllable and, second, a given word may contain more than one laryngeal.

The loss of the laryngeals may have begun in Navarre, around the 11th century. According to Michelena (1977 [2011]: 169) /h/ would have remained as a contrastive segment in Álava and in La Rioja at least until the 13th century. More recently, Salaberri (2013) has found instances of /h/ in Alavese toponymy of the 14th century. Thus, the loss of /h/ would have spread from west to east and from south to north, until disappearing from almost the whole Spanish territory.[42]

4.3.2 *Domain of /H/ in eastern Basque dialects*

In the modern dialects, laryngeals /h, h̃/ and aspirated stops /p[h], t[h], c[h], k[h]/ are present in only a limited domain, which encompasses a foot formed by the first two syllables of the word. This constraint reduces their potential locations to only two: aspirated segments, if

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41   The place name *Maeztu* was already in use in 1257 (cf. Michelena 1964 [2011b]: 33). The initial /m/ implies that the assimilation of nasality of the stop did not occur due to a following /n/ but a later /h̃/, developed precisely from *n. Compare *Bahaheztu* to the place name *Bahanezta* in the same document. If the two forms are related, the latter shows an <n> which the former lacks.

42   Unfortunately, there is no writing of relative length predating the aforementioned period (i.e., between the 12th and 14th centuries) written in Basque where the loss of /H/ in the dialects from the Spanish area could be traced, only scarce onomastic attestations. Nevertheless, there is a short transcription from Bakedano (Navarre, 1566) in which four <h>s are transcribed in the positions observed in modern continental dialects (Maiora Mendia 2011). In addition, the Basque name *Mehe*[E] 'thin' was written with the letter *he* <ה> /h/ in the Jewish community from Lizarra in the 14th century (Mirones Lozano 2009).

they were to appear, could only be present either in the onset of the first syllable or in the onset of the second syllable. This observation is true from the oldest eastern documents (i.e. *Linguæ Vasconum Primitiæ* by Dechepare (1545 [1980]), but no such distributional restriction was found in the western dialects —as shown by example (4.5)— or Aquitanian —example (4.1). Compare the medieval onomastics in *Livre d'or de Bayonne* (*Cartulary of Sainte-Marie de Bayonne*, examples date from the end of the 12th century) in (4.6a) and *Cartulary of Saint-Jean de Sordes* (4.6b), with /h/ only appearing in the first two syllables, to the Alavese place names in (4.5). In these documents, probably written by Gascon speakers (cf. Luchaire 1879: 207), <f> is used to represent /h/, and only appears in the first two syllables.[43] The examples and their 19th century Lapurdian equivalents are taken from Luchaire (1879: 207, cf. also 1879: 100f., footnote 2 for other examples):

(4.6)   /h/ *(<f>) in the eastern dialects* (cf. Luchaire 1879: 207)

a)   **Livre d'or de Bayonne**

12th century form	**19th century form**
Fondarraga	*Hondarraga*
Ferizmendi	*Harizmendi*
Sufarasu	*Zuharrazu*
Feribarren	*Hiribarren*
Fathse	*Haitza*
Ferriete	*Harrieta*
Ferriague	*Harriaga*

b)   **Cartulary of Saint Jean de Sordes**

11th century form	**19th century form**
Olfegi	*Olhegi*
Befasken	*Behasquen*

Although one could argue that the fact that no aspirate after the second syllable is found in Luchaire's place name list may be due to chance, a comparison with the western *Reja de San Millán* in example (4.5) reveals the high number of /h/s in a late syllable in

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43   High Navarrese personal names of the same period in the *Cartulary of San Salvador de Leyre* do not show use of <h> (cf. Luchaire 1881), so that the High Navarrese loss of /H/ may have begun by that time.

it.[44]

Michelena (1957-58 [2011a]) linked this restriction to a demarcative stress first hypothesized by Martinet (1950 [1974]). Michelena reconstructed stress in the peninitial syllable of the word —instead of the initial syllable proposed by Martinet. Following the stressed syllable, no laryngeal would be allowed by the language's phonotactics. The series of aspirated stops is likewise restricted to the onset of the first two syllables (Michelena 1951 [2011a]: 22ff.).[45] Example (4.7) shows the loss of /h̃/ in the third syllable in words in which no metathesis occurred:

(4.7)   Loss of /h/ (< *n) in the third syllable

Lat.	**Recons. form**		**Mod. Bsq.**	**Trans.**	**Gloss**
ballaena	> **baleh̃a*	>	*balea*[LW]	/balea/	'whale'
corōna	> **koroh̃a*	>	*koroa*[LW]	/koroa/	'crown'
catēna	> **kateh̃a*	>	*katea*[LW]	/katea/	'chain'
sabănum	> **zamah̃u*	>	*zamau*[LW]	/ʂamau̯/	'tablecloth'

Thus, the shift of the stress to the peninitial syllable (cf. Egurtzegi & Elordieta 2013, §3.4.2) created an initial iambic foot, and no aspirated segment was allowed outside of it. This initial foot was a prosodically prominent domain, which enabled the production of aspirated segments in it.

The relationship between stress and aspiration is not unheard of. Michelena himself proposed it based on the phonotactic distribution observed in Old Welsh (cf. Michelena 1977 [2011]: 330). Aspiration is strongest in stressed syllables in several languages —such as Swedish (Jessen 2001: 175) or American English (Hirose & Gay 1972: 147; Sawashima 1997: 71)— (Miller 2012: 127).

According to (Miller 2012: 127f.), acoustic intensity is a measure of loudness, which is a common correlate of stress (Gordon & Applebaum 2010: 35). Aerodynamic,

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44   Compare, for example, *Feribarren* and *Ferriete* in the *Livre d'or de Bayonne* (12th century) to *Gogahen* and *Beguheta* in the *Cartulary of San Millán* (year 952), bearing the same suffix. According to Michelena (1964 [2011b]: 30), *Gogahen* should have been written *Goiahen*.

45   There are only few exceptions involving derived words and compounding: *erakhutsi*[E] 'to show' (cf. *ikhusi*[E] 'to see'); *erakharri*[E] 'to bring, to attract' (cf. *ekharri*[E] 'bring'), etc. Zuberoan has aspirated stops in stressed syllables, which in modern Zuberoan may be after the second syllable: *aakhói* 'meat-eater', *arrathǘ* 'rat' (Std. Bsq. *arratoi*[LW]), *baanthálla* 'February' (Std. Bsq. *barantaila*[LW]), *boontháte* 'will' (Std. Bsq. *borondate*[LW]). Leiçarraga transcribed aspirated stops in the third syllable in some participles in an inconsistent way: <eyarthu> 'to wither, to dry' (cf. *eihartu*), <garaithu> 'to win, to defeat' (cf. *garhaitu*[E]), etc. (cf. Michelena 1977 [2011]: 177, footnote 28).

acoustic and EMG measurements by Ladefoged (1967) and Ladefoged and Loeb (2009) show a positive correlation between stress and increased subglottal pressure. In addition, Demolin (2007: 89) and Ohala (1990) showed that positively correlated subglottal pressure and intensity contours span multiple segments with aerodynamic and acoustic data (cf. Baer et al. 1976: 176). Given that subglottal pressure drops during the production of intervocalic [ɦ] and stop aspiration (Demolin 2007: 77f., Ohala and Ohala 1972, cf. Ladefoged 1967: 43), the end of the first foot of the word may have been linked to a drop in intensity —i.e., intensity dropped after the stress. Thus, the low intensity after the second syllable may have facilitated the domain-dependent loss of /H/.

4.4 /H/ in the modern language

I will discuss several features of the laryngeals in modern Basque: the dialects in which they are found, their phonotactic restrictions, sound patterns that have yielded to those phonotactic restrictions and the increasing loss of /h/ in the continental varieties.

4.4.1 Modern geographic distribution of laryngeals

/h/ is maintained today in the three northern dialects located in the area beyond the Pyrenees, while /h̃/ is maintained only in Zuberoan; all of these varieties are in French territory. However, /h/ does not have the same presence in all of these dialects: it increases significantly as one moves from western varieties to eastern varieties. /h/ is more frequent in Low Navarrese than it is in Lapurdian, to the same extent that the significance of /h/ in Zuberoan is much bigger than that of the same segment in Low Navarrese and Lapurdian. /h/ was being lost in the eastern varieties of the Lapurdian dialect in the 19th century and was already lost in the coast, as can be seen in Bonaparte's (1869 [1991]) dialectal descriptions.

Thus, it could be argued that Zuberoan is the only modern variety in which laryngeals do not show any critical trace of recession, as well as being the only dialect that maintains the distinction between an oral /h/ and a nasalized /h̃/ (see Hualde 1993b, 2003a; Igartua 2008 and Egurtzegi 2013a, 2013b, §4.3.1).

4.4.2 Phonotactics

Historic Basque shows a limited distribution of the aspirates: there are no laryngeals outside of prevocalic position and there is no real evidence to postulate a stage where aspirates were found in coda position.[46] /H/ can be found before any of the vowels (*hiri*[E] 'city', *heri*[LW] 'ill', *hari* 'thread', *hori*[E] 'yellow', *hura*[E] 'that one'). Although common, the pattern V₁HV₁ is not required (cf. *mihi*[E] 'tongue', *mehe*[E] 'thin', *ahal*[E] 'to be able to', *ohoin*[E] 'thief', *zuhur*[E] 'wise, prudent', etc.; but also *behi*[E] 'cow', *nahi*[E] 'to want', *aho*[E] 'mouth', *uhain*[E] 'otter', *lohi*[E] 'dirt', etc.).

Laryngeals do not form any kind of tautosyllabic consonant cluster in any reconstructable stage of the language. However, /h/ can appear —besides in initial and intervocalic position, including between a vowel and a diphthong— as the second member of heterosyllabic sonorant-/h/ clusters (cf. Lafon 1958 [1999]: 121), usually in bi-morphemic forms. The sonorants found in these clusters are /n/, /l/, /ɾ/, /r/, /ɲ/ and /ʎ/ (cf. Michelena 1977 [2011]: 167, Egurtzegi 2013a: 151). No cluster is found where the first segment is /m/, and none is formed by any other segment usually present in syllable codas —such as sibilants, for example (cf. Michelena 1977 [2011]: 168). Examples of the different contexts of /h/ are given in (4.8):

(4.8)   Phonological contexts of /h/

a)   Word-initially — #_V

Std. Bsq.	Trans.	Gloss
hori	[hoɾi]	'that (one)'
harri[E]	[hari]	'stone'
han[E]	[han]	'there'
haur[E]	[hau̯ɾ]	'child'
hau[E]	[hau̯]	'this (one)'
hain[E]	[hai̯ɲ]	'that (much)'

b)   Between vowels — V_V

Std. Bsq.	Trans.	Gloss
ahizpa[E]	[aɦis̺pa]	'sister (of a woman)'

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46 Nevertheless, there are compounds that may suggest that an aspirate developed from a word-final rhotic in the first member of the compound (see §4.5.2 below).

b)   **Between vowels — V_V**

Std. Bsq.	Trans.	Gloss
ehun[E]	[eɦun]	'hundred'
aho[E]	[aɦo]	'mouth'
eho[E]	[eɦo]	'to grind, to mill'
oihan[E]	[oi̯ɦan]	'forest'
aihotz[E]	[ai̯ɦots̺]	'sickle'

c)   **After a sonorant[47] — VR_V**

Std. Bsq.	Z Bsq.	Trans.	Gloss
senar[E]	*senhar*	[s̺enɦar]	'groom'
inurri	*üñhürri*	[yɲɦyri]	'ant'
ele	*elhe*[E]	[elɦe]	'word'
ilargi[E]	*illhargi*	[iʎɦarɣ̞i]	'moon'
urrats[E]	*urrhets*	[urɦets̺]	'step'
eri	*erhi*[E]	/erhi/	'finger'

The opposition between the two rhotic segments <r> /ɾ/ and <rr> /r/ being neutralized in coda position notwithstanding, the rhotic contrast was maintained before /h/ and has been contrastive in this position in Zuberoan[48] until very recent times (after the 18th century, according to Michelena 1977 [2011]: 270), when the contrasting rhotics were neutralized —in that context and elsewhere— after the systematic loss of the alveolar tap (see Egurtzegi 2013a: 141), which was completed in the 19th century.

Although the contrast between the laryngeals /h/ and /h̃/ was effective in all dialects in older stages of the language (Egurtzegi 2013a, §6.2, §6.5.1), minimal pairs are difficult to find. A modern minimal triplet can be found in Mod. Z *ehi* /ˈehi/ 'finger' (< Lit. Z *erhi*[E]) vs. *ehi* /ˈeh̃i/ 'easy' vs. Mod. Z *ei* /ei̯/ < Lit. Z *eri*[49] 'ill' (cf. Lafon 1958 [1999]).

In addition, /h/s in contact with a nasal consonant (or with a vowel adjacent to a

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47   Note that, unlike initial /h/s, post-consonantal /h/s present in the northern dialects are not reflected in the orthography of Modern Standard Basque (1970-). Palatal laterals and nasals are also not represented in the standard orthography (cf. §1.1).

48   Michelena (1977 [2011]: 167) mentions that Leiçarraga (Old Lapurdian dialect, 16th century) also shows a systematic differentiation between rhotics in this position. He writes *urrhets* 'step' or *urrhe* 'gold' (cf. Std. Bsq. *urrats*[E] [urats̺], *urre*[E] [ure]), but *orhe*[E] 'dough', *erhi*[E] 'finger', *bur-hezur*[E] 'skull' (cf. Std. Bsq. *buru* [buɾu] 'head', *burezur* [buɾes̺ur] 'skull'), etc.

49   This word has an initial /h-/ in Lapurdian *heri*[LW] (as well as in the donor Gascon) but /h/ does not appear in any Zuberoan author, neither old nor modern (Camino, p.c.).

nasal consonant), are assimilated to /h̃/, so that the two laryngeals do not contrast in these positions. This is shown by the examples in (4.9), taken from Larrasquet's (1939) glossary. Larrasquet does not use a specific symbol to transcribe the nasalization on the <h>, but transcribes it in the vowels surrounding it instead:

(4.9)   Assimilation of nasality of /H/ *in a nasalized context*

a)   N.H

Z	**Trans.**	**Gloss**
janhari[E]	[janh̃ai̯][50]	'food, nourishment'
senhar[E]	[s̺enh̃ar]	'husband'
sinhets[E]	[s̺iɲh̃ets̺]	'to believe'
ainhara	[ai̯ɲh̃aa]	'swallow' (cf. Std. Bsq. *enara*[E])
anhua	[anh̃ua]	'food portion, supply' (cf. Std. Bsq. *anoa*[LW])

b)   NV.H

Z	**Trans.**	**Gloss**
nahi[E]	[nah̃i]	'to want'
nahas	[nah̃as̺]	'to mix'
nihaur[E]	[nih̃au̯]	'me (intensive form)'
mihi[E]	[mih̃i]	'tongue'
mehe[E]	[meh̃e]	'thin'
mahats[E]	[mah̃ats̺]	'grape'

c)   .HVN

Z	**Trans.**	**Gloss**
arhan[E]	[ah̃an]	'plum'
arhin[E]	[ah̃in]	'light, not heavy'
ehun[E]	[eh̃un]	'hundred'
lehen[E]	[leh̃en]	'first'
uhuñ	[uh̃uɲ]	'thief' (Std. Bsq. *ohoin*[E])
ahamen	[ah̃amen]	'mouthful' (cf. *aho*[E] /aho/ 'mouth')
Johanne[LW]	[joh̃aɲe]	(personal name)

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50   Zuberoan lost /ɾ/ in the 19th century. More specifically, the generation born in 1840 was the last to produce the tap in Zuberoan (Camino, p.c.).

According to the transcriptions in Larrasquet (1939), the assimilations in (4.9a) and (4.9b) seem to be systematic. The assimilation in (4.9c) seems to be systematic as well though Larrasquet (1939) does not transcribe it in words such as *ahuntz*[E] 'goat' or *oihan*[E] 'forest'. Nevertheless, the words that Larrasquet does not transcribe as nasalized are probably nasalized as well: *ahuntz* is expected to have an etymological /h̃/, since it is found with the reconstructed intervocalic *n in the last name *Anuncibay* (*anunc-* > *ahuntz* 'goat', (*h*)*ibai*[E] 'river'). Larrasquet (1939) is not systematic in the transcription of nasality: he does not transcribe it in *ehun*[E] 'hundred' but he transcribes it in *ehunka* 'by hundreds', for instance.

While the segment /h̃/ cannot always be securely reconstructed, it seems clear that some of the words in (4.9) did not involve nasalized aspirates in an earlier stage of the language. Clear examples of /h/ being assimilated to /h̃/ instead of being the product of an intervocalic /n/ include Mod. Z *ahin* 'light' and Mod. Z *ahan* 'plum' —with a flap preceding the /H/ until two centuries ago, cf. Lit. Z *arhin*[E] and Lit. Z *arhan*[E]— as well as *Johanne*[LW] —a biblical name with a well-known etymology— and *ahamen* 'mouthful' —a word derived from *aho*[E] /aho/ 'mouth'— in (4.9c).

Of special interest is the series of intensive pronouns *nihau*(*r*) /ni'h̃au̯(ɾ)/ 'me myself', *ihau*(*r*)[E] /i'h̃au̯(ɾ)/ 'you yourself', *zihau*(*r*) /s̺i'h̃au̯(ɾ)/ 'you yourself (formal)', *gihau*(*r*)[E] /gi'h̃au̯(ɾ)/ 'we ourselves', etc. This series did not have an intervocalic -*n*- (cf. Lit. Z *haur*[E] and R *kaur*, which lack nasalization); it was derived from the addition of the determiner *haur* 'this' (Mod. Bsq. *hau*) to the series of personal pronouns (Michelena 1977 [2011]). Later, the /h/ in the first person singular form *nihaur* was assimilated to /h̃/, and the rest of the series took the segment from this form by analogy.

In addition to the mentioned phonotactic restrictions and their limited domain, one more restriction applies to aspirates /h, h̃/ and aspirated segments /p^h, t^h, c^h, k^h/ in the eastern dialects that maintain them today: a maximum of one aspirated segment occurs in each word, including both laryngeals and aspirated stops. The process that gave rise to it will be discussed in the next section.

4.4.3 Status of /h̃/ as a phoneme

In this dissertation, I have adopted the phonological analysis /Vh̃V/ (as first proposed by Hualde 1993b: 294f.) over the previous analysis /ṼhṼ/ (by Larrasquet 1932:

168 and subsequent works) for a sequence that is phonetically realized [Ṽ̰h̃Ṽ̰]. The preference for this analysis finds support in different observations.

First, the laryngeal that developed from intervocalic *n is produced with audible nasalization in modern Zuberoan. The vowels that surround [h̃] are nasalized as well, but so are any two vowels surrounding a nasal segment in Basque, as in *ona*[E] [õnã] 'the good' or *ama* [ãmã] 'mother' (Hualde 1993b: 294).

Second, if the vowels surrounding /h̃/ were to be considered contrastively nasalized, they would be the only unstressed contrastively nasalized vowels in modern Zuberoan. All (other) contrastively nasalized vowels in modern Zuberoan are in the stressed syllable of oxytones (Hualde 1993b: 295). Thus, the distribution of nasalized vowels in Zuberoan (cf. §6.2.1) points towards the /Vh̃V/ analysis.

I can add a third reason after the discussion in the previous section. In Zuberoan, /h/ is assimilated to /h̃/ in nasalized contexts (cf. §4.4.2). The /h̃/ in examples like *nihau(r)*[E] /ni'h̃au̯(ɾ)/ 'me myself' from *ni*[E] 'me' and *haur* 'this'; *Johanne*[LW] /jo'h̃aɲe/ 'John', with a know Biblical origin; Mod. Z *ahin* /a'h̃in/ 'light' and Mod. Z *ahan* /a'h̃an/ 'plum' < Lit. Z *arhin*[E] and Lit. Z *arhan*[E] can only be due to an assimilation of nasality; these instances of /h̃/ cannot come from an older intervocalic *n. Even more, /h̃/ has taken part in an analogical change which affected the intensive pronouns. The secondary /h̃/ in *nihau(r)* /ni'h̃au̯(ɾ)/ 'me myself' developed after an assimilation of nasality (cf. *hau(r)* /hau̯(ɾ)/ 'this'). Nevertheless, this segment spreads analogically to the rest of the paradigm, cf. *ihau(r)* /i'h̃au̯(ɾ)/ 'you yourself', *zihau(r)* /ʂi'h̃au̯(ɾ)/ 'you yourself (formal)', *gihau(r)* /gi'h̃au̯(ɾ)/ 'we ourselves', etc. The laryngeals in these forms do not have a source for their nasalization, yet they are nevertheless nasalized. These examples cannot be easily accounted for if we were to adopt the /ṼhṼ/ analysis, but can be straightforwardly analyzed as assimilations of nasality and analogies if /h̃/ were phonemic in Zuberoan. This is the case according to the account adopted in this dissertation.

4.4.4 Movement of /H/ by perceptual metathesis

In addition to the instances of /H/-loss after the second syllable discussed in §4.3.2, a large number of /H/s underwent metathesis. The loss of /H/ after the second syllable occurred due to an accentual shift (cf. §3.4.2) which limited the domain of /H/ to the first two syllables of the word. As a consequence of /H/s after the stress being phonotactically

ill-formed, many instances of this segment were reinterpreted in a phonotactically acceptable position (cf. Lakarra 2009a, 2009b, 2013b: §3.3; Egurtzegi 2011, 2013b). This occurred by means of a process of perceptual metathesis (see Blevins & Garrett 2004: 128ff.; cf. §8.2).

According to Ultan (1978: 395), there is a cross-linguistic bias towards reinterpreting segments that have become phonotactically unacceptable in their particular context in a new phonotactically acceptable (and usually prosodically prominent) position (cf. Egurtzegi 2011, 2013b). In this case, the phonotactically acceptable positions are limited to the onset of the first syllable and the onset of the second syllable. Both positions were prosodically prominent: the second syllable was systematically stressed in that stage of the pertinent dialects and the word-initial syllable is inherently prosodically strong. Any instance of /H/ following the stress was systematically lost (Michelena 1977 [2011]: 177; cf. example (4.7) in §4.3.2), provided it did not have any available position in which it could be reinterpreted, and underwent metathesis (Egurtzegi 2013a, 2013b).

We find documented evidence of this metathesis in examples such as modern *hibai*[E] 'river' and *harea*[LW] 'sand'. The first is attested as *ibahi* or *ubahi* in the Middle Ages, thus showing the laryngeal in its old position.[51] In the case of modern *harea* (< *areh̃a* < Lat. *arēna*) 'sand', which has been often analyzed as an example of addition of /h-/ by previous researchers, it shows an initial nasal vowel whose presence is illuminating. It can be seen in the form *ãrea* [ãɾea] from the Roncalese dialect, which enables the inference of a previous nasal context (see §6.2.2 on Roncalese vowel nasalization).

Examples of this metathesis include the ones involving intervocalic /h̃/ from older /n/ (cf. §4.2.3) in the third syllable as depicted in (4.10a) with loanwords from Latin as well as examples of /h/ with no evident nasalization as in (4.10b-c).

(4.10)   *Metathesis of* /h/

a)	**Lat.**			**Mod. Bsq.**	**Trans.**	**Gloss**
	arēna	> *areh̃a*	>	*harea*[LW]	/haɾea/	'sand'
	leōnem	> *leoh̃e*	>	*lehoi*[LW]	/lehoi̯/	'lion'
	Asenārius	> *azeh̃ari*	>	(*h*)*azeri*[LW]	/has̻eɾi/	'fox'

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51   Cf. *Sagibahia* in the Becerro Galicano from San Millán de la Cogolla dating from 1128 (Manterola, p.c.) or the toponym from La Rioja *Murubai*, written as *Muruvahy* in 1251 (Aznar Martínez 2009).

b)	**Med. Bsq.**		**Mod. Bsq.**	**Trans.**	**Gloss**
	ibahi	>	*hibai*[E]	/hibai̯/	'river'

c)	**Mod. Bsq.**		**Cl. L**	**Trans.**	**Gloss**
	loak hartu[E]	>	*lohakartu*[E]	/lohakartu/	'to get asleep' (lit. 'sleep-take')

Whenever no metathesis occurred —as in the cases depicted in (4.7), where no metathesis is possible due to the lack of an empty place to metathesize to— laryngeals in the third syllable (or later in the word) were simply lost (cf. Michelena 1950 [2011a]: 18f., 1977 [2011]: 177). This process will be further discussed in §8.2.1 and other cases of perceptual metathesis will be discussed through §8.2.

This sound pattern may be viewed as a case of preservation of the phonotactic structure or structural analogy[52] (Blevins 2004: 153ff., 2009). In the case of metathesis, pre-existing phonotactics can prime reanalysis of ambiguous strings (Blevins 2004: 155).

In addition to the metatheses affecting /H/ in the third or a latter syllable, there are other processes of metathesis, which may be more recent, that moved /h/ from the first syllable to the second or vice-versa. Examples of these include Bsq. *aihotz*[E] > Cl. L *haiotz* (Axular 1643 [1976]) 'machete', *auhen*[E] > *haben* 'lament', *hezur*[E] 'bone' (< **enazur*, cf. Arbelaiz 1978), *onherran*[E] 'to laud, bless, benediction' (*hon+erran* 'good-say'), *onheritzi*[E] 'to love, approval' (*hon+eritzi* 'good-deem'), etc.

Parallels to this kind of metathesis can be found in the literature. In Korlai Creole Portuguese (or Kristi language), all rhotic trills became post-aspirated. Nevertheless, whenever the rhotic was in medial position, the aspiration or spread glottis feature metathesized to the word-initial syllable, either as a feature or segmentalizing as a /h/. This is shown in example (4.11) from Clements (1996: 75, 79; cf. Hualde 2006b):

(4.11) Rhotic trill aspiration in Korlai Creole Portuguese (Clements 1996: 75, 79)

a) **Aspiration of word-initial /r/**

Por.	Kor. Cr. Por.	Gloss
rei	*rhe*	'king'
rabo	*rhab*	'tail'

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52 "In the course of language acquisition, the existence of a phonological contrast between A and B will result in more instances of sound change involving shifts of ambiguous elements to A or B than if no contrast between A and B existed." (Blevins 2004: 154).

a)   Aspiration of word-initial /r/

Por.	Kor. Cr. Por.	Gloss
rede	*rhed*	'net'
rezar	*rhedza*	'pray'
romper	*rhupe*	'break'

b)   Metathesis of /h/ to word-initial position

Por.	Kor. Cr. Por.	Gloss
arroz	*haro*	'rice'
correr	*khure*	'run'
burro	*bhur*	'donkey'
barriga	*bharig*	'belly'
morre	*mhure*	'die'

The examples in (4.11b) are especially interesting, since they involve the metathesis of /h/ to the first syllable, which may be seen as a parallel of the metathesis found in eastern Basque in addition to being a parallel of the domain-dependent loss of /h/. In both eastern Basque and Korlai Creole, /h/ is not only maintained in the first syllable or first two syllables of the word, it is even moved there.

However, as Hualde (2006b) clarifies by citing Clements (1996: 88), the stress in Korlai Creole Portuguese falls in the final syllable of the word except in trisyllabic words with open final syllable, which are paroxitonic. The preference for the word-initial syllable is not due to chance, but rather to a bias towards reinterpreting metathesized segments in a prosodically prominent position (cf. Blevins & Garrett 2004), given the cross-linguistic prosodic prominence inherent to the beginning of the word (cf. Barnes 2006: §4). Thus, the link between aspiration and stress should probably be defined as a link between prosodic prominence and stress instead.

4.4.5 Dissimilation of aspirates

In addition to the already mentioned accentual shift (cf. §3.4.2) and the domain it created (§4.3.2), there is yet another diachronic process that has also notably conditioned the phonotactic pattern that aspirates show in present times. This is the dissimilation of

aspirates (cf. Michelena 1977 [2011]: 174; Lafon 1948: 56f.), similar to that referred to as Grassmann's Law in Indo-European linguistics (Grassmann 1863). This process involves the deletion of any aspirate followed by another aspirate within the phonological word: /H/ > /Ø/ /_V(R)HV(C) (cf. Michelena 1977 [2011]: 174). Examples of this process in compounds involving the word *hil* 'dead, to die' are given in (4.12):

(4.12) Grassmann's Law in compounds

1ˢᵗ member		2ⁿᵈ member		Compound	Trans.	Gloss
hil	'dead'	*herri*	'town'	*ilherri*	/ilheri/	'graveyard'
hil	'dead'	*hotz*	'cold'	*ilhotz*	/ilhots̪/	'corpse'
hil	'dead'	*haur*ᴱ	'child'	*ilhaur*	/ilhau̯r/	'stillbirth'
hil	'dead'	*hots*	'sound'	*ilhots*	/ilhots̪/	'elegy'

In addition, a not very different restriction affects aspirated stops. In Latin loanwords with onset voiceless stops in the first two syllables, the first stop is systematically aspirated while the second never carries aspiration (cf. Michelena 1977 [2011]). MacEachern (1999: 28) looked for counter-examples to this restriction against Larrasquet (1939) and found that "in all entries involving both a voiceless aspirated and a voiceless unaspirated stop, the aspirated stop precedes the unaspirated stop". Examples of this restriction are given in (4.13):

(4.13) Distribution of aspirated stops in TVTV Latin loans

Lat.	Bsq.	Trans.	Gloss
pĭper	*phiper*ᴸᵂ	/pʰiper/	'pepper'
pĭcem	*phike*	/pʰike/	'fish' (Std. Bsq. *bike*ᴸᵂ)
thēca	*theka*	/tʰeka/	'pod' (Std. Bsq. *leka*ᴸᵂ)
catēna	*khatea*ᴸᵂ	/kʰatea/	'chain'
parcĕre	*pharkatu*	/pʰarkatu/	'to forgive' (Std. Bsq. *barkatu*ᴸᵂ)

The distribution of aspirated stops is the opposite to what would be expected if they were affected by Grassmann's Law as described in (4.12), so that the process affecting a sequence of laryngeals and that affecting aspirated stops do not need to be coetaneous. In addition, aspirated stops do not co-occur with /H/ (cf. Lafon 1958 [1999]): in Zuberoan

words such as *trahel* 'person with crippled legs' and *kehela* 'screen, lattice-work door', the initial stop is unaspirated (Hualde 1993b; MacEachern 1999: 26).

The sound patterns in (4.12-13) are usually related to that found in Sanskrit and Ancient Greek, which consists in deaspirating an aspirated stop when followed by another aspirated stop, although it also affects /h/ (< *s) in Ancient Greek. In Sanskrit, laryngeal restrictions operate at the root level (MacEachern 1999: 28). Example (4.14) shows Sanskrit roots with their perfect forms:

(4.14) *Grassmann's Law in Sanskrit* (Anderson 1970)

Root	**Recons.**	**Perfect**	**Gloss**
p^hal	*p^hap^hala	pap^hala	'burst'
$ɖ^hauk$	*$ɖ^huɖ^hauka$	$ɖuɖ^hauka$	'approach'

Laryngeal co-occurrence restrictions are typologically common (MacEachern 1999). Other non-Indo-European languages with this restriction include Quechua, which does not allow more than one aspirated (or glottalized) stop within a word, the Siouan language Ofo (de Reuse 1981; Jacques 2011) and Kashaya. In Quechua, whenever two stops are susceptible to being aspirated/glottalized, it is always the first one that carries the feature (cf. Landerman 1994; Igartua 2002: 370). In the extinct Siouan language Ofo, it is the second obstruent that maintains the aspiration. A similar sound pattern is found in the Pomoan language Kashaya (or Southwestern Pomo). Examples in (4.15) are taken from Buckley (1994: 83):

(4.15) *Grassmann's Law in Kashaya* (Buckley 1994: 83)

a)	p^hi-^hmi-w	*pihmíw*	'see in detail'
	p^hu-$^hc^ha$-w	*puhc^{h}áw*	'blow over'
	p^ha-hol-$ʔ$	*pahól'*	'look for an unseen object with end of a stick'
	c^hi-$c^ha·$-w	*cic^{h}áw*	'grasp with handled instrument'

b)	k^hi-k^hi	*kik^{h}i*	'gill cover'
	$t^he·$-t^he-n'	*te·t^{h}én'*	'my mother'

In Kashaya, this rule applies after prefixation (4.15a) and in cases of reduplication

(4.15b). It dissimilates the aspiration of stops preceding an aspirate, but it does not dissimilate segmental /h/.

Hence, this development entails that no modern Basque word has more than a single aspirate/aspirated stop, a situation that significantly contrasts with the phonotactics of the stage of the language shown by the medieval documentation found in the *Cartulary of San Millán* (vide §4.3.1 supra) as well as in Aquitanian (cf. Gorrochategui 1984). This dissimilation may have occurred more than once during the history of the language (cf. Ariztimuño 2011).

4.4.6 Loss of /h/ in the modern eastern Basque dialects

Laryngeals are in clear recession in modern Lapurdian varieties. Coastal Lapurdian lost /h/ in the 19th century, and this loss is currently spreading southwards. Some authors (cf. Igartua 2001: 200f. and 2011: 904f.) have linked the loss of /h/ to the weakening of stress. Under these accounts, its preservation in modern Zuberoan is associated with the strong stress that this dialect possesses in the penultimate syllable —most of its words are paroxytones.

In recent research by Jauregi and Epelde (2013), based on the *Norantz* database (Iker 2009, cf. Oyharçabal et al. 2011, 2012), 74% of the speakers older than 70 years produced word-initial /h-/, while only 31% of the younger population —many of them native speakers of French— produced /h/ in this position (Jauregi & Epelde 2013: 252). The percentages of the production of aspirates in medial position are even lower: 53% of the older speakers and only 21% of the younger speakers produced /-h-/ in the survey (Jauregi & Epelde 2013: 254).

The loss of /h/ in the modern eastern varieties has been attributed to the contact with French or the influence of western Standard Basque, which lacks this segment (Jauregi & Epelde 2013: 258f.). However, Jauregi and Epelde also point out that, as /h/-loss is a common sound pattern, it may have developed independently as well.

Given the observation by Jauregi and Epelde (2013) of the low frequency of production of intervocalic /h/ in comparison to that of word-initial /h/, a potential path for this loss may be proposed. The loss of intervocalic /h/ hardly needs phonetic explanation; nevertheless several details of this process in Basque can be highlighted. These would involve the continued production of /VhV/ sequences as a breathy-voiced hiatus [V̤.V̤],

with no clear segmental source. This breathy-voiced vowel sequence would have been reinterpreted as a hiatus with no specified laryngeal configuration and merge with any other hiatus, i.e., /VhV/ > [VɦV] > [V̤.V̤] > /V.V/. The breathy-voiced production of a /V.hV/ sequence is very common in connected speech and it was common in the data from our survey (cf. §4.6).

In general, /h/-loss is expected first in intervocalic position, and only later in word-initial position. While word-initial /#h-/ is salient, intervocalic V[ɦ]V has a much lower perceptual saliency.

4.5 Other instances of /h/

In addition to *h and the instances of /H/ derived from another segment within the language, there are some /h/s that arose without an etymological justification, some that may be analyzed either as a consequence of analogy or as originating from a phonological process and some that entered the language in borrowings. All these instances will be discussed in this section.

4.5.1 Non-etymological /h/

In addition to the aforementioned processes, there is a small number of words, mostly borrowings, that show a non-etymological laryngeal. These borrowings are Romance loans whose modern Basque form shows an adventitious /h/ absent from the original form in the donor language. This /h/ is usually added word initially, with few examples of post-consonantal word-intermediate addition. Examples (most of them taken from Igartua 2011: 907) of this parasitic /h/ include the following words in (4.16):

(4.16)   *Non-etymological* /h/ *in Latin and Romance loanwords*

a)   /h-/ (Igartua 2011: 907)

Bsq.	Trans.	Lat./Gsc.	Gloss
harma[LW]	/harma/	Lat. *arma*	'weapon'
hezkabia[LW]	/hes̺kabja/	Lat. *scăbie*(*m*)	'ringworm'
harrapatu[LW]	/harapatu/	Gsc. *arrapar*	'to capture'
harroka[LW]	/haroka/	Gsc. *arròca*	'rock'

a)   /h-/ (Igartua 2011: 907)

Bsq.	Trans.	Lat./Gsc.	Gloss
hira[LW]	/hiɾa/	Lat. *īra*	'wrath'
haizkora[LW]	/haiʂkoɾa/	Lat. *asciola*	'ax'
hauzu[LW]	/hauʂu/	Lat. *ausus* (*sum*)	'allowed'
(*arima*) *herratü*[LW]	/heraty/	Lat. *errāre*	'lost soul'

b)   /-h-/

Z Bsq.	Trans.	Gsc.	Gloss
uñhu[LW]	/uɲ'hu/	*onhon*	'onion'
mañhatü[LW]	/maɲ'haty/	*baigner*	'to bath'

Explanations for most of the non-etymological /h-/s in (4.16a) have already been proposed by different authors. Michelena (1977 [2011]: 172, footnote 10) proposed that the crossing between *arroka* 'rock' and *harri*[E] 'stone' gave rise to the modern form *harroka*[LW], and that the /h-/ in *hezkabia*[LW] 'ringworm' was due to a crossing with *hatz* 'pruritus, scabies'. The initial /h-/ in *harma*[LW] 'weapon' has been proposed by Segurola in the *Historical Etymological Basque Dictionary* (*EHHE*, Lakarra et al. in prep.) to be due to a metathesis in the usual idiom *harmak hartu* 'take arms', similar to the examples in §4.4.4 and §8.2.1 but with the metathesized segment moving over the word boundary, cf. *lohakartu*[E] from *loak hartu* 'to get asleep'.[53] Lakarra (2014) has proposed the /h-/ in *herratü* 'lost' to come from a blending with *herratü*[LW] 'to shoe (a horse)'.

This addition of a word-initial laryngeal would be far from unknown at a typological level. Blevins (2008: 87) explains that regular laryngeal epenthesis typically occurs at prosodic boundaries —such as at the beginning or the end of the word—, given that it originates from the glottal pulses in the tonal curves that delimit word boundaries. These kinds of sound patterns include the systematic prothesis of /h/ before *ypsilon* in Greek or that of a glottal stop in Germanic languages, as in English or in the case of the German *Knacklaut*, which is also systematic (Blevins 2008; Igartua 2011: 908).

On the other hand, the addition of these segments after a sonorant would not be so common, as well as the examples offered in the literature being of very suspicious nature

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53   Metatheses across word-boundaries are not usual. Nevertheless, some are attested in words that are produced together in a higher than chance frequency. One such example is J-Sp. *par amodre de* (cf. Std. Sp. *por amor de*) 'for the love of', which is almost only used in the idiom 'for the love of God'.

and, occasionally, even etymological: the /h/ in *anhoa*[LW] /anhoa/ 'food portion, supply' could possibly be etymological if a metathesis is proposed (Lat. *annōna* > **annõh̃a*[54] > **anõh̃a* > *anhoa*), as in other "usual suspects" such as *onherran*[E] /onheran/ 'to laud, to bless, benediction' and *onheritzi*[E] /onheriţşi/ 'to love, approval', both compounds of *hon* /hon/ 'good' (cf. Lakarra 2009a, see §8.2.1 for more examples). Some other examples of /H/-addition are rather difficult to argue against: such is the case of Z *mañhatü*[LW] (< Brn. Gsc. *banhar*) 'to bath' and *uñhu*[LW] (cf. Brn. Gsc. *onhon*) 'onion' in (4.16b), both involving an addition after a palatal, interestingly.

4.5.2 Development of /h/ in compounds

In seemingly old processes of compounding, whenever the first member was a rhotic-final monosyllable, usually a tap —although not necessarily, cf. /lur/ 'ground, soil', *lühidorrez*[E] [lyhiđoreş] 'by land (*terra firma*)'—,[55] the final rhotic becomes /h/ (apud Lakarra 2009a: 585, footnote 64 and 2014: §3.1; see also Igartua 2006 for a different view). This /h/ is maintained if the second member of the compound begins with a vowel, but lost otherwise. Examples of this process include these in (4.17), compiled from Michelena and Sarasola (1987-2005):

(4.17)   /-ɾ/ > /h/ *in the first member of a compound*

1st member		Gloss	Compound	Trans.	Gloss
hur[E]	/huɾ/	'water'	*uharte*[E]	/uharte/	'island'
hur	/huɾ/	'water'	*uhalde*[E]	/uhalde/	'shore'
hur	/huɾ/	'water'	*uholde*[E]	/uholde/	'flood'
zur	/şuɾ/	'wood'	*zuhaitz*[E]	/şuhai̯ţş/	'tree'
zur	/şuɾ/	'wood'	*zuhar*[E]	/şuhar/	'barrel'
zur	/şuɾ/	'wood'	*zuhauts*	/şuhau̯ţş/	'wood dust'
hor	/hoɾ/	'dog'	*ohalano*[E]	/ohalano/	'Spanish bulldog, mastiff'
hor	/hoɾ/	'dog'	*ohara*[E]	/ohaɾa/	'female dog in heat'
hor	/hoɾ/	'dog'	*ohildu*[E]	/ohildu/	'to howl, shoo'
lur[E]	/lur/	'ground'	*luhikara*[E]	/luhikaɾa/	'earthquake'

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54   Both the evolution of Lat. /n/ to Bsq. /ñ̃/ (§4.2.3) as well as the (later) Lat. /nn/ to Bsq. /n/ are regular in intervocalic position.

55   Many word-final rhotics were /ɾ/ at an earlier stage (compare *bihar*[E] /bihar/ 'tomorrow' to *biharamun*[E] /bihaɾamun/ 'the day after', for instance).

1ˢᵗ member	Gloss	Compound	Trans.	Gloss
lur /lur/	'ground'	*luhartz*[E]	/luharʦ̺/	'European mole cricket'
lur /lur/	'ground'	*luhesi*[E]	/luheʂ̺i/	'soil wall'

Though the second member of some compounds in (4.17) are V-initial, in other cases the second member of the compound begins with /h/: compare *arte*[E] 'between', *alde*[E] 'place', *alano* 'Spanish bulldog', *ikara*[E] 'trembling, fear' to *haitz*[E] 'rock', *hauts* 'dust', *hartz*[E] 'bear' or *hesi*[E] 'fence'. In other cases, the second member of the compound is obscure.

The final rhotic leaves no obvious trace in the cases where the second member of the compound begins with a consonant as in the examples in (4.18), also compiled from Michelena and Sarasola (1987-2005):

(4.18)   Loss of word-final rhotics in compounds

1ˢᵗ member	Gloss	Compound	Trans.	Gloss
hur[E] /huɾ/	'water'	*ubi*[E]	/ubi/	'ford'
hur /huɾ/	'water'	*ubarroi*[E]	/ubaroi̯/	'cormorant'
zur /s̺uɾ/	'wood'	*zutabe*[E]	/s̺utabe/	'pole, column'
zur /s̺uɾ/	'wood'	*zubi*[E]	/s̺ubi/	'bridge'
hor /hoɾ/	'dog'	*ozar*[E]	/os̺ar/	'big dog'
lur[E] /lur/	'ground'	*ludardara*[E]	/ludardaɾa/	'earthquake'
lur /lur/	'ground'	*lugorri*[E]	/lugori/	'red soil (uncultivated)'

From the /-r, -ɾ/ > /-h/ perspective, the loss of final *-r* implies an intermediate phase with a coda /h/, given that a rhotic would be maintained in this position —adapted by being neutralized to the trill. In contrast, a laryngeal would have a great instability in syllable coda if it ever was in that position, given that no documented stage of the language possesses preconsonantal laryngeals.

Since this process occurred only in coda —given that it appears in word-final position of the first member of a compound— and since, as has already been mentioned, no instance of coda /h/ is known in any attested state of the language, the laryngeals developed from a final rhotic maintained until modern times must necessarily have resyllabified and be currently located in intervocalic position. Thus, the monosyllabic

nature of the first component of the compound is necessary if the /h/ were to be maintained until present times. Given that the final segment of the first word would be resyllabified to the onset of the next syllable (i.e., the second) and that no /H/ can occur beyond that domain in the modern dialects, this is the only position where /r, ɾ/ > /h/ could be observed. Nevertheless, it is worth mentioning that no instance of rhotic loss is found in disyllabic words ending in such segments, which would be the expected result if this process occurred in all kind of words, given that no /h/ is maintained in these positions.

Igartua (2006) proposed a different analysis for this set of words. According to his account, all final rhotics were lost in these kinds of examples (and not only the instances found in syllable codas as proposed above) and the modern /h/s were nothing else than the initial segment of the second member of the compound, which Lakarra (2014) described as vocalic. Igartua (2006: 520) argues that this /h/ cannot be considered the outcome of a phonetic evolution but that of a morphophonological process, given that it does not occur in any context other than composition.[56]

4.5.3 Loss of intervocalic [β, ð̞, γ] and /ɾ/ in Low Navarrese

A final recent development that gave rise to a laryngeal occurred in Low Navarrese dialects and some neighboring Lapurdian varieties during the 19th century (cf. Camino 2013: 74). As shown by example (4.19), many intervocalic taps and approximants were lost in these varieties. Examples in (4.19) are taken from fieldwork recordings by Camino (2004: 466, 2013: 74):

(4.19) Loss of intervocalic [β, ð̞, γ] *and* /ɾ/ *in Low Navarrese* (Camino 2004: 466, 2013: 74)

a)   Loss of intervocalic approximants

LN	Std. Bsq.	Trans.	Gloss
ilunaar	*ilunabar*	[iʎunaβar]	'dusk, twilight'
iiltzeko	*ibiltzeko*	[iβ̞iltʂeko]	'in order to walk'
iakoitz[E]	*ebiakoitz*	[eβ̞iakoi̯tʂ]	'Saturday'
eatsi	*ebatsi*[E]	[eβ̞atʂi]	'to steal'

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56 Nonetheless, morphophonological processes may originate in phonetic developments and, although they may be scarce, there are typological parallels for this sound pattern, such as the case of /r/ > /x/ > /h/ in southern Portuguese and Brazilian Portuguese (Hurch 1988: 87), the trill being the affected segment in this sound change.

iraazten	*irabazten*	[iɾaβ̞aʂten]	'winning'
zaalik	*zabalik*[E]	[ʂaβ̞alik]	'open'
gasnateia	*gasnategia*	[gaz̪nateɣ̞ia]	'place to keep cheese'
ene ostuko	*ene gustuko*	[eneɣ̞uʂtuko]	'for my taste'

b)   Loss of intervocalic flaps:

LN	Std. Bsq.	Trans.	Gloss
bihaamun	*biharamun*[E]	[biɦaɾamun]	'the day after'
baatze	*baratze*[LW]	[baɾatʂe]	'(vegetable) garden'
bedeazka	*bederazka*	[beð̞eɾaʂka]	'one by one'
hua	*hura*[E]	[huɾa]	'that (one)'
eeman	*eraman*[E]	[eɾaman]	'to carry'
buu	*buru*	[buɾu]	'head'
khuutze	*gurutze*[LW]	[guɾutʂe]	'cross'
iduitu	*iduritu*	[ið̞uɾitu]	'to think, figure' (*iduri*, *irudi*[E] 'picture')

As shown by the examples *iraazten < irabazten* 'winning' and *iduitu < iduritu* 'to think, to figure', not all flaps or approximants were necessarily dropped. In addition, in some words that were affected by this process, an added /h/ [ɦ] is found instead of the previous [β̞, ð̞, ɣ̞] and /ɾ/. Some of these cases include the examples in (4.20), also taken from field recordings by Camino (2004: 466, 2013: 74):[57]

(4.20)   Addition of intervocalic /h/ in Low Navarrese (Camino 2004: 466, 2013: 74)

LN	Std. Bsq.	Trans.	Gloss
ehatsi	*ebatsi*[E]	[eβ̞atʂi]	'to steal'
zahal	*zabal*[E]	[ʂaβ̞al]	'wide, open'
gihiletik	*gibel*[E]-*etik*	[giβ̞eletik]	'from behind'
gihilka	*gibelka*	[giβ̞elka]	'backwards'
ihiltzian	*ibiltzean*	[iβ̞iltʂean]	'while walking'
zeharri	*zedarri*[E]	[ʂeð̞ari]	'boundary marker, milestone'
pohore	*botere*[LW]	[boteɾe]	'power' (cf. *podore* [poð̞oɾe])
bahatzetan	*baratze*[LW]-*tan*	[baɾatʂetan]	'in the gardens'
gahitu	*garaitu*[E]	[gaɾai̯tu]	'to win'

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57   Some of the examples in (4.20) also appear in Epelde (2003: 293).

LN	Std. Bsq.	Trans.	Gloss
behezi	*bere(i)zi*[E]	[beɾei̯ʂi]	'to separate, discern'
ihetsi	*ire(n)tsi*[E]	[iɾen̪t̠s̠i]	'to swallow'
zihikota	*zirikota*	[ʂiɾikota]	'the cheese whey'
behotü	*berotu*	[beɾotu]	'to heat up'
ohia	*orea*[E]	[oɾea]	'the dough'[58]
ahinki	*arinki*[E]	[aɾiŋki]	'quickly'

Two different explanations may be proposed for this process. First, [β̞, ð̞, ɣ̞, ɾ] may have become /h/ before being dropped in Low Navarrese, and only some of these /h/s have been maintained until now. Second, [β̞, ð̞, ɣ̞, ɾ] may have been lost in intervocalic context and non-etymological /h/s may have arisen as a means of hiatus breaking. The latter possibility seems preferable for multiple reasons. First, [β̞, ð̞, ɣ̞, ɾ] tend to drop in the whole Basque Country —as well as in Spain—, and they don't become /h/ in any other place. Second, of the three approximants [β̞, ð̞, ɣ̞], only the velar is subject to being reinterpreted as /h/.[59] Third, Low Navarrese possesses /h/ as a contrastive segment intervocalically. Thus, /h/-loss (< [β̞, ð̞, ɣ̞, ɾ]) is not expected in this phonological context without affecting the instances of *h.

In short, we can analyze the examples in (4.19) as instances of intervocalic loss of [β̞, ð̞, ɣ̞, ɾ], similar to those found in most Basque dialects, and the examples in (4.20) as sporadic insertion of /h/ as a hiatus-breaker. The presence of /h/ in the dialect has made it possible to use this segment over others used in other dialects, such as [ɣ̞] in Bizkaian, a sound pattern developed after the loss of /H/ in that dialect.

4.5.4 Borrowed /h/: Lat./Rom. /f-/ : Bsq. /h-/

There is a reduced number of /h/s present in Romance loanwords whose Latin equivalents have /f/ instead. Examples of this set of words include these in (4.21):

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58 In the case of *ohia* 'the dough' and *ahinki* 'quickly', the /h/ can also be treated as etymological by considering the older /rh/ cluster to have been simplified by a loss of the rhotic, cf. the more conservative variants *orhea*[E] and *arhinki*[E] after the loss of the possibility that the /h/ following the sonorant was lost first and a second /h/ was developed from the then intervocalic flap cannot be discarded, but seems rather expensive. Similar cases include *ahan* < *arhan*[E] 'prune', *ehia* < *erhia*[E] 'the finger' and *ohoitzen* < *orhoitzen*[E] 'remembering'.

59 For the perceptual similarity between /ɣ/ and /h/, see the case of /h/ > /ɣ/ in the Yurok intensive infix *-eɣ-* reported by Garrett (2001).

(4.21) *Word-initial* /h-/ *from Rom.* /f-/

Bsq.	Trans.	Lat.	Gloss
horma[LW]	/horma/	*fõrma*	'wall'
haro[LW]	/haɾo/	*phăru*(*m*)	'lighthouse'
haxe[LW]	/haʃe/	*fasce*(*m*)	'beam'
hiru(*n*)[LW]	/hiɾun/	*fīlu*(*m*)	'spin'
holla[LW]	/hoʎa/	*folia*(*m*)	'leaf' (cf. Old Gsc. *holha*)

Lakarra (2009a: 581f., 2014: 11) proposes additional examples of Rom. /f/ : Bsq. /h/ with /h/ in medial position instead of word-initially: Gasc. *afodz* > **ahotz* > Bsq. *aihotz*[E] /ai̯hot͜s/ 'sickle', Gasc. *afenà* > **ahen* > Bsq. *aihen*[E] /ai̯hen/ 'vine', etc. Although **f* > /h/ has been invoked more than once to sustain a Basque substrate in Spanish (cf. Menéndez Pidal 1964: 198ff.; Penny 1991: 79, 2006: 113), there is no evidence of this kind of sound pattern in the inherited vocabulary. As a matter of fact, /f/ > /h/ is likely to have been developed in a neighboring Romance language, before the borrowing of these words into Basque occurred.

Among the Romance languages in (possible) contact with Basque, two different treatments are described for word-initial Latin /f-/ in Igartua (2011: 898): this segment is maintained in Occitan, Catalan, Aragonese and French, while it becomes /h-/ in Spanish and in Gascon, both languages which were (and are) in contact with the occidental and oriental areas of the Basque Country, respectively. Thus, loanwords that were not possibly taken from Spanish —due to their dialectal distribution within Basque (as *aihen* and *aihotz* supra) or their absence from this language— must necessarily be borrowings from Gascon and these not taken from Gascon should have been borrowed from Spanish. Lakarra (2014) finds many examples of this sound pattern in Romance words introduced into Basque via Gascon, and proposes that Lat. /f/ appear as a labial stop in Basque, while Rom. /f/ (> /h/) is continued by Bsq. /h/.

The debuccalization of labial fricatives /ɸ, f/ > /h/ is cross-linguistically well attested: it occurs in some Romance languages (Spanish, Gascon, Sardinian, Italian dialects, etc.), Faliscan, Etruscan, Creek, some Bantu languages, Japanese, Mongol, Even, some Salishan dialects, Armenian and probably in Dravidian languages (Merlingen 1977: 201ff.).

4.6 Acoustics of the laryngeals

In Egurtzegi (2013b), different kinds of laryngeals from the Zuberoan dialect were analyzed according to the position in the word where they were produced as well as to the historical origin of the segment in each particular case. In the following section, spectrograms and waveforms from the mentioned survey[60] will be reproduced and commented on.

4.6.1 Intervocalic nasalized /h̃/

Nasalized laryngeals are not easy to discern in a spectrogram: it may be the case that there are nasal anti-resonances —i.e. zeros— and a nasal pseudo-formant may also appear in the adjacent vowels, but it may also not be the case. As a consequence, these features are not always easy to distinguish. Voicing, on the other hand, is easier to measure: its characteristic intensity in the lower frequencies and the sinusoidal component of the glottal pulses make the discernment between voiced and voiceless fricatives easier. Nasalized /h̃/ is expected to be voiced in all its productions, which means [ɦ̃] —and not [h̃] — will be consistently produced. Thus, intervocalic (oral) laryngeals —i.e., [ɦ]— are similar to intervocalic nasalized laryngeals —i.e., [ɦ̃]— except for the nasalization present only in the latter.

Figure 4.1 exemplifies the nasalized [ɦ̃] in the word *ihitz*[E] [ĩ̥ɦ̃ĩ̥ts̪] 'dew, frost'. In addition to the characteristic first and second formants of [i], which are respectively located around approximately 500 Hz and 2300 Hz —canonically, for masculine voices—, the spectrogram shows an intervening pseudo-formant with a frequency of around 1000 Hz. This formant, as was already mentioned, may appear in nasalized segments, but is not the best phonetic cue to observe nasalization. The uninterrupted pitch curve shown in the spectrogram, only interrupted by the final affricate, denotes the presence of voicing in the rest of the word.

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60   The recordings used for Egurtzegi (2013b) included more than a thousand instances of /H/ recorded from more than 20 Zuberoan speakers from different varieties of the dialect. Most of these recordings are included in Oyharçabal (1999) and Santazilia (in prep.). For more precise information on how the audio files were recorded and analyzed see Egurtzegi (2013b: 159f.).

Figure 4.1: Spectrogram of ihitz [ĩ̆h̃ĩts̪] *'dew, frost'.*

Although intensity and pitch are notably higher in the second vowel —observe the darker formants between 0.3 and 0.35 seconds and the rise in the pitch line—,[61] the spectrogram does not show a clear consonantal segment between the two vowels, so that looking at the waveform may be a better means to establish frontiers between these segments.

Regarding the waveform in Figure 4.2, which has been zoomed to show only the production of the two [i]s —i.e., [ĩh̃ĩ]—, it shows an aperiodic component in the wave, which may be attributed to the influence of the laryngeal, even from the beginning of the word. Although the precise moment when [h̃] is produced is difficult to delimit, the variability shown by the wave strongly suggests its presence. The main trace of [h̃] in Figure 4.1 is the amplitude fall, which points to a consonantal element different to the vowels surrounding it.

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61   Although the stress is expected to fall on the first vowel, it is on the second one in this particular production of the word.

Figure 4.2: Waveform of the beginning of ihitz, [ı̃h̃ı̃].

In order to determine the presence of nasalization in the laryngeal, further evidence can be obtained from spectral slices of the segment under analysis. If a segment is nasal or nasalized, the spectral slice should show zeros due to nasal anti-resonances. Figure 4.3 shows a spectral slice of the production of *ihitz* [ı̃ˈh̃ı̃ts̺] 'dew, frost' in Figure 4.1, taken during the production of the [h̃], more precisely in the second 0.27394. In Figure 4.3, the sudden downfalls of the sound pressure level show that the laryngeal in [ı̃ˈh̃ı̃ts̺] is nasalized.

Figure 4.3: Spectral slice of the [h̃] *in ihitz* [ı̃ˈh̃ı̃ts̺] *'dew, frost'.*

The intervocalic /h/ that potentially developed from a rhotic also shows voicing: in all the cases I analyzed the /h/ is clearly voiced [ɦ]. This is not surprising, since this is the case for (almost) all intervocalic /H/s. This kind of /h/ seems virtually indistinguishable from any other intervocalic /h/ in the language. Thus, it is subject to the assimilation of nasality discussed in example (4.9) from §4.4.2. This is exemplified by the spectrogram in Figure 4.4, which shows the word *zühain*[E] [s̺yɦ̃ãi̯ɲ] 'tree', a compound based on the word

for 'wood' *zur*, with a voiced aspirate between 0.2 and 0.25 seconds, appreciable in the light decrease of both pitch and intensity:

Figure 4.4: Spectrogram of zühain [ʂyˈh̃ai̯ɲ] *'tree'.*

In addition, as seen above, the nasalization of the aspirate can be observed in the presence of anti-resonances. Figure 4.5 shows a spectral slice of the [h̃] in the production of *zühain* [ʂyˈh̃ai̯ɲ] 'tree' in Figure 4.4, taken in the second 0.203402, during the production of the nasalized laryngeal. The zeros produced by the anti-resonances can be observed around the middle of the graphic:

Figure 4.5: Spectral slice of the [h̃] *in zühain* [ʂyˈh̃ai̯ɲ] *'tree'.*

4.6.2 /h/ after a sonorant

The status of laryngeals following a lateral or nasal sonorant is similar to that of intervocalic /h/: /h/ is voiced in almost all analyzed instances. Figure 4.6, which corresponds to *belhar* [belɦar] 'grass', exemplifies this situation. The laryngeal, which is located between seconds 0.15 and 0.23 approximately, shows visible voicing in the lower frequencies as well as in the uninterrupted pitch line. The friction is clearer in Figure 4.6 than it was in Figures 4.1 and 4.4, in which the formant structure appeared in a clearer way.

Figure 4.6: Spectrogram of belhar [ˈbelɦar] *'grass'.*

4.6.3 Word-initial laryngeals: after a pause or in the speech chain

In contrast to intervocalic [ɦ], utterance-initial /h/ is voiceless in almost every entry compiled in the corpus used by Egurtzegi (2013b). This statement is true for all instances of /h/ in the beginning of the utterance, i.e., it refers to laryngeals that were produced following a pause. This lack of voice is reflected in aperiodic noise, which does not show cycles until the beginning of the vowel —in contrast to the voiced [ɦ], which, as was already discussed, reflects periodic glottal pulses. This is shown by the waveform in Figure 4.7, which shows a word-initial /h-/ preceded by a pause.

Figure 4.7: Waveform of word-initial [#h-] *after pause.*

The spectrogram in Figure 4.8 shows the initial /h/ in the word Std. Bsq. *hiru*[E] Z [hiu] 'three'. The lack of voice can be seen not only in the absence of the pitch line during the production of this segment, but also in the lack of any concentration of energy in the lower frequencies.

Figure 4.8: Spectrogram of hiru [hiu] *'three'.*

Laryngeals are systematically voiceless in utterance-initial position and in isolation —i.e., after a pause— as well as after any oral stop or fricative. Nevertheless, contextual voicing is the norm in word-initial position when /h/ is produced in a phonological context where word-internal [ɦ] appears. In other words, word-initial voiceless laryngeals are produced with voice when the preceding word in the phonic string ends in a vowel or a sonorant (see below).

A good example of this contextual voicing can be found in numbers that, due to being composed of more than one word, did not undergo the anticipatory dissimilation discussed in §4.4.5, which systematically affected the rest of the Basque lexicon. Figure 4.9 shows the spectrogram of the number *hogeitahamasei* 'thirty six', composed by

hogeita 'twenty (and)' and *hamasei* 'sixteen'. In this example, the first /h/ (between 0.1 and 0.15 seconds approximately) is maintained voiceless, while the second (located between 0.35 and 0.4 seconds approximately) has been produced thoroughly voiced. This is evidenced by the lack of a pitch line and energy in the lower frequencies in the first aspirate while both of them can be observed in the second.

Figure 4.9: Spectrogram of hogeitahamasei [hoei̯tahãmãs̤ei̯] *'thirty six'.*

Regarding the frequency of this contextual voicing, Egurtzegi (2013b) analyzed around 200 instances of word-initial laryngeals that occur after a vowel or a sonorant in the speech chain. Of these, approximately 85% were clearly produced as voiced, even by highly restrictive criteria. On the other hand, only 12% of the productions were voiced when the /h/ followed a pause or a stop. All unexpected voiced instances of word-initial /h/ were produced by the same speaker, who, interestingly enough, was prone to eliding this segment —and even the feature of breathiness as a whole— as well.

4.6.4 The sequential ambiguity of /H/

As mentioned above (cf. §4.4.4), processes of /h/-metathesis are common in the history of Basque (cf. Lakarra 2009a, 2009b, 2014; §8.2.1). The elongated phonetic cues (cf. Ohala 1981, 1993) present in aspirates as well as aspirated consonants and breathy vowels —such as having more energy in the fundamental frequency or the greater amount of noise (see Blevins & Garrett 2004: 123)— tend to extend to nearby vowels and produce ambiguity in the phonic string. In some cases (such as in the case of a hypoarticulated

production or a sub-optimal perception), this ambiguity can yield non-etymological reinterpretation.

Figure 4.10 shows the word *heri*[LW] ['he.i] 'sick', as produced by a speaker of a continental dialect of Basque. In this production, the word-initial /h/ affects the whole sequence —as shown by the waveform in Figure 4.11, in which the vowels that follow [#h] are zoomed and the coloring produced by aspiration is clearer. The presence of aperiodic noise during the whole sequence creates an ambiguity that may lead the listener to recover this segment in a position different to its etymological position:

Figure 4.10: Waveform and spectrogram of Std. Bsq. heri [he̯i] *'sick'.*

Figure 4.11: Waveform of the end of hei, [e̤i̤].

This ambiguity, in turn, can yield different processes as a result of a non-etymological reinterpretation of the source of the breathiness by the listener. The processes derived from this ambiguity include dissimilation —cf. the anticipatory dissimilation similar to Grassmann's Law in §4.4.5— as well as the mentioned metathesis (Blevins 2004; §4.4.4). The general principle of mapping a phonetic feature to a phonological representation by assigning it to a segment is called *Feature-to-segment mapping principle*[62] by Blevins (2004: 152). Thus, in words that possess more than one segment involving similar elongated phonetic cues, the resulting ambiguity can be resolved by the listener by restoring only one of two similar segments. Nevertheless, the opposite could occur whenever the listener restores two aspirates in a sequence in which only an etymological /h/ was present.[63] In addition, the listener could restore a single segment in a different (non-etymological) position instead of perceiving it where it was produced. Among the words analyzed by Egurtzegi (2013b) is an instance of *ahal*[E] 'to be able to', realized as [ha̤fia̤l] or maybe even [ha̤a̤l], as shown by Figure 4.12, where fricative noise occurs from the beginning of the utterance. This noise may potentially be interpreted by the listener as a word-initial voiceless /h/ with no etymological justification.

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62 "In the learning algorithm which allows listeners to interpret the phonetic string as a sequence of segments, a phonetic feature, Fp, whose domain overlaps with other segment-defining phonetic features is assumed to have a unique featural source /SF/ in the phonological representation (where F may be a feature or feature-complex)." (Blevins 2004: 152).
63 This might occur, for instance, in a language which, unlike modern Basque, has no laryngeal co-occurrence restrictions (see MacEachern 1999 on these).

Figure 4.12: Spectrogram of ahal 'be able to'*, produced with initial* [h]*,* [ḥaḥạl].

4.7 Conclusions

This chapter has shown that modern Basque laryngeals have several different historical origins, including intervocalic /n/, word-final rhotics, Lat./Gsc. *f-*, /h/ can be non-etymological or continue an older *h, and it may have developed from word-initial voiceless stops.

4.7.1 Phonotactics of the aspirates

The restricted phonotactic domain of /H/ in modern Basque has been emphasized throughout the chapter. In modern Basque, /H/ is limited to the first two syllables of the

word, a pattern that may also be in evidence in the eastern varieties of the language in the Middle Ages. While medieval documentation from eastern varieties does not show any /h/ after the second syllable —cf. example (4.6) in §4.3.2—, western dialects from the same period —11th to 13th century, cf. (4.5) and (4.10b)— show laryngeals in onset position of any syllable of the word.

In addition, I have discussed another distributional restriction regarding the two laryngeals found in Zuberoan: /h/ and /h̃/ do not contrast when no intervening consonant is found between the aspirate and a nasal stop, both when the laryngeal follows the nasal stop —both in VN.HV and NV.HV sequences— as well as when the laryngeal precedes the nasal stop —(C)VH.VN.

4.7.2 Aspirates according to their position

We have observed that Basque laryngeals are produced as they are phonetically expected in terms of the position of the word in which they appear: word-initial /h/ is systematically voiceless, while intervocalic /h/ is voiced.

Michelena (1977 [2011]: 167) already mentioned the contextual variability regarding the production of /H/: "La aspiración es sorda en posición inicial, pero sólo excepcionalmente entre vocales, sobre todo cuando éstas son del mismo timbre. Entre vocales nasales es nasal"[64] (cf. Larrasquet 1928: 47, 1932: 168, 1934: 31). In this chapter initial /h/ has been identified as voiceless and medial /H/ as voiced, not only intervocalically but also after a sonorant. On the other hand, no special condition has been observed for the case of /H/ surrounded by vowels of the same quality specifically mentioned by Michelena (1977 [2011]: 167) and Larrasquet (1928: 47, 1932: 168).

4.7.3 Metathesis of /H/

I have analyzed the metathesis of /H/ in terms of perceptual metathesis as proposed and described by Blevins and Garrett (1998, 2004) and grounded the discussion on

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64 "Aspiration is voiceless in initial position, but only exceptionally between vowels, especially when these vowels are similar. It is nasalized between nasalized vowels", my translation (A.E.). Michelena's description is directly taken from Larrasquet (1928: 47, 1932: 168): "Devant une voyelle, l'*h* est sourde [...]. Entre voyelles, cette fricative est encore sourde parfois, mais rarement, surtout entre voyelles de même timbre: elle est en général sonore en ce dernier cas [...]. Entre voyelles nasales, elle est nasalisée".

recorded data of the modern Zuberoan dialect of Basque. The phonetic ambiguity regarding the intended location of /H/ in some productions —as seen in Figures 4.10-12— may yield a non-etymological reinterpretation that would result in a process of metathesis if it were to spread.

This metathesis was highly productive in the eastern dialects after the establishment of stress on the second syllable of the word and the subsequent phonotactic restriction of laryngeals to the initial foot.

4.7.4 Phonetic source of the voicing

The modern voiced vs. voiceless status of laryngeals follows from general phonetic restrictions: the coarticulation of these segments with the vowels that surround it may also account for the voiced realizations of intervocalic /h/. In fact, the degree of coarticulation is different in different positions: word-initially, the beginning of the laryngeal is clearly voiceless and, once the production of the vowel has begun, the effect of the previous aperiodicity is apparent on the vowel. Nevertheless, the production is very different when in medial position, where (almost) all productions of /H/ are completely voiced. It is usual for this intervocalic voiced aspirate to fuse with the vowels surrounding it. Thus, it seems more appropriate to define these instances as breathy voice, which is especially common in intervocalic position in casual speech. In these cases, the sinusoidal component does not fade from the waveform during the sequence, and aspiration is only displayed as an aperiodic component in the vowels that surrounded the laryngeal, this being the difference between these vowel clusters and any other.

A strong tendency (around 85% of the instances analyzed in Egurtzegi 2013b) towards contextual voicing of word-initial /h/ has been observed. This voicing occurred when the affected aspirate was preceded by a word ending in either a vowel or a sonorant. These are precisely the contexts in which an aspirate can be found in medial position, and this segment is voiced in this position as well. On the contrary, /h/ preceded by pause or by an obstruent is produced without voicing. The fact that aspirates are regularly phonetically voiced in /R#hV/ implies the systematic voiced production of /h/ in the second syllable of the word in the modern language.

4.7.5 Final remarks

In utterance-initial position, the /h/ is regularly produced with a spread glottis, i.e. without voice. As a consequence of this, instances of /h/ which metathesized from intervocalic position to word-initial position (cf. Bsq. *hibai*[E] < Med. Bsq. *ibahi* 'river') are phonetically indistinguishable from other instances of word-initial /h/. In the same way, laryngeals located after a sonorant which were etymologically word-initial (as in the case of *onherran*[E] 'to laud, bless, benediction' < *hon-erran* 'good-say', cf. Lakarra 2009a: 590) are indistinguishable from any other post-consonantal /h/ in the modern language.

Variants like the aforementioned Roncalese *ãria* 'sand' (Std. Bsq. *harea*[E]) may point to nasalized laryngeals being produced (and contrastive) word-initially in an older stage of the language, although this example may be more efficiently analyzed as being due to featural metathesis (as in R. *gãzta*[E] 'cheese' < *gaztã*, cf. Arch. B *gaztaẽ*, §6.2.2).

This chapter has shown the importance of /H/ in the understanding of Proto-Basque by emphasizing their different historical origins as well as the reduced number of examples of non-etymological /h/s, showing that some of the examples classified as non-etymological by previous researchers are, in fact, etymological.

5 Implications of /u/-fronting in Zuberoan Basque

5.1 Introduction

All modern Basque dialects have at least 5 vowels /i, e, a, o, u/. Of these dialects, only Zuberoan and Low Navarrese from Mixe (cf. Lafon 1962b [1999]: 105f.; Camino 2009a, 2009b) have developed a contrastive sixth vowel quality, the front rounded high vowel /y/. This vowel systematically corresponds to /u/ in the other dialects and can be tracked back to that segment by means of cross-dialectal comparison. Nevertheless, it is now distinct from /u/, since certain phonological contexts inhibited fronting (Michelena 1977 [2011]: 42; §5.2.1) and since there are other sources of /u/ in this dialect (cf. Egurtzegi in prep., §7.2).

According to Michelena (1977 [2011]: 41), the realization of Zuberoan [y] is closer to French [ø] than it is to French [y]. Hualde (1993b: 290) also describes this segment as being an intermediate sound between French [y] and [ø] and further notes, referring to Larrasquet (1932) and Lafon (1958 [1999]), that this is consistent with the fact that the other two high vowels of Zuberoan Basque (/i/ and /u/) are more open than they are in French (Hualde 1993b: 290f.). Gavel also describes the three Zuberoan high vowels as lower than their French counterparts and states that this is also the case in many Bearnese varieties of Gascon (Larrebat 1926: 29 footnote 1, cf. Michelena 1977 [2011]: 41 footnote 6).

The front high rounded /y/ is present from the oldest documents available in the Zuberoan dialect. It is present in Sauguis (1908-1909), and in Oihenart (1657 [2003]), who describes this vowel and represents it as <u>, as opposed to /u/, which he transcribes as

<ou>.[65] Michelena mentions Tartas (1666 [1995]) as the first book written in Zuberoan, and says he is consistent with this tradition (cf. Michelena 1977 [2011]: 41). Nevertheless, the classification of Tartas' variety as Zuberoan is highly debatable today. In addition, Tartas does not discern /u/ from /y/, at least orthographically, and consistently uses <u> for all high rounded vowels (Gómez, p.c., cf. Tartas 1666 [1995], 1672 [1996]). Other 17th century documents that distinguish the two high rounded vowels include Belapeire (1696 [1997]) and *Pronus* (anonymous, ca. 1676 [1998]).

Although this vowel is written as <u> in the old tradition, following French written tradition, where /y/ is reproduced as <u> and /u/ is written as <ou>, it is consistently written as <ü> in modern texts, and that is the grapheme that will be used in the examples given here. In some old texts, <eu> is used instead of <u> (cf. Oyharçabal 1991, where the word *lür* /lyr/ 'Earth, land' is written <leur> more than ten times). This vowel sequence represents /ø/ and /œ/ in French —cf. *heureux* /øʁø/ 'happy', *feu* /fø/ 'fire' and *peu* /pø/ 'a little', but also *peur* /pœʁ/ 'fear', *jeune* /ʒœn/ 'young' and *leur* /lœʁ/ 'their, them'. This is consistent with the aforementioned observation of Zuberoan high vowels being more open than their French counterparts.

The high front rounded vowel is not completely unknown in the other two northern dialects, Lapurdian and Low Navarrese, since both of them show it in various French borrowings, such as *faktüra*[LW] [faktyɾa] 'receipt', *kandidatüra*[LW] [kan̪diðatyɾa] 'candidacy', *nümero*[LW] [nymeɾo] 'number' (cf. Zuazo 2008: 43).

Zuberoan speakers also contrast oral and nasalized vowels (cf. §6.2.1). This opposition was probably present in most Basque dialects in some older stage (cf. Michelena 1977 [2011]: 247; Egurtzegi 2013a: 127), after the loss of intervocalic nasalized /h̃/ (< *n, cf. Michelena 1950 [2011a]: 8f., 1977 [2011]: 171; Egurtzegi 2013b and, especially, Igartua 2008; see also §4.2.3) gave rise to nasalized vowels, diphthongs and hiatuses (§6.2). Loss of /h̃/ is domain-dependent in Zuberoan Basque (§4.3.2).

In order to corroborate and further illuminate the widely accepted descriptions of the processes involving Zuberoan high vowels and their distribution, Egurtzegi (2014) randomly surveyed more than 500 pages of the *General Basque Dictionary* (*Orotariko Euskal Hiztegia*, Michelena & Sarasola 1987-2005) looking for Zuberoan texts from

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65   Peillen (1992: 252) claims to have seen <u> used this way in manuscripts from the 14th century, but does not cite the manuscript itself. If this were to be believed, it would be the earliest *ante quem* point for this process. In any case, we would only be able to offer a rather wide time frame for the development of this process in Zuberoan, i.e. from the 9th to the 14th century.

different authors and identifying examples involving the analyzed sound patterns. In this chapter, I have used the examples in Egurtzegi (2014) as well as new ones, taken from the *Dictionnaire basque-français* by Lhande (1926-1938) and *Le Basque de la Basse-Soule Orientale* by Larrasquet (1939). These examples are reproduced in this chapter, as well as reviewing the previous literature on this issue. Note that in some cases more than a single example involving the same root will be provided.

5.2 The development of the front rounded high vowel

As in various Gallo-Romance languages such as French (Harris 1988) or Occitan (Wheeler 1988), Zuberoan Basque developed a sound pattern in which (most instances of) high back vowel /u/ were fronted to /y/. This process appears to have been context-free, as shown by the examples in (5.1):

(5.1) /u/ > /y/ *in Zuberoan Basque*

a) **Before a coronal consonant**

Std. Bsq.	Lit. Z[66]	Trans.	Gloss
egun	*egün*	[eɣyn]	'day'
mundu[LW]	*mündü*	[mỹn̪dy]	'world'
punta[LW]	*phünta*	[pʰyn̪ta]	'top'
kunde[E]	*künte*	[kyn̪te]	'kind, species'
uda[E]	*üda*	[yð̞a]	'summer'
duda[LW]	*düda*	[dyð̞a]	'doubt'
dut	*düt*	[dyt]	'I have'
duzu	*düzü*	[dys̺y]	'you have'
gutxi[E]	*güti*	[gyti]	'few'
mutur	*müthür*	[mytʰyr]	'snout'
guzti[E]	*güzi*	[gys̺i]	'all'
buztan[E]	*büztan*	[bys̺tan]	'tail'
urre[E]	*ürhe*	[yrɦe]	'gold'
urrats[E]	*ürháts*	[yrɦats̺]	'step'
lur[E]	*lür*	[lyr]	'ground'

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66   Note that Modern Zuberoan lost the tap /ɾ/ during the 19th Century —see Michelena 1977 [2011]: 272, who mentions that Gèze (1873: 2) already shows this loss (cf. also Camino 2009a: 167). The examples used in this chapter are taken from Literary Zuberoan, which predates /ɾ/-loss, for the sake of clarity.

a)   Before a coronal consonant

Std. Bsq.	Lit. Z	Trans.	Gloss
beldur[E]	*beldür*	[beḻdyr]	'fear'
egur	*egür*	[eɣyr]	'wood'
hezur[E]	*hezür*	[heṣyr]	'bone'
urrin	*ürrin*	[yrin]	'smell'
zakur[E]	*zakhür*	[ṣakʰyr]	'dog'
-	*gürkatü*	[gyrkaty]	'to swallow'
-	*ürpho*	[yrpʰo]	'manure pile'
urgatzi	*ürgaiztü*[E]	[yrɣai̯ṣty]	'to help'

b)   Before a velar consonant

Std. Bsq.	Lit. Z	Trans.	Gloss
suge	*süge*	[ṣyɣe]	'snake'
sukalde[E]	*sükhalte*	[ṣykʰalte]	'kitchen'
ukan[E]	*ükhen*	[ykʰen]	'to have'
uko	*ükho*	[ykʰo]	'refusal'
ukatu[E]	*ükhatü*	[ykʰaty]	'to negate, reject'
lukainka[LW]	*lükhainka*	[lykʰai̯ŋka]	'spicy sausage'
-	*nük*	[nyk]	'I am (alloc. masc.)'
-	*dük*	[dyk]	'it is (alloc. masc.)'

c)   In further environments

Std. Bsq.	Lit. Z	Trans.	Gloss
zeru[LW]	*zelü*	[ṣely]	'sky'
zu	*zü*	[ṣy]	'you'
leku[LW]	*lekü*	[leky]	'place'
negu[E]	*negü*	[neɣy]	'winter'
ume[E]	*hüme*	[hyme]	'child'

However, this process deviates from that found in the Romance languages, given that there are some seemingly unrelated phonological contexts where the fronting does not occur, or, at least, where the fronting is not systematic. The contexts hindering fronting involve a following coronal segment, but —as seen in the examples in (5.1a)— not all

coronals inhibit fronting. Examples (5.1b-c) show instances of /u/ fronting in different (non-coronal) contexts.

The contexts where fronting is inhibited have been described in the early literature (cf. Uhlenbeck 1903; Gavel 1920; Lafon 1937 [1999], 1958 [1999], 1962a [1999], 1962b [1999]; and Michelena 1977 [2011]) and reproduced in more recent papers (cf. Zarabozo 1972; Hualde 1993b; Zuazo 2008; Oñederra 2009a, 2009b; and Egurtzegi 2013a: 129, 2014).

5.2.1 Contexts where fronting is inhibited

Fronting was inhibited before three different segments/clusters: before an apico-alveolar fricative sibilant /s̺, z̺/; before an alveolar tap /ɾ/; and before a rhotic-dental cluster /rtʰ, rt, rd/.[67] Examples of maintained *u are shown in (5.2-4). Although the tap has been recently dropped in Zuberoan Basque and the rhotics no longer contrast (cf. Michelena 1977 [2011]: 270ff.; Egurtzegi 2013a: 141), examples from an older stage of the language, known as Literary Zuberoan, are provided throughout this chapter for the sake of clarity.

(5.2) *Before an apico-alveolar fricative* [s̺, z̺]

a)

Std. Bsq.	Lit. Z	Trans.	Gloss
ikusi[E]	*ikhusi*[68]	[ikʰus̺i]	'see'
itsusi	*itxusi, itsusi*	[itʃus̺i], [it̺s̺us̺i]	'ugly'
pusatu[LW]	*phusatü*	[pʰus̺aty]	'to push'
uste[E]	*uste*	[us̺te]	'thought'
busti[LW]	*busta, busti*	[bus̺ta], [bus̺ti]	'to wet, wet'
-	*buska(tü)*[LW]	[bus̺katy]	'to search'

b)

Std. Bsq.	Lit. Z	Trans.	Gloss
usna[E]	*usna*	/us̺na/, [uz̺na]	'instinct'[69]

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67   The contrast between plain voiceless and voiceless aspirated stops is not very productive in modern Basque (cf. Lafon 1948: 60; Michelena 1950 [2011a]: 6, 1951 [2011a]: 21, 1977 [2011]: 147, 178, see however 171). Hualde (2003a: 21) finds the minimal pair *merkhatü*[LW] 'market' vs. *merkatü* 'to become cheap' in the variety of Zuberoan documented by Larrasquet (1939).

68   /u/ is maintained in its compounds and derivatives as well: *ikhus*[E] [ikʰus̺] 'see', *ikhusten* [ikʰus̺ten] 'seeing', *ikhusgarri* [ikʰuz̺ɣari] 'worth seeing', etc. *Erakutsi*[E] [erakut̺s̺i] 'show' can be viewed as a causative of *ikusi* 'to see'.

b)	Std. Bsq.	Lit. Z	Trans.	Gloss
	euskara[E]	*uskara*[70]	[us̺kaɾa]	'Basque'
	-	*Susdiakre*[LW]	[s̺uz̺ðiakɾe]	'sub-deacon'[71]
	Jesus	*Jesus*(-*Krist*)	/ʒeʒuz̺/, [ʒeʒus̺]	'Jesus Christ'
	usain[E]	*usaje, usa*(*iñ*)	[us̺aʒe], [us̺aiɲ]	'smell'
	usatu	*usatü*	[us̺aty]	'to use, have as a costume'
	usantza[LW]	*usantza*	[us̺ants̺a]	'usage'
	hustu	*hustü*	[hus̺ty]	'to empty'
	(*esku*) *huska*	(*eskü*) *huska*	[hus̺ka]	'bare (handed)'

(5.3)   *Before an alveolar tap* /ɾ/

Std. Bsq.	Lit. Z	Trans.	Gloss
ur	*hur*[E72]	/huɾ/	'water'
zur	*zur*[73]	/s̺uɾ/	'wood'
hura[E]	*hura*	[huɾa]	'that (one)'
zure	*zure*	[s̺uɾe]	'your'
zuri	*zuri*	[s̺uɾi]	'to you' (but *zü* 'you', *zük* 'you (erg.)', etc.)
gure	*gure*	[guɾe]	'our'
guri	*guri*	[guɾi]	'to us' (but *gü* 'we', *gük* 'we (erg.)', etc.)
zuri	*xuri*	[ʃuɾi]	'white'
axuri	*axuri*	[aʃuɾi]	'lamb'
urin	*urin*	[uɾin]	'animal fat'
hiru[E]	*hirur*	/hiɾuɾ/	'three'
barau[E]	*barur*[74]	/baɾuɾ/	'fasting'

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69   The examples in (5.2b) have fronted variants in (5.5a) and (5.5c).

70   Variants of the word for 'Basque' used in Zuberoan texts include: *ü/uskara*, *eü/uskara* and *u/üskaa*. The modern Zuberoan form is usually *üska* /ys̺'ka/, with simplification of the hiatus created after the loss of the tap. Low Navarrese and Lapurdian variants show an initial *h-* (cf. *heuskara*, *heskuara*).

71   *Susdiakre*[LW] /s̺us̺djakɾe/ shows variants with and without coda /s̺/, as well as with and without vowel fronting (cf. *Sü(s)diakre*, /s̺ys̺djakɾe/, /s̺ydjakɾe/). This word was borrowed with a back vowel, cf. Occ. *sosdiacre*, Fr. *sous-diacre* /sudjakʁ/ 'sub-deacon'.

72   Also *hurtü* [hurty] 'liquefy, melt', *hurtatü* [hurtaty] 'irrigate', *hursü* [hurs̺y] 'aqueous', etc. Compounds involving water that begin with *uh-* (< *huh-* < *hur*, cf. Lakarra 2009a: 585, footnote 64; §5.3.2) usually show fronted alternants or variation: *üharte*[E] [yɦarte] 'island', *uhaitz*[E]/*ühaitz* [uɦai̯ts̺]/[yɦai̯ts̺] 'river', etc. The back vowel in *uhaitz* appears 5 times out of 17 in our survey.

73   /u/ is also maintained in the compounds *zurgin* [s̺urɣi̯n] 'carpenter', *zurgizen* [s̺urɣi̯s̺en] 'sapwood', etc. Even *zuhar*[E] [s̺uɦar] 'pony keg' as well as some instances of the word *zuhaiñ*[E] [s̺uɦai̯ɲ] 'tree', which have lost the stem-final tap and, subsequently the phonological context that prevents the fronting, maintain the high back vowel, although in the last example *zühaiñ* [s̺yɦai̯ɲ] is usual.

74   I also found an instance of *barür* with a fronted vowel.

Std. Bsq.	Lit. Z	Trans.	Gloss
isuri[E]	*ixuri, isuri*	[iʃuɾi], [is̺uɾi]	'flow, pour'
irakurri[E]	*irakur(tü)*[75]	/iɾakuɾty/	'to read'

(5.4) *Before a (heterosyllabic) rhotic-dental cluster /rt, rtʰ, rd/*

Std. Bsq.	Lit. Z	Trans.	Gloss
urte[E]	*urthe*	[urtʰe]	'year'
urtarril[E]	*urtharril*	[urtʰariʎ]	'January'
-	*urthatse*	[urtʰats̺e]	'first day of the year'
(j)aurtiki[E]	*urthuki*[76]	[urtʰuki]	'to throw, throw away'
ureztatu	*hurtatü*	[hurtaty]	'to irrigate'
urde[E]	*urde*	[urð̥e]	'pig, animal'
urdin[E]	*urdin*	[urð̥iɲ]	'blue'
-	*Urdiñarbe*	[urð̥iɲarβ̥e]	(town name)

The first examples in (5.3) show that coda neutralization of rhotics —which makes every coda rhotic a trill (cf. Michelena: 1977 [2011]: 274) except before /h/ in Zuberoan (and in older stages of other dialects, cf. Michelena 1977 [2011]: 270f.)— does not feed the fronting of /u/. Although underlying taps surface as trills in this position, the preceding /u/s are maintained before them.

However, as stated above, there are some exceptions where maintenance of *u is expected, but where fronting occurs instead. Some of these exceptions are included in (5.5-8):

(5.5) *Exceptional fronting before apico-alveolar fricatives /s̺, z̺/*

a)	Std. Bsq.	Lit. Z	Trans.	Gloss
	-	*üsna*[E]	/ys̺na/, [yz̺na]	'instinct'[77]
	euskara[E]	*üskara*	[ys̺kaɾa]	'Basque'

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75   Also inhibited in *irakur* [iɾakur] 'read', *irakurten* [iɾakurten] 'reading', *irakurtzian* [iɾakurts̻ian] 'when reading', *irakuraldi* [iɾakuɾa̪ldi] 'reading moment', *irakurzale* [iɾakurs̺ale] 'reader', etc. It is not clear whether this word belongs here or in (5.9), given that in other dialects this verb appears with a trill instead (cf. Std. Bsq. *irakurri*[E] [iɾakuri] 'to read'). In any case, the aforementioned *irakuraldi* (in contrast to Std. Bsq. *irakurraldi* [iɾakuɾa̪ldi]), which shows an underlying tap, supports this classification.

76   This verb shows some variation regarding the initial vowel/diphthong and even i/u variation (cf. §5.4.3) in the second syllable: *urthiki, urthuki, aurthiki, aurthüki*.

77   The examples in (5.5a), as well as these in (5.5c), have non-fronted variants in (5.2b).

-	*Sü(s)diakre*[LW]	[s̺yz̺ðiakre]	'sub-deacon'
Jesus	*Jesüs(-Krist)*	/ʒez̺yz̺/, [ʒez̺ys̺]	'Jesus Christ'
usain[E]	*üsaje, üsa(iñ)*	[ys̺aʒe], [ys̺aɪ̯n]	'smell'
usatu	*üsatü*	[ys̺aty]	'to use to, have as a costume'
usantza[LW]	*üsantza*	[ys̺ants̺a]	'usage'

b)	Std. Bsq.	Lit. Z	Trans.	Gloss
	kuluxka[E]	*küska, küxka*	[kys̺ka], [kyʃka]	'nap'
	ustel(du)[E]	*üspeldü, üstel*	[ys̺pel̪dy], [ys̺tel]	'to rot, rotten'
	ustiatu[E]	*üstiatü, üstio*	[ys̺tiaty], [ys̺tio]	'to make the most of'[78]
	musker[E]	*süsker*	[sys̺ker]	'lizard'
	sugandila[E]	*süskandea*	[sys̺kan̪dea]	'wall lizard'[79]
	justu[LW]	*jüsto, injüsto*	[ʒys̺to], [iɲ̩ʒys̺to]	'fair, unfair' (cf. Brn. Gsc. *just* 'fair', *injust* 'unfair')

c)	Std. Bsq.	Lit. Z	Trans.	Gloss
	hustu	*hüstü*	[hys̺ty]	'to empty'
	(esku) huska	*(eskü) hüska*	[hys̺ka]	'bare (handed)'

The examples in (5.5) show that not all /us̺/ sequences were maintained, but some underwent fronting to /ys̺/ as in any other context. However, most of these examples —at least those in (5.5a) and (5.5c)— are not systematically fronted, but rather show variation from author to author instead. In addition, many of the instances in (5.5b) show variation regarding the sibilant following /y/, and thus may have a different history, and some have been influenced by Gallo-Romance forms with a front round vowel, as is the case of *jüsto*[LW], *injüsto* (which may come from Sp. *justo* 'fair', *injusto* 'unfair' but be altered by the similarity with Gsc. *just*, *injust*).

It should also be mentioned that the last two examples in (5.5c) are derivatives based on *hüts* [hyts̺] 'mistake, empty, lack', which has a final affricate. Since /ts̺/ does not hinder fronting nowadays —see (5.9d) on this—, these words are actually expected to show fronting as they do.

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78 This word has Zuberoan variants with the other two sibilants as well, cf. *üztiatü* [ys̻tiaty] and *üxtiatü* [yʃtiaty].

79 Lit. Z *süsker* 'lizard' and Lit. Z *süskandera* 'wall lizard' have probably been influenced by Z *süge* 'snake' (cf. also Z *süskandila* < Std. Bsq. *sugandila* for the excrescent /s̺/).

(5.6) Exceptional fronting before alveolar tap /ɾ/

Std. Bsq.	Lit. Z	Trans.	Gloss
-	*üra*	[yɾa]	'tradition'
*seguru*LW(*ago*)	*segür*(*ago*)	[s̺eɣyɾaɣo̝]	'sure(r)'

*(5.7) Words with the suffix -(t)üra*LW *(cf. Brn. Gsc. -tura /tyɾa/)*

Std. Bsq.	Lit. Z	Trans.	Gloss
*ardura*LW	*ardüra*	[arð̞yɾa]	'often, temperament'
*ohitura*E	*ohidüra*	[oɦið̞yɾa]	'usage'
*etendura*E	*ethendüra*	[etʰen̪dyɾa]	'hernia, break'
*apaindu*LW*-ra*	*apañdüra*	[apaɲdyɾa]	'adornment'
*eskritura*LW	*eskritüra*	[es̺kɾityɾa]	'(Holy) Scriptures'
*kreatura*LW	*kreatüra*	[kɾeatyɾa]	'creature'
*soltura*LW	*solthüra*	[s̺ol̪tʰyɾa]	'permission'
*figura*LW	*figüra*	[fiɣyɾa]	'figure'
*hantura*E	*hanküra*	[haŋkyɾa]	'swelling, bump'
*arrangura*LW	*arranküra*	[araŋkyɾa]	'concern'

(5.8) Fronting in inflection: verbal forms in -rik (partitive) and -ren (future)

Std. Bsq.	Lit. Z	Trans.	Gloss
*hautatu*LW*-rik*	*haitatürik*	[hai̯tatyɾik]	'chosen'
*konparatu*LW*-rik*	*konparatürik*	[kompaɾatyɾik]	'compared'
*kargatu*LW*-rik*	*kargatürik*[80]	[karɣatyɾik]	'charged'
*kasu*LW*-rik*	*kasürik*	[kas̺yɾik]	'(any) attention'
*hartu*E*-ren*	*hartüren*	[hartyɾen]	'take (fut.)'
sarturen	*sarthüren*	[s̺artʰyɾen]	'come in (fut.)'
*irakur*E*-turen*	*irakhurtüren*	[iɾakʰurtyɾen]	'read (fut.)'
*ausartu*LW*-ren*	*ausartüren*	[au̯s̺artyɾen]	'dare to (fut.)'

The examples of u > y preceding a tap (5.6-8) are arranged in three different groups: the general group of words which show fronting before a tap (5.6), words which

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80 An instance of *kargaturik* [karɣatuɾik] 'charged' was found in the survey. Being only one and given the large number of examples pointing in the opposite direction, the possibility of this instance being a typographical error should not be discarded.

finish in the sequence -(*t*)*üra*[E] (5.7) and words which involve inflectional morphology involving a morpheme-initial tap (5.8).

The small number of items in (5.6) shows that instances of fronting before a tap are even fewer than those before an apical sibilant. From the two examples in (5.6), the first word, *üra*, may belong to the second group of words (5.7), while the second is a transparent loan which may also be included in the same group.

The words in (5.7) may be taken as a single instance of fronting, given that they all share a final suffix from Romance: -*üra*. This suffix was loaned from the neighboring Romance languages but also gained some degree of productivity within the inherited lexicon. Note that in modern Bearnese Gascon and modern French the suffix Brn. Gsc. -(*t*)*ura*, Fr. -(*t*)*ure* are pronounced /-(t)yɾa/, /-(t)yʁ/, e.g. Brn. Gsc. *signatura* /signatyɾa/, Brn. Gsc. *natura* /natyɾa/, Brn. Gsc. *verdura* /berdyɾa/, Brn. Gsc. *figura* /figyɾa/ and Fr. *signature* /siɲatyʁ/, Fr. *nature* /natyʁ/, Fr. *verdure* /vɛʁdyʁ/, Fr. *figure* /figyʁ/, etc.

Inflected verbal forms with the partitive morpheme -*rik* or forms with the future morpheme -*ren* in (5.8) were not affected by inhibitory environments and thus fronted as any other -*tu* > -*tü* '(verbal participial suffix)' in their paradigms. This may be either a sign of a late formation or, more plausibly, a consequence of the process being limited to the boundaries of the phonological word (cf. the pronouns *zure* 'your', *zuri* 'to you', *gure* 'our', *guri* 'to us' in example (2), where the fronting is consistently inhibited).

As is apparent from the examples (5.5-8), no clear instances of fronting before rhotic-dental clusters /rt, rtʰ, rd/ can be found in the survey. Stems ending in a trill followed by a suffix which begins with a dental stop —such as -*tü* in *hartü*[E] 'to take'— do not behave as clusters and thus undergo fronting as expected in any other context. This fact supports the phonological word boundary proposed above.

In addition to the main contexts where *u is maintained, there remain some words that do not exhibit any of these patterns yet still resist the process. Most of them do not consistently inhibit fronting —as happened with some examples of /u/ followed by / s̺/ in (5.5)— but they do show variation to some extent. The ones found in the survey are listed under (5.9):

(5.9)   *Further examples of unexpected non-fronted /u/s*

a)   **Std. Bsq.**   **Zuberoan**   **Trans.**   **Gloss**

    kurrinka[E]   *kurrunka*[81]   [kuruŋka]   'growl, grunt'

    zurratu[LW]   *zurratü*   [ʂuraty]   'to tan, to dress (a skin)'

b)   **Std. Bsq.**   **Zuberoan**   **Trans.**   **Gloss**

    uso[E]   *urzo*[82]   [urʐo]   'dove'   but also *ürzo, ürso, ürxo* [yrʐo], [yrʐo], [yrʃo]

    urratu   *urratü*   [uraty]   '(to) tear, rip'   but also *ürratü* [yraty]

c)   **Std. Bsq.**   **Zuberoan**   **Trans.**   **Gloss**

    agur[LW]   *agur*   [aɣur]   'hi, bye'   but also *agür* [aɣyr]

d)   **Std. Bsq.**   **Zuberoan**   **Trans.**   **Gloss**

    huts   *huts*   [hutʂ]   'mistake'   but also *hüts* [hytʂ]

e)   **Std. Bsq.**   **Zuberoan**   **Trans.**   **Gloss**

    -          *buket*[LW]   [buket]   'bouquet (of flowers)' (< Gsc. *boquet*)

       The examples in (5.9a) regularly appear with the back vowel, these in (5.9b) show variation, while only a single non-fronted variant was found for the examples in (5.9c-d). It is worth noting that the examples in (5.9a-c) show potential instances of "unexpected" maintenance of *u before the trill, while example (5.9d) occurs before an apical affricate. (5.9c) may be taken away as an exception and marked as a typographical error, given that it only appeared once. In any case, the back vowel /u/ in *agur* is also preceding a trill —as the examples in the previous groups do.

       The /u/ in *huts* precedes an affricate that shares place of articulation with one of the described inhibitory segments —namely its fricative counterpart /ʂ/ in (5.2). Peillen (1992: 252) checked the attestations of this word chronologically and found that 18th century authors used *huts* /hutʂ/ instead of *hüts* /hytʂ/, concluding that the fronting was not completed until the 19th century, when the usage of the fronted variant was systematic.

       Examples like *zurratü*[LW] 'to tan, to dress (a skin)' or *buket*[LW] 'bouquet (of flowers)',

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81   The second /u/ is not necessarily expected to front, given that it may come from /i/ (cf. *kurrinka*[E]) but the first one is a back vowel in all the dialects. Note that this word may be phonosymbolic.

82   The non-fronted variant was uncommon (three times out of twenty).

the last one in (5.9e), involve recent Romance loanwords that probably postdate the fronting process. In addition, this particular word did not undergo fronting in French nor Gascon (cf. Fr. *bouquet* /bukɛ/ and Gsc. *boquet* /buket/, with a back vowel), thus not being an exception.

In sum, if we discard the unexpected instances of *u with a single attestation in (5.9c-d) and the late loans, all instances of /u/ in (5.9a-b) are followed by a trill.

As mentioned above, in addition to Zuberoan, the Mixean variety of Low Navarrese Basque shows the fronting of /u/ as well. However, only northern subvarieties of Mixean show the fronting, it being absent from the southern villages (cf. Camino 2009a, 2009b: 69). Mixean speakers are in close contact with speakers from other dialects (and languages) that have developed /y/. Mixean Basque has an adstrate relationship with Zuberoan Basque in the east. In the north, many of its speakers are also bilingual in Bearnese Gascon. The fronting has developed in Mixean in a phonologically conditioned way similar to that of Zuberoan —in contrast to the systematic fronting of /u/ found in Gascon. The only (notable) difference is the group of segments that inhibit the process, which includes all contexts found in Zuberoan —i.e. before /ɾ/, /s̺/, /ts̺/ and the clusters /rtʰ, rt, rd/— with the addition of two contexts only found in Mixean, namely before the velar obstruents /k/ and /g/ (cf. Lafon 1962b [1999]: 105f.; Camino 2009b: 70f.), phonetically realized as [ɣ̞] after a vowel (as it is in all relevant cases). Thus, the examples given in (5.1b), which are systematically fronted in Zuberoan, do not show fronting in Mixean Low Navarrese. These are shown again in (5.1b'):

*(5.1b') Maintenance of *u before a velar consonant in Mixean Low Navarrese*

Std. Bsq.	Lit. Z	Mix. LN	Trans.	Gloss
suge	*süge*	*suge*	[s̺uɣ̞e]	'snake'
sukalde[E]	*sükhalte*	*sukhalde*	[s̺ukʰalde]	'kitchen'
ukan[E]	*ükhen*	*ukhan*	[ukʰan]	'to have'
uko	*ükho*	*ukho*	[ukʰo]	'refusal'
ukatu[E]	*ükhatü*	*ukhatü*	[ukʰaty]	'to negate, to reject'
lukainka[LW]	*lükhainka*	*lukhinka*	[lukʰiŋka]	'spicy sausage'
-	*nük*	*nuk*	[nuk]	'I am (alloc. masc.)'
-	*dük*	*duk*	[duk]	'it is (alloc. masc.)'

Some conclusions are possible after analyzing the words which maintained the etymological back high vowel /u/ unaltered. It seems that the segments that have had the strongest inhibitory effect on /u/-fronting are the tap /ɾ/ and the rhotic-dental obstruent clusters, followed by the apical sibilant fricative and, to a much lesser extent, the rhotic trill and the apical sibilant affricate. The fronting after the apical sibilant affricate seems to be more recent, and the examples of inhibition before a trill may be due to a rule inversion.

5.2.2 Fronting of /u/-based diphthongs

The fronting did not affect diphthongs involving [u̯] in the same way that it affected the simple vowels. Instead of yielding a front rounded glide, most /Vu̯/ diphthongs were fronted (as well as unrounded) to /Vi̯/ in both Zuberoan and Roncalese (cf. Michelena 1977 [2011]: 76; Egurtzegi 2013a: 139). This contrasts with the dialectal distribution of the high back vowel fronting, which was only developed in Zuberoan.[83] *au is the most common /u̯/-based diphthong, while *eu is uncommon. Examples in (5.10) show some of the fronted /Vu̯/ diphthongs.

(5.10) Fronting of /Vu̯/ to /Vi̯/

Std. Bsq.	Lit. Z	Trans.	Gloss
gau[E]	gai	[gai̯]	'night'
gauza[LW]	gaiza	[gai̯s̺a]	'thing'
auzo[E]	aizo	[ai̯s̺o]	'neighborhood'
laudatu[LW]	laidatü	[lai̯ðaty]	'to laud, to praise'
laudorio[LW]	laidorio	[lai̯ðoɾio]	'praise'
hautatu[LW]	haitatü	[hai̯taty]	'to choose'
belaun[E]	belhaiñ	[belɦai̯ɲ]	'knee'
iraun[E]	iraiñ	[iɾai̯ɲ]	'to last'
afaldu	aihaltü	[ai̯ɦaḻty]	'to dinner' (cf. LN auhaldu)
afari[E]	aihari	[ai̯ɦaɾi]	'dinner' (cf. LN auhari)
irauli[E]	iraili	[iɾai̯ʎi]	'to spin, turn over/around'
nau	nai	[nai̯]	'auxiliary, 3rd person sg. - 1st person sg.'
nauk	naik	[nai̯k]	'I am (allocutive, informal)'

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83 High back vowel fronting was also developed in the bordering north-eastern subvariety of Low Navarrese from the northern villages in the region of Mixe (Camino 2009a, 2009b: 69).

Std. Bsq.	Lit. Z	Trans.	Gloss
-	*naizü*	[nai̯ʂy]	'I am (allocutive, formal)'
naute	*naie*	[nai̯e]	'auxiliary, 3rd per. pl. - 1st per. sg.'
*utzi*E	*eitzi*	[ei̯t̪ʂi]	'to leave' (cf. S *eutzi*)
*leun*LW	*lein*	[lei̯n]	'soft'

However, this fronting was contextually limited, in a manner reminiscent of that of the high back vowel in §5.2.1. This is shown by the examples in (5.11), which encompass lexical items that failed to front.

(5.11)   *Diphthongs with maintenance of* /u̯/

a)

Std. Bsq.	Lit. Z	Trans.	Gloss
*lau*E	*laur*	/lau̯ɾ/ [lau̯ɾ]	'four'
*haur*E	*haur*	/hau̯ɾ/ [hau̯ɾ]	'this'
*zauri*LW	*zauri*	[ʂau̯ɾi]	'wound'
*zeu*E	*zihaur*	/ʂiñau̯ɾ/	'you yourself'
*berau*E	*beraur*	/beɾau̯ɾ/	'this/the same, (only) this'
euri	*euri, eubri*	[eu̯ɾi], [eu̯βɾi]	'rain'

b)

Std. Bsq.	Lit. Z	Trans.	Gloss
-	*phausa(tü)*LW	[pʰau̯ʂaty]	'rest, to rest'
*nagusi*E	*nausi*	[nau̯ʂi]	'boss'
-	*ausiki*E	[au̯ʂiki]	'to bite'
*ausartu*LW	*ausartü*	[au̯ʂarty]	'to dare'
*euskara*E	*euskara*	[eu̯ʂkaɾa]	'Basque'
euskaldun	*euskaldün*	[eu̯ʂkal̪dyn]	'Basque speaker'
*deus*LW	*deus*	/deu̯ʐ/, [deu̯ʂ]	'something'[84]

c)

Std. Bsq.	Lit. Z	Trans.	Gloss
*haur*E	*haur*	/hau̯ɾ/	'child'

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84   Cf. Std. Bsq. *deus ere* 'nothing' Mod. Z *deuse* [deu̯ʐe].

d)	Std. Bsq.	Lit. Z	Trans.	Gloss
	hauts	*hauts*	[hau̯ts̠]	'dust'
	(cf. *hausten*	*hausten*	[hau̯s̠ten]	'breaking')

As shown by (5.11), the fronting was systematically inhibited when the semivowel was followed by /ɾ/ (5.11a) or /s̠/ (5.11b), and there are also a couple of maintained diphthongs before /r/ (5.11c) and /ts̠/ (5.11d). There are, however, some instances of inhibition of the fronting that seemingly fall outside of the aforementioned phonological contexts, as shown by (5.12):

(5.12)   Exceptionally maintained /u̯/ semi-vowels

a)	Std. Bsq.	Lit. Z	Trans.	Gloss
	arau[E]	*arau*	/aɾau̯/	'rule'
	alfer[E]	*auher*	/au̯her/	'lazy'
	auhen[E]	*auhen*	/au̯hen/	'lament, moan'

b)	Std. Bsq.	Lit. Z	Trans.	Gloss
	jaun[E]	*jaun*	/ʒau̯n/	'sir'[85]
	jauki	*jauki*	/ʒau̯ki/	'to commit'
	jantzi[E]	*jauntsi*	/ʒau̯nts̠i/	'to dress'
	jauzi[E]	*jauzi*	/ʒau̯s̠i/	'to jump'

Some of these, however, may be explained by a loss of the conditioning segment. That is the case, for instance, with *arau*[E] 'rule', if we accept as potentially older the variant *araur* /aɾau̯ɾ/ attested in authors like Maister and potentially Xarlem (apud Michelena & Sarasola 1987-2005) or *auher* 'lazy', with another flap present in some variants (cf. Lit. Z *aurher*, R *aurer*, both also attested in Maister). In addition to this, the diphthong in *arau* 'rule' was probably *-*ao*- before (according to Michelena 1977 [2011]: 77, 97) and *auher* 'lazy' is a borrowing (again, apud Michelena 1977 [2011]: 181) that may postdate this process. The word *auhen*[E] 'lament, moan' is not as well attested as *arau* and *auher* in Zuberoan,[86] but a similar solution may be proposed for this word as well. For independent

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85   But cf. also R *jein* 'sir', with fronting of the glide.
86   Michelena and Sarasola (1987-2005) say *auhen*[E] 'lament, moan' is only found in Eguiateguy (1785 [1983]) within Zuberoan, and the text is modern enough to have lost the flap.

etymological reasons, Lakarra (p.c.) reconstructs a metathesis (*ahuen > auhen*) for this word.

Insofar as the forms in (5.12b) are concerned, the inhibition of the fronting has been attributed to avoidance of *jau- > **jai-* in the literature, although Michelena (1977 [2011]: 77) expresses doubts about this statement and adds that some instances of *-au-* in verbal radicals may be secondary. This initial yod is maintained in some dialects, although modern Zuberoan shows [ʒ] instead.

Alongside the /u̯/ to /i̯/ semivowel fronting, a second fronting affected some glides in positions that inhibited the general glide fronting described in (5.10) above. Some off-glides that did not undergo the first fronting were sporadically affected by a fronting process that did not involve unrounding, as shown by (5.13). All of them show non-fronted variants listed under (5.11).

(5.13)   Exceptionally fronted semi-vowels

Std. Bsq.	**Lit. Z**	**Trans.**	**Gloss**
euskal, euskara[E]	*eüskal, üskara*	[ey̯s̺kal], [y̺s̺kaɾa]	'Basque'
jaun[E]	*jaün*	[ʒay̯n]	'sir'
deus[LW]	*deüs*	[dey̯s̺]	'something'
euri	*eüri*	[ey̯ɾi]	'rain'

Finally, rising diphthongs are unusual in Basque, but are maintained, as shown by (5.14).[87]

(5.14)   Maintenance of rising diphthongs

Std. Bsq.	**Lit. Z**	**Trans.**	**Gloss**
joan[E]	*juan*	[ʒwan]	'to go'
zorte[LW]	*suerte*	[s̺werte]	'luck'

Rising diphthongs are recent in most (if not all) Basque dialects. As far as the cases in (5.14) are concerned, *suerte* 'luck' is a late loan, while Z *juan*, Std. Bsq. *joan* 'to go' is attested as *johan* in older texts (cf. also the 1st person singular Std. Bsq. *noa* 'I go', 3rd person singular Std. Bsq. *doa* 'he goes', etc. which are attested as *noha*, *doha*, etc. as well),

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87   /u̯i̯/ diphthongs behave as any other instance of /u̯/, cf. *esküin*[E] [es̺ky̯n] 'right hand'.

so that the hiatus is modern and, thus, the diphthong even more recent.

The process described above involves the fronting of the velar semivowel /u̯/ to /i̯/ in Zuberoan and Roncalese. Fronting did not affect the instances of the glide located in the very environments described for the inhibition of fronting of syllabic /u/ in §5.2.1, namely before an alveolar flap or an apical sibilant fricative —as well as before a trill and to diphthongs following a yod. Some of the initially unaffected items underwent a later fronting to rounded semivowel /y̆/, instead of the expected unrounded /i̯/. Rising diphthongs were unaffected by the process, as they probably evolved after this sound pattern was developed.

5.3 Phonetics behind the process

Now that the process has been described and the contexts where the fronting or palatalization did not apply have been specified, we can try to gain a deeper understanding of the process by considering typological parallels as well as the phonetic literature on vowel fronting. We will look at the factors facilitating /u/-fronting as well as phonetic reasons for inhibition of the process in certain contexts. Finally, this sound pattern will be linked to the contact situation in which it developed, which has probably been a significant causal factor in its development.

5.3.1 Typological parallels

Although it is described as context-free in the literature on Gallo-Romance —in Gascon (Rohlfs 1977: 124), Occitan (cf. Wheeler 1988: 247) and French (cf. Bourciez 1967: 94)—, in Zuberoan Basque u > y appears to be inhibited before the apical sibilant fricative, tap and rhotic-dental obstruent clusters (cf. §5.2.1).[88]

Languages with context-free high back vowel fronting include Gallo-Romance languages such as French (Harris 1988: 210) and Occitan (Wheeler 1988: 247), the Gallo-Italic languages (Piedmontese, Lombard, Emilian, Romagnol, etc.) and Arpitan (Franco-Provençal). Outside of Romance, a similar sound change is described for the Lolo-Burmese language Akha, and Albanian. Some English dialects such as Standard Southern British English (Hawkeys & Midgley 2005; Henton 1983; McDougall & Nolan 2007;

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88 Also, to a much lesser extent, potentially before the trill and even the apical sibilant affricate, as seen above.

Harrington et al. 2008; Harrington 2012), Australian English (Cox & Palethorpe 2001), New Zealand English (Gordon et al. 2004) and Southern and General American English (Bailey 1997; Fridland 2008) have fronting of /u/, but it gave rise to /ʉ/ instead of /y/. /u/ > /ʉ/ fronting is also found in Swedish or in Açorean and some varieties of European Portuguese (Hualde, p.c.). /u/-fronting is also one of the sound changes involved in chain shifts proposed by Labov (1994: 116).

Contextual assimilatory fronting of back vowels, usually known as umlaut, is found in Germanic languages such as Old High German, Old Dutch, Old Saxon, Old English, Old Norse and Old Frisian and in Rotuman (Churchward 1940), among others. In all of these changes, /u/ fronting is triggered by an /i/ in an adjacent syllable.

Although they are far from uncommon in Europe, only 6.6% of the languages (37 out of 562) in the WALS database (Maddieson 2013) have front rounded vowels. As a matter of fact, 78% of the languages in the survey (29 out of 37) are found in the North-Central area of the Eurasian continent (cf. Blevins to appear: 11). Languages with front rounded vowels outside of this area are scarce.

5.3.2 Development of context-free fronting of /u/

Vowels have more context-free changes than consonants and can go in almost any direction, although not all shifts are equally common. The pronunciation of a vowel is variable, and the extent of this variability is limited by the division of the vocalic perceptual space in each language (Bradlow 1995). The perception of a given vowel is not categorical. Instead, some exemplars (known as prototypes) are judged to be more typical than others. Prototypes make the perceptual distance between them and the exemplars that surround them shorter than psychophysically expected, warping these exemplars into the same category (Blevins 2004: 286). This is known as the "perceptual magnet effect" (Kuhl 1991, 1995; Iverson & Kuhl 1995, etc.).

In addition, according to the exemplar theory of speech (Johnson 1997; Pierrehumbert 2001), "a new token which is well positioned with respect to a category can actually provide a better example of that category (in being recognized quickly and rated highly) than any actual example of that category that has been previously experienced" (Pierrehumbert 2001: 143). If no phonological category is assigned to a neighboring psychoacoustic space, prototypes may move over time, effectively dragging all non-

prototypical exemplars with them. Thus, context-free vowel shifts may be expected when acoustic space is available.

In Gallo-Romance, systematic /u/-palatalization has been attributed to a push-chain (cf. Labov 1994: 116). The raising of the mid back vowel /o/ to /u/ would have overcrowded the high back vowel space, and that would have triggered the fronting of u/ to /y/ (Haudricourt & Juilland 1949: 109; 1970: 114).

Harrington (2012) argues that context-free fronting of /u/ starts from coarticulatory contexts. Coarticulation can be a source of various kinds of sound changes (Ohala 1981, 1993), like vowel harmony (Beddor et al. 2002) or vowel nasalization (Hajek 1993).

According to Harrington (2012: 104), perception-production relationships tend to be aligned in coarticulatory patterns (Fowler 2005) and it is only during a sound change in progress that production and perception are misaligned. In this scenario, the actual sound change would occur as the context-dependent and context-independent phonetic variants come closer together and the perceptual compensation for coarticulatory effects is reduced, giving rise to a new production-perception alignment (Harrington 2012: 104).

Under this account, both perception and production may be involved in the source of the change: contextual coarticulation is no longer compensated by the listener (cf. Ohala 1993) and the outcome of fronting environments is then phonologized in other phonological contexts (Harrington 2012: 116), given a shift of the variants in non-fronting contexts toward the variants found in fronting contexts. This analysis is consistent with Harrington's observation that the context-less /u/s in younger generations of speakers of English are similar to the /u/s produced in fronting contexts by older generations of speakers of the same variety.

The most common consonantal coarticulatory situations where a back vowel is fronted are environments involving alveolar consonants (Flemming 2001, 2003; Öhman 1966). Harrington et al. (2011) looked for the predisposition towards the fronting of /u/ in German in T_1uT_1 context (T a voiceless stop) and found that both the onset and offset of /u/ in /tut/ as well as the onset of /u/ in /kuk/ were well into the /y/ space (Harrington 2012: 106). Further, high back vowels are more prone to diachronic fronting than high front vowels are to retraction, as empirically tested by Harrington (2012: 115f.).[89]

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89 Although centralization is known in lax vowels: /ɪ/ in New Zealand English (Maclagan & Hay 2007, see also Moon & Lindblom 1994).

Given that there is no clear phonetic conditioning factor in Basque,[90] the possibility of an areal origin for this sound pattern will now be discussed.

5.3.3 The role of contact in developing typologically uncommon sound patterns

As noted earlier, Basque front rounded vowels have not evolved in isolation. Zuberoan is adjacent to Romance languages that also have front rounded vowels, and, indeed, this is part of a larger region where front rounded /y/ may be seen as an areal feature. Given this, it seems quite likely that contact has played a role in the development of a cross-linguistically fairly rare sound pattern as the emergence of a high front rounded vowel in so many geographically adjacent languages (cf. §5.3.1 and §5.5). However, determining to what extent this contact has influenced these sound patterns seems more complicated. This section will involve a discussion of a possible way areal diffusion as linguistic experience —or, in this case, exposure— may affect learning.

Blevins' (to appear) take on areal sound patterns may be useful in understanding how sound patterns like this may spread by means of contact. She suggests that language experience alters phonetic perception, by the "perceptual magnet effect" (cf. Kuhl 1991, 2000; Kuhl & Iverson 1995). The main idea is that when first acquiring a language, proto-categories act as magnets, drawing nearby perceptual stimuli into them. In language contact situations, continuous exposure to a second language may result in a warping of perceived distances of phonetic tokens. According to Blevins (to appear: 7), in situations of long-term bilingualism, an external phonetic proto-type may be internalized and act as a perceptual magnet in the first language of the infant.

Crucial to this model are the notions that the establishment of a phonetic proto-type requires perceptual saliency of the segment involved, as well as intense language contact spanning multiple generations and that this "sound change will appear to be natural and phonetically motivated, and indistinguishable from internal developments" (cf. Blevins to appear: 8).

As a matter of fact, /y/ —as any other front rounded vowel— is perceptually

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90 Although I have previously argued (in Egurtzegi 2013a: 239) that the original context of the fronting may have been the sequence /tu/ —which is particularly common due to the high frequency of the morpheme *-tu* / *-du*, the participle suffix in verbal constructions—, the vowel in the participle suffix is not only final and unstressed, but also has a high level of predictability. Thus, it seems highly unlikely that /u/-fronting originated in this suffix, and from there, spread through the entire lexicon.

salient. If it were to act as a perceptual magnet as understood by Blevins (to appear), it would draw tokens of the phonetically close /u/ even closer to its prototype when speakers of a language which lack /y/ are in close and continued contact with speakers of a language that has /y/ in its phonological inventory. Such has been the case of speakers of Zuberoan and Mixean Basque and speakers of Bearnese Gascon. This contact is shown by the great number of Gascon loanwords in the two dialects (cf., for instance, the long list of borrowings with a stressed nasalized vowel in example 6.9 in §6.2.1).[91]

5.3.4 Inhibition of the fronting process

From the parallels mentioned in §5.3.1 above, the case of the context-free fronting of American English /u/ is of special interest. This was a southern feature but now is described as covering most of the North American continent (Labov 2008: 27). In the American case, a dark [ɫ] inhibits the process when following the affected /u/, in the same way the aforementioned segments inhibit fronting in Zuberoan Basque. However, this constraint does not occur in Southern American varieties, although it does exist in all non-Southern varieties (cf. Labov et al. 2006: 152).

It may be hypothesized that the inhibition before [ɫ] was active when the sound pattern began to spread northwards but it is not active anymore, or that both sound patterns, although clearly areal, developed independently. Koops (2010: 113) weighs both possibilities and concludes that these sound patterns represent two processes.[92] This constraint is still active in non-Southern dialects, where the degree of fronting is even higher than in the Southern dialects (cf. Labov et al. 2006: 153), although this sound change is described as being already complete there (cf. Baronowski 2008).

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91 Hualde (p.c.) proposes a different approach for the spread of this sound pattern. According to him, the sound change may have started as a phonetically gradual, lexically abrupt process, perhaps in northern France. From there, it may have spread as phoneme substitution, rather than being phonetically gradual (cf. Hock 1991: 433ff. for a parallel sound change in Dutch). By the time it got to the Gascon area it must have been this type of process: Generation 1 says /pluma/, generation 2 says /pluma/ and /plyma/ and, eventually, the innovative pronunciation prevails. In the case of bilingual Gascon-Basque speakers, a generation of speakers would have learned both /pluma/ and /plyma/ in Gascon as two pronunciations of the same word. These speakers, when speaking in Basque would tend to produce /lyma/ alongside older /luma/. To the extent that these are two sounds that are perceived as different, the phonetic ambiguity present before an apical /s/ or /r/ may have resulted in ambiguity in categorization. According to him, chances are that phonetic motivation was no longer relevant in the adoption of the process in Basque.

92 Koops discerns two different kinds of "fronted u" in the Houston Anglos dialect, which "differ in a number of fine phonetic details" (2010: 119). According to him, these two types of /u/ show the properties of Southern fronted /u/ and the general American palatalized back vowel.

The inhibition of English /u/ > /ʉ/ by a following dark [ɫ] may be attributed to the degree of shared gesture of the consonant and the affected vowel. The degree of coarticulation in tautosyllabic /ul/ sequences is extreme, and this, coupled with the "back" specification for the lateral, is ultimately inhibitory.

The consonants that inhibit palatalization in Zuberoan do not fit this description. However, Recasens and Pallarès (2001) suggest reasons for the resistance to coarticulatory processes in a combination of place and manner that may illuminate the process. As Recasens and Pallarès (2001: 274) point out, tongue dorsum coarticulation data show that highly constrained consonants have large coarticulatory effects in contiguous vowels and can inhibit vowel dependent effects (Fowler & Saltzman 1993). According to them, some consonants involving apical activity of the tongue also require a concrete dorsal placement of the tongue, and this may inhibit neighboring vowels from articulatory processes towards the palatal zone:

> *It thus appears that consonants involving demanding manner requirements (and little dorsopalatal contact) block consonantal and vocalic effects at the palatal zone, i.e., apical vibration for r, frication for s and, less so, laterality and the formation of a secondary lingual constriction for dark ɫ* (Recasens & Pallarès 2001: 288)*.

Thus, this "secondary" placement of the tongue dorsum may play a role in inhibiting palatalization in Zuberoan Basque. While the shift from /u/ to /y/ involves a fronting in the placement of the tongue, the consonants "involving demanding manner requirements and little dorsopalatal contact" crucially require a lowering and back placement of the tongue dorsum, and thus inhibit /u/-fronting. Recall that the group of segments or clusters that inhibit the process include precisely the appropriate segments: the apical rhotic /ɾ/ and the apical sibilants /s̺/, /z̺/ and /ts̺/ —in older stages of Zuberoan and in Mixean— but not the laminal sibilants /s̻/, /z̻/ and /ts̻/, which deviate from the other sibilants precisely in being produced with the blade of the tongue instead of the tip and thus do not require a back placement of the tongue dorsum. Interestingly, the only rhotic-obstruent clusters included /rtʰ, rt, rd/ are those involving activity of the tip of the tongue in both consonants. Although the production of [t] in sequences such as /ata/ does not involve alveolar contact of the tip of the tongue, i.e. [at̪a], the realization of the /t/ after a rhotic is more retracted than in intervocalic contexts. This can shed light on why these clusters

inhibit fronting, while sequences like /tut/ favor it. The other rhotic-obstruent clusters do not inhibit fronting, since they involve non-coronal segments as second members. Although in a less extensive way, the fronting is also inhibited before the trill (see example (5.9) in §5.2.1).

The segments that inhibit fronting in Mixean Low Navarrese, namely /k/ and /g/, are also produced with a back placement of the tongue dorsum, so that they could potentially create the same coarticulatory effect that the segments that inhibit the process in Zuberoan Basque produce. It is worth mentioning that, as stated above, productions of the sequence /kuk/ by speakers of German show instances of /u/ into the /y/ space but, crucially, only in the onset, while in the case of /tut/ the coarticulation occurs in the offset as well as the onset (Harrington et al. 2011, Harrington 2012: 106). Thus, the VC coarticulation of the sequence /uk/ seems to result in a back vowel, which is consistent with its status as an inhibiting segment in Mixean Low Navarrese.

In short, inhibition of u > y is a consequence of coarticulatory effects due to the tongue dorsum lowering and backing of the tongue dorsum required for the production of the set of coronal segments and clusters /ɾ, s̺, z̺, ts̺, rtʰ, rt, rd/, which demand precise movements of the tip of the tongue.

5.4 Related processes

Alongside the fronting processes discussed in §5.2, other processes have contributed to establish the modern distribution of Zuberoan high vowels. This section provides an overview of the phonological processes that followed high back vowel fronting.

5.4.1 Raising of (phonetically) nasalized [õ]

The raising of the mid back vowel /o/ to /u/ is probably the most important among the sound patterns developed after the fronting of /u/. These processes involve the sporadic raising of many phonetically (i.e. contextually) nasalized instances of [õ] (cf. Egurtzegi in prep., §7.2) and the systematic raising of phonological (i.e. contrastive) /õ/ (cf. Michelena 1977 [2011]: 38). While the sporadic raising of [õ] is known, to different extents, in all northern dialects, the systematic raising of /õ/ is only found in Zuberoan. These vocalic

items eventually merged with the instances of /u/ in contexts that inhibited fronting in Zuberoan (cf. §5.2). The phonetic analysis of this process is based on the ambiguity in height inherent to nasalized vowels (cf. Beddor et al. 1986). I will further discuss these sound patterns in §7.2.

5.4.2 Assimilation of high vowels

Once the innovative vowel /y/ was established in the Zuberoan dialect, its frequency was increased by means of different vowel assimilation processes, all of them involving the assimilation of a high vowel —i.e., either of /u/ or /i/— to /y/.

Although the /u/-fronting did not take place before the flap, the apical sibilant fricative and the rhotic-dental stop clusters (§5.2.1), some maintained /u/s were subsequently assimilated to a following /y/. This assimilation was quite common, as shown by the examples in (5.15):

(5.15) Anticipatory assimilation of /u/ to /y/

Std. Bsq.			**Lit. Z**	**Trans.**	**Gloss**
puru^{LW}	**purü*	>	*pürü*	[pyɾy]	'pure'
buru	**burü*	>	*bürü*	[byɾy]	'head' (cf. *bürzagi* 'leader')
usu^{LW}	**usü*	>	*üsü*	[ys̺y]	'usually' (once *usütto* 'usually')
usurpatu^{LW}	**usürpatü*	>	*üsürpatü*	[ys̺yrpaty]	'to usurp'
aingeru^{LW}	**aingurü*	>	*aingürü*	[ai̯ŋgyɾy]	'angel'
gurutze^{LW}	**kurütxe*	>	*kürütxe*	[gyɾyʧe]	'cross'
kusku	**kuskü*	>	*küskü*	[kys̺ky]	'skin, shell, peel, cocoon'
iguriki^E	**egurü*	>	*egürü(ki)*	[eɣyɾyki]	'to hope, wait'⁹³
inguru^{LW}	**üngurü*	>	*üngürü*	[yŋgyɾy]	'surroundings'
liburu^{LW}	**liburü*	>	*libürü*	[liβyɾy]	'book'
aiduru	**haidurü*	>	*haidürü*	[hai̯ðyɾy]	'to be expecting, waiting for'
-	**Altzurükü*	>	*Altzürükü*	[alt͡s̺yɾyky]	(place name)
-	**hustütx*	>	*hüstütx*	[hys̺tyʧ]	'stupid'
burdina^E	**burdüña*	>	*bürdüña*	[byrd̥yɲa]	'iron'⁹⁴

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93 This verb has a wide range of dialectal variants including Lit. Z *egürüki, ügürüki*; L, LN *iguriki*^E, *iguruki*. The i/u alternation in the third syllable appears in all continental dialects, so that an anticipatory /u-y/ assimilation (**egürüki*) may be assumed for the variants *egürüki* and *ügürüki* instead of a perseverative /y-i/ assimilation (***egüriki*).

A similar kind of anticipatory assimilation affected the other high vowel, rounding most instances of /i/ to /y/ when preceding /y/, so that all high vowels assimilate to a following high round fronted vowel in Zuberoan. Examples in (5.16) give account of this assimilation:

(5.16)   *Anticipatory assimilation of* /i/ *to* /y/

Std. Bsq.	Lit. Z	Trans.	Gloss
irudi[E]	*üdüri*	[yð̞yɾi]	'image'
iruditu	*üdüritü*	[yð̞yɾity]	'to imagine'
ilun[E]	*ülhün*	[yʎɦyɲ]	'dark'
liburu[LW]	*lübürü*	[lyβyɾy]	'book'
ikuzi[E]	*ükhüzi*	[ykʰyʂi]	'to clean, baptize'
itzuli[E]	*ützüli*	[yt̠s̠yʎi]	'to return'
izurri	*üzürri*	[yʂyɾi]	'plague'
bihurr[E]*-i*	*bühürri*	[byɦyɾi]	'crooked'
bihurtu	*bühürtü*	[byɦyɾty]	'to become'
inguru[LW]	*üngürü*	[yŋgyɾy]	'surroundings'
iturri[E]	*üthürri*	[ytʰyɾi]	'fountain, source'
iñurri	*üñhürri*	[yɲɦyɾi]	'ant'
irun[LW]	*ürün*	[yɾyɲ]	'to spin (yarn)'
higuin[E]	*hügün*	[hyɣyɲ]	'stink'
itsu[E]	*ütsü*	[yt̠sy]	'blind'
higuingarri	*hügüngarri*	[hyɣyŋgari]	'disgusting'
iguriki[E]	*ügürüki*	[yɣyɾyki]	'to hope, wait' (cf. *egürüki*)
paradisu[LW]	*paradüsü*	[pʰaɾað̞yʂy]	'paradise'
apezpiku[LW]	*aphezküpü*	[apʰes̠kypy]	'bishop'
estudiatu[LW]	*üstüdiatü*	[ystydiaty]	'to study'
zizeilu[LW]	*züzülü*	[s̠ys̠yʎy]	'bench' (cf. BN *zizilu*)
bilur	*büllhür*	[byʎɦyr]	'rope, tie'

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94   This may be seen as not directly coming from Bsq. *burdina*[E] but *bürdüña < *burdüña < *burduña < burdiña*, cf. B *burruña*. In any case, the variant *burruña* is not very widespread. If this were a perseverative assimilation (**bürdiña > bürdüña*) instead of an anticipatory assimilation (**burdüña > bürdüña*), it would be the only example of unexpected fronting of /u/ before a rhotic-dental stop cluster (cf §5.2.1).

All examples given in (5.15-16) involve instances of anticipatory assimilation. A reasonable question is whether this assimilation could also occur perseveratively. Examples (5.17-18) show instances of perseverative assimilations parallel to the assimilations in (5.15-16), but perseverative assimilations do not seem to be as common as anticipatory assimilations. Only one instance of perseverative assimilation of /u/ to /y/ was found, while perseverative assimilations of /i/ to /y/ do not seem to be that infrequent. Nevertheless, it is worth recalling that no counterexamples to this assimilation are found in the examples (5.2-4), i.e. no instance of inhibition of /u/ fronting showed a second high rounded vowel /u/ (> /y/) within the morpheme.

(5.17)   *Perseverative assimilation of* /u/ *to* /y/

Std. Bsq.	Lit. Z	Trans.	Gloss
kukuso	*küküso*	[kykyɡo]	'flea'

(5.18)   *Perseverative assimilation of* /i/ *to* /y/

a)	Std. Bsq.	Lit. Z	Trans.	Gloss
	urritz	**ürrütz**	[yryt͡s]	'hazel tree'
	sugibel	**sükhübel**	[ʂykʰyβ̞el]	'log for the fire'

b)	Std. Bsq.	Lit. Z	Trans.	Gloss
	iñurri	*üñhürrü*	[yɲɦyry]	'ant' (cf. *üñhürri*)
	-	*ülhüngü*	[yʎɦyŋgy]	'thunder, lightning' (cf. *ilhüngi, ülhüngi*)
	uzki[E]	*üzkü*	[yʂky]	'butt, anus'
	hazkurri	*hazkürrü*	[haʂkyry]	'food, nourishment'
	zubi[E]	*zübü*	[ʂyβy]	'bridge'
	barruki[E]	*barrükü*	[baryky]	'stable, barn, corral'

In the example (5.17), the similar, reduplication-like sequence in the first two syllables may have played a role in the fronting of the second vowel.

While the two examples in (5.18a) seem to be clear instances of perseverative assimilation, the examples under (5.18b) may be interpreted as instances of the reanalysis depicted in example (5.22) in §5.4.3 as well (see Camino 2009a: §8.4.1 on this).

The assimilation of high vowels is not necessarily systematic in all varieties of

Zuberoan, as shown by forms like *librü*, *libürü*[LW] (alongside *lübürü* 'book'), *ezkiribü* 'scripture', *nizün* '(auxiliary verb, 1st-2nd-past tense)', etc. Forms with the suffix *-tü* like *gorritü* 'to make red' or *irakhurtü* 'to read' show that the verbal participial suffix *-tü / -dü* does not trigger the assimilation. It is not clear whether high vowel assimilation affected newer instances of /u/ (from [ð], cf. Egurtzegi in prep., §5.4.1 and §7.2) that were developed after the fronting or not: we find *ezküntü* (Std. Bsq. *ezkondu*[LW] 'to marry') alongside *khuntü* (Std. Bsq. *kontu*[LW] 'issue') in a sentence from the 19th century writer Etchahun.[95] However, note that *ezküntü* 'to marry' should not be subject to assimilation due to the etymological /y/ being that of the suffix *-tü* (*ezkün-tü*).

The assimilation of high vowels may have had two different phases, namely /i/ > /u/ and /u/ > /y/. This is inferred from the presence of /u/ > /y/ in Zuberoan and from /i/ > /u/ assimilation being present in the neighboring Roncalese dialect. The proposal of two phases would help to account for examples such as *iduri* > *üdüri* 'image', in which the tap following the second vowel would have prevented the fronting. However, if the assimilation of /i/ > /u/ preceded this process, a word-initial /y/ (*iduri* > **uduri* > **üduri* > *üdüri*) would have been the source of the fronting of the second vowel.

5.4.3 Unrounding and raising in stem-final vowels

Some morphonological processes common to most Basque dialects but realized in a different way in each variety are the changes affecting stem-final vowels (cf. Michelena 1977 [2011]: 93f., 99, etc.), which happen after a suffix beginning with a vowel is added to a noun that ends in a vowel. Zuberoan has three different processes that give rise to non-etymological high vowels in such contexts: stem-final *-y* and *-e* give rise to *-i*, while stem-final *-o* becomes *-u* when a vowel-initial suffix is added to it. Examples of these processes are given in (5.19-21):

(5.19)   Unrounding of stem-final /y/ *to* /i/

Uninflected	Inflected	Trans.	Gloss
saintü	*saintia*	[s̺aintia]	'saint, holy (det.)' (Std. Bsq. *saindu*[LW])
infernü[LW]	*infernia*	[iɱfernia]	'hell (det.)'
zelü	*zelian*	[s̺elian]	'in (the) sky/heaven'

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95   *Ezküntü direnian, gero beste khuntü* 'Once they are married, other issues' (cf. Etxahun 1969-70: 398).

Uninflected	Inflected	Trans.	Gloss
ürgüillü	*ürgüilliaren*	[yrɣyi̯ʎiaɾen]	'(of the) pride' (Std. Bsq. *orguilu*[LW])
eskü[E]	*eskia*	[es̺kia]	'hand (det.)'
mündü[LW]	*mündia*	[myn̪dia]	'world (det.)'
negü[E]	*negian*	[neɣi̯an]	'(in) winter'
ordü	*ordian*	[orðian]	'(in) time'
küskü	*küskia*	[kys̺kia]	'skin, shell, peel, cocoon (det.)'
paradüsü	*paradüsian*	[paɾaðys̺ian]	'(in) paradise' (Std. Bsq. *paradisu*[LW])

(5.20)   Raising of stem-final /e/ to /i/

Uninflected	Inflected	Trans.	Gloss
alte	*altia*	[al̪dia]	'side (det.)' (Std. Bsq. *alde*[E])
kunte	*kuntia*	[kun̪tia]	'count (det.)' (Std. Bsq. *konde*[LW])
bake[LW]	*bakia*	[bakia]	'peace (det.)'
uhure	*uhuria*	[uh̃uria]	'honor (det.)' (Std. Bsq. *ohore*[LW])

(5.21)   Raising of stem-final /o/ to /u/

Uninflected	Inflected	Trans.	Gloss
balio	*baliua*	[baliua]	'value (det.)'
akto[LW]	*aktuak*	[aktuak]	'act(s)'
gozo[E]	*gozua*	[gos̺ua]	'sweet (det.)'
aro[E]	*arua*	[aɾua]	'age (det.)'

Michelena (1977 [2011]: 108) —and Camino (2009a: 196)— described a reanalysis process based on similar alternations to those shown in (5.19) and (5.20), respectively. In this process, some words ending in *-e* (or *-i*) changed to *-ü* after the reanalysis of *-ü* as the ending of non-definite forms whose finite form ends in *-ia* (cf. *mündü*[LW] – *mündia* 'World', *eskü*[E] – *eskia* 'hand', *bürü* – *buria* 'head'). Due to the similar ending of the definite forms of words with a non-definite form ending in *-e*, *-i* and *-ü* —i.e. *-ia*, cf. examples (5.19) and (5.20)—, some forms ending in *-e* or *-i* were "corrected" to end in *-ü*. The examples in (5.22) are from Camino (2009a: 196), who also gives examples of Low Navarrese from the region of Mixe, such as *azerü* 'fox' (Std. Bsq. *azeri*[LW]) or *argizaitü* 'full moon, moon shift' (< *argizaite*) and one of *-ü* to *-e* from the same region: *dole* (*iten*) < *dolü*[LW] (*egiten*) 'be sad,

have compassion'.[96]

(5.22) Reanalysis of the final vowel after stem-final raising (Camino 2009a: 196)

Model uninfl. – def. sg.	Etymological form uninfl. – def. sg.	→	Reanalyzed form uninfl. – def. sg.	Gloss
mündü – mündia	: *drole – drolia*	→ *drolü – drolia*		'weird'
eskü – eskia	: *arrabote – arrabotia*	→ *arrabotü – arrabotia*		'pelota court'
bürü – buria	: *bederatzi – bederatzia*	→ *bederatzü – bederatzia*		'nine'

The instances of progressive assimilation of word-final *-i* to *-ü* in (5.18b) may also be interpreted as a morphological reanalysis followed by a proportional analogy, as in the examples in (5.22).

5.4.4 Sporadic dialectal variation between /i/ and /u/

Given the high degree of interaction that the high vowels seem to exhibit in eastern Basque varieties such as Zuberoan or Roncalese, it may not be surprising to find instances of (seemingly) context-free dialectal variation between /i/ and /u/. However, this kind of vowel changes is sporadic and geographically restricted. Examples (5.23-24) list some of these along with their diverse variants:

(5.23) Instances of sporadic /u/ > /i/

Std. Bsq.	Lit. Z	Trans.	Gloss
gorputz[LW]	*khorpitz*	[kʰorpit̻s̻]	'body'
mutil[LW]	*mithil*	[mitʰiʎ]	'boy' (cf. also older Z *müthil*)
ume[E]	*hime*	[hime]	'child' (cf. also Z *hüme*)
garizuma[LW]	*goroxima*	[goɾoʃima]	'Lent' (cf. also Z *gorozüma*)

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96 A similar reanalysis of final *-i* to *-e* (which also have *-ia* as definite form) is found in examples such as Std. Bsq. *hasi*[E] > Z *hase* 'to start' or Std. Bsq. *orrazi*[E] > Z *orraze* 'comb'.

(5.24) Instances of sporadic /i/ > /u/

a) | **Std. Bsq.** | **Lit. Z** | **Trans.** | **Gloss**
--- | --- | --- | ---
zerbitzatu[LW] | *zerbütxatü* | [ʂerβyʧaty] | 'to serve'
aurtiki[E] | *urthuki* | [urtʰuki] | 'to throw, throw away' (cf. also Z *urthiki*)[97]

b) | **Std. Bsq.** | **Lit. Z** | **Trans.** | **Gloss**
--- | --- | --- | ---
kurrinka[E] | *kurrunka* | [kuruŋka] | 'growl, grunt'
ausiki[E] | *usuki* | [uʂuki] | 'to bite, sting' (cf. also Z *usiki*)[98]

In contrast to the instances of /o/ > /u/ raising in nasal contexts (see §7.2), these sporadic changes do not seem to have a fixed chronology: While the raised vowels remain unperturbed regarding the fronting and thus can be distinguished from the old *u which fronted to /y/ in Zuberoan (see §5.2), the /u/s that arise from /i/ can either be fronted (5.24a) or maintained as such (5.24b), potentially pointing towards different chronologies for each word. As about the /i/s coming from a high rounded vowel in (5.23), in most of the cases —cf. *müthil*, *hüme* and *gorozüma*— it may seem as if /y/ were unrounded due to a hypercorrection attributing its rounding to the nasal labial in contact with it —and thus /u/ > /y/ > /i/. The case of *korpitz* has probably been similar, although I am not aware of any attestation of **korpütz* in Zuberoan.

5.5 A brief look at the neighboring Romance languages

In the Romance languages in contact with Zuberoan, Vulgar Latin long *ū* (/uː/) was regularly fronted to /y/. This happened in French (Bourciez 1967: 94) and Occitan (Wheeler 1988: 247) as well as in Gascon (Rohlfs 1977: 124), which is usually considered an Occitan dialect (although not necessarily, cf. Chambon & Greub 2002, 2009) but deviates from the other Occitan dialects to some extent. Example (5.25) gives instances of this fronting in both Gascon and French and offers Latin forms for comparison. The examples of Bearnese Gascon are taken from Lespy and Raymond (1887 [1998]) and Palay (1932-34 [1980]). The transcriptions of Donzacese Gascon are taken from Kelly (1973):[99]

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97   One instance of a fronted variant was found: *aurtüki*.
98   Maister used the fronted *üsüki*.
99   Examples of the fronting in Occitan include Occ. *un* /yn/ 'one (masc.)', Occ. *tu* /ty/ 'you', Occ. *segur* /segy/ 'safe, sure'.

(5.25) /u/ fronting in Gascon and French

Brn. Gsc.	Dzc. Gsc.	Fr.	Transcr.	Lat.	Gloss
utile	/yˈtile/	*utile*	/ytil/	*ūtĭlis*	'useful, helpful'
lua, lu[100]	/ˈlyno/[101]	*lune*	/lyn/	*lūnam*	'moon'
ua, u	/ˈyno/	*une*	/yn/	*ūnam*	'a, one (fem.)'
lèituga	/lɛjˈtygo/	*laitue*	/lety/	*lactūcam*	'lettuce'
dur	/dyr/	*dur*	/dyʁ/	*dūrum*	'hard'
cuu, cu	/kyw/	*cul*	/ky/	*cūlum*	'ass'

One could think that this sound pattern developed during an older, common period of the languages, as in Gallo-Romance, for instance, which is usually placed from the end of the 5th century until the middle of the 9th century. However, Hall (1976) does not reflect this sound change in his transcriptions of Early Old French.

In fact, /u/ > /y/ fronting took place after the so-called second palatalization, which is taken as the crucial process in the separation between northern and southern Gallo-Romance, i.e. Old French and Old Occitan (cf. Buckley 2009: 32).[102] Examples such as Lat. *cūram* > O. Fr. *cure* /kyr/ 'cure' (and not **/ʧyr/) or Lat. *cūpam* > Fr. *cuve* /kyv/ 'barrel' (and not **/ʧyv/) give account of this relative chronology (Bourciez 1967: 95; Buckley 2009: 39).

The Second (or Gallo-Romance) Palatalization began around the end of the 5th century or the beginning of the 6th (apud Meyer-Lübke 1890: 354ff.), but the aforementioned /k/-palatalization did not develop until much later, being usually placed around the 7th century (Fouché 1958: 203ff.; Bourciez 1967: 94f.; Matte 1982: 102; Buckley 2009: 38f.).

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100 Intervocalic /n/ is dropped in Gascon (Anglade 1921: 185) as in Gsc. *lua* /ˈlya/ < Lat. *lūnam* 'moon', Gsc. *ua* /ˈya/ < Lat. *ūnam* 'a, one (fem.)', Gsc. *prua* /ˈpɾya/ < Lat. *prūnam* 'coal' or Gsc. *fiestra* /hiˈestɾa/ < Lat. *fenestram* 'window'.

101 Lat. word-final *-a* is maintained as /a/ in a region of Béarn. However, in most Bearnese regions, Lat. *-a* is raised to /œ/ or /o/ (Biu, p.c.). Lat. *-a* is raised to /o/ in most Gascon dialects, including the Donzacese variety in example (5.25) —as well as in Occitan—, and raised to /e/ in Landes and in the Bayonne-Orthez region (cf. Rohlfs: 1977: 125). In addition, the Bayonnese variety drops this final *-e* after a stressed /y/ or /i/: *lu* /ly/ 'moon' (< Lat. *lūnam*), *u* /y/ 'a, one (fem.)' (< Lat. *ūnam*), *hari* /haˈri/ 'flour' (< Lat. *farīnam*), *gari* /gaˈri/ 'hen' (< Lat. *gallīnam*).

102 Northern Occitan —which is usually taken as a transition zone (Lafont 1971: 107)— shows Gallo-Romance fronting: *chevra/chavra* 'goat', *cheira* 'dear', *chen/chin* 'dog', *chas/chies* '('s) house' (Buckley 2009: 57). In any case, Buckley (2009: 59) concludes that this sound-pattern is borrowed from French.

Thus, /u/-fronting in French may be placed in the period when the first Old French texts were written, i.e. around the 9th century (Bourciez 1967: 94f.).

/u/-palatalization is systematic in French, and has been accounted for by means of a push-chain (cf. Labov 1994: 116) in the literature. It was proposed that the raising of the mid back vowel /o/ to /u/ overcrowded the high back vowel space, which subsequently triggered the second step in the chain-shift (Haudricourt & Juilland 1949: 109, 1970: 114). This explanation, alongside its late chronology, separates the fronting of /y/ from that of /æ/ (/'a/, /a:/ > /a:/ > /æ:/ > /ɛ/), which is, as a matter of fact, one of the vowels triggering Gallo-Romance second palatalization.

It is difficult to establish a time frame for the fronting in Old Occitan, given that Lat. /u:/ is maintained orthographically (cf. Anglade 1921: 82). Anglade (1921: 84) finds instances of palatalization of /l/ before front vowels in medieval texts from the end of the 13th century, and these include fronting before graphic <u>. This evidences the fronted status of /y/ in Occitan by the end of the 13th century, but does not give us a clear date.

Dating the fronting is even more complicated within Gascon. Rohlfs (1977: 124) acknowledges this fact and proposes a rather recent time frame, without further temporal specification. Rohlfs (ibid.) proposes that the sound-pattern extended gradually from one region to another and that it was already completed by the time /o/ before a nasal raised to /u/ (cf. Egurtzegi in prep., §7.2 for Basque [õ]-raising and §7.4.1 for this process in Gascon), given that the latter was unaffected by the fronting.

In addition to /y/, both French and Gascon also have the on-glide /ɥ/, although the latter shows it only in borrowings (cf. Kelly 1973: 31, 38) such as Dzc. Gsc. /abi'tɥa/ < Fr. *habituer* /abitɥe/ 'get used', Dzc. Gsc. /abitɥɛlo'men/ < Fr. *habituellement* /abitɥɛlmã/ 'usually', Dzc. Gsc. /pɥi'sen/ < Fr. *puissant* /pɥisã/, /pɥisãt/ 'powerful', Dzc. Gsc. /si'tɥado/, cf. Sp. *situado* /situ'ado/ (examples from Kelly 1973: 31, 35). When speaking about semivowels, Kelly (1973: 38) does not give any example of [y̑].

5.6 Conclusions

In this chapter I have analyzed the fronting of Common Basque /u/, and the general evolution of /y/ in Zuberoan. I have also analyzed a corpus based on the *General Basque Dictionary* (Michelena & Sarasola 1987-2005) as well as the *Dictionnaire basque-français* (Lhande 1926-1938), checking for the phonological contexts where the process of /u/-

fronting was inhibited and comparing them to those proposed in the literature. I have confirmed that the flap /ɾ/ and the rhotic-dental clusters /rtʰ, rt, rd/ systematically inhibit fronting, while the apical sibilant fricatives /s̺, z̺/ most often do as well. Seemingly old cases of inhibition of the fronting preceding the apical sibilant affricate /ts̺/ as well as some cases before an apical trill /r/ have been found.

I have also confirmed that, as the previous literature described, not all following coronal segments inhibited fronting, since the palatalization of /u/ occurred systematically before /t/, /d/, /l/, /ʎ/, /s̪/, /z̪/, /ts̪/, /ʃ/ or /tʃ/, and regularly with only a few exceptions before /r/.

5.6.1 Phonetics of the process (and of the inhibiting contexts)

The potential importance of contact between Zuberoan and Bearnese Gascon in the spread of this sound pattern has been addressed. The model in Blevins (to appear) states that areal sound patterns may develop when listeners are exposed to perceptually salient segments (or features) through significant, continued exposure to a second language. The model predicts this sound change to be similar to other phonetically motivated, natural sound changes, as is the case of /u/ fronting in Zuberoan.

I have also proposed that the fronting of /u/ to /y/ was inhibited due to coarticulatory effects: maintenance of *u was a consequence of the coarticulation caused by consonants requiring active tongue dorsum lowering and backing. This tongue dorsum placement is required to perform the fine movements of the tip of the tongue involved in the production of inhibitory segments and clusters /ɾ, s̺, z̺, ts̺, rtʰ, rt, rd/.

5.6.2 Distribution of high vowels in Zuberoan

In addition to the fronting of /u/, I have analyzed several other processes that have played a role in the development of the modern distribution of high vowels in Zuberoan. Among them, the most important may be the raising of /o/, which only affects nasalized items and thus has been described as [õ] > [ũ] (see §7.2). I have also discussed the unrounding of /y/ to /i/ and the stem-final raising of /e/ to /i/ and /o/ to /u/.

Alongside these vowel shifts, I have also analyzed different assimilations of high vowels, all yielding new instances of /y/, either instead of an older /i/ or instead of an

instance of /u/ not affected by the fronting. These assimilations usually happened anticipatorily, but examples of perseverative assimilation of /i/ to /u/ are not rare.

We have also seen some instances of sporadic variation between high vowels, where it does not seem feasible to attribute the shift to any clear phonological condition.

In sum, most instances of Standard Basque /u/ became /y/ in Zuberoan. The distribution of /u/ in modern Zuberoan is very restricted, since it may only appear before a rhotic, /s̺/, /z̺/ or in contact with a nasal segment /m/, /n/, /h̃/ or /ɲ/, as well as stem-finally after the addition of a suffix beginning with a vowel to a stem ending in -*o*. Since all instances of old /u/ in nasal context fronted regularly and old /o/ was raised in this context, high rounded vowels contrast adjacent to nasals. High vowel assimilation has enabled an opposition before /ɾ/, /s̺/, /z̺/ and /rtʰ, rt, rd/. However, /y/ is absent from prevocalic stem-final position —since it unrounded to -*i* there—, so that the two high round vowels do not contrast in that position. Assimilation of other high vowels to /y/ has made words containing /y/ and a different high vowel scarce within the Zuberoan dialect.

5.6.3 Dialectal differences: Zuberoan vs. Mixean vs. Roncalese

The fronting of /u/ not only occurs in Zuberoan, but also in the neighboring Mixean variety of Low Navarrese Basque. In most northern subvarieties within this variety —since southern villages do not show the fronting (cf. Camino 2009b: 69)—, the fronting process has developed similarly to that of Zuberoan (in contrast to the systematic fronting in the Romance languages). The only difference is found in the group of segments that inhibit the process, which includes the velar obstruents /k/ and /g/, in addition to those found in Zuberoan.

Articulatorily, these segments are produced with a back placement of the tongue dorsum, so that they could create the same coarticulatory effect the segments that inhibit the process in Zuberoan Basque produce.

Zuberoan and Roncalese also shared a couple of the innovations discussed in this chapter, namely /u̯/ > /i̯/ glide fronting as discussed in §5.2.2 and the assimilation of high vowels depicted in §5.4.2, although the vowels involved in the assimilation were /u/ and /i/ instead of /y/ and /i/, given that Roncalese lacked /y/. The fact that the glide fronting is common to both Zuberoan and Roncalese dialects and that a second process of palatalization of the velar semivowels fronted them to /y̑/ instead of /i̯/ —yielding precisely

the segment resulting from the fronting of the high back vowel— may be interpreted as the process affecting the glides having an older chronology than the process affecting the syllabic vowels, although this is far from clear.

Given that Roncalese also shared high vowel assimilation with Zuberoan, another potential interpretation of the shared sound patterns is that the fronting of the high back vowel was active in an older stage of Roncalese. In this scenario, Roncalese and Zuberoan would have shared all sound patterns involving fronting —instead of having a similar assimilation which affected /u/ instead of /y/— with an additional later innovation that merged /y/ back with /u/ in Roncalese. The possibility of Roncalese having sub-phonemic variants of the back vowels in a manner similar to that in Zuberoan was already suggested by Michelena, who noted that it was resolved in a different way due to the contact with Navarro-Aragonese instead of Bearnese Gascon (cf. Michelena 1954 [2011a]: 647). This same idea was echoed by Camino (2011 [2014]), but it may find additional support after glide palatalization is linked to /u/ fronting based on the similar phonological contexts of both processes. In addition, this would make high vowel assimilation homogeneous in both dialects.

5.6.4 Analogous processes in neighboring Romance languages

We have seen that nearby Romance languages such as French, Occitan and Gascon all share the fronting of the high back vowel /u/. In contrast to what we found in Zuberoan, the fronting has been described as context free and exceptionless in all Romance languages that developed the process. In the Gallo-Romance languages, the back vowel fronting affected all instances of Latin /uː/, which became Vulgar Latin /u/ around the 2nd century AD. In Zuberoan, in contrast, the fronting was inhibited in some very specific phonological environments, a condition which does not seem to have a parallel in any of the Romance languages.

In addition to this, Zuberoan —as well as Roncalese— shows a different pattern of palatalization for the rising diphthongs, fronting /Vu̯/ to /Vi̯/ instead of Vy̯. This fronting, interestingly enough, shares the phonological conditions of the fronting of syllabic /u/. Zuberoan lacks the on-glide /ɥ/, probably due to the scarce and modern nature of w-based falling diphthongs in the dialect, which is present in French and, to a lesser extent, also in Gascon.

5.6.5 Chronological implications

Although the fronting process discussed in this chapter is common to all Gallo-Romance languages, this process was developed after the division of the languages of Oc and Oïl, i.e. Old Occitan and Old French. The Romance language which Zuberoan was in contact with, (Pre-)Gascon, also shares this sound pattern, and it may have been an independent Romance language since even before —the processes that made it distinct from Occitan began around the 5th century and were completed by circa year 600, according to Chambon and Greub (2002: 489). Thus, the fronting of Vlg. Lat. /u/ (< Lat. /uː/) seems to have spread geographically from one Romance language to another and ultimately into Zuberoan more than it seems to be an inherited innovation of all three Romance languages that Zuberoan took from them afterward.

According to Buckley (2009: 39), /u/-fronting can be placed around the 9th century for Old French, but, due to Occitan writing system not changing after the palatalization, the literature does not give any clear date for Occitan —it only states that /u/ produced consonant palatalization by the end of the 13th century— and even less for Gascon. If Old French were the source of the process, which seems plausible given the direction of the isoglosses, we could assume a somehow later date for the fronting in southern languages such as Gascon and, moreover, Zuberoan Basque. Thus, we can guess that Zuberoan developed the fronting some time after the 9th century, but, since we cannot guess how long a time that would be, we should place the *post quem* in the 9th century itself.

The /u/s before the apical sibilant affricate /tş̺/ seem to show a late fronting (cf. §5.2.1). The facts that /tş̺/ is one of the inhibitory segments in Mixean and that diphthong palatalization does not occur before /tş̺/ in either dialect confirm that this was initially part of the inhibitory contexts. Since all other phonological contexts are regularly maintained throughout the written attestations of different times, we may conclude that the fronting of /u/ before an apical affricate sibilant did not occur until late —maybe even around the end of the 18th century, although we cannot be certain about it— but the fronting was completed in all other contexts some centuries before that time.

Overall the Zuberoan /u/-fronting sound pattern illustrates the importance of considering perception, production and contact in the analysis of historical developments.

6 Contrastive vowel nasalization

6.1 Introduction

In this chapter the development of contrastive vowel nasalization in different Basque dialects is analyzed. This analysis is based on the differences in the emergence of contrastive vowel nasalization in the contiguous Zuberoan and Roncalese dialects, which developed different distributions of this feature.

Of modern Basque dialects, only Zuberoan and Roncalese contrast oral and nasalized vowels. However, 16th-17th century Bizkaian showed a contrast analogous to that found in Roncalese, as explicitly mentioned by the Bizkaian authors Garibay and Madariaga (cf. Michelena 1958 [2011b]: 218). Section §6.2 discusses the distributions of contrastive vowel nasality found in Zuberoan; Lapurdian and Low Navarrese and those in the rest of the Basque dialects.

In addition, this chapter includes a chronological order of the different sound changes that are mentioned throughout the chapter, all of which involve the aforementioned dialects.

This chapter, as well as §5.2 and §7.2, are based on a survey (cf. Egurtzegi 2014, in prep.) of more than 500 pages of the *General Basque Dictionary* (Michelena & Sarasola 1987-2005), in which examples involving the sound patterns under discussion were identified and analyzed as used by diverse Zuberoan authors from different periods, as well as examples from the recent dialectological literature (Camino 2009a, 2009b; Zuazo 2008). The latest resources added to that survey are the *Dictionnaire basque-français* by Lhande (1926-1938), which includes words from all eastern dialects of Basque and the Zuberoan

glossary in *Le Basque de la Basse-Soule Orientale* by Larrasquet (1939).

6.2 Different distributions of contrastive vowel nasalization

Nasalization is one of the most widespread (non-basic) vocalic features in the world's languages, together with contrastive vowel length (Ladefoged & Maddieson 1996: 298). In the UPSID database 71 out of 317 languages (%22,4) show this feature (Maddieson 1984: 130).

Most authors (first Larrasquet 1939 and then echoed by Michelena 1977 [2011]; Hualde 1993b, 2003a; Zuazo 2008: 46, etc.) describe vowels surrounding nasal consonants as nasalized in Basque. Examples of this kind of nasalization include any vowel in contact with a nasal or nasalized consonant as in the words *khatiña* /kʰaˈtiɲa/ [kʰaˈtĩɲã] 'chain', *ihitz*[E] /iˈh̃its/ [ĩˈh̃ĩts] 'dew, frost' or *ene* /ˈene/ [ˈẽnẽ] 'mine'.

Contrastive vowel nasalization is usually a consequence of the reinterpretation of the phonetic nasalization of a vowel due to coarticulation with an adjacent nasal consonant as originating in the vowel itself (cf. Ohala 1993: 247f.; Hajek 1993; Beddor 2009). In languages without contrastive vowel nasalization, the development of an opposition between oral and nasalized vowels is usually associated with the loss of a nasal consonant (cf. Ohala 1981: 186, 1989; Blevins 2004: 202; Hajek 1997). Thus, nasalized vowels are not "created" after the loss of a nasal consonant, given that they were already nasalized prior to the consonant drop, at least phonetically (cf. Ohala 1993: 248). It is typically only after the loss of the nasal consonant that they become contrastive segments and an opposition between oral and nasalized vowels arises.

In Basque, contrastive vowel nasalization arises in *VnV sequences. First, all instances of intervocalic /n/ systematically became a nasalized aspirate /h̃/ around the beginning of the Middle Ages (cf. Igartua 2008; §4.2.3).[103] Later, after the loss of the aspirates /h/ and /h̃/, vowels surrounding the nasalized aspirate /h̃/ became contrastively nasalized. Aspirated segments were lost in two ways in the different Basque dialects (§4.3): they were either dropped after the second (stressed) syllable —as in Lapurdian, Low Navarrese and Zuberoan— or they were lost altogether —as ultimately happened in the other dialects. Lastly, /h̃/ was deprived of its nasalization and merged with /h/ in Lapurdian

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103 Aquitanian roots such as *seni-* (Gorrochategui 1984) still show the intervocalic nasal stop absent in Arch. B *sẽĩ* (> Mod. B *sein*) and L, LN *sehi*[E] 'boy, servant'.

and Low Navarrese. Thus, nasalized /h̃/ is only preserved in modern Zuberoan and only in the second syllable of the word. The domain of /h/ loss and /h/ retention is depicted in (6.1), with examples of the evolution of contrastive nasalization from the inherited lexicon in (6.2a) and Latin loanwords in (6.2b):

(6.1)   Domain dependent loss of /h, h̃/

(6.2)   Intervocalic /n/ > /h̃/

a)   Inherited vocabulary

Rec. form	Mod. Z	Trans.	Std. Bsq.	Gloss
anari	*ahai*	/ahãi̯/	*ahari*[E]	'ram'
ini	*ihi*	/ih̃i/	*ihi*[E]	'rush, reed'

b)   Loanwords

Lat.	Mod. Z	Trans.	Std. Bsq.	Gloss
anătem	*ahate*	/ah̃ate/	*ahate*[LW]	'duck'
honōrem	*uhue*	/uh̃ue/	*ohore*[LW]	'honor'

Given that all laryngeals were dropped altogether from the 11th to the 14th century in the central and western dialects (apud Michelena 1977 [2011]: 169; Salaberri 2013; cf. §4.3.1), these varieties possessed nasalized vowels in any syllable. On the other hand, eastern dialects only lost aspirates from the second syllable on (cf. §4.3.2), so that vowel nasalization only developed within that domain in that area.

As a consequence, two different patterns of nasalization evolved independently in

different Basque dialects. While Roncalese vowels can contrast in nasality in any part of the word and appear in both monosyllabic and disyllabic/polysyllabic words, cf. (6.3b), in Zuberoan the same contrast is only found in the stressed syllable (cf. Hualde 2003a: 31) of oxytonic disyllabic/polysyllabic words, and it is thus absent from word-initial syllables, cf. (6.3a):

(6.3)   *Contrastive vowel nasalization in Zuberoan and Roncalese*

a)

Zuberoan	**Trans.**	**Std. Bsq.**	**Gloss**
ardǘ	/ar'dũ/	*ardo*[E]	'wine'
lehǘ	/le'hũ/	*lehoi*[LW]	'lion'
hügǘ̃	/hy'gỹ/	*higuin*[E]	'repugnance'

b)

Roncalese	**Trans.**	**Std. Bsq.**	**Gloss**
ãr	/ãr/	*har*[E]	'worm'
ẽzur	/'ẽs̬ur/	*hezur*[E]	'bone'
ũr	/ũr/	*hur*[E]	'hazelnut'
õl	/õl/	*ohol*[E]	'board'
ãria	/'ãɾia/	*harea*[LW]	'sand'
gãzta	/'gãs̬ta/	*gazta*[E]	'cheese'

The oldest written documents (excluding Aquitanian, cf. Gorrochategui 1984) show contrastive vowel nasalization in some varieties of Basque: the brief word-list compiled by the 12th century pilgrim Aymeric Picaud in his *Guide for the traveler* (*Iter pro peregrinis ad Compostellam*, book V of the *Codex Calixtinus*, written around 1140) already included items with a nasalized vowel such as <ardum>, Std. Bsq. *ardo*[E] 'wine' and <araign>, Std. Bsq. *arrai(n)*[E] 'fish' (cf. Michelena 1964 [2011b]: 51ff.); Trask 1997: 44f.).[104] This word list is assumed to be written in a High Navarrese variety of the language (cf. Michelena 1964 [2011b]: 63; Martinez-Areta 2009: 76). The name [*Eneco*] *Arçaia* (cf. *artzaina* 'the shepherd'), attested in the 13th century (Michelena 1964 [2011b]: 37), reflects another potential instance of contrastive vowel nasalization in Navarre.

In the 20th century, we find oppositions between oral and nasalized vowels in

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104   The final <-m> in *ardum* is not due to Latin accusative declension, but rather is a way of indicating a preceding nasalized vowel, as was first pointed out by Bonaparte in a letter to Webster (Webster 1881: 125, cf. Michelena 1964 [2011b]: 52). The final <-gn> in *araign* may also stand for the nasalization in the preceding vowel.

Zuberoan and Roncalese dialects. Michelena (1977 [2011]: 38) gives *hügǘ* /hy'gɣ̃/ 'repugnance' and *gahṹn* /ga'hyn/ 'foam'[105] as an example of this opposition in oxytones in Zuberoan and mentions that Roncalese distinguishes between word final diphthongs *-ãĩ* and *-ain.* and *-ãũ* and *-aun* (cf. Michelena 1956 [2011a]: 115).

In any case, the distribution of nasalized vowels is different in the two dialects. Each dialect is discussed in turn in the following sections.

6.2.1 Contrastive nasalization in Zuberoan

Nasalization in the Basque dialects evolved from the loss of the nasalized aspirate /h̃/, which regularly developed from intervocalic alveolar nasal stops (cf. Michelena 1950 [2011a]: 8f., 1977 [2011]: 171; Igartua 2008).[106]

Given that modern Zuberoan maintains both laryngeals (as observed by Lafon 1958 [1999] and phonologically analyzed by Hualde 1993b; cf. Egurtzegi 2013b; §4.2.3 on /H/ in Zuberoan) in the first two syllables of the word (cf. *ahái*[E] /a'h̃ai̯/ 'ram', *ahántzi*[E] /a'h̃antʃi/ 'forget', *aháte*[LW] /a'h̃ate/ 'duck', *haiña* /'hai̯ɲa/ comm. *harea*[LW] 'sand', etc.), this dialect did not develop contrastive vowel nasalization in contexts where /h/ versus /h̃/ was maintained, namely before the onset of the second syllable. On the other hand, Zuberoan —as well as the other eastern dialects (cf. Egurtzegi & Elordieta 2013; §4.3.2)— lost all laryngeals after the second syllable (cf. Michelena 1950 [2011a]: 18f., 1977 [2011]: 177), i.e. in the onset of σ₃, σ₄, etc. As a consequence of the drop of /h̃/, nasalized vowels may be found in this particular domain. This domain-dependent loss of /h̃/ gave rise to a restricted distribution of the vowel nasalization contrast.

In modern Zuberoan, stressed word-final vowels can be contrastively nasalized (cf. Hualde 1993b, 2003a: 31).[107] This nasalization arose after the loss of the etymological source of this feature. Contrastively nasalized vowels are the result of the loss of intervocalic /-h̃-/ in the final syllable of the word. Due to the very restricted environment

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105 The etymology of this form is unclear. The oxytonic stress may be explained as resulting from a contraction from previous **gahurin* (cf. L *ahurin*). Michelena proposed **babune* (Michelena 1977 [2011]: 124), but this seems rather complicated, since this form would give rise to a nasalized vowel and the stressed vowel would not contrast with Z *hügǘ* < **higuni/e* (v. Michelena 1977 [2011]: 123) as it does.
106 Nevertheless, Michelena did not reconstruct two different laryngeal phonemes.
107 Zuberoan has an unmarked penultimate stress pattern (cf. Michelena 1977 [2011], 1957-58 [2011a]; Hualde 1993b, 1997a, 1999a, 2003b; Elordieta 2011a; Egurtzegi 2013a, Egurtzegi & Elordieta 2013; §3.2.1, etc.).

where these segments developed, inherited words that have nasalized vowels are very scarce in this dialect. However, borrowings have increased the number of words with nasalized segments.

Phonologically nasalized vowels developed internally after the loss of /h̃/. After the loss of all aspirates in the third syllable, vowels that were phonetically nasalized due to an adjacent /h̃/ lost the segmental source of their phonetic nasalization. In Zuberoan, as well as in Roncalese, peninitial stress shifted again towards a demarcative paroxitonic stress. Then, these vowel encounters were simplified or diphthongized, and the stress-carrying vowel was now in the last syllable of the word (cf. §3.4.3; Egurtzegi & Elordieta 2013).

(6.4)   Development of Zuberoan word-final stressed nasalized vowels

Recons. Process	**Zuberoan**	**Trans.**	**Gloss**
*ardáno > *ardáh̃o > *ardã́o> *ardȭ́ >	*ardũ̃́*	/ar'dũ/	'wine'
*higúni > *higúh̃i > *higũ̃́i >	*hügṹ́*	/hy'gỹ/	'repugnance'

Most native Basque words at this stage were not longer than three syllables. As a consequence, the loss of glottal fricatives can be described as occurring in the post-tonic third syllable when the word-stress fell on the second. This loss produced contrastively nasalized vowels on both sides of the lost laryngeal, namely in the second and in the third syllables. Some time after that, stress was reanalyzed as occurring on the penultimate syllable instead of the second (probably in trisyllabic words, cf. Michelena 1977 [2011]: 344f.; §3.4.3). With the development of this new stress system, nasalized vowels that were located in the stressed penultimate syllable of the word were prominent and may have been regarded as the source of the nasalization, which extended to preceding and following vowels. Lastly, vowel blendings and simplifications created the modern distribution of nasalized vowels in Zuberoan Basque, which are mostly word-final (cf., however, example 6.7). This sequence of processes is depicted under (6.5):

(6.5)   *Processes involved in the development of Zuberoan* stressed nasalized vowels

	Process	Oxytonic words	Paroxytonic words
	Reconstructed form[108]	*ardano* 'wine'	Lat. *arēna* 'sand'
i	/n/ > /h̃/ /V_V	*ardah̃o	*areh̃a
ii	Peninitial stress	*ardáh̃o [ar'dãh̃õ]	*aréh̃a [a'ɾẽh̃ã]
iii-a	Metathesis of /h̃/ in σ>2	-	*haɾ̃ẽã
iii-b	Deletion of /h̃/ in σ>2	*ardã̃õ	-
iv	[+2] > [-2] stress reanalysis[109]	*ardã̃õ	*haɾ̃ẽã
v	Nasalization in σ́[110]	*ardã̃o	*haɾ̃ẽa
vi-a	VV blending/simplification	*ardṍ	-
vi-b	e.V raising	-	*haɾ̃ía
vii	Raising of [õ]	*ardṹ	-
viii	Restitution of /n/ /i_	-	*haríña

Due to the domain-restricted origins of the Zuberoan contrastive vowel nasalization, there are no contrastively nasalized vowels in the first syllable of inherited words. This is a consequence of the dropped /h̃/s being located from the third syllable onward. Nasalized aspirates in the second syllable were maintained in Zuberoan (cf. **ini* > *ihi*[E] /'ih̃i/ 'reed'). Thus, nasalized vowels developed not before the second syllable of the word. Native Zuberoan words do not develop nasalization in the first syllale. This limitation distinguishes Zuberoan from Archaic Bizkaian and Roncalese.

Stressed word-final nasalized vowels were also incorporated into Zuberoan in borrowings from Bearnese Gascon. Thus, the scarce nasalized vowels in word-initial syllables are found in monosyllables with nasalized vowels borrowed from Gascon (cf. *fĩ*[LW] 'fine, prudent' and *lĩ*[LW] 'linen'). Native Zuberoan words would not result in monosyllables with nasalized vowels, given that the loss of /h̃/ only occurred from the third syllable onward.

Many authors (cf. Michelena 1977 [2011]; Zuazo 2008: 46) describe vowels

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108 The reconstructed form probably had no word-level stress but phrase-level stress, cf. Egurtzegi & Elordieta 2013, §3.7.2.

109 The shift in this step may not be apparent, but it implies the relocation of the stress from the central to the Eastern type (cf. Egurtzegi & Elordieta 2013, §3.4.3). It may be represented as [σσ́]σ > σ[σ́σ].

110 Step (vi) implies the reinterpretation of the nasality as originating from the stressed syllable. The nasalization of the second vowel is thereby deemed phonetic (i.e. contextual) by the listener. This may be represented as follows: the intended item /ar'dãõ/ was produced by the speaker as [ardãõ] and heard as [ardãõ], but hyper-corrected (cf. Ohala 1993) by the listener to /ar'dão/.

surrounding nasal consonants as nasalized —without specifying whether the nature of this nasalization is active or passive. Hualde (1993b, 2003a: 31) specifies that, in examples such as *khatiña*[LW] [kʰaˈtĩɲã] 'chain', *ama* [ˈãmã] 'mother' or *ahate*[LW] [ãˈh̃ãte][111] 'duck', every vowel in contact with a nasal consonant is phonetically nasalized. Vowels in contact to nasals or nasalized consonants /n/, /m/, /ɲ/ or /h̃/ are not considered contrastively nasalized. For example, I suggest *gasná* not ***gasnã̌* (< *gaztana) 'cheese', *ah̃áte* not ***ãh̃ǎte* (< Lat. *anătem*) 'duck'), etc.

The case of the final vowel in *gasná*, *gazná* [gazˈnã], Std. Bsq. *gazta*[E] 'cheese' is complicated. This vowel is probably not contrastively nasalized from a modern phonological perspective[112] —due to its nasalization being contextually predictable, thus /gazˈna/—, but it had (at least) a contrastively nasalized final /ã/ prior to the simplification of the heterosyllabic vowel cluster (**gaznǎ.ã* > *gasná*), and it is different from previously mentioned examples in being an oxytone as a result of this simplification.[113]

As a consequence of the very limited domain where contrastively nasalized vowels developed in Zuberoan, contrastively nasalized vowels are infrequent in the inherited lexicon of this dialect. In addition, no nasalized diphthong has been maintained in modern Zuberoan, given that they were monophthongized. The modern varieties of this dialects possess only nasalized monophthongs. This also distinguishes Zuberoan from Roncalese and Archaic Bizkaian (cf. §6.2.2). Examples of words that illustrate the processes in (6.5) in potentially inherited vocabulary are shown in (6.6):

(6.6)   *Zuberoan word-final nasalized vowels in (potentially) inherited vocabulary*

Zuberoan	Trans.	Std. Bsq.	Gloss
ardǖ	/arˈdũ/	*ardo*[E]	'wine'
hügǖ	/hyˈgỹ/	*higuin*[E]	'repugnance'

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111   Note that, although phonetic nasalization will only be transcribed while discussed, this is true for all the examples in the language.

112   In any case, phonetic measurements of its final vowel (in comparison to vowels affected by contextual nasalization) should shed light on this issue. Our expectation is that the dominant allophonic pattern would likely push this vowel into a classification of predictable nasalization.

113   The evolution of the reconstructed form *gaztana to Zuberoan *gasná* 'cheese' may be proposed to be as follows: *gaztana > **gaztah̃a* > **gaztǎ̃ã* > *gaztǎ (cf. *ardǖ* 'wine' < *ardǒ < **ardǎ̃õ* < **ardah̃o* < *ardano), with two other changes (/z/ > /s/ and /t/ > /n/) that differentiate western *gazta* and eastern *gasna*. These changes may be due to an analogy with *esne* 'milk' (Blevins, p.c.). The potential anticipatory assimilation of /t/ to /n/ in *gasná*, would not be as expected as that affecting a voiced stop. For the assimilation of /d/ to /n/ in a nasal context cf. the variant of *ardo* L, LN *arno* 'wine' and the even more illustrative LN, Z *anho* 'wine', which maintained the /h/, metathesized to the second syllable, presumably after an early loss of the rhotic.

Zuberoan	Trans.	Std. Bsq.	Gloss
gorriü̃́	/go'rjũ/	-	'reddish mushroom'
hazkü̃́	/ha̯s'kũ/	*azko(i)n*[E]	'badger'
Xiberü̃́[E]	/ʃibe'rũ/	*Zuberoa*	'Zuberoa (region)'

Although the list in (6.6) is already short, it may be further reduced by any of the items listed under (6.6) being identified as a loan in the future.

In addition to the examples of nasalized vowels in stressed word-final position shown in (6.6), some words followed steps i-v in (6.5) but did not undergo blending or simplification of the nasalized hiatus. These words have a nasalized vowel in stressed position; though the vowel is not word final, it is followed by a low vowel /a/:

(6.7)   *Zuberoan contrastively nasalized vowels in stressed penultimate syllables*

Zuberoan	Trans.	Std. Bsq.	Gloss
orrü̃́a	/o'rũa/	*orro*[E]	'roar, bellow'

In the cases depicted in (6.7) —as well as (6.8b) and (6.9c)— the /ĩ/ or /ũ/ is not in the final syllable but in the stressed penultimate, and consistently followed by /a/. The low vowel in (6.7) may have been added after a reanalysis of the article -*a* as belonging to the root. The nasalized vowel is in the second syllable of the word (as opposed to the nasalization in the first syllable developed within Roncalese and Archaic Bizkaian, cf. §6.2.2), as expected from the analysis discussed above.

Old Latin borrowings that were already integrated into the language were affected by the same series of processes. This is shown by example (6.8):

(6.8)   *Zuberoan contrastively nasalized vowels in Latin loanwords*

a)	Lat.	Recons. Process	Z	Trans.	Std. Bsq.	Gloss
	bimus+-ana	> **bigana > bigahã >*	*bigã́*	/bi'gã/	*biga*[E]	'2-year-old heifer'[114]
	leōne(m)	> **leohẽ > *lehõĩ >*[115]	*lehü̃́*	/le'hũ/	*lehoi*[LW]	'lion'

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114 It is not clear whether this word is a compound of *biga* 'two' or a Latin loan from *bimus-ana* > **bimana*. Michelena proposed the former first and the latter later (cf. Arbelaiz 1978). A derivation from the Latin form meets the problem of /m/ (> /b/) > /g/, a change which is far from common.

115 It is not clear whether the laryngeal carried its nasalization when it metathesized —**leohẽ > *lehõ(i)*— or whether it was left behind as a feature of the vowel —**leohẽ > *lehõ(ĩ)*. Examples such as **harĩa > Z hariña* 'sand' suggest the latter, at least for Zuberoan.

a) **Lat.**   **Recons. Process**   **Z**   **Trans.** **Std. Bsq.** **Gloss**

    organa   *> *orgah̃a > orgã̃a >*   *orgã́* /or'gã/ *orga*[E] 'cart'

b) **Lat.**   **Recons. Process**   **Z**   **Trans.** **Std. Bsq.** **Gloss**

    catēna   *> *kateh̃a > katẽ́a >* *katĩa* /ka'tĩa/ *katea*[LW] 'chain'

As shown by (6.8), the processes in (6.5) affected old Latin loanwords in the same way they affected the inherited vocabulary and, thus, these old borrowings developed their nasalized vowels within the Basque language.

It is worth mentioning that another form of the word in (6.8b) in modern Zuberoan is *khatiña* /kʰa'tiɲa/, with a restituted nasal stop. A similar case is that of *lozebĩa* 'wasp' in (6.9c), which has a restitued nasal stop in most Zuberoan varieties (cf. *lozebiña* /lo̝ẹ'biɲa/; see §6.3 on this process). Nasal stop restitution has restricted contrastively nasalized vowels to the stressed last syllable of oxytones in modern Zuberoan.

The lists of words encompassed in (6.6-8) aim to be nearly-exhaustive, so that there may not be many more examples of nasalized vowels developed within Zuberoan —i.e., that followed, at least, steps i-v in (6.5) within the language.

On the other hand, recently introduced loanwords containing a stressed nasalized vowel are much more common. In the case of recent Romance loanwords, the loss of the nasal segment —the coronal nasal stop /n/ (cf. Hualde 2003a: 31)— occurred within the donor language —i.e. Bearnese Gascon— and not in Zuberoan. Only stressed word-final nasalized high vowels —and a single /'ĩ.a/ sequence, cf. (6.9c)— have been introduced into the language as such, word-medial VNC sequences being regularly maintained as VNC (cf. *dantzatü*[LW] 'dance', *injüsto* 'unfair', *bunbü̃*[LW] 'bonbon', etc.). Examples of Bearnese borrowings with a word-final stressed nasalized high vowels are given in (6.9a-b), while the only form with a /'ĩ.a/ sequence is under (6.9c). Many Bearnese Gascon varieties have lost the nasalization in these words (cf. Rohlfs 1977: 6, footnote 11). Most Bearnese forms are taken from Larrasquet (1939), Agirre Sarasola (2001: 666) and Palay (1932-34 [1980]).

(6.9)   *Zuberoan contrastively nasalized vowels in recently loaned vocabulary*

a)   /'ĩ#/

Zuberoan	**Trans.**	**Brn. Gsc.**	**Brn. Trans.**	**Gloss**
bedezĩ[LW]	[beðe'z̝ĩ]	*medecin*	/mede'sĩ/	'physician'

a) /'ĩ#/

Zuberoan	Trans.	Brn. Gsc.	Brn. Trans.	Gloss
botî́	[bo'tĩ]	-	-	'together, mixed'
fî^{LW}	[fĩ]	*fin*	/fĩ/	'fine, prudent'
khiristî́	[kʰiɾiş'tĩ]	*crestian*	/kres'tja/	'christian' (Std. Bsq. *kristau*^{LW})
kokî́^{LW}	[ko'kĩ]	*coquin*	/ku'kĩ/	'rascal, scoundrel'
kosî́^{LW}	[ko'z̦ĩ]	*cosin*	/ku'zĩ/	'cousin'
kutxî́^{LW}	[ku'ʧĩ]	*cochin*	/ku'ʧĩ/	'cushion'
llapî́^{LW}	[ʎa'pĩ]	*lapin*	/la'pĩ/	'rabbit'
latî́^{LW}	[la'tĩ]	*latin*	/la'tĩ/	'Latin'
lî^{LW}	[lĩ]	*lin*	/lĩ/	'linen'
lleperî^{LW}	[ʎepe'ɾĩ]	-	-	'hare'
Martî́^{LW}	[mar'tĩ]	*Martin*	/mar'tĩ/	'Martin'
sarrasî́^{LW}	[șara'z̦ĩ]	*sarrasin*	/sara'zĩ/	'Saracen'

b) /'ũ#/

Zuberoan	Trans.	Brn. Gsc.	Brn. Trans.	Gloss
arratû́	[ara'tʰũ]	*arraton*	/ara'tũ/	'mouse' (Std. Bsq. *arratoi*^{LW})
arrazû́	[ara'z̦ũ]	*arrason*	/ara'zũ/	'reason' (Std. Bsq. *arrazoi*^{LW})
billû́^{LW}	[bi'ʎũ]	*bilhon*	/bi'ʎũ/	'hewn tree trunk'
briû́^{LW}	[bɾjũ]	-	-	'drunk'
bunbû́^{LW}	[bum'bũ]	*bonbon*	/bun'bũ/	'bonbon'
butû́^{LW}	[bu'tũ]	*boton*	/bu'tũ/	'button'[116]
eskalanpû́	[eșkalam'pũ]	-	-	'flat shoe'
ezperû́^{LW}	[eșpe'ɾũ]	*esperon*	/espe'ɾũ/	'spur'
faizû́^{LW}	[fai̯'z̦ũ]	*faiçon*	/fai̯'sũ/	'manners'
fanfarrû́^{LW}	[faɱfa'rũ]	*fanfarron*	/fanfa'rũ/	'swaggerer'
ferrû́^{LW}	[fe'rũ]	*ferron*	/fe'rũ/	'crimson clover'
fripû́^{LW}	[fɾi'pũ]	*fripon*	/fri'pũ/	'rascal, rogue'
herresilû́^{LW}	[hereși'ʎũ]	*resilhon*	/rezi'ʎũ/	'fine mix of flour'

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116 Larrasquet (1939: 86) transcribes [bũ'tũ] instead, with a nasalized vowel in the first syllable. While we cannot know whether it represents a phonetic phenomenon or not —Larrasquet (1939) regularly transcribed predictable nasalization—, the former is to be preferred given that nasalization in the first syllable it is not present, neither in the donor Gascon *boton* /bu'tũ/ nor in Fr. *bouton* /butɔ̃/. No other examples of distinctive nasalization in non-stressed syllables are found in Zuberoan Basque.

b) **/'ũ#/**

Zuberoan	Trans.	Brn. Gsc.	Brn. Trans.	Gloss
kabesṹ^{LW}	[kaβe'sũ̥]	caveçon	/kabe'sũ/	'bridle'
kantṹ^{LW}	[kan̪'tũ]	canton	/kan'tũ/	'corner, angle'
kharrṹ	[kʰa'rũ]	-	-	'ice'
kherestṹ^{LW}	[kʰeɾes̠'tũ]	crestador	/kresta'du/	'job of gelding'
melṹ^{LW}	[me'lũ]	melon	/me'lũ/	'melon'
milliṹ	[mi'ʎjũ]	milion	/mi'ljũ/	'million' (Std. Bsq. *milioi*^{LW})
patrṹ	[pa'tɾũ]	patron	/pa'trũ/	'patron' (Std. Bsq. *patroi*^{LW})
phezṹ	[pʰe'z̠ũ]	-	-	'trench'
phozṹ^{LW}	[pʰo's̠ũ]	poson	/pu'zũ/	'poison' (Std. Bsq. *pozoi*^{LW})
phuntxṹ^{LW}	[pʰun̪'ʧũ]	ponchon	/pun'ʧũ/	'punch'
pihṹ^{LW}	[pi'h̃ũ]	pihon	/pi'hũ/	'indigent'
pijṹ^{LW}	[pi'ʒũ]	pijon	/pi'ʒũ/	'pidgeon'
pintṹ^{LW}	[pin̪'tũ]	pinton	/pin'tũ/	'bottle of wine'
presṹ^{LW}	[pɾe'z̠ũ]	preson	/pɾe'zũ/	'prison'
salṹ	[s̠a'lũ]	salon	/sa'lũ/	'living room' (Std. Bsq. *saloi*^{LW})
sasṹ	[s̠a'z̠ũ]	sason	/sa'zũ/	'season, time' (Std. Bsq. *sasoi*^{LW})
taulṹ^{LW}	[tau̯'lũ]	taulon	/tau̯'lũ/	'garden tile'
txintxṹ^{LW}	[ʧin̪'ʧũ]	chinchon	/ʧin'ʧũ/	'pork rind, crackling'
xabṹ^{LW}	[ʃa'β̃ũ]	savon	/sa'bũ/	'soap' (Std. Bsq. *xaboi*)

c) **/'ĩ.V#/**

Zuberoan	Trans.	Brn. Gsc.	Brn. Trans.	Gloss
kosĩa^{LW}	[ko'z̠ĩa]	cosia	/ku'zĩa/	'cousin (fem.)'
lozebĩ́a	[los̠e'bĩa]	-		'wasp'

As in the case of *lozebiña* 'wasp' in (6.9c) and the Latin loanword *khatiña* 'chain' in (6.8b), the Bearnese borrowing *kosĩa*^{LW} /ko'z̠ĩa/ 'cousin (fem.)' in (6.9c) is also found as *khüzüña* /kyz̠yɲa/, with a different chronology, including fronting of /u/ in the first syllable, assimilation of /i/ to /y/ (cf. §5.4.2) in the second and nasal restitution (§6.3).

Subsequent to this process, most Zuberoan varieties (as well as other dialects, cf. §6.3) reanalyzed the nasalization of /ĩ/ in inherited words and old borrowings as /in/, both

in a hiatus and after a diphthong: Lat. *arēna* > **areh̃a* > *harĩa > Lit. Z *hariña* > Mod. Z *háiña* 'sand'; Lat. *regīna* > **erregih̃a* > *erregĩa > Z *erregiña*[LW] 'Queen'; *arrani > **arrah̃i* > *arrãĩ > Z *arrain*[E] 'fish', etc.

As is made apparent by the examples in (6.9), words including a nasalized vowel are mainly Bearnese borrowings into Zuberoan, and these borrowings usually involve oxytones ending in /'ĩ/ —cf. (6.9a)— and oxytones ending in /'ũ/ —cf. (6.9b)—, thus making them the most frequent nasalized vowels in the language.

Thus, modern Zuberoan is highly skewed regarding the frequency of the different nasalized vowels. Firstly, Zuberoan lacks nasalized mid vowels: there are no instances of /ẽ/ in our nearly-exhaustive survey nor are there of the phoneme /õ/. This is the historical consequence of the former being raised to /ĩ/ when it was the first vowel of a hiatus (cf. Lat. *catēna* > **kateh̃a* > *katḗã > *katĩa* > *katíña* 'chain' and Lat. *arēna* > **areh̃a* > *harḗã > *harĩa > Lit. Z *haríña* 'sand', see Michelena 1977 [2011]: 89ff. and Egurtzegi 2013a on these vocalic processes) and the latter being systematically raised to /ũ/ (cf. Michelena 1977 [2011]: 38; and (7.6) in §7.2.1). Secondly, due to the massive introduction of Bearnese loanwords involving /ĩ/ and, especially, /ũ/, the presence of these nasalized vowels has increased. Lastly, due to the very restrictive conditions for language-internal development of nasalized vowels and no nasalized vowel other than /ĩ/ and /ũ/ being introduced by borrowing, the presence of /ã/ is limited to a couple of potential Latin loanwords (*bigã́*[E] '2-year-old heifer' and *orgã́*[E] 'cart' in example 6.8) and /ỹ/ only appears in a single word (*hügǘ* 'repugnance') in our survey. As a last difference with the nasalization of other Basque dialects depicted in §6.2.2 below, modern Zuberoan lacks nasalized diphthongs due to the simplification of /ṹ/-based diphthongs (cf. R *ardãũ* vs. Z *ardũ* 'wine') and the systematic restitution of /n/ after the nasalized front glide /ḭ̃/ (cf. R *arrãĩ* vs. Z *arrain*[E] 'fish').

6.2.2 Contrastive nasalization in Roncalese and Bizkaian

The distribution of nasalized vowels found in Roncalese is analogous to that found in older states of other Basque dialects such as Bizkaian and Alavese (cf. Egurtzegi 2013a: 126f.). This distribution of nasalized vowels is (or has been) found in dialects where laryngeals were lost before the loss of the nasality in /h̃/, which developed from intervocalic /n/ —i.e., VnV > Vh̃V > ṼṼ. Examples of this ordering of the processes are

found in Roncalese or Bizkaian dialects. While the former maintained this opposition until its disappearance in the 20th century, the latter merged nasalized vowels with their oral counterparts some time around the 17th century, although potential instances of nasalized vowels can be found until the second half of the 18th century (cf. Ulibarri in prep.). The extinct Alavese dialect was close to Bizkaian and may have had a similar distribution of the nasalization. The examples of nasalized vowels in the 16th century Alavese dictionary compiled by Landucci (Michelena 1958 [2011b], originally written in 1562) seem very similar to those in the Bizkaian *Refranes y Sentencias* (Lakarra 1996) from 1596: compare Landucci <erreguia>, Mod. B *erregiña*[E] 'the Queen'; Landucci <mia>, Mod. B *miña* 'the tongue' (Std. Bsq. *mihi*[E]) to *Refranes y Sentencias* <burdiaric>, Mod. B *burdiñarik* '(any) iron'; *Refranes y Sentencias* <sardia> Mod. B *sardiña*[LW] 'sardine' (Michelena 1958 [2011b]: 218). All these forms show nasalized vowels, which were later affected by the segmentalization discussed in §6.3. These were usual in 17th century Bizkaian: <capitaya>, Std. Bsq. *kapitaina*[LW] 'the captain'; <arraya>, Std. Bsq. *arraina*[E] 'fish', <usaya>, Std. Bsq. *usaina*[E] 'smell', etc. (Michelena 1958 [2011b]: 220). However, Lazarraga[117] (cf. Monumenta Linguae Vasconum 2010-2013) does not shown any clear pattern of nasalization.

In these dialects, nasalized hiatuses emerged from the loss of intervocalic /h̃/ (< *n, cf. Igartua 2008; §4.2.3), which later went on to become nasalized diphthongs and vowels. Although the etymological origin of /h̃/ is an intervocalic *n —and thus no etymological /h̃/ is expected in the initial syllable— the nasalized vowels derived from its loss may appear in any given syllable, since vowels preceding /h̃/ were nasalized as well as vowels following it, and processes of metathesis (Lat. *arēna* > *areh̃a* > *h̃area* > R *ãria* or *areh̃a* > *harẽã* > R *ãria*) and vowel simplification (*unur* > *uh̃ur* > *ũũr* > R *ũr*, *anaztu* > *ah̃aztu* > *ããztu* > Arch. B *ãztu*, *RS* <anztu>, cf. Lakarra 1996: 288) also affected its distribution.

Nasalization metathesis in Roncalese (cf. Michelena 1950 [2011a]: 19, 1954 [2011a]: 636-637) may have occurred as a metathesis of /h̃/ (Lakarra 2009b; Egurtzegi 2011: 52f., 2013b: 164f.) or as a more recent featural metathesis (cf. Egurtzegi 2011: 55ff.), given that both are attested within Basque dialects. Examples of the former may include R *ãria* (< *areh̃a* < Lat. *arēna* 'sand', cf. *harea*[LW] in the dialects which maintain

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/h/, where it has been metathesized to the initial syllable of the word), while the latter is shown by examples such as R *gãzta*[E] (< **gaztahã* < **gaztana* 'cheese', cf. Arch. B *gaztaẽ*, in Capanaga), which does not have any possibility of being a segmental metathesis, given that there is no empty onset to which the aspirate could have been metathesized. Nevertheless, compare also the Literary Zuberoan variant *hariña* /hariɲa/ (< **harĩa* < **harẽã* < **areh̃a* < Lat. *arēna* 'sand'), showing /h/-metathesis as well as segmentalization of the nasality as an obstruent after the high front vowel (cf. Z *khatiña* /kʰatiɲa/ < *katĩa* < **katẽã* < **kateh̃a* < Lat. *catēna* 'chain'), precisely in its etymological position.

There are four main differences between the distribution of nasalized vowels in Archaic Bizkaian and Roncalese and that found in Zuberoan. First, the opposition does not need to be restricted to the stressed syllable.[118] Second, nasalized vowels are common in the first syllable of the word. Third, nasalized diphthongs are maintained. Fourth, the nasalized vowel inventory is different: /ĩ, ẽ, ã, õ, ũ/ in Archaic Bizkaian and Roncalese vs. /ĩ, ỹ, ã, ũ/ in Modern Zuberoan. Examples of Roncalese nasalized vowels in (6.10) are taken from Michelena (1953 [2011a]: 588ff., 600ff. and 1954 [2011a]: 616ff.):

(6.10)   Contrastively nasalized vowels and diphthongs in Roncalese

a)   Nasalized Vowels

Roncalese	**Trans.**	**Std. Bsq.**	**Trans.**	**Gloss**
ãr	/ãr/	*har*[E]	/har/	'worm'
ãtze	/'ãt͜se/	*ahantzi*[E]	/ahant͜si/	'to forget'[119]
ãria	/'ãria/	*harea*[LW]	/haɾea/	'sand'
gãzta	/'gãs̺ta/	*gazta*[E]	/gas̺ta/	'cheese'[120]
ẽzur	/'ẽs̺ur/	*hezur*[E]	/hes̺ur/	'bone'
lũ	/lũ/	*liho*	/liho/	'linen'
sũ, sĩ	/s̺ũ/, /s̺ĩ/	*suhi*[E]	/s̺uhi/	'son-in-law'
ũr	/ũr/	*hur*[E]	/hur/	'hazelnut'
õl	/õl/	*ohol*[E]	/ohol/	'board'
(i)ĩze	/'ĩs̺e/	*ehiza*[E]	/ehis̺a/	'hunt'
zĩ	/s̺ĩ/	*zi*[E]	/s̺i/	'acorn'
zĩatu	/'s̺ĩatu/	-	-	'to curdle'

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118   At least in Archaic Bizkaian, which probably had phrase-level accentuation (§3.4.1).
119   Cf. the related Arch. B. *ãztu* (in *RS*) for Std. Bsq. *ahaztu* 'forget'.
120   The word *gazta*[E] 'cheese' appears as *gaztan-* in compounds (cf. *gaztanbera* 'cottage cheese, curd').

a)   Nasalized Vowels

Roncalese	Trans.	Std. Bsq.	Trans.	Gloss
kĩo	/'kĩo/	*kino*	/kino/	'stink'

b)   Nasalized diphthongs

Roncalese	Trans.	Std. Bsq.	Trans.	Gloss
arrãĩ	/a'rãĩ̯/	*arrain*[E]	/arain/	'fish'
xãĩ	/ʃãĩ̯/	*xahu*[LW]	/ʃahu/	'clean'
eskribãĩ	/es̺kɾi'bãĩ̯/	*eskribau*[LW]	/es̺kɾibau/	'scribe'
kristiãĩ	/kɾis̺ti'ãĩ̯/	*kristau*[LW]	/kɾis̺tau/	'christian'
artzãĩ	/ar'ts̺ãĩ̯/	*artzain*[E]	/arts̺ain/	'shepherd'
txerrizãĩ	/ʧeri's̺ãĩ̯/	*txerrizain*[E]	/ʧeris̺ain/	'swineherd'
ãĩzpa	/'ãĩ̯s̺pa/	*ahizpa*[E]	/ahis̺pa/	'sister (of a girl)'
ãĩzto	/'ãĩ̯s̺to/	*aizto*[E]	/ais̺to/	'knife'
ãĩzterrak	/ãĩ̯s̺terak/	-	-	'scissors'
arrazõĩ	/ara's̺õĩ̯/	*arrazoi*[LW]	/aras̺oi̯/	'reason'
jipõĩ	/ji'põĩ̯/	*jipoi*[LW]	/jipoi̯/	'beating'
morrõĩ	/mo'rõĩ̯/	*morroi*[LW]	/moroi̯/	'boy'
lleprõĩ	/ʎe'pɾõĩ̯/	-	-	'hare'
eskõĩ	/es̺'kõĩ̯/	*eskuin*[E]	/es̺kwin/	'right hand'
karrõĩ	/ka'rõĩ̯/	-	-	'ice'
sagarrõĩ	/s̺aga'rõĩ̯/	*sagarroi*[E]	/s̺agaroi̯/	'hedgehog'
azkõĩ	/as̺'kõĩ̯/	*azkon*[E]	/as̺kon/	'badger'
sarõĩ	/s̺a'rõĩ̯/	*saroi*[E]	/s̺aroi̯/	'meeting point for shepherds'
ardãũ	/ar'dãũ̯/	*ardo*[E]	/ardo/	'wine'
ẽũr	/ẽũ̯r/	*inor*[E]	/inor/	'somebody'

While nasalized vowels are absent from non-stressed syllables in Zuberoan and only found in a couple of loanwords in the initial syllable of the word (cf. §6.2.1 supra), they are common in neighboring Roncalese, as shown in (6.10). Unlike in modern Zuberoan —which lacks any nasalized diphthong, cf. §6.2.1—, nasalized diphthongs were common in Roncalese (cf. Michelena 1954 [2011a]: 623-624) as well as in Archaic Bizkaian, cf. (6.11). /ãĩ̯, õĩ̯/ were very common in Roncalese, while /ãũ̯, ẽũ̯/ were much less common in the extint Roncalese dialect.

6.2.3 Contrastive nasalization in other Basque dialects

Potential evidence of nasalized vowels in Lapurdian is found in *Vocabula Biscaica*, the second word-list of the *Glossaria Vasco-Islandica* (cf. Bakker et al. 1991). This glossary lists Basque words as elicited by an Icelander who was probably involved in trade with Basque fishermen. The variety which the fishermen spoke is assumed to be Lapurdian (cf. Deen 1937 [1991]; Hualde 1984, 1991b), and the relations took place during the 16th and 17th centuries.

Among many other words, the especially interesting <sagarduna> 'cider' (cf. Std. Bsq. *sagardoa*) appears two times (cf. Deen 1937 [1991]: 75 and 82) in the glossary, and in both cases shows an unexpected graphic <n>.[121] This grapheme may be much better understood if attributed to a nasal vowel (cf. Z *ardű* 'wine'), transcribed as an obstruent by a non-speaker of the language. Although such vocabularies are filled with transcription errors, an <n> showing up where vowel nasality is expected in other dialects seems out of the reach of the power of chance, even more given that this word appears twice in the document. Thus, it may have been the case that a foreigner wrote down something that no native speaker felt the need to, and at least some Lapurdian speakers had some vestiges of vowel nasality until the 17th century.

In addition, the *General Basque Dictionary* mentions that the word <erregia> 'Queen' is attested without an orthographic nasal in the Alavese author Lazarraga, the High Navarrese author Beriain, in a High Navarrese *Salve Regina* from the end of the 16th century (which probably followed the unrestricted distribution in §6.2.2) as well as in certain Lapurdian correspondence from the same period, which probably implies the presence of a nasalized vowel on it.

All Basque varieties —with the exception of Zuberoan— are expected to have possessed an inventory of five nasalized vowels /ĩ, ẽ, ã, õ, ũ/, and a distribution of vowel nasality not necessarily limited to the stressed syllable. However, a domain-dependent pattern is expected in any other dialect which maintained aspirates in the first two syllables of the word, namely in Lapurdian and Low Navarrese. Nevertheless, nasalized vowels do not need to be stressed in these dialects, given that they do not share the Eastern stress

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121 Although *-n* is maintained in the combination form (cf. *ardan-* in *ardandegi* 'winery'), the <n> in <sagarduna> does not seem analogical, given that is follows a back vowel that is only maintained in full forms: compare *ardao*, *ardo*[E], *ardu*, etc. to *ardan-*.

system present in Zuberoan and Roncalese, in which stress always falls in one of the last two syllables (cf. §3.2.1). It is the combination of the domain-dependent distribution of vowel nasalization and the Eastern stress system that resulted in all nasalized vowels being stressed, so that dialects in which only one of these conditions was met[122] did not develop the nasalization constraints of Zuberoan.

/Ṽ/ > /Vn/ segmentalization (cf. §6.3) of older vowel nasality after a high-front vowel or glide in the third syllable is also found in both Lapurdian and Low Navarrese. Examples of this process include *usani > *usah̃i > *usãĩ > L, LN, Z usain[E] 'smell', *mah̃ah̃i > *mahãĩ > L, LN, Z mahain[E] 'table' and Lat. leōne(m) > *leoh̃e > *lehõĩ > L, LN lehoin[LW] 'lion' (cf. Z lehű). This segmentalization probably extended to the initial syllable after the loss of the phonemic contrast between /h/ and /h̃/ in Lapurdian and Low Navarrese (cf. ihauteri vs. inhauteri 'carnival', cf. iñauteri[E]).

6.3 Restitution of "non-etymological" -n

Before nasal and oral vowels merged, effectively ending the nasality contrast in Archaic Bizkaian as well as in other Basque dialects, the nasalization of nasalized high front vowels and glides was reinterpreted as originating in a following non-etymological nasal stop. This also happened in Zuberoan, although it was limited to the third syllable in that dialect for the same distributional reasons affecting vowel nasalization (cf. §6.2.1). Example (6.11) compares older Bizkaian variants (taken from Ulibarri in prep.)[123] with their Standard Basque equivalent and with an equivalent from a relevant modern Basque dialect, when illustrative:

(6.11)   *Contrastively nasalized vowels in Archaic Bizkaian* (Ulibarri in prep.)

Arch. B	Trans.	Std. Bsq.[124]	Trans.	Gloss
sẽĩ	/s̠ẽĩ̯/	sehi[E], sein	/s̠ehi/, /s̠ei̯n/	'servant, boy'[125]
õĩ	/õĩ̯/	oin[E]	/oi̯n/	'foot' (cf. LN, Z huin)

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122 This is the case of Roncalese, which possesses the Eastern stress system but no domain-dependent loss of /h̃/, or Lapurdian and Low Navarrese, which shared the domain-dependent loss of /h̃/ with Zuberoan but did not develop the innovative [-2] Eastern stress system.

123 Note, though, that they have been adapted to represent an archaic stage of the language by maintaining the sibilant opposition.

124 Modern Bizkaian variants are similar to those in Standard Basque, excluding the aspirates.

125 The meaning of B sein /s̠ei̯n/ is 'boy'. This meaning is older than that of its northern equivalent sehi, which stands for 'servant' today. Cf. also Aq. seni- in Senicco, Seniponnis, etc. (Gorrochategui 1984).

Arch. B	Trans.	Std. Bsq.	Trans.	Gloss
arrãĩ	/arãĩ̥/	*arrain*[E]	/arai̥n/	'fish'
zemãĩ	/s̪emãĩ̥/	*zemai*[LW]	/s̪emai̥/	'menace'
usãĩ	/us̪ãĩ̥/	*usain*[E]	/us̪ai̥n/	'smell'
mĩ	/mĩ/	*mihi*[E]	/mihi/	'tongue' (cf. B *min*)
mãĩ	/mãĩ̥/	*mahai*[E]	/mahai̥/	'table' (cf. L, LN, Z *mahain*)

This segmentalization of the nasal feature of the vowel occurred in most Basque dialects, although not to the same degree. For instance, words with an etymological *ñ̃ < *n in the third syllable —although it could metathesize later on— show a final *-n* in the eastern dialects (cf. L, LN, Z *usain*[E] 'smell', L, LN *sasoin*[LW] 'season, time' or L, LN, Z *mahain*[E] 'table' and L, LN *lehoin*[LW] 'lion',[126] with metathesis) but words with /ñ̃/ in the second do not, since /ñ̃/ was maintained in that position (cf. L, LN, Z *sehi*[E] 'servant' vs. B *sein* 'boy' or L, LN, Z *mihi*[E] vs. B *mi(i)n* 'tongue').

This segmentalization has had a lesser impact in High Navarrese and some Gipuzkoan varieties, as shown by HN *sei* 'servant'; G, HN *arrai* 'fish'; G, HN *usai* 'smell'; G, HN *mi* 'tongue'; G, HN *artzai* 'shepherd'; B, G, HN *leoi* 'lion'; and B, G, HN *mai* 'table'. Only the word (*h*)*oin*[E] 'foot' shows a final nasal in all dialects in a regular manner.

There are instances of word-internal segmentalization of /n/ as the widespread comm. *erregiña*[LW] 'Queen' (cf. older *erregĩã*) or the much less extended LN, Z *hariña* 'sand'; LN, Z *khatiña* 'chain'; B *iñes* 'run away'; G, HN *iñauteri*[E] / LN *inhauteri* 'carnival', HN *inardetsi* / LN *inhardetsi* 'to answer, replicate',[127] and the dialectal variants of B, G, HN *iñor*[E] / Z *inhur* 'nobody',[128] as well as similar variants in the related words *iñon*[E] 'nowhere', *iñola*[E] 'by no means', *iñoiz*[E] 'never', etc.

6.4 Contrastive vowel nasalization in Gascon

As in Basque, contrastive vowel nasalization in Gascon comes from the loss of

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126 Zuberoan had nasalized vowels instead in these words: Old Z *lehõ* 'lion' (> Mod. Z *lehũ*) and Old Z *sasõ* 'season, time' (> Mod. Z *sasũ*).

127 The intervocalic /ñ̃/ in verbs such as *i(n)harrosi*[E] 'to shake', *i(n)hardetsi*[E] 'to answer, respond', *i(n)hardun*[E] 'to be doing something', comes from an older /n/ which continues an older segment, identified as /r/ by Michelena (1977 [2011a]) and as /d/ by Lakarra (2008), who reconstructed the verbal prefixes *da-ra-*.

128 Variants without segmentalization include S, R, AE *ior* / HN (*n*)*igor* / Z *ihur* / L, LN *nehor, nihor.*

intervocalic alveolar nasal stops that became /h̃/.[129] Loss of an intervocalic nasal stop is attested in other Romance languages such as Galician-Portuguese, Sardinian, Corsican, early Romanian and Alpine dialects of France and Italy (cf. Sampson 1999: 145). The deletion of the intervocalic consonant happened prior to the first long documents written in the language. The examples in (6.12a) are attested in the *Cartulary of Bigorre*, from the 11th-12th centuries and those in (6.12b) are place names as attested in the 11th century (Luchaire 1879: 211; also in Jungemann 1955: 192; Bec 1968: 38):

(6.12)   Loss of -n- in medieval Gascon (Luchaire 1879: 211)

a)   **Gsc.**   **Lat.**   **Gloss**

Domeeg   *Dominicus*   (personal name)

garias   *gallīnas*   'hen (pl.)'

Aueraed   *abellan-ētum*   'hazelnut grove'

camiar   *camināre*   'to walk'

b)   **Gsc.**   **Lat.**

Salies   *Salīnas*

Doat   *Donātum*

Castahied   *Castanētum*

Although not usually mentioned in the literature, it may have been the case that the loss of intervocalic alveolar nasal stops occurred after becoming nasalized aspirates, as in Basque (cf. Igartua 2009; Egurtzegi 2013a, 2013b; §4.2.3). Although this option is not mentioned by Sampson (1999: 144ff.) or Bec (1968), Michelena (1950 [2011a]: 9) mentions that the aspirate is attested in personal names in preliterary Gascon. The place name from Armagnac (Gers) as attested in the 11th century *Castahied* (used as an example by Sampson 1999: 145, Jungemann 1955: 192, etc.) in (6.12b) shows it as well. The other two place names in (6.12b) correspond to Bearnese Gascon.

Although most dialects have already lost them, Gascon possessed five contrastively nasalized vowels /ĩ, ỹ, ẽ, ã, ũ/. The lack of /õ/ is due to being regularly raised to /ũ/ (§7.4.1), as in Zuberoan Basque (§7.2.1). The examples of phonologically nasalized vowels in (6.13) are taken from Sampson (1999: 154f.):

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129 [n] has a shorter intrinsic duration than [m] (cf. Cresci 2014).

(6.13) Contrastively nasalized vowels in Gascon (Sampson 1999: 154f.)

a)   /'Ṽ#/

Gsc.	Gsc. Trans.	Lat.	Gloss
vin	/bĩ/	*uīnum*	'wine'
cadun	/ka'dỹ/	*cata-ūnum*	'each (masc. sg.)'
maison	/mai̯'zũ/	*mansiōnem*	'house'
plen	/plẽ/	*plēnum*	'full (masc. sg.)'
pan	/pã/	*pānem*	'bread'
lan	/lã/	*lāna*	'wool'

b)   /'Ṽ.V#/

Gsc.	Gsc. Trans.	Lat.	Gloss
vesia	/be'zĩœ/	*vicīna*	'neighbor (fem. sg.)'
haria	/ha'ɾĩœ/	*farīna*	'flour'
esquia	/es'kĩœ/	*skīna*	'backbone'
lua	/'lỹœ/	*lūna*	'moon'
plea	/'plẽœ/	*plēna*	'full (fem. sg.)'

In a similar way as Zuberoan, Gascon had the nasalization transferred from an unstressed vowel to the stressed vowel (cf. Sampson 1999: 154). Nasalization in the stressed penultimate vowel is more frequent than in Zuberoan, and non-high vowels are also more frequent than they are in the Basque dialect.

Nasalization (especially in non-final position) has been lost in most Gascon dialects. Some Gascon varieties have restitued the nasal word-finally by adding a velar nasal stop /ŋ/, but modern Bearnese Gascon shows oral vowels with no nasal instead.

In contrast to other Romance languages such as Portuguese and Galician, there was no restitution of the palatal nasal stop /ɲ/ after /i/. This sound pattern occurred in Galician-Portuguese as well as in Basque (§6.3), but not in Gascon. Compare Por. *vizinha* 'neighbor (fem.)' and Por. *farinha* 'flour' (as well as Gal. *veciña* and *fariña*) to their Gascon cognates in (6.13b).

6.5 Conclusions

This chapter has discussed the development of contrastive vowel nasalization in the different Basque dialects. Different Basque dialects have developed different kinds of contrastive nasalization.

6.5.1 Distribution of the vowel nasality opposition

Three different kinds of vowel nasalization have been discerned in the different Basque dialects. Nasalized vowels arose after intervocalic *n systematically became a nasalized aspirate /h̃/, which was subsequently lost under different conditions in different dialects. In most dialects, five nasalized vowels /ĩ, ẽ, ã, õ, ũ/, as well as nasalized diphthongs, developed in any given syllable of the word after aspirates including /h̃/ merged with zero —i.e., if they were lost altogether. This is the case of both western 16th century Bizkaian and eastern Roncalese dialects, as well as (potentially) all dialects in between. Wherever aspirates were lost after the second syllable, as in the case of Lapurdian and Low Navarrese, contrastive vowel nasalization developed in a domain-dependent way, in complementary distribution with the presence of /h̃/ and /h/ —i.e. from the second syllable— but involving the same inventory present in western (and central) Basque dialects.

The case of Zuberoan is more complex. The combination of the domain-dependent distribution of the continental dialects and the innovative Eastern penultimate stress system found in Zuberoan yielded a pattern where contrastively nasalized vowels are limited to the stressed syllable, which is usually the ultimate but may (rarely) be the penultimate as well. The constraint of contrastive vowel nasalization being effective only in the stressed ultimate or penultimate syllable finds a parallel in Gascon.

The inventory of nasalized vowels in Zuberoan is very restricted. Zuberoan lacks nasalized diphthongs due to the simplification of /ũ̯/-based diphthongs and the systematic restitution of /n/ after the nasalized front glide /ĩ̯/. It also lacks nasalized mid vowels due to all instances of /e/ being raised to /i/ when in a hiatus and contrastively nasalized /õ/ being systematically raised to /ũ/. In spite of the fact that Gascon possessed five different contrastively nasalized vowels, only loanwords involving /'ĩ, 'ũ/ have been introduced into Zuberoan. Due to the massive introduction of Bearnese loanwords involving /'ĩ/ and /'ũ/, the presence of these vowels has increased critically. In contrast, /'ã/ and /'ỹ/ are limited to

a couple of items.

6.5.2 Dialectal distribution

Although the dialects which possessed contrastively nasalized vowels cannot be specified, there are traces that point towards all dialects having the opposition in an older period.

One trace of this is the fact that contrastively nasalized vowels are attested in both ends of the Basque Country, i.e., in the western Bizkaian and Alavese dialects and in the eastern Roncalese and Zuberoan dialects. When an innovation is shared by the peripheral dialects of a language, it was probably shared by the central dialects as well (cf. *relic areas*, Antilla 1989: 294). Second, vowel nasalization was present in 12th century High Navarrese —as attested by the word list compiled by the French pilgrim Aymeric Picaud— and it may be attested in the 17th century not only in High Navarrese but in Lapurdian as well.

Lastly, the main reason for proposing the opposition for all dialects is the restitution of the apical nasal after a high front vowel or glide being common to all modern dialects. This restitution is usual in eastern dialects outside of /H/'s domain, i.e. from the third syllable on, and it is found in any given syllable in Bizkaian. However, if we look at the dialectal distribution of word doublets such as B, L, LN, Z, AE *arrain*[E] : G, HN *arrai*, we find that this segmentalization, although attested, may not be so common in the central dialects, namely in High Navarrese and Gipuzkoan. This restitution does not occur in Gascon, although it is found in other Romance languages such as Galician and Portuguese.

6.5.3 Chronological implications

The development of contrastively nasalized vowels occurred right after the loss of the nasalized aspirate, but this loss has different chronologies in the different dialects: in Zuberoan, laryngeals were dropped after the second syllable when the stress shifted to peninitial position (cf. Egurtzegi & Elordieta 2013), whereas in Bizkaian and Alavese all instances of /H/ can be expected to drop at the same time, since these dialects never developed the stress system that triggered the domain-dependent loss of /h/ and /h̃/. In the case of Roncalese, it is yet to be determined whether the unconditioned loss of /H/ occurred before or after the establishment of peninitial stress, but the latter is more likely.

Given that Michelena (1977 [2011]: 169) proposed that the loss of /H/ began in Navarre circa the 11th century and it was present in the western dialects at least until the 14th century, we may assume that vowel nasalization was a feature in several Basque dialects around the end of the Middle Ages.

6.5.4 The role of contact

Contrastively nasalized vowels have been developed by means of language-internal processes in Basque. Nevertheless, borrowings from Gascon have greatly increased the number of words with contrastively nasalized vowels in Zuberoan. Contact between Zuberoan and Gascon has probably helped preserve the distinction until recent times. While most Basque dialects lost contrastive vowel nasalization around 4-5 centuries ago, some Zuberoan varieties have maintained it until today. Other Zuberoan varieties (as well as Roncalese) have lost it only recently. The same is true for Bearnese Gascon, where some varieties maintain the distinction while most have already lost it.

6.5.5 Final remarks

In sum, this chapter has demonstrated that, although both come from the loss of the same segment and are in contiguous dialects, the opposition of nasalized vowels is very different in Roncalese and Zuberoan. In spite of both having nasalized vowels from the second syllable —due to the loss of the nasalized aspirate /h̃/— Roncalese and Bizkaian have also developed nasalized vowels in the first syllable, whereas Zuberoan maintains /h̃/ in that domain. In addition, due to different processes, modern Zuberoan shows vowel nasality only in the stressed syllable and (almost) only in the last syllable of the word as well as having a very restricted nasalized vowel inventory.

7 Vowel raising reconsidered

7.1 Introduction

In this chapter I analyze the raising of the mid back vowel /o/. Section §7.2 presents a new analysis of the seemingly heterogeneous contexts that trigger raising of the mid back vowel /o/, whose phonetic contexts were previously described as "not […] easy to define" (Martínez-Areta 2013b: 62; cf. Zuazo 2008: 44f.).

This sound pattern is primarily found in Zuberoan, although it is present, to a lesser degree, in other eastern Basque dialects. This process can be differentiated from the seemingly similar raising of phonologically nasalized /ˈõ/, a related sound pattern found only in Zuberoan. I propose that all cases involve raising of contextually nasalized /o/, the raising process being thus more accurately described as raising of phonetically nasalized [õ].

Section §7.3 offers typological parallels of this sound pattern as well as a phonetic explanation of the two processes. Both processes are accounted for by means of the phonetic ambiguity in vowel height caused by the addition of "nasal formants" to the F1 space in nasalized vowels.

In short, this chapter analyzes two processes involving nasalization that could not have been easily accounted for by means of phonological description but are straightforwardly explained in phonetic terms, emphasizing the importance of phonetics in historical and phonological research.

This chapter, as well as §6.2.1 and §5.2, are based on a survey of Basque data (cf. Egurtzegi 2014, in prep.) extracted from the *General Basque Dictionary* (Michelena &

Sarasola 1987-2005), Lhande's (1926-1938) *Dictionnaire basque-français*, Larrasquet's (1939) *Le Basque de la Basse-Soule Orientale* and recent dialectological literature (Camino 2009a, 2009b; Zuazo 2008).

7.2 Raising of (contextually) nasalized [õ]

Alongside phonologically nasalized vowels, most authors (cf. Larrasquet 1939; Michelena 1977 [2011]; Hualde 1993b, 2003a; Zuazo 2008: 46) describe vowels surrounding nasal consonants as nasalized —without specifying whether this nasalization is passive or active. Examples of this kind of nasalization include any vowel in contact with a nasal consonant, as in the words *khatiña*[LW] [kʰaˈtĩɲã] 'chain', *ihitz*[E] [ĩˈh̃ĩts̺] 'dew, frost' or *ene* [ˈẽnẽ] 'mine'. The phonetic nature of the sound pattern analyzed in this chapter will be grounded in precisely this kind of nasalization, which will be described as predictable —i.e. contextual.

In addition to historical /u/s maintained where /u/-fronting was blocked (§5.2.1), there are other sources of /u/ in Zuberoan: many instances of old /o/ raised to /u/ (cf. Michelena 1977 [2011]: 43f.). This vowel raising is also found, to a lesser degree, in other eastern dialects of Basque, where it is very sporadic. Although this raising is widespread in the dialect, it is not systematic. As a consequence of lexical diffusion (Labov 1994), exceptions to the process may be found both in unaffected lexical items and in particular words only being subject to raising in some varieties of Zuberoan (cf. *konpasione*[LW] [kompas̺jone] 'mercy', *gizun* [gis̺un] but also *gizon*[E] [gis̺on] 'man', etc).

Peillen (1992: 253) places the beginning of /o/-raising in the 18th century, but this is far from obvious, especially given that there is a clear tendency to interchange <o> and <u> in the earliest works written in any eastern dialect of Basque. Variation of this kind can be found in Dechepare (1545 [1980]) and Leiçarraga (1571 [1900]) (cf. Michelena 1977 [2011]: 44f.). The Low Navarrese Dechepare, for instance, uses the raised variants *hun*, *unsa* and *ungi* alongside *hon*[E] 'good', *onsa*[E] 'well' and *hongi* 'well'. The graphematic <o>s that appear in Zuberoan texts until the 18th century are probably due to the writing tradition of this dialect, which was adopted from Gascon, where <o> represents /u/.

7.2.1 Contexts of raising

The phonological context where modern Zuberoan shows /u/ instead of common /o/ has usually been described as "before -*n* as well as in some other barely specifiable contexts" (following Michelena 1954 [2011a]: 617, 1977 [2011]: 43; cf. Egurtzegi 2013a: 132; Martinez-Areta 2013b: 62; Zuazo 2008: 44f.; Camino 2011 [2014]). Under the new analysis proposed here, the sporadic mid back vowel raising may target any instance of phonetically nasalized /o/ —or [õ]. Namely, /o/ > /u/ affects /o/s adjacent to a nasal consonant, allowing us to propose a simple [õ] > [ũ] change. Example (7.1) shows instances of raising in contact with the alveolar [n], while (7.2) shows raisings in contact with the labial [m].

(7.1)   Raising adjacent to [n]

a)   Vn]$_\sigma$

Std. Bsq.	Zuberoan	Trans.	Gloss
on[E]	*hun*	[hun]	'good'
gizon[E]	*gizun*	[giʂun]	'man'

b)   V]$_\sigma$[$_\sigma$n

Std. Bsq.	Zuberoan	Trans.	Gloss
honen	*hunen*	[hunen]	'of this'
hona[E]	*hunat*	[hunat]	'here'
bonet[LW]	*bunet*	[bunet]	'hat'
onest[LW]	*unest*	[uneʂt]	'honest'
desonest[LW]	*desunest*	[deʐuneʂt]	'dishonest'
pertsona[LW]	*persuna*	[perʂuna]	'person'
estonatu[LW]	*estunatü*	[eʂtunaty]	'to astonish, surprise' (cf. L, LN *estonatu*)

c)   [$_\sigma$nV

Std. Bsq.	Zuberoan	Trans.	Gloss
nor	*nur*	[nur]	'who (abs)'
nork	*nurk*	[nurk]	'who (erg)'
norbait	*nurbait*	[nurβai̯t]	'somebody'
nornahi	*nurnahi*	[nurnahi]	'anybody'

c) **[σnV**

Std. Bsq.	Zuberoan	Trans.	Gloss
nola	*nula*	[nula]	'how'
noiz	*nuiz*	[nui̯ş]	'when'
*noble*LW	*nuble*	[nuβ̞le]	'noble'

(7.2)   Raising adjacent to [m]

a) **Vm]σ**

Std. Bsq.	Zuberoan	Trans.	Gloss
zenbait	*zunbait*	[şumbat]	'a few' (cf. L, LN, R, older Z *zonbait*)
*tronpatu*LW	*trunpatü*	[tɾumpaty]	'to err; deceive' (cf. Brn. Gsc. *trumpá*)

b) **V]σ[σm**

Std. Bsq.	Zuberoan	Trans.	Gloss
*komentu*LW	*khumentü*	[kʰumen̪ty]	'convent'
*erresuma*LW	*erresuma*	[ereşuma]	'kingdom' (cf. older Z *erresoma*)

c) **[σmV**

Std. Bsq.	Zuberoan	Trans.	Gloss
*amodio*LW	*amurio*	[amuɾio]	'love'
*amore*LW	*amure*	[amuɾe]	'love'
-	*musde*LW	[muẕð̞e]	'sir' (cf. LN *morde > murde*)
*moda*LW	*muda*	[muð̞a]	'style'
*molde*LW	*mulde*	[mul̪de]	'manner, way'
moldatu	*muldatü*	[mul̪daty]	'to adapt'
*motz*E	*mutz*	[mutş]	'short'
moztu	*muxtü*	[muʃty]	'to cut'

The next sets show that [õ] > [ũ] also affects vowels adjacent to less usual nasal stops. (7.3) shows instances of the raising in contact with [ɲ] and (7.4) corresponds to those preceding allophonic nasal stops.

(7.3)   *Raising adjacent to* [ɲ]

a)   **Vɲ]σ**

Std. Bsq.	Zuberoan	Trans.	Gloss
soin[E]	*su(i)ñ*	[s̻ui̯ɲ]	'body'
soineko[E]	*suñeko*	[s̻uɲeko]	'dress'
zein[E]	*zu(i)ñ*	[s̻ui̯ɲ]	'what, which one' (cf. L, LN, R, S, older Z *zoin*)
oin[E]	*hu(i)ñ*	[hui̯ɲ]	'foot'
amoina[LW]	*amuina*	[amui̯ɲa]	'alms, hand out' (cf. L, LN, older Z *a(u)moina*)[130]

b)   **V]σ[σɲV**

Std. Bsq.	Zuberoan	Trans.	Gloss
-	*u(i)ñhu*[LW]	[ui̯ɲh̃u]	'onion' (cf. Brn. Gsc. *onhon*)[131]

c)   **[σɲV**   **older Z *-ño* > Z *-ñu***   **'diminishing suffix':**

Std. Bsq.	Zuberoan	Trans.	Gloss
liburu[LW]*-txo*	*libürüñu*	[liβɣɾyɲu]	'little book'
gaixo[E]*-txo*	*gaxoñu*	[gaʃoɲu]	'(little) poor thing'

(7.4)   *Raising before nasal stops with non-contrastive place features*

a)   **Vn̪]σ**

Std. Bsq.	Zuberoan	Trans.	Gloss
arrunt[LW]	*arrunt*	[arun̪t]	'common, ordinary' (cf. L, S *arront*)
konde[LW]	*kunte*	[kun̪te]	'count'
kontra[LW]	*kuntre*	[kun̪tre]	'against'
ondu	*huntü*	[hun̪ty]	'to mature, to age'
kontatu[LW]	*khuntatü*	[kʰun̪taty]	'to tell'
kontu[LW]	*khuntü*	[kʰun̪ty]	'total, count'
kontent[LW]	*kuntent*	[kun̪ten̪t]	'happy'
hontaz	*huntaz*	[hun̪tas̻]	'about this'
ezkondu[LW]	*ezkuntü*	[es̻kun̪ty]	'to marry'
hondar[E]	*hundar*	[hun̪dar]	'remainder'

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130   Cf. also the parallel Gascon development **aumoine* > *aumouyne* 'alms, hand out'.

131   The /h/ in this word is non-etymological. These /h/s are rare, but present in modern eastern dialects nevertheless. Other examples of non-etymological /h/ include *harma*[LW] 'weapon' (< Lat. *arma*), *hira*[LW] 'wrath' (< Lat. *īra*) and *hezkabia*[LW] 'ringworm' (< Lat. *scăbies*). For some explanations of these unexpected /h/ see §4.5.1.

b)   Vn̪]ₒ

Std. Bsq.	Zuberoan	Trans.	Gloss
-	*untsa*	[un̪t͡sa]	'well' (cf. *ontsa*ᴱ)
*kontserbatu*ᴸᵂ	*kuntserbatü*	[kun̪t͡serβ̞aty]	'to preserve'
-	*munstra*ᴸᵂ	[mun̪stra]	'showing, sample', cf. (7.1c).

c)   Vn̪]ₒ

Std. Bsq.	Zuberoan	Trans.	Gloss
ontzi, untzi	*untzi*	[un̪t͡si]	'ship'
*ontza*ᴸᵂ	*untza*	[un̪t͡sa]	'ounce'

d)   Vɲ]ₒ

Std. Bsq.	Zuberoan	Trans.	Gloss
*esponja*ᴸᵂ	*espunja*	[es̞puɲ̟a]	'sponge'

e)   Vŋ]ₒ

Std. Bsq.	Zuberoan	Trans.	Gloss
-	*hunki*	[huŋki]	'profit'
ongailu	*hunkallü*	[huŋkaʎy]	'fertilizer'

The next two example sets (7.5-6) show that the raising of [õ] is not linked to nasal stop environments but affects any phonetically nasalized [õ]. (7.5) includes vowels in contact with the nasalized aspirate /h̃/ while (7.6) shows phonologically nasalized vowels due to sound patterns discussed in §6.2.1.

(7.5)   Raising adjacent to [h̃]

a)   V]ₒ[ₒh̃V

Std. Bsq.	Zuberoan	Trans.	Gloss
*ohore*ᴸᵂ	*uhure*	[uh̃uɾe]	'honor'
*ohoin*ᴱ	*uhuiñ*	[uh̃ui̯ɲ]	'thief'

b)   [ₒh̃V

Std. Bsq.	Zuberoan	Trans.	Gloss
inor^E	*ihur*	[ih̃ur]	'nobody'
inon^E	*ihun*	[ih̃un]	'nowhere'
inola^E	*ihula*	[ih̃ula]	'by no means'
inoiz^E	*ihuiz*	[ih̃ui̞s̞]	'never'
laino^E	*lanhŭ*	[lanh̃u]	'cloud'
anoa^{LW}	*anhua*	[anh̃ua]	'food portion, supply'

(7.6)   *Regular raising of word-final stressed /õ/*

a)   **/'õ#/ > /'ũ#/ in the inherited lexicon**

Std. Bsq.	Zuberoan	Trans.	Gloss
ardo^E	*ardũ*	[ar'ð̞ũ]	'wine'

b)   **/'õ#/ > /'ũ#/ in borrowings**

Std. Bsq.	Zuberoan	Trans.	Gloss
saloi^{LW}	*salũ*	[s̞a'lũ]	'living room'
arratoi^{LW}	*arratũ*	[ara'tʰũ]	'mouse'
lehoi^{LW}	*lehũ*	[le'h̃ũ]	'lion'
arrazoi^{LW}	*arrazũ*	[ara'z̞ũ]	'reason'
patroi^{LW}	*patrũ*	[pa'tɾũ]	'patron'
-	*presũ*^{LW}	[pɾe'z̞ũ]	'prison'
sasoi^{LW}	*sasũ*	[s̞a'z̞ũ]	'season, time'
milioi^{LW}	*milliũ*	[mi'ʎjũ]	'million'

The examples in (7.6) are especially interesting, since they show a regular sound change that has yielded the merger of /õ/ and /ũ/ in /ũ/. The examples in (7.6a) involve potentially inherited words, while examples in (7.6b) show loanwords of different periods (cf. §7.4.1). It is worth mentioning that all contrastively nasalized vowels in Zuberoan are in stressed position (cf. §6.2.1).

Given that the instances of vowel raising discussed above did not undergo fronting, this process is either more recent than the fronting discussed in §5.2 or was contemporary with it. As expected, instances of *u in nasal contexts like *lagün*^E [laɣyn] 'friend', *egün* [eɣyn] 'day', *zordün* [s̞orð̞yn] 'debtor', etc. show fronting.

7.2.2 Non-nasalized /o/ > /u/ raising

There are a few instances of /o/ > /u/ that do not involve contextually nasalized vowels. Some of these are listed under (7.7) and (7.8):[132]

(7.7)   *Instances of /o/ raising in non-nasal contexts*

a)

Std. Bsq.	**Zuberoan**	**Trans.**	**Gloss**
esposa[LW], *esposatu*	*espusatü*, *espusa*	[es̺pus̺aty]	'married, bride'
koska, *kozka*	*kuska*, *kuzka*	[kus̺ka]	'hit'

b)

Std. Bsq.	**Zuberoan**	**Trans.**	**Gloss**
azkordin[E]	*hazkurdiñ*	[has̺kurð̞iɲ]	'zit, chilblains'

c)

Std. Bsq.	**Zuberoan**	**Trans.**	**Gloss**
igurtzi, *igurzpen*	*igurtzi*, *igurzpen*	[iɣurts̺i]	'to suffer', 'patience' (cf. B, G, HN, AE *igortzi*)

(7.8)   *Words ending in -ús*

Std. Bsq.	**Zuberoan**	**Trans.**	**Gloss**
uros[LW]	*irús*	[i'rus̺]	'happy' (cf. L, LN *huros*)
malerus[LW]	*malerús*	[male'rus̺]	'unhappy' (cf. *malhuros*)
balios	*baliús*[LW]	[ba'ljus̺]	'valuable'
kurios	*küriús*[LW]	[ky'rjus̺]	'beautiful, curious'
-	*preziús*[LW]	[pre'ʂjus̺]	'precious'
amoros	*amurús*	[amu'rus̺]	'loving'
-	*despendiús*	[des̺pen̪'djus̺]	'costly'
-	*balentiús*[LW]	[balen̪'tjus̺]	'swaggerer'
-	*finaziús*[LW]	[fina'ʂjus̺]	'deceitful'
-	*iratiús*[LW]	[ira'tjus̺]	'durable'

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132 Zuazo (2008: 45) also mentions *phastual* [phas̺'twal] 'Zuberoan traditional theater' and *labuai* [la'βwai̯] 'farmer' as instances of /o/ > /u/, but those represent glides in diphthongs formed after the loss of a tap and not syllabic vowels. Older texts show the forms *phastoral*[LW] [phas̺'toral] and *laborari*[LW] [laβo'rari]. Later in the same section, Zuazo himself (2008: 46) describes this kind of raising offering the example *aroa*[LW] > *aua* 'the time, epoch' instead, when aiming to show that this late diphthong does not undergo the fronting discussed in example (5.10) from §5.2.2.

None of the examples in (7.7) is without its problems and each can be ultimately discarded as exceptional raising for various reasons: *espusa* 'bride' was probably borrowed from Brn. Gsc. *esposa* /espuza/ or less likely Fr. *épouse* /epuz/, but certainly not from Sp. *esposa* /esposa/ as it is the case of Std. Bsq. *esposa* 'wife', *kuska* is clearly phonosymbolic (cf. *kosk*[E] *egin* 'bite'), *hazkurdin*[E] (*hatz + gordin* 'raw') involves a folk etymology based on *urdin* 'blue' and the dialectal variation of *igortzi* : *igurtzi* spreads as far as the western Bizkaian dialect, pointing to either an older process or a lowering in the central dialects instead of a raising in the peripheral. As a matter of fact, a raising of /o/ to /u/ when in a syllable next or prior to /i/ is widely attested in old western authors such as Landucci (cf. Michelena 1958 [2011b]).

The unexpected non-nasalized /o/ raisings under (7.8) share the *-ós* suffix from Gascon (cf. Gsc. *malerós* /male'rus/ 'unhappy'). Thus, the raising of the Gascon suffix *-ós* /'-us/ (cf. Fr. *-os*) in example (7.8) did not occur in Zuberoan, but it was borrowed as such from Gascon. These words tend to be oxytones in Zuberoan, keeping the stress in its etymological place after losing the final vowel in Gascon.

Note that the raisings in (7.7-8) occurred before segments where /u/-fronting did not take place. /u/ > /y/ fronting was systematic in Zuberoan, but it was inhibited before apical sibilants and apical rhotics (see §5.2.1). It is possible, then, that these instances of /u/ are older than those listed under (7.1-6), since the examples in (7.7-8) do not necessarily need to be in a counterfeeding order to avoid the fronting of the high back vowel in them. Thus, the instances in (7.7-8), which may be reduced to a handful —*espusa*, *kuska*, *hazkurdiñ* and the borrowed suffix *-us*—, show sporadic raisings that may have been both before or after the general raising, given that these words would not be subject to fronting due to their phonological context.

7.3 Vowel nasalization and vowel height

Raising and lowering of nasalized vowels like that seen in the eastern Basque dialects is a typologically common sound pattern. Beddor (1982) lists up to 75 languages that show sound patterns of allophonic or phonemic variation between oral and nasal vowel height with specific references. Other surveys include Bhat (1975), Foley (1975), Ruhlen (1978) and Schourup (1973). Changes in height of nasalized vowels are found, among many other languages, in Romance languages such as French and Portuguese,

Celtic languages as Irish and Breton, Indo-Aryan languages as Bengali, Maithili and Hindi, and other IE languages such as Armenian and Dutch. Outside of Indo-European, Bantu languages as Swahili, other Niger-Congo languages such as Ewe, the Dravidian Havigannada (Havyaka Kannada), Oto-Manguean languages such as Mixtec and Zapotec, Arawakan languages such as Shiriana and Asháninka, the Iroquoian language Seneca, New-Guinean languages as Fore and Gadsup, the Athabaskan Plains Apache (Kiowa-Apache) language, the Eskimo-Aleut Inuit as well as North American isolates Yuchi and Haida all show raising or lowering of nasalized vowels (Beddor et al. 1986: 198f., see Beddor 1982 for references on each language).

Cases parallel to the specific [õ] > [ũ] change in the eastern Basque dialects exist in Dutch (Germanic) and Batak (Malayo-Polynesian). The Khoekhoe (Nama) Khoe language raised mid-back contextually nasalized vowels /o/ and /ɔ/ when adjacent to any nasal consonant (Beddor et al. 1986: 199).

While nasalized high vowels are lowered and nasalized low vowels are raised in both contextual and non-contextual situations, the general surveys show different sound patterns for nasalized mid vowels (Beddor et al. 1986: 199, cf. Beddor 1982 and Maddieson 1984). The presence or absence of a segmental source of the nasalization seems to affect the outcome. Mid vowels are usually lowered when there is no surrounding nasal consonant, but raised when they are adjacent to a source of contextual nasality.

The observation that the presence or absence of a segmental source of the nasality yields different outcomes implies that the [õ] > [ũ] raising shown in examples (7.1-5) may be different from the /'õ#/ > /'ũ#/ raising in paroxitonic words shown in example (7.6). This would be consistent with the dialectal distribution of the processes in the eastern varieties, since the former sound pattern is widespread while the later is found only in Zuberoan. Zuberoan is precisely the only modern dialect that has conserved its distinctive nasalized vowels (cf. Hualde 2003a: 31; Egurtzegi 2013a: 126f.).[133]

There is yet another asymmetry affecting mid vowels: front mid vowels are more likely to lower whereas back mid vowels are more likely to raise (Beddor et al. 1986). This asymmetry may also apply to high vowels but is more prominent in mid vowels.

As in any given process that is found in such a wide range of languages across the world, we expect a natural phonetic explanation for this sound pattern. Articulatory,

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133 This is alongside the now defunct Roncalese dialect, which showed a different distribution of these
      segments (cf. §6.2.2).

acoustic and perceptual constraints have been invoked to account for the reinterpretation in oral height of nasalized vowels (see Beddor et al. 1986 for extensive bibliography on each perspective).

Acoustically, the ambiguity in height is attributed to nasal coupling. The coupling of the two tracts adds a pole-zero pair to the lower frequencies of the vowel spectrum (cf. Fant 1960). The nasal pole (or nasal formant) and the nasal zero almost cancel each other, but the first formant (F1) is altered in the process. This alteration increases along with the level of coupling in production, which makes the nasal formant more prominent. Beddor et al. (1986) provide figures that illustrate this shift in the frequency of F1 in different vowels. The frequency of the nasal formant is lower than F1 in low vowels and higher than F1 in high vowels. This is consistent with the observations inferred from the survey, namely that high nasalized vowels are perceived as mid and low nasalized vowels are perceived as mid as well (Wright 1980, cf. Beddor et al. 1986: 202).

With respect to the mentioned asymmetries in mid vowels, Beddor (1982) measured the center of gravity of nasal and oral vowels of different languages. She found that the center of gravity of nasal mid back vowels is lower than that of oral mid back vowels and the center of gravity of nasal mid front vowels is higher than that of oral mid front vowels. This observation is consistent with the tendency for nasalized /o/ to raise and nasalized /e/ to lower (cf. Beddor et al. 1986).

There have also been perception experiments consistent with a perceptual ambiguity in the height of nasalized vowels. Krakow et al. (1988) showed that English speaking listeners perceived nasalized vowels as differing in height from their oral counterparts except when they preceded /n/, an environment where listeners could attribute nasalization to the phonological context. This experiment suggests that a listener's incapacity to find the source of the nasalization in a vowel can yield a reinterpretation in terms of oral height, especially in languages without phonologically nasalized vowels. This perceptual ambiguity may play a role in the development of contrastive vowel nasalization:[134]

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134 Recent studies (Carignan et al. 2011; cf. also Shosted et al. 2012) suggest that speakers of American English may compensate for the low-frequency shift in spectral energy due to velopharyngeal opening by raising the tongue during the production of nasalized /i/. Thus, oral articulation may play a complex role in vowel nasalization and the effects of nasalization in vowels may, in some cases, be compensated by a lingual gesture.

> *One account of phonemicisation of vowel nasalisation with concomitant nasal consonant loss is that the perceptual salience of vowel nasality increased as the perceptual salience of the conditioning nasal consonant decreased (see Kawasaki 1986). However, at the transition stage, distinctive vowel nasalisation is not fully integrated into the language. If listeners do not expect non-contextual nasal vowels but also do not perceive the now weakened nasal consonant, then they might attribute the acoustic effects of vowel nasalisation to either (a) nasal coupling, (b) change in tongue configuration, or (c) both nasal coupling and change in tongue configuration. Under these conditions, we would expect /VN/ or /NV/ to result historically in (a) /Ṽ/ with nasalisation but no height change, (b) /V'/ with height change but no nasalisation, or (c) /Ṽ'/ with height change and nasalisation* (Beddor et al. 1986: 211).*

Although the authors present the last option as less common cross-linguistically, they mention that in French, nasalized low vowels come from contextually nasalized non-low vowels. Beddor et al. (1986: 211) further mention that there is no consensus in the relative chronology of the lowering and the development of contrastive nasalization (cf. Entenman 1977; Haden & Bell 1964; Martinet 1965; Pope 1934), suggesting that both changes may have occurred in the same period.

I propose that the Zuberoan raising of stressed word-final nasalized /'õ#/ may be a similar development. Although potentially related, this /'õ#/ > /'ũ#/ process is different from the more general [õ] > [ũ]. Contextually nasalized raising and raising with no clear nasal environment are distinguished in the phonetic literature (cf. Beddor et al. 1986), and they also have different isoglosses in the eastern Basque dialects. The perceptual experiment by Krakow et al. (1988) suggests that nasalized vowels in oral contexts are most ambiguous in height in languages with no contrastive nasality in vowels, and this is consistent with the very limited distribution of contrastive nasalization in Zuberoan. The fact that Zuberoan contrastive nasalization exhibits low productivity may make /'õ#/ prone to reinterpretation (Krakow et al. 1988). This propensity towards height reinterpretation alongside the prosodic prominence and longer duration of contrastively nasalized vowels due to their stressed status in Zuberoan may account for the systematic nature of /'õ#/ > /'ũ#/.

Mid back vowel raisings can be divided into two different processes: the more general sporadic process described as [õ] > [ũ], present in many eastern varieties, and the final stressed (phonologically) nasalized mid back vowel raising /'õ#/ > /'ũ#/. The raising of nasalized vowels has been explained in terms of the acoustic ambiguity produced by the addition of two nasal formants in the F1 domain, which can yield changes in vowel height (Beddor et al. 1986), especially in languages without contrastive nasalization. The

direction of the sound change observed in the generalizations made from the cross-linguistic surveys of this sound pattern is consistent with the measurements of the center of gravity of nasal and oral mid back vowels (Beddor 1982). The systematic nature of /'õ#/ > /'ũ#/ in Zuberoan may be due to the lack of nasal context in that sound pattern, which facilitates the listener's reanalysis of nasal permutations as oral in languages without vowel nasality contrast (Krakow et al. 1988).

7.4 Vowel raising in neighboring Romance languages

This section introduces different vowel raisings found in the Romance languages in contact with Basque and especially those in contact with Zuberoan Basque, which means Gascon plays the most significant role. Two similar kinds of raising are discussed: a raising of the nasalized mid back vowel [õ], similar to that found in Zuberoan, which occurred in all varieties of Gascon and a parallel raising of a different nasalized vowel, namely that of /a/ [ã] > [ẽ] /e/, which is limited to the southern varieties of Gascon, such as that of Bayonne.

7.4.1 Nasalized [õ] raising in Gascon

Gascon had a conditioned raising of the phonetically nasalized mid back vowel [õ] similar to that found in Zuberoan. This sound pattern is absent from other Gallo-Romance languages such as French, used here as a means of comparison. In this case, only nasalized mid-back vowels are raised. This process is especially common when the etymological /o/ precedes a nasal stop. This sound pattern is similar to that discussed in §7.2 for Zuberoan. This raising process is common to all varieties of Gascon, although the examples come from the Donzacese variety. The transcriptions of this particular variety in (7.9) are taken from Kelly (1973: 30ff.):

(7.9)   */o/ raising in nasalized contexts in Donzacese Gascon* (Kelly 1973: 30ff.)

Gsc.	Dzc. Trans.	French	Fr. Trans.	Gloss
pónder	/'punde/	*pondre*	/pɔ̃dʁ/	'to lay'
pont	/pun/	*pont*	/pɔ̃/	'bridge'
bon	/bun/	*bon*	/bɔ̃/	'good'

Gsc.	Dzc. Trans.	French	Fr. Trans.	Gloss
font	/fun/	*font*	/fɔ̃/	'well, fountain'
mon	/mun/	*mon*	/mɔ/	'my'
nom	/nun/	*nom*	/nɔ/	'name'
son	/sun/	*son*	/sɔ̃/	'sound'
rond	/run/	*rond*	/ʁɔ̃/, /ʁɔ̃d/	'round'
long	/lun/	*long*	/lɔ̃/, /lɔ̃g/	'long, extended'
contunhar	/kunty'ɲa/	*continuer*	/kɔ̃tinɥe/	'to continue'
conduir	/kun'dɥi/	*conduire*	/kɔ̃dɥiʁ/	'to take, drive'
situacion	/sitɥa'sjun/	*situation*	/sitɥasjɔ̃/	'situation'
continuacion	/kuntinɥa'sjun/	*continuation*	/kɔ̃tinɥasjɔ̃/	'continuation'
continuèl	/kunti'nɥɛl/	*continuel*	/kɔ̃tinɥɛl/	'abiding'
avion	/a'bjun/	*avion*	/avjɔ̃/	'airplane'
vagon	/ba'gun/	*wagon*	/vagɔ̃/	'wagon'
bombardar	/bunbar'da/	*bombarder*	/bɔ̃baʁde/	'to bomb'
bolhon	/bu'ʎun/	*bouillon*	/buʎɔ̃/	'broth, stock'
viulon	/bjulún/	*violon*	/vjɔlɔ̃/	'violin'
puençon	/pwɛn'sun/	*poinçon*	/pwɛ̃sɔ̃/	'punch, stamp'
oncle	/'unkle/	*oncle*	/ɔ̃kl/	'uncle'
ombra	/'umbro/	*ombre*	/ɔ̃bʁ/	'shade'
non	/nu/	*non*	/nɔ/	'no'
bona	/buno/	*bonne*	/bɔn/	'good, tasty'
pomèr	/pu'mɛ/	*pommier*	/pɔmje/	'apple tree'

/on/ > /un/ seems to be systematic in loanword adaptation (cf. Kelly 1973: 73), except for the rarely used loan *on* < Fr. *on* /ɔ̃/ 'we, somebody', which, according to Kelly (1973: 73, footnote 6) "must be retained as such to avoid confusion with /un/ 'où'".[135]

As shown in (7.6b) and §6.4, in the Bearnese dialect of Gascon (in contrast to French) word-final contrastively nasalized /ɔ̃/ was raised to /ũ/, in the same way it occurred in Zuberoan. Although this nasalization is already lost in most Bearnese varieties (cf. Rohlfs 1977: 6, footnote 11), it is transcribed for the sake of comparison. Examples of this

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135 Unstressed /o/ is raised to /u/ in the Donzacese dialect of Gascon —as well as in Central Catalan (Hualde, p.c.)—, as shown by the pairs Dzc. Gsc. *telefòne* /tele'fono/ 'phone' (< Fr. *téléphone* /telefɔn/) vs. Dzc. Gsc. *telefonar* /telefu'na/ 'to call' (< Fr. *téléphoner* /telefɔne/) and Dzc. Gsc. *vòte* /'bote/ 'vote' (< Fr. *vote* /vɔt/) vs. Dzc. Gsc. *votar* /bu'ta/ 'to vote' (< Fr. *voter* /vɔte/) (cf. Kelly 1973: 43, 72).

raising in (7.10) are taken from Agirre Sarasola (2001: 666) and presented alongside Zuberoan parallels:

(7.10) *Word-final /õ/ raising in Bearnese Gascon and Zuberoan Basque* (Agirre Sarasola 2001: 666)

Brn. Gsc.	Brn. Trans.	Zuberoan	Z Trans.	Gloss
lèu	/le'ũ/	*lehũ*[LW]	[lẽ'h̃ũ]	'lion'
arraton	/ara'tũ/	*arratũ*[LW]	[ara'tʰũ]	'mouse'
arrason	/ara'zũ/	*arrazũ*[LW]	[ara'z̺ũ]	'reason'
patron	/pa'tɾũ/	*patrũ*[LW]	[pa'tɾũ]	'patron'
preson	/pɾe'zũ/	*presũ*[LW]	[pɾe'z̺ũ]	'prison'
sason	/sa'zũ/	*sasũ*[LW]	[s̺a'z̺ũ]	'season, time'
milion	/mi'ʎjũ/	*milliũ*[LW]	[mi'ʎjũ]	'million'
salon	/sa'lũ/	*salũ*[LW]	[s̺a'lũ]	'living room'

The similarity of the processes in the two neighboring languages makes it difficult to determine whether the raising happened in the donor language or occurred in both languages in a parallel way (cf. Blevins to appear). In this scenario, examples like Brn. Gsc. *lèu* : Z *lehũ* 'lion' are especially enlightening, given that each shows the expected native treatment of intervocalic /n/: while in Zuberoan intervocalic /n/ becomes a nasalized /h̃/ (cf. Igartua 2008; §4.2.3) and metathesizes to the second syllable (cf. Lakarra 2009b; Egurtzegi 2011, 2013b, §4.4.4, §8.2.1), word-final /-n/ is simply lost in Gascon (Rohlfs 1977: 158). The two processes are depicted in (7.11).

(7.11) *The evolution of Lat. leōnem 'lion' in Zuberoan Basque and Bearnese Gascon*

	Lat.	Reconstructed Process	Mod. form	Trans.
Z Bsq.:	*leōne(m)*	> *leohẽe > *lehõ(i) >	*lehũ*	/le'hũ/
Brn. Gsc.:	*leōne(m)*	> *leon > *leõ > leũ >	*lèu*	/le'u/

7.4.2 Nasalized [ã] raising in Bayonnese Gascon

Unlike Zuberoan, some varieties of Gascon had yet another phonetically nasalized vowel raising analogous to that of [õ] to [ũ], namely the raising of [ã] to [ẽ]. Anglade (1921: 51) mentions certain Gascon texts from Bayonne where /an/ is raised to /en/ in

stressed syllables.[136] Such cases are given in example (7.12):

(7.12)   /a/ raising in nasalized contexts in Bayonnese Gascon (Anglade 1921: 51)

Bay. Gsc.	(Vlg.) Latin	Gloss
enz	*antius*	'but'
quen	*quantum*	'how much'
ten	*tantum*	'so much'
sen	*sanguem*	'blood'
sent	*sanctum*	'Saint'[137]

This second sound pattern involving contextually nasalized vowels does not seem to have a parallel in any Basque dialect in contact with Gascon. The raising of nasalized vowels within north-eastern Basque dialects appears limited to [õ].

7.5 Conclusions

This chapter has discussed the raising of the mid-back vowel in eastern dialects. I have proposed a new analysis for the raising of mid-back vowels: nasalized [õ] was raised to [ũ]. In addition, the raising of [õ] has been divided into two different sub-processes: while the raising of contextually nasalized [õ] to [ũ] is sporadic and present in all eastern dialects, word-final raising of phonologically nasalized stressed /'õ#/ to /'ũ#/ occurs only in Zuberoan and is systematic.

7.5.1 Phonetics behind the raising of the mid-back vowel

I have argued that the raising of nasalized vowels is a consequence of the ambiguity created by the addition of two nasal formants in the F1 domain (Beddor et al. 1986). This ambiguity can result in a change in vowel height, especially in languages where the nasality contrast is not very prominent. This is the case of Zuberoan Basque, where words including a phonemically nasalized vowel are limited to a couple of dozen. The direction of the change in vowel-height found in this sound pattern is consistent with both the

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136 It is worth mentioning that the word for 'Saint' does not usually carry any stress in constructions such as *Sent Pé < sanctum Petrum* 'Saint Peter' (Anglade 1921: 51), and /a/ rises likewise in the mentioned example.

137 Cf. *seinh* in 1251 as well as *sen* in 1451 in the *Cartulary of Limoges* (cf. Anglade 1921: 51).

generalizations made from cross-linguistic surveys and the measurements of the center of gravity of nasal and oral mid back vowels made by Beddor (1982).

The systematic nature of /'õ#/ > /'ũ#/ may be due to the lack of a consonantal source of nasality in this sound pattern. This may have facilitated the listener's reanalysis of the phonetic variation as if it were due to oral height, given the limited presence of contrastive vowel nasalization in the dialect. These reanalyses are common in languages without a very productive vowel nasality opposition (Krakow et al. 1988). The stressed status of Zuberoan contrastively nasalized vowels may have played a role in the raising. The limited domain of contrastive nasalization in Zuberoan alongside the near-gap produced by high back vowel fronting —which made most instances of /u/ > /y/ (cf. Lafon 1937 [1999], 1958 [1999]; Michelena 1977 [2011]; Egurtzegi 2014, §5.2)— probably contributed to the high frequency of the raising of nasalized vowels in Zuberoan as opposed to other eastern Basque dialects.

In sum, a more complete account of vowel nasalization and processes triggered by nasalized vowels is obtained by integrating phonetics as a means of description and explanation of historical sound patterns which have received little attention in the past.

7.5.2 *Similarities with neighboring Romance languages*

After looking at vowel raisings in Romance languages, it seems clear that the raising of nasalized [õ] is similar in Gascon and Zuberoan. This context-dependent raising of the mid back vowel is relatively recent and geographically restricted —it is not found in other Romance languages such as French or Catalan.

Most examples of systematic word-final raising of stressed /'õ#/ involve Bearnese borrowings which have been raised in the donor language as well. While it may be proposed that the borrowings were loaned after the raising took place, the process affected inherited words to the same degree. In addition to inherited words (cf. **ardõ* > Z *ardũ* 'wine'), words like Z *lehũ* 'lion' show traces of older Basque developments such as /n/ > /ñ̃/ /V_V, in contrast to its Bearnese homologue Brn. Gsc. *lèu*, which shows the loss of word-final /n/, with loss of the contrastive nasalization in many modern varieties.

Certain old texts in Bayonese Gascon show an additional raising, similar to that of [õ] but involving [ã] instead. These are attested as far back as the 13th and the 15th centuries (cf. Anglade 1921: 51).

It is difficult to establish a date for the raising of [õ] based on written documentation, since orthographic tradition in Gascon did not discern <o> and <u> before <n>, systematically using <o> instead.

7.5.3 Chronological implications

The raising of nasalized back vowels is definitely more recent than the creation of phonologically nasalized vowels (§6), since it affected all instances of word-final stressed nasalized /õ/ regularly. This process is also subsequent to the fronting of /u/ to /y/ discussed in §5, since the outcomes of the raising were not affected by the fronting.

Given that Zuberoan (and Low Navarrese) writers usually followed the writing conventions of the Bearnese tradition (cf. §7.5.4), the chronology of the process cannot be stated by basing the dating on the systematic use of the orthographic sequence <un> from the 18th century onwards. The use of <u> before <n> from the 18th century does not show a recent sound change; it only implies a change in the writing system. As a matter of fact, sporadic <un> sequences appear in older Zuberoan texts as well, and even the first authors attested in an eastern variety (cf. Dechepare and Leiçarraga) show a high degree of variability in the use of the back vowel in the relevant words affected by this process.

8 Basque Metathesis Processes

8.1 Introduction

This chapter focuses on metathesis, which is defined as a change in the order of phonological elements involving the movement of a segment or feature. Metatheses and metathesis-like processes are analyzed in the evolution from Common Basque to the modern dialects. Instances of these processes in Modern Basque are also discussed, with the aim of determining a systematic explanation that accounts for both diachronic and synchronic processes. To this end, a corpus with a large number of instances of metathesis in the Basque language has been formed, relying especially on the diachronic and dialectological literature —mainly Michelena (1977 [2011]), Arbelaiz (1978) and the *General Basque Dictionary* (Michelena & Sarasola 1987-2005).

The first aim is to determine the types of metathesis that have developed in Basque. I distinguish two main processes, as well as minor sound patterns that are included in them. In addition, I propose one of the specific sound patterns to be systematic, while the rest show sporadic processes. For the sake of analysis, I follow the typology of metathesis proposed in Blevins and Garrett (1998, 2004), and adapt their model to the patterns found in the language, proposing new ways of looking at the process in some instances.

The main conclusion of this chapter becomes evident as we deal with the analysis and classification of Basque metathesis processes in depth. These sound changes could be separated into two different groups, each completely independent from the other, namely *perceptual metathesis* and *reciprocal metathesis*. The former refers to the movement of a single segment within the phonological string, limited to segments or features with a

stretched-out feature. Reciprocal metathesis, on the other hand, makes reference to those metatheses which show the transposition of two non-adjacent segments which exchange location with each other, as understood from the tradition initiated by Brugmann (1904 [1970]: 245) and followed by more modern scholars (cf. Ultan 1978). Although metatheses of this kind are not typically addressed in the phonological literature, they have proven to be especially productive processes within the history of the Basque language, as well as being heavily constrained phonologically. The two kinds of metatheses found in Basque are represented in (8.1), where the metathesized segments are represented by X and Y, and segments that maintain their position by A, B and C:

(8.1)   Perceptual vs. reciprocal metathesis

a)   Perceptual metathesis: X A B C   →   A B X C
b)   Reciprocal metathesis: X A Y B   →   Y A X B

I also illustrate how some instances of metathesis are phonetically conditioned, focusing on the phonetic naturalness of this kind of sound change. Following Ohala (1981, 1993, 2003), this analysis emphasizes the important role played by the listener in the process of phonological change, which can be caused when the listener reinterprets ambiguous segments in non-etymological positions, resulting in metathesis.

8.2 Perceptual metathesis

The first kind of metathesis discussed in this chapter involves processes affecting a single segment, which is reanalyzed in a non-etymological position. Not all segments in the phonological inventory of a language can undergo this kind of metathesis. Only segments that possess one of a limited set of phonetic features (see §8.2.5) may be affected by it. This kind of reordering of segments (or features, cf. §8.2.4) will be referred to as perceptual metathesis.

A range of perceptual metatheses are carefully analyzed by Blevins and Garrett (1998, 2004), who coined the term perceptual metathesis. According to the authors, the elongated phonetic cues which some segments possess can yield ambiguities in the phonic string, thereby creating problems when the listener attempts to reconstruct the linear order of the segments. Whenever the listener reconstructs a segment with a stretched-out feature

in a non-etymological position an instance of metathesis takes place. These micro-sound changes (cf. Ohala 1993) may (or may not) phonologize (cf. Hyman 1975, 1976, 2013) and spread to other speakers over time. This is the analysis followed throughout this chapter and elsewhere (cf. Egurtzegi 2011, 2013a, etc.).

I will distinguish between systematic and sporadic cases of perceptual metathesis. Only a subset of metatheses affecting /H/ are systematic.

8.2.1 /H/-metathesis

The only systematic process of metathesis in Basque involves the metathesis of a laryngeal /H/ (Lakarra 2009b; Egurtzegi 2011, 2013a, 2013b, cf. §4.4.4). /H/-metathesis is also the only metathesis process that affects the inherited lexicon instead of affecting only borrowings or both borrowings and native Basque words. Only those Latin loans that were already integrated into the language at the time of its application were affected. The /H/s in these Latin borrowings had developed from *n > *h̃ some centuries ago. In contrast, Romance borrowings which entered the language later did not have /H/s susceptible to this sound pattern.

/H/ is metathesized from one onset to another:[138] instances of /H/ etymologically located in the third or a later syllable move to the second syllable or the first. This metathesis occurred after an accentual shift (§3.4.2) created a limited distribution for /H/: no aspirate was allowed after the first two syllables. The metathesizing /H/ may come from *h or from *n (after /n/ > /h̃/ /V_V, cf. Igartua 2008, Egurtzegi 2013b, §4.2.3). Metathesis of *h̃ from *n is easier to reconstruct, given that *h̃ leaves a trace of nasalization in the vowels that surrounded it. This nasalization surfaces as a nasal stop after front glides, as in (8.2b). Examples of /H/-metathesis are given in (8.2):

(8.2)   *Systematic metathesis of* /H/

a)	**Lat.**	**Recons.**		**Mod. Bsq.**	**Trans.**	**Gloss**
	arēna	> *areh̃a*	>	*harea*[LW]	/haɾea/	'sand'
	Asenārius	> *azeh̃ari*	>	*hazeri*[LW]	/has̺eɾi/	'fox' (cf. *Acenari*)
	leōnem	> *leoh̃e*	>	*lehoi(n)*[LW]	/lehoi̥n/	'lion'

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138   The onset is its only possible position in the syllable in Basque, cf. §4.4.2.

b) **Recons.** **Mod. Bsq.** **Trans.** **Gloss**

*igune[139] *> *iguh̃e > *higũĩ >* *higuin*[E] /higui̯n/ 'repugnance'

*abune *> *abuh̃e > *habũĩ >* *habuin*[E] /habui̯n/ 'foam'

*ebane *> *ebah̃e > *hebãĩ >* *hebain*[E] /hebai̯n/ 'disabled'

c) **Med. Bsq.** **Mod. Bsq.** **Trans.** **Gloss**

ibahi *>* *hibai*[E] /hibai̯/ 'river'

What is crucial in these metatheses is the historical location of the stress in the second syllable of the word in the dialects that maintained laryngeals until today, given that no aspirate was allowed after this position (cf. Michelena 1957-58 [2011a]; §4.3.2).

Likewise, there seems to be a bias directly related to this process that facilitates the reanalysis of a segment that would otherwise get lost in a phonotactically allowed position after a stress shift (Ultan 1978: 395). This would facilitate the metathesis of an aspirate in the onset of the third syllable to an empty onset in any of the syllables before the stress, i.e. to either the second or the first syllable.

Metathesis of /H/ can also occur as a sporadic process. These metatheses can move /H/ from the first syllable to the second, even moving to a post-sonorant position, as in (8.3b) (Lakarra 2009b).[140] These instances adequately conform to the hypothesis that any aspirated segment —/H/ or aspirated stops— is forbidden after the stress, since the laryngeals move to the onset of the (historically) prosodically prominent second syllable.

(8.3) *Sporadic metathesis of* /H/ (Lakarra 2009b)

a) **Mod. Bsq.** **Recons.** **Gloss**

herrauts[E] *<* *erhauts* 'dust' (cf. *hauts* 'dust')

haitz[E] *<* **ah̃itz < *anitz* 'rock' (v. Arbelaiz 1978: 26)

b) **Mod. Bsq.** **Recons.** **Gloss**

onherran[E] *<* *hon* 'good' + *erran* 'to say' 'blessing, benediction'

onheritzi[E] *<* *hon* 'good' + *eritzi* 'to deem' 'to love, approval'

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139 The final vowel in these reconstructed forms can be either *-i* or *-e*.

140 See also Lakarra (2013b) for similar processes in borrowings from Gascon.

8.2.2 Perceptual metathesis involving liquids

The metathesis involving the movement of a single liquid has been very productive in the history of Basque, although not systematically so. This can be inferred from the high number of instances of /L/-metathesis collected in Egurtzegi (2011). /L/-metathesis mainly affected borrowings. No tautosyllabic onset cluster has been possible in Basque until very recent time.[141] While Latin /TL/ clusters were adapted by means of epenthesis and deletion, later borrowings also involve metathesis.

I have found four main types of perceptual metathesis involving liquids within Basque. One involves the movement of a rhotic from one coda to another (8.4a). This is the only change which does not involve a cluster as well as the only that affects the inherited vocabulary in addition to affecting loanwords. The other three /L/-metatheses involve onset clusters and only affect loanwords:[142] Metathesis of a liquid from a *muta cum liquida* cluster —in syllable onset— to a coda (thus dismantling the cluster) in (8.4b), the movement of a liquid from a coda to an onset creating a new cluster in (8.4c), and the metathesis of an onset liquid to another onset (creating a new cluster after breaking an etymological one) in (8.4d). These different possibilities of perceptual metathesis are shown in example (8.4):

(8.4) *Perceptual metathesis involving liquids* (Egurtzegi 2011)

a)	**Var. A**		**Var. B**	**Gloss**
	arlo[E] (B, G)	:	*alor* (comm. exc. B)	'field, area'
	masorka[LW] (L)	>	*marsoka* (L)	'loom shuttle'

b)	**Var. A**		**Var. B**	**Gloss**
	adrillu[LW] (B, L)	>	*ardillu* (Old L)	'brick'
	estrata[LW] (B, G, HN)	>	*estarta* (B, G, HN)	'path, track'
	grutze, krutze (B, S)	>	*gurtze, kurtze* (B)	'cross' (Std. Bsq. *gurutze*[LW])

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141   With the potential exception of sound-symbolic vocabulary.
142   Stop-liquid clusters were absent from Proto-Basque, cf. §1.1.1.

c)   **Var. A**   **Var. B**   **Gloss**

alpargata[LW]	>	*alprageta*	'espadrille'
terko[LW] (B)	>	*treko* (B)	'stubborn'
turko[LW] (L, LN, Z)	>	*truko*	'Turk'

d)   **Var. A**   **Var. B**   **Gloss**

desondra[LW]*-garri*	>	*tresondagarri* (HN)	'dishonoring'
eskribaun[LW] (B, G)	>	*eskibraun*	'scribe'
errepublika[LW]	>	*erreplubika*	'republic'

While the examples in (8.4b-c) involve local CV/CC metatheses, the ones in (8.4a) and (8.4d) demonstrate non-local movements and show that those long-span segments can be reinterpreted across more than a single segment. With the exception of the first example, all examples in (8.4) involve loanwords. Example (8.4b) shows the dismantling of a cluster that is unknown outside the loaned vocabulary in Basque, and example (8.4c) demonstrates the creation of a non-etymological *muta cum liquida* cluster. The first two examples in (8.4d) seem to dismantle a CCC cluster. While most processes in examples (8.4) seem to be clear instances of perceptual metathesis, example (8.4d) may also be analyzed in a different way (see the discussion in §8.5.1).

Phonotactic restrictions have been proposed to play a role in triggering /r/-metathesis. This is especially clear in the history of Slavic languages (Shevelov 1964). In the case of Basque, /r/-metathesis processes dismantling a cluster (8.4b) are conditioned by the lack of such clusters in older stages of the language (§1.1.1). Metathesis of /r/ from a coda to another (8.4a) seems to be the result of the reinterpretation of the rhotic in the only other acceptable position in the word. Two different pathways may be proposed: *al.hor > a.lor > ar.lo* or **harlo > *halor > alhor*. Nevertheless, the sequence involving loss of /H/ (§3.4.2) and metathesis gives rise to forms attested in different dialects, and thus seems preferable. On the other hand, metathesis of /L/ from a /TL/ cluster to another (8.4d) does not seem to be phonotactically conditioned in Basque (in contrast to what has been proposed for Gascon, cf. Dumenil 1983).

8.2.3 Perceptual metathesis involving glides

Like sonorant metatheses, vowel and glide metatheses include two different types, which are distinguished according to the number of segments that change their position.

The analysis of these two types of metathesis highlights the differences between vowels and glides, each of them being involved in completely different (and well defined) processes. While vowels undergo only reciprocal metathesis, glides become metathesized as a result of perceptual metathesis. As shown in the examples in (8.5), a glide could emerge in a new position after reinterpretation by the listener:

(8.5) *Glide metathesis* (Egurtzegi 2011)

a)

Var. A		**Var. B**	**Gloss**
basaurde (B, G)	>	*basuerde* (G)	'wild boar'
errau[LW] (HN)	:	*errua* (G)	'unit of weight'
bienke[LW] (B)	>	*beinke* (B, G)	'good that'
jator (G)	:	*aitor* (G)	'fertile ground'

b)

Var. A		**Var. B**	**Gloss**
(*h*)*ausin* (L, LN, Z)	:	(*h*)*asuin* (L, HN, AE)	'nettle' (cf. *asun*[LW])
euskara[LW] (HN, AE)	:	*eskuara* (L, LN)	'Basque'[143]
saroe [s̺aɾwe] (HN)	>	*saure* (S)	'meadow' (cf. *saroi*[LW])
gerezia[LW] (comm.)	>	*gereiza* (Harriet)	'cherry'
materia[LW] (comm.)	>	*mateira* (G)	'matter, topic'[144]

c)

Var. A		**Var. B**		**Var. C**	**Gloss**
zalui	:	*zauli*	:	*zailu*	'agile' (cf. *zal*(*h*)*u*[LW])

The glides may move from one side of the diphthong to the other, as in (8.5a) or they may metathesize from one syllable to another as in (8.5b). Example (8.5c) shows that, in the case of a diphthong composed of two high vowels, there are two segments susceptible to metathesis, and either of them can move to another syllable as a glide.

8.2.4 Featural metathesis

Lastly, a different variety of perceptual metathesis involves the movement of a phonetic feature from a segment to another. As in the case of the instances of perceptual metathesis discussed in §8.2.1-3, featural metathesis affects only phonological features bearing elongated phonetic cues (Ohala 1993). Such is the case with palatalization.

The metathesis of palatalization usually occurs in a perseverative manner —in the same direction as the VC assimilation of palatality, /l, n/ > /ʎ, ɲ/ /i__—, but not necessarily. Examples of this process are shown in (8.6):

(8.6) *Featural metathesis of palatalization* (Egurtzegi 2011)

a)	**Var. A**		**Var. B**	**Gloss**
	mantellina (Old G)	>	*manteliña*[LW] (G, LN)	'headscarf'
	Sp. *hollín*	>	*oliñe*[LW] (B)	'soot'

b)	**Sp.**		**Bsq.**	**Gloss**
	llano	>	*laño*[LW] (L, LN)	'modest, unassuming, affable'

c)	**Nav. Rom.**		**Bsq.**	**Gloss**
	navalla	>	*ñabala*	'knife' (Std. Bsq. *labana*[LW])

d)	**Var. A**		**Var. B**	**Gloss**
	señale[LW]	>	*senalle* (B)	'signal'

Regarding the question of why one direction is favored over the other, I suggest that preservation of the structure plays a role in some examples. The perseverative direction of the featural metathesis in cases as those in (8.6a) is a consequence of the direction of the assimilation. The examples in (8.6a) have a high-front vowel between the alveolar consonants that palatalizes the second of these. Given that the palatalization of the second consonant is recoverable from the phonological context, the palatalization of the first consonant may be deemed phonetic by the listener. The direction of the cases in (8.6b-d) may be simply due to chance.[145]

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145 Nevertheless, the comparatively lower frequency of word-initial palatals may have facilitated the process in (8.6b). Word-initial palatalization is only developed by hypocoristic palatalization (Oñederra 1990; Hualde 2003a: 39) and not by assimilation in most of the vocabulary. Only finite verbs show

A similar featural metathesis that affects vowels instead of consonants is that involving nasalization. In Roncalese Basque, a variety that maintained contrastive vowel nasalization until it disappeared in the 20th century (cf. §6.2.2), some words show nasalization in a vowel which was not in contact with a nasal consonant. Examples of this metathesis include those in (8.7):

(8.7) *Metathesis of vowel nasality* (Michelena 1953 [2011a], 1954 [2011a])

	Roncalese		**Recons. form**			**Std. Bsq.**	**Gloss**
a)	*gã́zta*	<	**gaztã*	<	**gaztana*	*gazta*[E]	'cheese'
b)	*ã́ria*	<	**arẽã*	<	Lat. *arēna*	*harea*[LW]	'sand'

While the first example in (8.7a) can only be the product of a featural metathesis, the second (8.7b) may also be a consequence of the metathesis of a nasalized aspirate, given that the initial /h/ in the variant *harea*[E] (L, LN) was historically nasalized —as well as being in the third syllable: Lat. *arēna* > **areh̃a* > Std. Bsq. *harea*; (cf. §4.2.3 and §4.4.4). Note nonetheless that nasalization was not carried over with the metathesis of the aspirate in Zuberoan: Lat. *arēna* > **areh̃a* > **hareh̃ã* > **hariã* > Lit. Z *haríña* > Mod. Z *háiña* 'sand'. Considering that both examples have the stress in the first syllable (cf. R *ã́ria*, Michelena 1953 [2011a]: 590; R *gã́zta*, 1954 [2011a]: 616), we may assume nasalization was reinterpreted as originating in the stressed syllable. All instances of vowel nasalization transcribed by Michelena (1953 [2011a]) in the Roncalese varieties of Izaba and Uztarrotze show nasalization in the stressed syllable.[146]

In addition to palatalization and nasalization featural metatheses, segmentalization processes can also be considered a kind of featural metathesis, and thus instances of perceptual metathesis, as long as they involve a feature that contains an elongated phonetic cue being metathesized into a non-etymological position (and accordingly segmentalized as an independent segment) after a listener-based reinterpretation.

This kind of sound change is mostly found in the reinterpretation of contrastive vowel nasalization[147] as a nasal stop after the formerly nasalized vowel or diphthong. Following Ohala's (1981: 187) analysis of listener-based sound change, this

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cases of palatalization by a following glide: *diagok > zegok, lioke > lloke*, etc. (Hualde, p.c.).

146 Izaba (Michelena 1953 [2011a]: 576ff.): *kĩo* 'bad smell', *kĩatu* 'to stink', *zĩ*[E] 'oak acorn', *zĩatu* 'to curdle'; Uztarrotze (Michelena 1953 [2011a]: 596ff.): *áĩzpa*[E] 'sister of a woman', *áĩzterrak* 'the scissors', *áĩztua* 'the knife', *gã́zta*[E] 'cheese', *ṹr* 'hazelnut', *karrṍatruk* 'frozen'.

147 Which was developed after intervocalic /ñ̃/ loss, see Michelena (1977 [2011]); §6.2.

segmentalization would be an instance of hypercorrection, as the listener attributes a "distortion" of the phonic string —vowel nasality, in this particular case— to a non-existing adjacent segment which would be (erroneously) restored.

In fact, the listener can make use of his or her information about his or her language in order to link the nasality in such vowels to the nasalization inherent to a vowel placed before a nasal stop, and thus balance both situations by restoring the "missing" segment. In these cases, the listener attributes the lack of a /n/ to the ambiguity of the phonic string and "corrects" the situation by "reinstating" a non-etymological segment. Some of the instances of this process found in Basque are shown in (8.8):

(8.8) *Segmentalization of vowel nasality* (Egurtzegi 2011)

Recons.	**Mod. Bsq.**	**Bsq. Trans.**	**Gloss**
*artzani > *artzah̃i > artzãi >	*artzain*[E]	/arts̺ai̯n/	'shepherd'
*arrani > *arrah̃i > arrãi >	*arrain*[E]	/arai̯n/	'fish'
*lukanika > *lukah̃ika > lukãika >	*lukainka*[LW]	/lukai̯nka/	'spicy sausage'
*garanu > *garah̃u > garãu >	*garau(n)*[LW]	/garau̯n/	'grain'

Segmentalization can also affect palatality in some Navarrese varieties, where loanwords including a palatal consonant have been reanalyzed as a sequence of a high-front semivowel followed by an alveolar obstruent. This process may be analyzed as a rule loss and hypercorrection of the progressive palatalization common to all Basque dialects (see Oñederra 1990 on palatalization in Basque). Examples of this process include:

(8.9) *Segmentalization of consonant palatality* (Egurtzegi 2011)

Sp.	**Sp. Trans.**		**Bsq.**	**Bsq. Trans.**	**Gloss**
botella	/boteʎa/	>	*boteila > botila*[LW]	/botila/	'bottle'
doncella	/donθeʎa/	>	*dontzeila*[LW]	/donts̺ei̯la/	'maid'
pollo	/poʎo/	>	*oilo*[LW]	/oi̯lo/	'hen'

Continuing the discussion of featural metatheses, I have argued (in Ariztimuño & Egurtzegi 2011 and Egurtzegi & Ariztimuño 2013) against Michelena's hypothesis on a metathesis of the *fortis-lenis* status of two consonants[148] for the connected etymology of

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148   From *eNala* to *eLana* or *vice versa*, with a *fortis* segment that becomes *lenis* and a *lenis* that becomes *fortis* in either case.

enara[E] / *elai*[E] 'swallow, martin' by proposing a more economical development. The example in (8.10) shows Michelena's (1977 [2011]: 326) proposal, based on an intervocalic position which feeds four different sound changes:[149]

*(8.10)   enara : elai < *eNala : *eLana* (Egurtzegi & Ariztimuño 2013)

a)   *(*eNala > *enaLa >) *eLana > *eLaha > *elaa > elae > elai*[E]

b)   *(*eLana > *elaNa >) *eNala > *eNara > enara*[E]

Either of the combinations between parentheses —which involve one *fortis-lenis* metathesis plus one reciprocal metathesis (cf. §8.3)— was necessary to link both variants (though in no particular order). But, while more instances of reciprocal metathesis of onset /l/ and onset /n/ are found in Basque (cf. §8.3.1), I have not been able to find any other example of the *fortis-lenis* metathesis shown in (8.10). In fact, this *fortis-lenis* metathesis can be avoided by reconstructing a segment that would alter the intervocalic context that made the metathesis involving consonantal "strength" necessary for previous authors:

*(8.11)   *eC.nala / *eC.lana* (Egurtzegi & Ariztimuño 2013)

a)   *(*eCnala >) *eClana > *eClaha > *eClaa > *eClae > elai*[E]

b)   *(*eClana >) *eCnala > *eCnara > *eCnara > enara*[E]

Thus, we will only need to reconstruct a reciprocal metathesis from *eC.nala* to *eC.lana* —which I describe among the reciprocal sonorant metatheses in §8.3.1 below—, and a late drop of the segment that counterfeeds the sound changes that would otherwise occur in an intervocalic position. In order for the reciprocal metathesis to develop, the reconstructed segment must be posited in the coda of the first syllable, which would only leave sibilants and sonorants available for that particular position.[150] Since pre-sonorant sibilants are uncommon (and seemingly modern) in Basque, a sonorant is preferable. For sonorants, a rhotic is preferred, especially considering that /n/ and /l/ in consecutive

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149 *N > n, *n > h, *L > l and *l > r occur in intervocalic position, apud Michelena (1977 [2011]).

150 *h cannot be proposed for this etymology, given that it would displace the first sonorant to the coda of the first syllable. A different syllabic position of the sonorants (**el.ha.na*, **en.ha.la*) would prevent perceptual metathesis (cf. §8.3.4). See Egurtzegi and Ariztimuño (2013) for further discussion of this etymology.

positions are more unstable than required,[151] and /rl/ and /rn/ clusters, although potentially modern, are much more widespread. Both variants *ernara*[E] and *erlai*[E] are found in different areas of the Bizkaian dialect according to the General Basque Dictionary, so that the rhotic can be defined to occupy the coda of the first syllable, as in (8.12):

(8.12) *ernala / *erlana   instead of *eNala / *eLana (Egurtzegi & Ariztimuño 2013)

a)   (*ernala >) *erlana > *erlaha > *erlaa > erlai > elai[E]

b)   (*erlana >) *ernala > *ernara > ernara > enara[E]

8.2.5 The phonetics behind perceptual metathesis

In perceptual metathesis, a stretched out feature bearing elongated phonetic cues is reinterpreted as originating in a non-historical position. This process is a consequence of the perceptual difficulty of localizing the (segmental) origin of a phonetic cue with long-distance effects affecting a multisegmental sequence.

As discussed by Ohala (1993), certain perceptual features are typically realized over relatively short time span, whereas others are realized over relatively long durations. Blevins and Garrett (2004: 121) mention the example of pharyngealization, a feature that is phonetically realized over a minimal CV or VC domain. According to the authors, whenever an entire CVC sequence is pharyngealized, being the features associated at some level with a unique segment, many different analysis of the phonetic sequence may result: any of the segments could be secondarily pharyngealized (CˤVC, CVˤC, CVCˤ) or a pharyngeal segment present in the sequence could be the source of ambient pharyngealization (ʕCVC, CʕVC, CVʕC or CVCʕ). If the listener reconstructs the source of pharyngealization in a non-etymological position, an instance of metathesis would take place.

As already mentioned, not all segments and features are subject to being reinterpreted by means of perceptual metathesis. Only features bearing elongated phonetic cues (Ohala 1993) produce the necessary ambiguity in the phonetic string that may yield the listener to the reinterpretation of a segment or feature in a non-historical position. These features and segments, alongside its crucial acoustic properties, are listed in a table in Blevins and Garrett (2004: 123), which is reproduced under example (8.13):

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151 /nl/ and /ln/ clusters are uncommon in Basque, cf. Egurtzegi (2013a).

(8.13) List of features and segments subject to undergo perceptual metathesis (Blevins & Garrett 2004: 123)

Feature	Segmental realisations	Acoustic property with long duration
rhoticity	rhotics, rhotic Vs	lowered F3 (LM: 244, 313)
laterality	laterals, lateral Vs	lateral formants (LM: 193ff.)
rounding	rounded Cs, rounded Gs, round Vs	lowering of all formants (LM: 356ff.)
palatalization	palatalized Cs, palatal Gs, high front Vs	raised F2 (LM: 364)
velarization	velarized Cs, velar Gs, high back Vs	lowered F2 (LM 361f.)
pharyngealization	pharyngealized Cs, Gs and Vs, ʕ, ħ	lowered F3, raised F1 (LM: 307)
laryngealization	laryngealized Cs, Gs and Vs, ʔ	more energy in F1, F2, more jitter (LMJ)
aspiration	aspirated / breathy Cs, Gs and Vs, ɦ, h	more energy in F0, more noise (LMJ)
retroflexion	retroflex Cs and Vs	lowered F3, F4, clustering of F2, F3, F4 (L: 203, LM: 28)
nasalization	nasals, nasalized Vs and nasalized Gs	spectral zero / nasal, anti-resonance (LM: 116)

(L = Ladefoged 1993; LM = Ladefoged & Maddieson 1996; LMJ = Ladefoged, Maddieson & Jackson 1988).

These features tend to take multisegmental domains, and can give rise to metathesis. Other features, such as major consonantal places of articulation (coronal, labial, dorsal), frication, continuancy and major class features show temporal alignment with single segments and are not expected to undergo metathesis (Blevins & Garrett 2004: 124).[152] Voicing is not included in the list of features in Blevins and Garrett (2004: 123), but the results of recent research by Ohala (2012) may let us add this feature to those in (8.13). For an extensive bibliography, see Blevins and Garrett (2004: 121ff.).

The extended domains of these features can also be blocked in certain phonetic contexts, such as an incompatible phonetic feature abutting the one in question (cf. Blevins & Garrett 2004: 124). This situation can generate apparent exceptions to regular metathesis by means of phonetic conditioning factors. Exceptions are expected where adjacent conflicting features block coarticulation, resulting in no segmental ambiguity.

Regarding the different directions of the process, an adaptation to the most usual patterns of the language is expected. Although presented in a teleological way, as a means

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152 See however Blevins and Garrett (2004: 127f., 139f.) on a different kind of metathesis involving fricative noise.

of solving ill-formed sequences, this observation was present from the earliest literature on the process (cf. Brugmann 1904 [1970]: 246) and gradually developed from there (cf. Grammont 1933: 239; Ultan 1978; Hock 1985). More recently, Hume (2004) incorporates it into her model as *attestation* and describes it as "a bias towards more practiced articulatory routines" (2004: 229), discarding the teleological component. Blevins (2004: 153ff.) defines adaptation to the most usual patters of the language as *structural analogy*, adding that pre-existing phonotactics can prime reanalysis of ambiguous strings in cases of metathesis (Blevins 2004: 155).

I have observed processes of metathesis resulting in the adaptation of a segment or sequence to the phonotactics of the language. In §8.2.2, example (8.4b) shows the separation of a tautosyllabic stop plus liquid cluster as a consequence of a metathesis, while in (8.4c) a metathesis resulted in the creation of a non-etymological /TR/ cluster. I propose that epenthesis and obstruent deletion (cf. Michelena 1977 [2011]; Egurtzegi 2013a) were the oldest means of loanword adaptation, since they are the most usual means of adaptation in Latin loans. Metathesis, on the other side, was a not so old sporadic result of the adaptation of /TR/ clusters. Non-etymological clusters were developed only after the unadapted introduction of Romance tautosyllabic stop-liquid clusters into the language was the norm.

Finally, it is worth mentioning that listeners may deal with segmental ambiguity favoring a prosodically prominent position (cf. Blevins & Garrett 2004: 134). As far as the non-etymological position of metathesized aspirates is concerned (cf. §4.4.4, §8.2.1), these segments are necessarily metathesized only to one of the first two syllables, given that they were lost in post-tonic position, cf. Michelena (1957-58 [2011a], 1977 [2011]; §4.3.2). Instances of /h/ moving to the first syllable can be analyzed as a consequence of the prosodic prominence inherent to word-initial position. The role of stress in the other cases of perceptual metathesis is not easy to determine. Changes in the stress pattern (cf. §3.4) make it difficult to relate metathesis to stress.

8.2.6 *Some typological parallels*

As in the case of any other phonetically natural phonological process, we expect to find instances of perceptual metathesis in a wide array of languages from all around the world. Classical Armenian (Grammont 1908; Schmidt 1981; Ravnæs 1991), for instance,

shows a regular inversion in the linear order of stop/africatte + rhotic clusters in word-initial and medial position, as shown in example (8.14):

(8.14)   /r/-metathesis in Classical Armenian (Blevins & Garrett 2004: 129)

a)

IE				**Cl. Arm.**	**Gloss**
$*kʲubʰros$	>	*$*subr(V)$*	>	*surb*	'holy'
$*bʰidros$	>	*$*bʰitrn(V)$*	>	*birt*	'rigid, rude'
$*megʲʰri$	>	*$*medzr(V)$*	>	*merdz*	'near'

b)

IE				**Cl. Arm.**	**Gloss**
$*dʰabʰros$	>	*$*dabrin$*	>	*darbin*	'smith'
$*swidros$	>	*$*kʰitrn$*	>	*kʰirtn*	'sweat'

c)

IE				**Cl. Arm.**	**Gloss**
$*bʰrātēr$	>	*$*brājr$*	>	*ełbajr*	'brother'
$*bʰrēwr$	>	*$*brewr$*	>	*ałbewr*	'spring, well'

In the examples affecting word-initial clusters in (8.14c), a prothetic V arises before the initial rhotic. In the same examples, dissimilatory effects in the first of two consecutive rhotics changes *r to /ł/ (cf. Blevins & Garrett 2004: 129).

While in Armenian a Cr cluster inverts its order to rC, the opposite change is attested as a regular metathesis in eastern dialects of Judeo-Spanish or Ladino. In these dialects, a regular *rð > ðr* change has occurred. The data from the Istanbul dialect in example (8.15) was compiled by Subak (1906: 171f.):

(8.15)   Rhotic metathesis in Istanbul Judeo-Spanish (Subak 1906: 171f.)

Std. Sp.	**Istanbul J-Sp.**	**Gloss**
tarde	*táðre*	'evening'
bastardo	*bastáðro*	'bastard'
verdura	*veðrúra*	'verdure'
cuerda	*kwéðra*	'cord'
cordero	*koðréro*	'lamb'
sordo	*sóðro*	'deaf'

A similar example of that found in Armenian, but in which the rhotic switches its position with the next vowel instead of doing so with the previous stop is found in the course from Old English to Middle English, as shown by the examples in (8.16), taken from Ultan (1978: 393):

(8.16) Rhotic metathesis in Middle English (Ultan 1978: 393)

Old Eng.		Mid. Eng.	Gloss
brid	>	*bird*	'bird'
þridde	>	*third*	'third'

As in the processes in (8.14-15), mirror images of the sound pattern in (8.16) are also found in the literature. One of these processes is found in the North Mazovian dialects of Polish (cf. Czaplicki 2009). The examples in (8.17) are taken from Zduńska (1965: 116ff.) and Friedrich (1955: 128), transcriptions and glosses are those of Czaplicki (2009: 357):

(8.17) Rhotic metathesis in North Mazovian Polish (Czaplicki 2009: 357)

Std. Pol.	North Maz. Pol.	Gloss
durʃlak	*druɛlak*	'colander'
dɛrkatɛ	*drɛkatɛ*	'to make a sound like a corn crake'
turkafka	*trukafka*	'turtle dove'
pjɛrɕtɕɛɲ	*priɕtɕɛɲ*	'ring'

As shown by examples (8.14-15) and (8.16-17), the reinterpretation of the metathesizing segment can occur in any direction. As a matter of fact, some of these possibilities are attested in Basque (cf. §8.2.2, example 8.4).

To give a parallel to another kind of very productive perceptual metathesis found in Basque (cf. §8.2.1), the examples in (8.18) below show the reinterpretation of aspirates in Marathi (Bloch 1915; Turner 1962-1966):

(8.18) *Aspirate metathesis in Marathi* (Blevins & Garrett 2004: 134)

a)	**Sanskrit**	**Prakrit**	**Marathi**	**Gloss**
	duhitr-	*duhia-*	*dʰuːv*	'daughter'
	mahattara-		*mʰaːtaːraː*	'greater' > 'old'

b)	**Sanskrit**	**Prakrit**	**Marathi**	**Gloss**
	astʰi	*attʰi-*	*haːd*	'bone'
	oʈʈʰa	*oʈʈʰa-*	*õʈʰ, hõʈ*	'lip'

According to Blevins and Garrett (2004: 134), if a segment or feature has extended cues of the sort responsible for perceptual metathesis, when misperceived, it is likelier to appear to be originating in the perceptually salient (or prominent) position. In the examples from (8.18), aspiration (both as a feature and as a segment) shifts to the word-initial consonant. Wherever the word begins with a vowel, as in (8.18b), the aspiration appears as an initial segment.

This is also true in the Basque case, where aspirates are reinterpreted in the first two syllables after the stress shift to the peninitial syllable, given that word-initial syllables are cross-linguistically prominent (Barnes 2006: 161ff.).

8.3 Reciprocal metathesis

The term reciprocal metathesis (following Ultan 1978) refers to the metatheses that involve two different non-adjacent segments that exchange their positions with one another. The possible components of the process undergone by two segments are specified in this section and the restrictions to which they must adhere are discussed. In order for reciprocal metathesis to occur, the two segments need to be in the same syllabic position — i.e., onset, nucleus or coda— and they need to share some crucial phonological features. This kind of metathesis is very usual in Basque, which affects not only consonants (cf. §8.3.1, §8.3.2), but vowels as well (§8.3.3).

Although this process is not as widely discussed in the literature as other kinds of metatheses, it has been known since the early 20th century (cf. Brugmann 1904 [1970]: 245): "Oder zwei Laute werden versetzt, indem sie gegenseitig ihren Platz vertauschen. [...] man antizipiert den späteren Laut, und die Nachholung des früheren ist nur eine

Folgewirkung dieser Vorausnahme".[153]

Reciprocal metathesis is a sporadic process which affected inherited words and loanwords in the same way in Basque. I hypothesize that, unlike perceptual metathesis, reciprocal metathesis originates in articulation. Reciprocal metathesis is similar to the speech error usually regarded as *spoonerism* (MacKay 1970: 323), in which the sequential order of two segments is involuntarily reversed (cf. *overinflated state → overinstated flate*; *pus pocket → pos pucket*; Goldstein 1968).

8.3.1 Reciprocal metathesis involving sonorants

I have found three kinds of reciprocal metatheses involving (at least) a sonorant segment in Basque: the metathesis of two liquids located in syllable codas as seen in (8.19); the transposition between an onset rhotic and an onset approximant (intervocalic voiced stops become approximants[154] in Basque, cf. Egurtzegi 2013a: 147) in (8.20); and the process involving an onset liquid and a coronal nasal, also in the onset of the syllable in (8.21):

(8.19) Reciprocal metathesis of /r/ *and* /l/ *in coda* (Egurtzegi 2011)

Var. A		Var. B	Gloss
alper (B, G, HN)	>	*arpel* (B)	'lazy' (cf. *alfer*[E])
elkar[E] (G, HN, L, LN)	>	*erkal* (AE)	'together'[155]
ergel[E] (G, HN, L, LN, Z)	>	*elger* (S)	'dumb'

(8.20) Reciprocal metathesis of a rhotic /ɾ, r/ *and an approximant* [β̞, ð̞, ɣ] *in onset* (Egurtzegi 2011)

a)	Var. A		Var. B	Gloss
	ediren[E] (L, LN, Z)	:	*eriden* (LN, Z)	'to find'[156]
	igaran[E] (B, L, LN, Z, R)	<	*iragan* (L, LN)	'to pass, go by'
	irudi[E] (B, G, HN, L)	:	*iduri* (L, LN)	'image, picture'

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153 "Or two sounds would be moved, mutually exchanging their position. [...] the last sound is anticipated, and the recovery of the previous is just a consequence of this movement", my translation (A.E.).

154 Intervocalic appoximant loss is already found in place names from the 12th century (Egurtzegi 2013a: 147). [β], [ð] and [ɣ] were probably realized as approximants before these metatheses occurred.

155 Cf. *alkar* (B, G, HN, AE, Z, R) : *arkal* (B).

156 Cf. *ediro* (B) : *erido* (B).

b)   **Var. A**   **Var. B**   **Gloss**

   arrabots (B, G, HN, LN)   :   *abarrots*[E] (L, LN)   'noise'

(8.21) Reciprocal metathesis of /l/ *and* /n/ *in onset* (Egurtzegi 2011)[157]

Var. A		**Var. B**	**Gloss**
benela (Old HN)[158]	>	*belena*[LW] (HN, R, S)	'gap between houses'
il(l)unabar (comm.)	>	*iñulabar* (G)[159]	'dusk, twilight'
nabala (N)	>	*labana*[LW] (B, HN)	'knife'

Rhotics and laterals behave in a different way in regard to their syllable position — i.e. onset or coda. As shown by example (8.19), rhotics and laterals seem to bear high exchange rates in syllable codas, but not so in onsets, where rhotics are more likely to be transposed with approximants —see (8.20)—, whereas laterals increase their exchange rates with coronal nasals, as in example (8.21).

Note the differences between /ɾ/, /r/ and /l/ regarding the position they occupy within the syllable: the difference between them decreases significantly in syllable-final position, where they are subject to undergo reciprocal metathesis in Basque, but syllable-initially rhotics (/ɾ/ and /r/) only exchange their position with approximants ([β̞], [ð̞] and [ɣ̞]), while the alveolar lateral /l/ exchanges its position with the alveolar nasal /n/ instead.[160]

According to the examples (8.19-20), coda rhotics do not behave in the same way as onset rhotics do. Crucial for the distinction between onset and coda rhotics is that rhotics contrast only in syllable onset. The neutralized coda rhotic may deviate from an intermediate realization towards that of the trill.

Evidence that supports this hypothesis can be found by looking at the rhotics that were etymologically located in syllable codas but where independent processes undergone by adjacent segments have changed their contexts into intervocalic positions. That could

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157 Alongside an instance of /l/ : /m/ metathesis: *milikatu* (G, GN, L, Baz, BN) > *limikatu* (L, BN) 'to suck'. Cf. the reconstruction of the word for 'swallow' in (§8.2.4), involving a reciprocal metathesis of /n/ and /l/.

158 See Iribarren (1952 [1984]), cf. Fr. *venelle*, Ast. *binietsa*.

159 The palatalization of the sonorants may be posterior to the metathesis, since it is always maintained in the same syllable.

160 These higher than usual exchange rates are not only evident in the case of metathesis, they are also shown in other processes such as the cross-dialectal alternation of /n/ and /l/ word-initially: *narru* (B, G) : *larru*[E] (comm.) 'skin, leather'; *nasai* (L, LN, Z) : *lasai*[E] (B, G) 'calm'; *numero*[LW] (B) > *lumero* (B) 'number'. Note that dissimilation may play a role in the last example, involving a Spanish loanword.

happen not only because of metathesis (8.22a) but also as a result of other developments, as shown by (8.22b). The examples are taken from Egurtzegi (2011):

(8.22)   Status of the coda rhotic after being resyllabified to the onset (Egurtzegi 2011)

a)	**Std. Bsq.**		**Dialectal**	**Gloss**
	Gernika	>	*Gerrinka*	'Gernika (place name)'
	Zornotza	>	*Zorrontza*	'Zornotza (place name)'

b)	**Std. Bsq.**		**Dialectal**	**Gloss**
	Fernando	>	*Ferrando*	'Ferdinand'[161]

The instances of metathesis of a single nasal to the tautosyllabic coda found in the two toponyms, as well as the dissimilation in the anthroponym *Ferrando*, show that the neutralized coda rhotic surfaces as a trill when it is resyllabified to an onset.[162]

All word-final rhotics are trills in the modern language, although some instances of these were taps in older stages of the language, as demonstrated by the alternations created by the definite article (as in [hur] vs. [huɾa] 'water, the water') as well as the inhibition of the Zuberoan fronting of /u/ to /y/, which occurred before the tap but not before the trill (as in *hur*[E] 'water' vs. *hür*[E] 'hazelnut', cf. §5.2.1).

On the other hand, the adaptation via epenthesis of tautosyllabic onset clusters such as /Tr/ (T a stop r a rhotic), which was regular in Latin loans (cf. Lat. *libru*(*m*) > Bsq. *liburu*[LW] 'book', etc.), gave rise to a tap (and not a trill).[163]

Reciprocal metathesis also underlines the differences between coda and onset laterals. The grouping of the reciprocal metatheses involving lateral segments does not seem very intuitive, with onset /l/ grouping with /n/ while coda /l/ groups with the coda rhotic.

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161   The analysis of the development of trills in (8.22) may be extended to some instances of /r/ in verbal forms such as *erran*[E] 'to say' < *er*(*a*)*san* or even *jarraitu*[E] 'to follow' (cf. Lakarra 2008 on verbs with the structure *e-da-ra-CVC*).

162   Nevertheless, this may be a Spanish alternation, cf. the name *Hernán* vs. *Herrán* and *Ferrán* (Hualde, p.c.).

163   This process may have been conditioned by elongated phonetic cues of the rhotic (cf. Blevins & Garret 1998: 123). Phonetically natural changes caused by sequential ambiguity probably span over a long period within the history of the language. Thus, both metathesis and vowel epenthesis may appear one after the other in no particular chronological order, as seen in *kaberestu* 'leading ox', cf. (8.40). However, folk etymology can't be completely ruled out for this particular example (cf. *abere* 'domestic animal, livestock').

8.3.2   *Reciprocal metathesis involving obstruents*

Two kinds of metathesis are found: metathesis between two stops and metathesis between a stop and a sibilant. Stop metathesis involves a position exchange between either two voiced or two voiceless segments, as seen in (8.23-24):

(8.23)   Reciprocal metathesis between voiced stops/approximants (Egurtzegi 2011)

Var. A		Var. B	Gloss
bage (B)	>	*gabe*[E]	'without'
bilgor[E]	>	*gilbor*	'belly, paunch'
bedekatu (B)	>	*debekatu*[LW] (G)	'to forbid'

(8.24)   Reciprocal metathesis between voiceless stops (Egurtzegi 2011)

Std. Bsq.		Dialectal	Gloss
apezpiku[LW]	<	*aphezküpü* (S)	'bishop'
bekatari	>	*betakari* (B)	'sinner' (cf. *bekatu*[LW] 'sin')
eskapatu[LW]	>	*espakatu* (LN)	'to escape, get away'

Given that voiced stops underwent spirantization in intervocalic position, the distinction between voiceless stops and old voiced stops (or modern approximants), could be either that of voicing or that of continuancy. The latter option is favored, in light of the examples (8.25-26). Every instance of the examples in (8.23) is expected to have undergone spirantization (which transformed them into [β̞], [ð̞] and [ɣ̞]) in the phonetic string at some point. Intervocalic spirantization occurs word-initially as often as medially (Hualde et al. 2011), and, given the high frequency of words ending in a final vowel in the language, word-initial stops should not be a problem for the hypothesis.

/b, d, g/ and /p, t, k/ can also undergo reciprocal metathesis with fricatives, so that voiced stops/approximants exchange their position with fricatives (8.25) and voiceless stops with affricates, as shown by the examples in (8.26):

(8.25) Reciprocal metathesis between /D/ *and* /S/ (Egurtzegi 2011)

Var. A		Var. B	Gloss
bezatu (B, G)	>	*zebatu*[LW]	'gotten used to'
Lat. *effaciare* (cf. Occ. *esfaçar*)	>	*ezabatu*[LW]	'to erase'

(8.26) Reciprocal metathesis between /T/ *and* /TS/ (Egurtzegi 2011)

Var. A		Var. B	Gloss
erakutsi (comm.)	>	*eratsuki*[E]	'to show'
petatxu (B, G)	>	*petxatu*[LW] (HN, S)	'patch'

Within the metatheses between a sibilant and a stop, voiceless stops pattern with affricates, while voiced approximants pattern with fricative sibilants. Thus, the segments which exchange position with one another seem to agree in continuancy.

Egurtzegi (2011) also found a couple of instances of reciprocal metathesis between a sibilant and a nasal stop, both of them involving the laminal fricative sibilant /ş/:

(8.27) Reciprocal metathesis between /N/ *and* /S/ (Egurtzegi 2011)

	Var. A		Var. B	Gloss
a)	*zomorro*[E]	>	*mozorro*	'insect, bug'
b)	*zemai*[E] < **zemae* < **zemaha* < **zemana*			'menace'

The examples in (8.27) pose a problem for the hypothesis that proposes continuancy as the feature shared by both components of reciprocal consonant metathesis. Despite nasal airflow being continuous in these segments, nasal stops are not expected to pattern with continuant segments (Chomsky & Halle 1968; Anderson 1976). In any case, the definition of nasals in terms of continuancy is far from evident (cf. Mielke 2008: 65).

8.3.3 *Reciprocal metathesis involving vowels*

Reciprocal vowel metathesis seems to be conditioned by a common phonological feature shared by both of the reordered segments. The relevant feature that constrains two-vowel non-local metatheses is [+/– high], which divides the 5-vowel (/a/, /e/, /i/, /o/, /u/) inventory into two groups of segments. A given segment can change position with another

one only if both are members of the same group:

(8.28) *Metatheses involving [– high] vowels* (/a/ & /e/, /a/ & /o/, /e/ & /o/) (Egurtzegi 2011)

a) **Var. A** **Var. B** **Gloss**

atera[E] (comm.) > *etara* (B, G) 'to come out, take out, leave'

Sp. *melancolía* > *malenkonia*[LW] 'melancholy'

b) **Var. A** **Var. B** **Gloss**

alkandora[LW] (B, G, A) > *alkondara* (B, G) 'shirt'

*erroldane > *erraldoi*[LW] (B, G) 'giant'

c) **Var. A** **Var. B** **Gloss**

hodei[E] (comm.) : *hedoi* (B, L, LN) 'cloud'

herdoil (L, LN, Z) : *ordei* (B, HN, A) 'rust'

(8.29) *Metathesis involving [+ high] vowels* (/i/ & /u/) (Egurtzegi 2011)

Var. A **Var. B** **Gloss**

ukitu[E] (comm.) > *ikutu* (B, G, HN) 'to touch'

ingude[LW] (HN, L) > *ungide* (LN) 'anvil'

Basque dialects show metatheses between either non-high (8.28) or high vowels (8.29). Metathesis between /a/ & /e/ (8.28a), /a/ & /o/ (8.28b), /e/ & /o/ (8.28c) and /i/ & /u/ (8.29) are attested. All examples in Egurtzegi (2011) fall under one of these groups.

8.3.4 The nature of reciprocal metathesis

Reciprocal metathesis involves the transposition of two non-adjacent segments by exchanging their sequential positions with each other. I analyze this kind of metathesis as originating in motor planning errors.

As explained by Garrett and Johnson (2013: 65), sound changes originating in motor planning bias factors are "speech errors that catch on". These speech errors are the consequence of the influence of some planning elements —such as gestures— in others through priming, coactivation, inhibition, etc. (cf. Garrett & Johnson 2013: 59f.). A sound

change occurs whenever one such error is incorporated into a language.[164]

Garrett and Johnson (2013: 60) describe two different patterns of speech errors that may yield sound change: blending and inhibition. The instances of reciprocal metathesis discussed in §8.3 are the consequence of a special case of blending (cf. Boomer & Laver 1968; MacKay 1970; Fromkin 1971, 1973; Dell 1986; Shattuck-Hufnagel 1987), namely motor plan priming (Tilsen 2009a, 2009b). Motor plan priming is the result of the interaction of nearby similar segments on each other as they are activated, and may result in different kinds of errors such as interchange errors, anticipations, and preservations, as shown by the examples in (8.30), taken from Garrett and Johnson (2013: 60f.):

(8.30)   Speech errors due to motor plan priming (Garrett & Johnson 2013: 60f.)

a)	interchange errors:	***sn**ow **fl**urries → **fl**ow **sn**urries*
b)	anticipation errors:	***r**eading **l**ist → **l**eading **l**ist*
c)	preservation errors	*waking **r**abbits → waking **w**abbits*

According to Garrett and Johnson (2013: 61), "plans that are in proximity to each other —in time, phonetic similarity, and articulatory planning structure" are more likely to undergo blending. Thus, the nature of speech errors based on motor plan priming delimits the potential segments subject to metathesize. However, speech planning and articulatory dynamics interact in very complex ways that may require a more comprehensive approach to speech production than that provided by current models (cf. Pouplier & Goldstein 2010: 644f.). Such model should span both cognitive utterance planning as well as the unfolding of articulation motion in space and time (Pouplier & Goldstein 2010: 645).

It seems clear that the position within the syllable is crucial in Basque reciprocal metathesis: only consonants in syllable onset interact with other consonants in syllable onset and the equivalent is true for those in syllable coda as well as for vowels in syllable nuclei. The role of proximity in time is reflected in the fact that most instances of reciprocal metathesis affect consonants in contiguous syllables.[165] In addition, phonological similarity is crucial as well, although the realization of this requirement in Basque reciprocal metathesis needs deeper discussion than the previous two.

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164 Although it has not been usual in the literature to suggest that speech errors may phonologize (cf. Garrett & Johnson 2013: 65f.), this observation was already present in classic studies such as Meringer and Mayer (1895 [1978]) and Meringer (1908).

165 Although not all, cf. for instance Bsq. *labana*[LW] < *nabala* 'knife'.

Insofar phonological similarity is concerned, we should look at the possible instances of reciprocal metathesis found in the language, as well as the ones found cross-linguistically. Reciprocal consonant metatheses found in Basque are the following: metathesis of /l/ and /r/, which is the only reciprocal metathesis found in syllable coda; metathesis of /l/ and /n/, only found in the onset of the syllable; metathesis of an onset rhotic /ɾ, r/ and an approximant [β̞, ð̞, ɣ̞], also limited to this position; metatheses between two approximants; metatheses between two voiceless stops; and these between an oral or nasal stop and a fricative or affricate sibilant. Although many of these processes involve segments that are rare or even absent in syllable coda —e.g. oral stops or approximants—, it is worth mentioning that only one of these processes affects segments in coda. While continuancy seems to be a factor in this process, this hypothesis meets with several problems —cf. §8.5.2.

For reciprocal vowel metathesis, it may be the case that both segments involved in the process are [α high], i.e., given the compiled examples, it seems that both segments participating in the metathesis must agree in height. No counterexamples of this observation have been found thus far. This may suggest a bigger separation between /i, u/ and /e, o/ than that between /e, o/ and /a/. However, there is no phonetic evidence supporting such hypothesis. There are studies that suggest the acoustic distance between non-high vowels to be greater, such as the measurements of the vowel system from Zaldibia Basque developed by Etxeberria (1990), which show a very narrow gap between /i, u/ and /e, o/. Nevertheless, I hypothesize the motivation for reciprocal metathesis to be found in motor-planning errors and not perceptual.

Unlike the case of some perceptual metatheses whose results were influenced by stress, in the case of reciprocal metathesis I am not able to specify any direction of the change at this point.

The triggers behind the two processes discussed in §8.2 and §8.3 are distinct in their nature. On the one hand, perceptual metathesis is caused by the ambiguity inherent to elongated phonetic cues (apud Blevins & Garrett 2004: 123); on the other, in reciprocal metathesis, phonological proximity may produce a reinterpretation in the order of the segments within the phonic string. Thus, the two processes discussed in this chapter appear to have very different sources.

8.3.5 Further cases of reciprocal metathesis

Given the proposal that reciprocal metatheses originate in common speech errors, similar to errors found in tongue twisters, these sound patterns are expected to be cross-linguistically common. Example (8.31) shows instances of this process in Spanish, (8.32) shows instances of reciprocal metathesis in Sardinian (cf. Frigeni 2009: 122) and (8.33) shows the same sound pattern in North Mazovian Polish (from Zduńska 1965: 116f.).

(8.31) Reciprocal metathesis in Spanish

Lat.		Sp.	Gloss
miraculum	>	*milagro*	'miracle'
parabola	>	*palabra*	'word'
mūrem + caecŭlum[166]	>	*murciégalo > murciélago*	'bat'

(8.32) Reciprocal metathesis in Sardinian dialects (cf. Frigeni 2009: 122)

Sar. Var. A		Sar. Var. B	Gloss
rotulare	~	*loðurare*	'to roll'
molare	~	*murale*	'molar'
renules	~	*nerules*	'kidneys'
nuraɣe	~	*runaɣe*	'Sardinian Pre-Roman tower-like building'

(8.33) Reciprocal metathesis in North Mazovian Polish (from Zduńska 1965: 116f.)

Std. Pol.		North Maz. Pol.	Gloss
wɔdɨgi	>	*wɔgidɨ*	'stem'
izdɛpka	>	*izbɛtka*	'room (dim.)'
prɔtsɛsja	>	*prɔsɛtsja*	'procession'
pɛrmanɛntnɨ	>	*pɛrnamɛntnɨ*	'permanent'
pɔrtsɛlana	>	*pɔrtsɨnɛla*	'china, porcelain'
rɛgulatɔr	>	*lɛguratɔr*	'regulator'

This sound pattern is also common in child language. Example (8.34) shows instances of reciprocal metathesis in Spanish child language alongside their standard Spanish equivalent (Frigeni 2009: 20, foonote 16).

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166 Sp. *murciélago* 'bat' is composed by Lat. *mūrem* 'mouse' and Lat. *caecŭlum* 'blind (dim.)'.

(8.34)   Reciprocal metathesis in Spanish child language (Frigeni 2009: 20, foonote 16)

Child Sp.		Std. Sp.	Gloss
vedera	<	*vereda*	'sidewalk'
caravela	<	*calavera*	'skull'

As shown by examples (8.31-33), sporadic reciprocal metatheses can be found in many different languages, as well as in child language (8.34). Compare them, for instance, to tongue twisters, which are found in many (if not most) languages as well. In addition to the aforementioned examples, similar metatheses may be found in languages such as Latin, French or English —cf. Lat. *leriquiae* < Lat. *rēlĭquĭae* 'relic' (Brugmann 1904 [1970]: 245), Fr. *moustique* 'mosquito' (cf. Lat. *musca* 'fly') and Non-Std. Eng. *irrevelant* < Std. Eng. *irrelevant* (Ultan 1978: 370)— and more parallels may be expected to come from future research.

8.4 Some metathesis-like processes

There are some other processes that may resemble metathesis in their final result, but have followed very different developments. In this section I will analyze two of these cases, one involving two different phonological processes —instead of a single metathesis — and another involving a morphological change.

8.4.1 Rule-telescoping

The first of these developments involves vowel movement. It is found in Spanish loanwords that begin with /re-/ in Spanish and with /er-/ in Basque. Since words beginning with a rhotic were not possible in Basque, /r/-initial borrowings were systematically adapted to the phonotactics of the language by means of prothetic vowel.[167] Among them, some words involving /e/ after the rhotic underwent deletion of the mid-front vowel, as shown in the following examples:

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167   The prothetic vowel depended on the vowel following the rhotic: compare *er(re)lazio*[LW] 'relationship', *er(re)lijio*[LW] 'religion' to *arropa*[LW] 'clothes', *arrasto*[LW] 'trace' (cf. Michelena 1977 [2011]).

(8.35)   Adaptation of Spanish loanwords beginning with /re-/ *(Egurtzegi 2011)*

Std. Bsq.					**Sp.**	**Gloss**
erlatibo^{LW}	<	*errelatibo*	<		*relativo*	'relative'
erlazio^{LW}	<	*errelazio*	<		*relación*	'connection, relationship'
erlijio^{LW}	<	*errelijio*	<		*religión*	'religion'
erloju^{LW}	<	*erreloju*	<		*reloj*	'clock'
ernegatu^{LW}	<	*errenegatu*	<		*renegado*	'renegade'
errie(r)ta^{LW}	<	*erreie(r)ta*	<		*reyerta*	'brawl'

This development, which seems to be systematic in Spanish loanwords beginning with /rel-/, has no relation to the vowel metathesis described above (§8.3.3) and thus requires a different explanation. For these reorderings, an account based on rule telescoping that consists of a prothesis and a deletion of the second vowel is preferable to the hypothesis of a single metathesis, especially if variants which maintain two /e/s (such as *errelijio*, *errelazio*, *erreloju...*), most of them being widely attested, are considered. I propose that this syncope first developed in pre-lateral contexts and later widened to some similar contexts involving different sonorants, without becoming systematic in the latter contexts.

Nevertheless, in addition to analyzing the process in (8.35) as a syncope, this process may be analyzed as a kind of perceptual metathesis as well. As in the case of rhotic perceptual metathesis (cf. §8.2.2), the ambiguity created by the elongated nature of /r/ could be what gives rise to the syncope of the /e/ in the second syllable. This may occur as a consequence of a CV metathesis involving the reinterpretation of /r/ after the second /e/: *rel-* > *errel-* > *e*^(e)*rl-* > *erl-*.

The process in (8.35) may be related to a common adaptation method developed in Basque for *muta cum liquida* clusters from Latin, namely /TrV$_1$/ > /TV$_1$rV$_1$/ (cf. Michelena 1977 [2011]; Egurtzegi 2013a: 141):

(8.36)   Adaptation of Latin /Tr/ *clusters into Basque*

Lat.		**Std. Bsq.**	**Gloss**
libru(*m*)	>	*liburu*^{LW}	'book'
lūcru(*m*)	>	*lukuru*^{LW}	'profit, gain'
crŭce(*m*)	>	*gurutze*^{LW}	'cross'

Lat.		Std. Bsq.	Gloss
scrībe(*re*)	>	*izkiri*(*b*)*atu*[LW]	'to write'
fronte(*m*)	>	*boronde*[LW]	'front'

The vowel insertion in (8.36) may as well be a consequence of a non-etymological reinterpretation enabled by the elongated phonetic cues of the rhotic, which would be perceived in the middle of the vowel, leading to a kind of epenthesis similar to a vowel-copying (cf. Blevins & Garrett 1998: 524). The ambiguity created by the stretched-out lowered F3 —which necessarily affects the adjacent vowel— together with a cluster not found in that stage of the language (see Artiagoitia 1993 on Basque syllabic structure) give rise to a /TV_1rV_1/ reinterpretation in which a new syllable is created by reconstructing the rhotic in the middle of the tautosyllabic vowel, so that the two vowels necessarily have the same quality in this process.

The motivation of the processes in (8.35-36) —especially that which occurred in the *muta cum liquida* clusters— can be straightforwardly explained following the same assumptions used for rhotic metathesis. This explanation of the process presents a connection between the perceptual metathesis of liquids already described supra (§8.2.2) and vowel epenthesis. These are, as a matter of fact, two of the most usual ways of adaptation of consonantal clusters from Latin and the Romance languages to the Basque,[168] e.g. the vowel epenthesis in *gurutze*[LW] and the liquid metathesis in *kurtze,* both forms derived from Lat. *crŭce*(*m*) 'cross'.

8.4.2 Morpheme movement

Two different kinds of morpheme movement among verbal constructions in Basque have been discussed. I argue that some metatheses occurring in verbs could be analyzed in a phonetically natural way using the same tools used with the rest of the items of the lexicon, i.e. the ambiguity and subsequent reinterpretation of phonologically long features and segments.[169] Some other rearrangements of the segmental order are better understood

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168 Another of these would be the deletion of the first consonant, as in the place name *Laudio*[LW] (from Lat. *Claudiano*), *luma*[LW] 'feather' (from Lat. *plūma*) or *laket*[LW] 'like' (from Lat. *placet*). For further discussion v. Michelena (1977 [2011]) and Egurtzegi (2013a: 163).

169 In the case of /n/-metathesis, nasal antiresonances and zeroes would be the elongated phonetic cues related to the nasality (cf. example 8.13; see Blevins & Garrett 2004: 123 and Ladefoged & Maddieson 1996: 116).

as morphological processes which are not related to phonology, at least not directly. Examples of phonological processes in verbs are given in (8.37), whereas examples of morphological processes can be found in (8.38):

(8.37) Phonological metathesis in verbal constructions (Egurtzegi 2011)

Dial. Bsq.					**Std. form**	**Gloss**
emoontzet (B)	<	**emodontzet*	<	*emon dotzet*		'I have given him/her'
iteunte (GN)	<	**eitedunte*	<	*egiten dute*		'they do'
emateunte (GN)	<	**ematedunte*	<	*ematen dute*		'they give'

(8.38) Morphological movement in verbal constructions (Egurtzegi 2011)

	Dial. Bsq.		**Std. form**	**Gloss**
a)	*eztonai**t*** (B)	<	*ez do**t** nahi*	'I don't want'
b)	*eztenai**la*** (G)	<	*ez dete**la** nahi*	'that I don't want'

The examples in (8.37) involve cases of perceptual metathesis of nasal stops, which undergo metathesis from the coda of the last syllable in the main verb to the coda of the first syllable in the auxiliary verb, i.e. from *emon dotzet* to **emo dontzet*, before dropping the intervocalic approximant [ð̞], which is usually lost between vowels but not after a nasal stop, where it is produced as a voiced stop [d].

The examples in (8.38) contrast with the ones in (8.37), since the latter report morphological reanalysis —of the first person singular morpheme and the complementizer, respectively— and have no phonetic motivation.

8.5 Open questions

Although our understanding of these metatheses is deeper than it was before,[170] there are some questions which remain to be answered yet. This section presents three such questions that arose in the development of this chapter.

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170 Thanks to works like Thompson and Thompson (1969), Bailey (1970), Ultan (1978), Hock (1985), Hume (1997, 1998, 2001, 2004), Mielke and Hume (2001) and Blevins and Garrett (1998, 2004), among others.

8.5.1 Classification of cluster-to-cluster liquid metathesis

One problem presented by the description of the different processes of metathesis present in Basque involves the instances of metathesis that may have more than one interpretation. Cluster-to-cluster liquid metatheses are one of these.

As seen in example (8.4d) in §8.2.2, one of the many metatheses involving liquids consists in the reinterpretation of a liquid, etymologically located after a stop and forming a tautosyllabic cluster, as belonging to a different cluster, following a stop that was etymologically prevocalic. In Basque, most of these transpositions involve a rhotic, but some affecting a lateral are found as well. Further examples of this process in (8.39) are taken from Egurtzegi (2011: 28):

(8.39) Cluster-to-cluster rhotic metatheses in Basque dialects (Egurtzegi 2011: 28)

Var. A		Var. B	Trans.	Gloss
*desondragarri*LW	>	*tresondagarri*	/tɾesondɾagari/	'dishonoring'
*eskribaun*LW	>	*eskibraun*	/es̺kibɾaun/	'scribe'
*apostru*LW	>	*aprostu*	/apɾos̺tu/	'apostle'
*errekobratu*LW	>	*errekrubatu*	/erekɾubatu/	'to recover'
*kabrarroka*LW	>	*krabarroka*	/kɾabaroka/	'large-scaled scorpion fish'
*errepublika*LW	>	*erreplubika*	/ereplubika/	'republic'

This kind of metathesis is very usual, and it can give rise to many different outcomes. In a TVTVTrV sequence, for instance, the listener could reinterpret the Tr cluster in any given syllable, and any possible non-etymological reinterpretation will be an instance of metathesis. (8.40) gives a good example of the variability in the potential new position of the metathesized segment. It shows the different dialectal variants of the word *kabestru*, a loanword from Latin *capistru*(*m*) 'leading ox', in Basque.

The sequence $T_1VT_2VT_3rV$ gives rise to (at least) three possible interpretations, with the rhotic placed after each of the stops in the word.

(8.40)   Attested dialectal variants according to the segment sequence reinterpretation

Structure	T$_1$rVT$_2$VT$_3$V	T$_1$VT$_2$rVT$_3$V	T$_1$VT$_2$VT$_3$rV
Variants	*krapestu, krabestu, krapeztu*	*kaprestu, kabrestu,* (cf. also *kaberestu*)	*kapestru, kabestru*

Two different accounts may be proposed for this kind of movement: On the one hand, these may fall under Blevins and Garrett's perceptual metathesis definition, given that the metathesized segments bear a stretched out feature (either rhoticity or laterality) with elongated phonetic cues (Ohala 1981, 1993), as the instances of metathesis discussed in §8.2. On the other hand, this process may as well be the consequence of motor planning errors similar to those discussed under §8.2, given that it involves the movement of a segment in a very specific phonological context —i.e., in a tautosyllabic onset Tr cluster— to a similar context in a nearby syllable in sequences such as TVTrV or TrVTV. Thus, there might be two different triggers that may give rise to this kind of metathesis, making it much more common than other processes of metathesis such as reciprocal metathesis itself.

Indeed, this kind of metathesis is very common in the Romance languages, and is also found elsewhere. Examples in (8.41) include cluster-to-cluster metatheses of rhotics as found in Standard Spanish, non-standard varieties of Spanish, Old Sardinian, Campidanese Sardinian, Portuguese and North Mazovian Polish. Examples in (8.41c) are from Geisler (1994: 110f.; cf. Garrett & Johnson 2013: 67), (8.41d) are from Frigeni (2005: 19), and that in (8.41f) is taken from Czaplicki (2009: 357):

(8.41)   Cluster-to-cluster rhotic metatheses in different languagues

a)   Cluster-to-cluster rhotic metathesis in Standard Spanish

Lat.		**Std. Sp.**	**Gloss**
crocodīl(l)us	>	*cocodrilo*	'crocodile' (cf. Lat. *cocodrīl(l)us*)
crepāre	>	*quebrar*	'to break' (cf. older Sp. *crebar*)
crūsta	>	*costra*	'scab, crust'

b)   Cluster-to-cluster liquid metathesis in non-standard Spanish

Std. Sp.		**Non-Std. Sp.**	**Gloss**
pobre	>	*probe*	'poor'
croqueta	>	*cocreta*	'croquette'

b) **Cluster-to-cluster liquid metathesis in non-standard Spanish**

Std. Sp.		Non-Std. Sp.	Gloss
dentífrico	>	*dentrífico*	'toothpaste'
Gabriel	>	*Grabiel*	'Gabriel'
Briviesca	>	*Bibriesca*	'(place name)'
Decathlon	>	*déclaton*	'Decathlon [French sports retailer]'

c) **Cluster-to-cluster liquid metathesis in Old Sardinian** (Geisler 1994: 110f.)

Lat.		Old Sar.	Gloss
castru(*m*)	>	*crástu*	'fort'
dextrā	>	*dresta*	'right (hand)'
februāriu(*m*)	>	*frevariu*	'of February'
pigru(*m*)	>	*prigu*	'slow'
cōchlĕa	>	*clocha*	'snail'
complēre	>	*clòmpere*	'to fill'
pūblicu(*m*)	>	*plubicu*	'public'

d) **Cluster-to-cluster rhotic metathesis in Campidanese Sardinian** (Frigeni 2005: 19)

Lat.				Cam. Sard.	Gloss
cōp(*ŭ*)*la*	>	**kopra*	>	*kroβa*	'pair, couple'
măc(*ŭ*)*la*	>	**makra*	>	*mraɣa*	'stain'
pĕdūc(*ŭ*)*lu*(*m*)	>	**pedukru*	>	*prioɣu*	'lice'

e) **Cluster-to-cluster rhotic metathesis in Portuguese**

G-P.		Por.	Gloss
fẽestra	>	*fresta*	'window'
tẽevras	>	*trevas*	'darkness'

f) **Cluster-to-cluster rhotic metathesis in North Mazovian Polish** (Czaplicki 2009: 357)

Std. Pol.		North Maz. Pol.	Gloss
pɔvrus	>	*prɔvus*	'cord'

8.5.2 Phonological features in reciprocal metathesis

As mentioned above (cf. §8.3.4), most if not all reciprocal vowel metatheses seem

to be between two vowels that agree in their value of height, i.e. the vowels invoved in reciprocal metathesis tend to be [α high] in Basque. Previous works (cf. Egurtzegi 2011) proposed continuancy to be the crucial phonological feature[171] behind reciprocal metathesis in Basque: The focus was on the [α continuant] nature of most segments undergoing consonantal reciprocal metathesis processes and special cases where then explained.

The different patterns found in Basque consonantal reciprocal metathesis are as follows:

(8.42)   Patterning of consonants in Basque reciprocal metathesis

	Consonants	**Example**
1-	/l/ : /r/	(8.19)
2-	/l/ : /n/	(8.21)
3-	/ɾ, r/ : [β̞, ð̞, ɣ̞]	(8.20)
4-	[β̞, ð̞, ɣ̞] : [β̞, ð̞, ɣ̞]	(8.23)
5-	/p, t, k/ : /p, t, k/	(8.24)
6-	/ʂ, s̺/ : [β̞, ð̞, ɣ̞]	(8.25)
7-	/t̺s̺, ts̺/ : /p, t, k/	(8.26)
8-	/m, n, s̺/ : /m, n, s̺/	(8.27)

As shown by the list in (8.42), many consonants undergo reciprocal metathesis with more than a segment. If we put all consonants that pattern with each other in the same set, as in (8.43), we get two sets where each consonant patterns with at least another consonant in the set, and does not pattern with any of the consonant in the other set:

(8.43)   Sets of consonants that may and may not undergo reciprocal metathesis

Set A: l, ɾ, r, m, n, β̞, ð̞, ɣ̞, ʂ, s̺.
Set B: p, t, k, t̺s̺, ts̺.

While the consonants in Set B are usually described as non-continuant, those in Set A include a couple of items that do not fit in the classic group of continuants, namely the lateral /l/ and the nasal stops /n/ and /m/. These segments, nevertheless, are far from being prototypical non-continuants as well.

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171 I focus on phonological features, since an approach based on gestures does not seem to be useful for this discussion.

The segment /l/ has more than once being described as behaving ambiguously insofar as continuancy is concerned (Gussenhoven & Jacobs 2005: 64, 66), so that it is [– continuant] in some languages (Scottish English is given as an example of such a language), while it behaves as [+ continuant] in others (Old Frisian among them). According to Mielke (2008: 72), "lateral liquids pattern with continuants about as often as they pattern with non-continuants", and his survey reveals 36 cases (or 54.5%) of lateral liquids that pattern with continuants and 30 cases (or 45.5%) that behave as [– continuant] (Mielke 2008: 66). He gives many examples of lateral liquids patterning with non-continuants (citing Alyawarra, Anywa, Basque,[172] Catalan, Dholuo, Dieri, Gooniyandi, Kolkuma Ijo, Koromfé, Libyan Arabic, Yucatan Maya, Nangikurrunggurr, Spanish, Toba, Tsakhur, Tswana, Turkish, Wangkangurru and Yir-Yoront, among other cases) and as many of laterals patterning with continuants (such are found in Arabana, Arapesh, Agulis Armenian, Catalan, Central Outer Koyukon, Ecuador Quichua, Ehueun, Epie, Finnish, Greek, Lumasaaba, Manipuri, Mising, Navajo, Shambala, Temne, Tswana, Ukue, Umbundu and Wiyot, among others).

Along with the typological data offered by Mielke (2008: 60f.), an articulatory view also supports the aforementioned ambiguity. Here, the articulation of liquids implies both characteristics (i.e. continuancy and non-continuancy) at the same time: airflow is blocked in the front-back axis while it flows continuously through the sides of the tongue.

Nasal stops are less frequently treated as ambiguous segments regarding continuancy, but their case is not very different from that of lateral liquids. They are more or less consistently treated as [– continuant] in phonological theory (cf. Chomsky and Halle 1968,[173] Anderson 1976, etc.), yet they seem to pattern more frequently with [+ continuant] segments than otherwise. According to the survey in Mielke (2008), nasals pattern with non-continuants in only 26.5% of the cases (for a total of nine), while the opposite situation is true in 73.5% of the cases (25 times). Nasals pattern with non-continualnts in Arabanaa, Capanahua, Catalan, Comanche, Higi, Nangikurrunggurr, Tiv, Wangkangurru and Yir-Yoront. Examples of nasals patterning with continuants are found in languages including Abun, Amele, Arabana, Boraana Oromo, Bukusu, Faroese, Finnish, Kalispel, Korean, Kuku Bari, Lower Grand Valley Dani, Macuxi, Mokilese, Navajo, Onti Koraga, Russian, Uneme, Wangkangurru, Warlpi and West Greenlandic Inuktitut.

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172 For the Basque case see Saltarelli et al. (1988); Hualde (1991a).
173 However, they make little use of this specification (cf. Mielke 2008: 65).

After analyzing these results, Mielke (2008: 74), proposes to divide [continuant] in different features related to its different phonetic definitions: following the definition by Halle and Clements (1983), [+ continuant$_{\text{mid-sagittal}}$] would require unrestricted airflow in the mid-sagittal region of the oral cavity, [+ continuant$_{\text{classic}}$] would require unrestricted airflow through some part of the oral cavity (as in the definition by Jakobson et al. 1952). Given that nasals would have a negative value for these features, Mielke (2008: 74) proposes a third feature, namely [continuous airflow] to account for their phonetic properties and the attested patternings. The values of the relevant segments for these features are shown in table (8.44), which reproduces that in Mielke (2008: 74):

(8.44)   Values of the relevant segments for features related to continuancy (Mielke 2008: 74)

	[+ continuant$_{\text{mid-sagittal}}$]	[+ continuant$_{\text{classic}}$]	[continuous airflow]
stops	−	−	−
nasals	−	−	+
lateral liquids	−	+	+
fricatives	+	+	+

According to the definitions of the features in (8.44), [continuous airflow] would be the feature that separates Set A and Set B into (8.43) in two natural classes.

The diverse definitions of continuancy may allow different values for segments such as nasals or lateral liquids. As a matter of fact, nasals and laterals phonologically pattern with both continuant and non-continuant segments, sometimes even in the same language (Miller 2012: 146; Mielke 2008: 56-77; Samuels 2009: 51; cf. Mielke's *feature ambivalence*). This may be accounted by the inclusion of additional features in phonological theory such as these in (8.44) or accepting the gradient nature of some features, given that, as stated by Mielke (2008: 77), "the phonological patterning of sounds is as varied as the phonetic cues are ambiguous".

8.6 Conclusions

In Basque, two different types of metathesis can be distinguished. First, there is metathesis involving a single segment where that segment has one of a limited set of stretched-out features. Second, there are metatheses involving an exchange between two

segments that are near each other, similar in syllable position and featurally similar.

8.6.1 Perceptual metathesis

I have analyzed most instances of metathesis of a single segment found in the Basque language as perceptual metatheses, following Blevins and Garrett (1998, 2004). I propose that the instances of single segment metathesis found in the language fall under Blevins and Garrett's definition of perceptual metathesis and that the only elements which undergo this processes belong to the limited set of segments bearing a stretched out feature with elongated phonetic cues —as defined by Ohala (1981, 1993).

Thus, this process can be analyzed as a consequence of the listener's reinterpretation of an ambiguous phonological string. The innovative variant could spread after that listener becomes a speaker and reproduces the sequence in a non-etymological manner. According to this account, only the following can take part in this kind of sound change: rhotic, lateral, rounded, palatal, velar, pharyngeal, laryngeal, nasal, retroflex and aspirated segments (cf. Blevins & Garrett 2004: 123; example 8.13 in §8.2.5).

8.6.2 Reciprocal metathesis

Secondly, I have discussed metatheses involving a position exchange between two similar segments located in the same part of the syllable (either onset, nucleus or coda), which were labeled reciprocal metathesis following Ultan's (1978) tradition.

I have proposed the source of reciprocal metatheses to be in motor planning errors (cf. Garrett & Johnson 2013), more specifically in interchange errors due to gesture blending. Garrett and Johnson (2013) mention the tendency toward blending plans that are in proximity to each other, understanding this notion as proximity "in time, phonetic similarity, and articulatory planning structure, (that is, onsets interact with onsets, nuclei with nuclei, etc.)".

Thus, in order for this kind of metathesis to occur, the affected segments have to be in temporal, phonetic and positional proximity, i.e. the segments undergoing the process have to be near each other in the phonological string, share a value of a phonological feature and be in the same syllabic position (onset, nucleus or coda).

I have proposed that the segment pairs involved in this kind of metathesis are

limited by a crucial phonological feature, the shared feature being [α continuant], or more precisely [α continuous airflow], for consonants and [α high] for vowels in Basque. It's unclear whether sharing this value for the relevant feature is necessary or whether it is just a tendency, but no exceptions have been found thus far. In addition, the pairs of segments that undergo perceptual metathesis in a specific syllabic position are limited by the language's phonotactics. In addition, I have discussed that nasals and laterals phonologically pattern with both continuant and non-continuant segments, sometimes even in the same language (cf. Miller 2012: 146; Mielke 2008: 56ff.; Samuels 2009: 51).

I have highlighted the need for further research into reciprocal metatheses, which is evident given the lack of literature on the topic, apart from some exceptions such as Czaplicki (2009) —who sees it as a psycholinguistic difficulty in the encoding of serial similar segments (2009: 363)— and the research on the not very different speech errors such as spoonerism (cf. MacKay 1970).

8.6.3 *The phonetic naturalness of metathesis*

I have proposed that certain metatheses (such as these involving the metathesis of a single segment in Basque or the transposition of two similar segments in the same language) are phonological processes with potential phonetic origins (cf. Blevins & Garrett 1998, 2004; Garrett & Johnson 2013; cf. also Mielke 2008).

The triggers behind the two processes discussed in this chapter are distinct in their nature. On the one hand, perceptual metathesis is caused by the ambiguity inherent to elongated phonetic cues (apud Blevins & Garrett 2004: 123); on the other, in reciprocal metathesis, the proximity between two segments may produce speech errors that yield to the reinterpretation of the sequential order of the segments within the phonic string. The two processes of metathesis have very different sources and their development is different as well.

By emphasizing the distinct nature of both metathesis processes, I want to highlight the great differences between them, not only because the perceptual metathesis involves one single segment undergoing metathesis and the reciprocal metathesis two different ones, but also because the former seems to be acoustical in nature, while the latter occurs in the process of recovering motor plans, i.e. before the process of articulation is even finished.

Recall that no teleology is needed in order to explain these processes, as we have

not seen any clear evidence pointing to syllable structure improvement or optimization once a word is adapted to the phonotactics of the language. I have argued that the resulting structures are neither easier to produce nor to perceive by means of sound changes that can occur in either direction (such as the dismantling, creation and rearrangement of *muta cum liquida* clusters). Perceptual metathesis is seen as the result of innocent mistakes made by the listener and somehow limited by the phonotactics of the language, which are continuously susceptible to diachronic change (cf. the location of /H/ before the second syllable's stress or the acceptance of previously disallowed clusters). On the other hand, reciprocal metathesis is proposed to arise from motor-planning speech errors. Thus, neither of the processes is analyzed as structure-improving. As stated by Ohala (1993: 262f.), the only teleology needed to understand sound change implies the fidelity regarding the information received by two listeners who want to communicate one with the other.

8.6.4 *Final remarks*

In this chapter, I have analyzed two different metathesis processes found in Basque from a phonetic perspective, showing that metathesis can be analyzed in a phonetically natural way by following the same assumptions accepted for any other phonetic process.

I have also shown that, even if the two processes share the term "metathesis", they are distinct from each other. In addition, I have presented both processes as two constrained developments that cannot be invoked whenever they are needed in reconstructive tasks, something that has been the norm in the past. Some segments metathesize alone while other segments do not. Some segments exchange position with one of a fixed set of segments, but only under certain conditions.

While perceptual liquid metathesis mainly affected borrowings, /H/-metathesis focused on the lexicon already found in the language. Reciprocal metathesis affected borrowings and inherited words to the same extent. Only one process of perceptual metathesis affecting /H/ has been described as systematic. This systematic /H/ metathesis occurred after an accentual shift and affected all instances of /H/ after the second syllable. All other instances of metathesis discussed in this chapter have been described as sporadic.

These examples of phonetically driven metathesis, have taken us one step further in the task of reaching more natural explanations in the field of phonology, while taking teleology out of phonetic explanations.

9 General conclusions

In this final chapter, different implications of the topics discussed throughout the dissertation are summarized. This chapter is divided in three sections based on the main fields (besides phonology) to which this research may be assigned or to which it may have had something to offer. The first section provides with implications for bascology. It consists of new analyses of already described phonological processes as well as original descriptions and analyses of sound patterns not deeply discussed in the literature. The second section highlights the importance of typological, phonetic and contact related explanations in historical linguistics and how this approach has yielded new results in this dissertation. The third section, centered on typology and phonetics, summarizes the typological parallels and the phonetic explanations behind the processes discussed in this dissertation.

In addition, a fourth section on potential future research presents tasks that I was not able to fulfill for this dissertation but that may be worth doing in the coming years. Finally I briefly summarize the general goal behind my current research.

Given the superficially heterogeneous nature of the present dissertation, a conclusions section has been provided in each chapter of the dissertation. Please see the conclusions section at the end of a given chapter for particular conclusions on the sound patterns discussed on each of those chapters.

9.1 Bascology

This dissertation has shown that phonetically and typologically based approaches to

historical phonology can be used to update the work on the historical sound patterns of Basque. I have proposed new analyses of already described phonological processes as well as original analyses of sound patterns that were not studied in detail by previous authors.

Examples of new analyses include that of /u/-fronting and the analysis of [õ]-raising. Zuberoan /u/-fronting has been widely described in the literature (cf. Uhlenbeck 1903; Gavel 1920; Lafon 1937 [1999], 1958 [1999], etc.), but the phonetically based approach to the split of Comm. Bsq. *u into Zuberoan /u/ and /y/ is new to this dissertation (§5.3.4). I have proposed that the inhibition of the fronting process occurred as a result of phonetic reasons, namely due to consonant coarticulation effects on the preceding high back vowel. In the case of /o/-raising, its phonological contexts were previously described as "not […] easy to define" (Martínez-Areta 2013b: 62; cf. Zuazo 2008: 44f.). In this dissertation, this process has been described as [õ]-raising instead (§7). This new description of the process readily accounts for the different phonological contexts — involving all nasal consonants in the language that may be either directly before or directly following the affected /o/— as well as for the phonetic motivation of the process (§7.3). The raising of nasalized [õ] is analyzed as a reinterpretation due to the ambiguity created by the addition of nasal formants to the F1 space.

On the other hand, sound patterns such as the two kinds of metathesis found in Basque or the different distributions of nasalized vowels were not studied in detail in the literature. I have based the analysis of the metathesis processes found in the Basque language on two different phonetically based phonological processes involving the restructuring of the sequential order of one or two segments in a phonological word: perceptual metathesis involves the perceptual reanalysis of phonological features bearing elongated phonetic cues (§8.2) and reciprocal metathesis involves the transposition of two non-adjacent phonologically similar segments in the same syllabic position which exchange location with each other (§8.3). I have argued that both processes have a phonetic origin: perceptual metathesis is perceptual in nature and reciprocal metathesis originates in motor planning errors. The different distribution patterns of contrastively nasalized vowels found in Basque have been analyzed according to the chronology of the historical processes affecting /h̃/ in each of the dialects (§6). I have argued that the loss of the nasalized laryngeal /h̃/, which is unconditioned in some dialects and limited to a certain domain of the word in others, has created different distributions of the contrastively

nasalized vowels in the different dialects, while further processes have changed the nasalized vowel inventory in Zuberoan Basque (§6.2.1).

Two other topics have been discussed in the dissertation: the history of Basque accentuation and the evolution of laryngeals in Basque. While there is plenty of previous research on both topics (cf., for instance, Hualde 1993a, 2007, 2012 and Elordieta 2011a on the history of Basque accentuation and Michelena 1950 [2011a]; Igartua 2001, 2006, 2008 and Lakarra 2009a, 2014 on aspiration in Basque), this dissertation has presented new insights for future discussion. In the case of the history of accentuation in Basque, a new chronology has been proposed for the attested accentuation systems (§3.4), trying to improve the chronology proposed by Elordieta (2011a): Phrase-level accent gives rise to peninitial word-level stress and this gives rise to penultimate stress. In addition, I have proposed that phrase-level accentuation was the system of Common Basque, and that further attested accentuation systems developed from it in different stages of the different dialects (§3.7.2). Regarding the status of laryngeals in the history of Basque, I have followed Hualde (1993b) in proposing /h̃/ to be a contrastive segment (§4.2.3), a view that has not been the standard in the literature. I have also presented evidence to justify this stance (§4.4.3). I have specified some new details regarding the distribution of /h̃/, such as the neutralization of the opposition between the laryngeals /h/ and /h̃/ when followed or preceded by a nasal segment in the same or a contiguous syllable (§4.4.2). This neutralization is resolved in favor of /h̃/. Given that /h̃/ can be reconstructed in all dialects, I have proposed this segment to be part of the inventory of Common Basque (cf. Appendix I).

9.2 Historical linguistics

In this dissertation, I have tried to show that typology and phonetics are of utmost importance in the study of historical phonology, and even more in the case of language isolates such as Basque. After an exhaustive internal reconstruction by means of the comparison of modern dialects and the historical records of the language, better hypotheses can be obtained by comparing reconstructed processes and systems to parallel sound patterns attested in other genetically unrelated languages.

The sound patterns discussed in this dissertation have parallels in different unrelated languages. Some of these parallels have been mentioned and, when appropriate,

discussed throughout the dissertation. Given that most recurrent sound patterns have a phonetic origin, a phonetic explanation has been proposed for most of the analyzed sound patterns.

I have tried to integrate the sound patterns discussed in this dissertation in the wider picture of sound change typology (cf. Blevins 2014) by trying to specify the properties of each process and their typological distribution. Typology and phonetic explanation play a central role in the field of modern historical phonology (Blevins 2004, 2006, 2014; Honeybone & Salmons 2014; Yu 2013), and I have tried to contribute to the general discussion with particular examples taken from the history of the Basque Language.

In addition, I have highlighted that language contact has been crucial in the development of several sound patterns in Basque. Such cases include /u/-fronting (§5) and [õ]-raising (§7), found in Zuberoan and the continental Basque dialects, respectively. I have argued that contact with Gascon has been the trigger of both developments, regardless of the different conditions that /u/-fronting met in Zuberoan, such as inhibitory contexts (§5.2.1). Other sound patterns, such as *n > /ñ̃/ (§4.2.3), seem to have spread between neighboring languages as well. Nevertheless, the direction of the borrowing of this sound pattern is not as clear as it is in the aforementioned vocalic processes, and it may as well have been the opposite (i.e. from Basque to Gascon). Following Blevins (to appear), I have proposed that areal sound patterns may develop when listeners are exposed to perceptually salient segments through significant, continued exposure to a second language. This sound change is predicted to be similar to other phonetically motivated, natural sound changes.

As emphasized by Benveniste (1935), the development of a relative chronology should be a central task of the historical linguist. A relative chronology helps us understand the historical evolution of the language as well as the nature of the phonological processes developed in said language and their interaction with each other. Although not a direct goal of this dissertation, an approximation to the chronology of most sound patterns discussed in each chapter has been offered in the conclusions of the related chapter. These partial relative chronologies have been put together to form a bigger, although still partial, relative chronology that encompasses some of the processes discussed throughout the dissertation. This relative chronology can be found in Appendix I.

9.3 Phonetics-typology

In this dissertation, I have attempted to add phonetic explanation to the description of different sound patterns observed throughout the history of Basque and its dialects. In addition, I have looked for typological parallels to these sound patterns, given that phonetically natural sound patterns are assumed to be potentially found in different, genetically unrelated, languages across the world. Many languages have been mentioned throughout the dissertation, including Armenian, Sardinian, Korlai Creole, English, Japanese, Portuguese, Polish, Nyole, Bengali, Ponapean, Akha or Ewe, for instance.

I'm not the first to propose phonetically based explanations for Basque sound patterns. In fact, some phonetic explanations that have been proposed by previous authors have been used to address the appropriate processes in this dissertation. Examples of these include the reinterpretation of the non-contrastive pitch rise in the second syllable of Northern Bizkaian accentuation system —which involves phrase-level pitch accent— as word-level second syllable stress accent (Hualde 2003c; Elordieta & Hualde 2003; cf. §3.4.2) and the phonetic basis of the *n > /h̃/ process (Igartua 2008). While this process may seem odd from a phonological standpoint, it is grounded on a phonetically natural relationship between nasality and glottality known as rhinoglottophilia (§4.2.4).

Other phonetic explanations to phonological processes found in the Basque language are new to this thesis. Examples of these include the proposals for Zuberoan /u/-fronting, [õ]-raising and the different processes of metathesis found in the Basque dialects.

Zuberoan /u/-fronting (§5) is a process that has been more than once discussed in the literature (Uhlenbeck 1903; Gavel 1920; Lafon 1958 [1999]; Michelena 1977 [2011]; Oñederra 2009b, etc.). Nevertheless, I have presented the first account that proposes a way to group together the coronal segments that inhibit fronting as opposed to the rest of coronal segments, which do not inhibit fronting. Based on observations by Recasens and Pallarès (2001), I have proposed the split between Zuberoan /u/ and /y/ to be a consequence of coarticulatory effects due to the tongue dorsum lowering and backing of the tongue dorsum required for the production of the set of coronal segments and clusters /ɾ, ʂ, ẓ, tʂ, rtʰ, rt, rd/, which demand precise movements of the tip of the tongue (§5.3.4). Other coronal segments present in Zuberoan Basque —such as /t/, /d/, [ð̞], /l/, /ʎ/, /n/, /ɲ/, /s̺/, /z̺/, /ts̺/, /ʃ/, [ʒ] or /ʧ/— do not require lowering and backing of the tongue dorsum and thus do not inhibit /u/-fronting.

The new account of the [õ]-raising found in the continental Basque dialects proposed in this dissertation (§7) is also phonetically based. Following Beddor et al. (1986), I have argued that the raising of nasalized vowels is a consequence of the ambiguity created by the addition of two nasal formants in the F1 domain (§7.3). This ambiguity can result in a change in vowel height, especially in languages where the nasality contrast is not very prominent, as it is the case of the Basque dialects that have developed this sound pattern. In these languages, the low frequency of nasalized vowels may facilitate the reinterpretation of the nasal formants as oral.

I have proposed dividing Basque metathesis processes into two groups with different triggers, and suggested that both phonological processes may be phonetic in their nature (§8). More precisely, I have suggested that perceptual metathesis (§8.2) is a perceptual process caused by the ambiguity inherent to segments bearing elongated phonetic cues (Blevins & Garrett 2004), which can be reinterpreted in a non-etymological position (§8.2.5). On the other hand, reciprocal metathesis (§8.3) may be a special kind of motor planning error that results in phonologization. In the case of perceptual metathesis, the proximity (in distance, phonological nature and syllabic position, cf. Garrett & Johnson 2013) between two segments may produce speech errors that yield to a change of the sequential order of these segments within the phonic string (§8.3.4).

In a similar way, typological parallels to Basque sound patterns have been mentioned in the appropriate sections of the dissertation. Some of these typological parallels were already present in the literature on Basque, such as the similarity between the Northern Bizkaian pitch-accent system and that of Tokyo Japanese (cf. Hualde 1988), the similarity between the dissimilation of aspirates known as Grassmann's Law in Indo-European and that found in Basque (cf. Michelena 1977 [2011]) or the different sound patterns involving rhinoglottophilia (Igartua 2008; cf. Blevins 2004). I have tried to mention more parallels to these sound patterns as well as parallels to other processes discussed in the dissertation, such as /u/-fronting (§5.3.1) or [õ]-raising (§7.3).

A particularly interesting parallel to Zuberoan /u/-fronting has been found in American English (§5.3.4). As in the Basque case, where /u/-fronting is blocked in cases of C-to-V coarticulation, in the case of (non-Southern) American English a dark [ɫ] inhibits the process when following the affected /u/ (Labov et al. 2006). Although both the outcome of the fronting —which involves /u/ > /ʉ/ instead of /u/ > /y/— and the segments that

inhibit this fronting —[ɫ] instead of /ɾ, s̺, z̺, t̺s̺, rtʰ, rt, rd/— are different in the case of American English, the fact that the fronting process can be inhibited by consonantal coarticulation remains the same in both sound patterns.

In addition, some parallels that were already present in the literature have acquired a bigger significance after being compared to more (or more precise) processes found in the Basque language. One such example is the aspiration of rhotic trills in Korlai Creole Portuguese (Clements 1996). In this language, rhotic trills are aspirated but this aspiration is only maintained in the first syllable of the word (cf. example 4.11a in §4.4.4). This was compared by Hualde (2006b) to the restriction that limits modern Basque aspiration to the first two syllables of the word. Now we can also compare the second set of examples (cf. example 4.11b in §4.4.4) to the cases of /H/-metathesis observed in Basque (§4.4.4 and §8.2.1). In the Korlai Creole case, in words in which the rhotic trill is in a syllable different to the first, the /h/ is metathesized to the first syllable after trill aspiration occurs in a later syllable. This can be related to the Basque case, in which many instances of /H/ that were located after the second syllable in older stages of the language metathesized to either of the first two syllables after an accentual shift (§3.4.2).

9.4 Future research

Although the chapters in this dissertation are meant to be as thorough as possible, some topics may require a future revision or update. In certain cases, the discussion on the topic has been limited prior to this dissertation, and further discussion by other scholars will probably bring new insights to it. One of these cases may be that of metathesis (§8), which has been practically absent from the literature on Basque until now. In other cases, the discussion may advance if the topics were to be handled from a different perspective, as in the case of the processes occurring in the compound boundary —such as these described in example (1.2) in §1.1.1 or that in §4.5.2—, where specific morphological factors may be playing a role.

The clearest way in which the research in this dissertation can be continued is by means of experimental testing of some of the hypotheses presented in previous chapters. As an example, it may be worth testing whether the degree of consonant-to-vowel coarticulation following a high back rounded vowel is actually significantly bigger for the apical consonants that historically inhibited /u/-fronting than it is for other coronal

consonants that did not hinder the fronting process (§5.3.4). Another empirical test worth performing in the future may be related to perceptual metathesis (§8.2). A perceptual test that presents recorded instances of ambiguous sequences of speech involving stretched-out rhoticity may shed light on the current directionality of the metathesis of rhotic segments in different consonant clusters in modern Basque. In addition, production and perception tests involving aspiration may be designed for speakers of continental dialects that are in the process of losing intervocalic aspiration, focusing especially in words beginning with a vowel followed by an intervocalic /h/.

Alongside empirical tests, more specific improvements may be added to different chapters in the future. In the proposal of a chronology of the attested Basque accentuation systems presented in §3, for instance, the subvarieties of the main 3 accentuation systems were intentionally left aside. Nevertheless, Hualde (1997a, 200, 2003c, 2007, 2012, etc.) has analyzed many of these subvarieties as well as their development, and his research will undoubtedly make it much easier integrating them into a bigger, more complete chronology of the innovations within each Basque accentuation system.

As for contrastive vowel nasalization, it may be the case that more instances (and potential cases) of contrastively nasalized vowels are found in some of the early sources (from the 16th to the 18th century) of more than one Basque dialect, provided that we Bascologists actually look for them. Recent philological research by Ulibarri (in prep.) has shown that vowel nasalization can be found in documents that are much more recent than we may have expected not so long ago. In case more instances of contrastive vowel nasalization are found in the written sources, a new and improved analysis will undoubtedly be fruitful.

Regarding the sound pattern I have referred to as reciprocal metathesis (§8.3), a gap that I intend to fill in future research involves the development of a list of the potential segment pairs subject to this process.[174] This "reciprocal metathesis cooccurrence chart" should specify which of the pairs are attested and which of them are unattested within Basque. Ideally, this list should distinguish among dialects as well, in order to show whether all attested combinations of segments that undergo metathesis with each other are equally found across the different Basque dialects. A bigger problem with reciprocal metathesis involves the direction of the change, i.e. specifying whether all sequential

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174   I owe this idea to Jeff Mielke.

orders of segments are equally susceptible to metathesis or not. Sadly, many of the examples of metathesis lack a widely accepted etymology, and thus the direction of the change cannot currently be determined precisely for those examples. Given that metathesis has more than once led to old morphemes becoming obscure, incorporating morphological insights into the reconstruction of forms susceptible to having undergone metathesis may help to discern the direction of the particular metathesis processes.

As a last observation, by writing this dissertation I have come to realize that, despite years of work on this topic, there is still detailed work to be done on the Latin and Romance loanwords introduced into Basque. Not all processes of adaptation observed in the language are equally regular, and not all loanwords follow the same adaptation processes. Clearly, there are different layers of borrowings within the Basque language that remain to be distinguished, as well as analyzed in more depth.

9.5 Final remarks

The goal of this dissertation was to show the importance of incorporating typological and phonetic explanations into the field of historical phonology. Certain sound patterns are better understood in light of typological parallels found in genetically unrelated languages. Other sound patterns can only be fully explained when they are analyzed from a phonetic perspective. In this dissertation, I have applied an approach that integrates both phonetic explanation and typological comparison to the history of the Basque language.

10 Appendixes

Appendix I. A relative chronology of some of the mentioned processes

One of the ultimate goals of the historical linguist is to reconstruct a relative chronology of the processes involved in the evolution of the language under study. A phonological relative chronology helps us understand the historical evolution of the language as well as the nature of the processes developed in said language and their interaction with each other. In the case of Basque, there is no relative chronology deemed as "standard". In fact, the only attempts towards a relative chronology of the Basque language have been Guiter (1989), Múgica (1996) and the recent Reguero-Ugarte (2010).

Although the processes analyzed in this dissertation are by no mean exhaustive, the chronological ordering of these processes is nevertheless an interesting partial illustration of the evolution of Basque in the last 2000 years. Given that some of the sound patterns discussed in this dissertation are found in only the eastern Basque dialects, I will present a relative chronology of the Zuberoan dialect instead of a more general one. It is probably too early to propose a relative chronology of all phonological processes in all Basque dialects, and this dissertation has by no means discussed all sound patterns in all dialects. Instead, focusing on a single dialect will help present a clearer picture of the evolution of Zuberoan itself, which is one of the most deviant Basque dialects.

I have chosen 5 words to illustrate this relative chronology, namely Std. Bsq. *ardo* 'wine', the borrowings Std. Bsq. *harea*[LW] 'sand' and Std. Bsq. *liburu*[LW] 'book' and the compound words Std. Bsq. *ardandegi* 'winery' and Std. Bsq. *artizar* 'bright star'. Preceding the chronology itself, I will introduce each process ordered in (A.1) and refer to the chapter where each of these sound patterns has been discussed. Steps that share a particular number but are followed by a different letter are assumed to be nearly-contemporary. Examples involving compounds are used to illustrate steps ii and iii, which are common to all Basque dialects and thus precede the dialectal division (provided they do not involve recent parallel evolutions). Given that further changes mentioned in the chronology are not restricted to compounds, later changes are represented only in non

compounded words.

Phonological processes mentioned in the chronology

Reconstructed form: The reconstructions presented at the top of the table are those usually regarded as Late Proto-Basque or (Early) Common Basque. Old loanwords are given in their Latin form.

i- Phrase-level accentuation: Phrase-level accentuation is hypothesized to have been common to all Basque dialects, and thus should have developed prior to the dialectal division (cf. §3.4.1).

ii, iii- Processes found in compounding: After the development of phrase-level accentuation, a class of marked (accented) words emerges from the processes subsequent to the addition of a glottal gesture between the two members of a compound or derived word (cf. Hualde 2007: 297ff.). Thus, first glottalization is added at the morpheme boundary and then -V and -T neutralization (and loss) and the development of a group of lexically accented words occur at roughly the same period (Hualde 2007; cf. §3.3.3). The compound words used below are not present in Modern Zuberoan, but are used as illustrative examples of processes common to all dialects.

Introduction of (Vlg.) Lat. *libru*: I have chosen two different old loanwords for this chronology: the Basque equivalents of Lat. *arēna* 'sand' and *libru*(*m*) 'book'. One of the differences between these two borrowings is that the word for 'book' shows marked accentuation in many Basque varieties while the word for 'sand' does not. Thus, the introduction of the word for 'book' needs to postdate the development of the class of accented words (in order to be adapted as such) while the word for 'sand' does not need to. The possibility of *harea* losing its accent in all Basque varieties cannot be discarded, but the idea of an early introduction —prior to the development of marked accentuation— is a very compelling possibility.

iv- Intervocalic *n > /h̃/: As in the case of the processes related to phrase-level accentuation, it is not easy to specify whether this sound pattern took place before or during Common Basque, but the result of the process can be reconstructed for all Basque varieties (cf. §4.2.3). What is clear is that

this sound pattern occurred after the processes found in compounding in step iii, given that it was bled by them (cf. *ardan-degi* 'winery').

v, vi- Processes related to peninitial stress: The shift of the stress to the peninitial syllable of the word (cf. §3.4.2) brought a number of segmental consequences. The clearest examples include the potential metathesis of a laryngeal (cf. §4.2) after the newly assigned position of the stress —provided there was an empty onset that could be filled by it— and the loss of any laryngeal that failed to metathesize to either of the first two syllables (cf. §4.4.4; §8.2.1). Given that the deletion affected both /h/ and /h̃/, the accentual shift that created the eastern distribution of laryngeal segments had to occur after the *n > /h̃/ process was already complete. After the metathesis or deletion of the nasalized laryngeals in a post-tonic syllable, the contextual nasalization of the vowels formerly surrounding them became contrastive (cf. §6.2).

vii, viii- Development of the Eastern stress system: The easternmost varieties of Basque reanalyzed peninitial stress as originating in the penultimate syllable (probably in trisyllabic words) and regularized this pattern (cf. §3.4.3). At some point after the reanalysis, vowel nasalization was regularly attributed to the stressed syllable and the nasality in its contiguous syllable was deemed contextual (cf. §6.2.1). These processes occurred during the Middle Ages, but it is difficult to specify the exact time. Nevertheless, penultimate stress is shared by Zuberoan and Roncalese —unlike /y/, for instance—, and that argues for placing it before the end of the dialectal division in the east.

ix- Processes affecting vowel clusters: Vowel raising and simplification in hiatuses (cf. §6.2.1) are the first processes that distinguish Zuberoan from Roncalese. While Roncalese varieties show *ardãu* 'wine' and both *ãrea* and *ãria* 'sand', Zuberoan regularly shows *ardǘ* and (*harĩ́a* >) *haríña*. It is not clear whether ix should be placed before of after x, but these seem to be the first processes discussed in the dissertation to distinguish Zuberoan from Roncalese.

x, xi- /u/-fronting and high vowel assimilation: While /u/-fronting is specific to

Zuberoan (cf. §5.2), /u̯/ > /i̯/ glide fronting (cf. §5.2.2) and the necessarily more recent assimilation of high vowels /i/ and /u/ to /y/ when in a contiguous syllable (cf. §5.4.2) seems to be paralleled by Roncalese. However, the lack of /y/ in Roncalese makes this assimilation /i/ to /u/ instead. Until further evidence confirms that Roncalese shared /y/ with Zuberoan (cf. Michelena 1954 [2011a]: 117ff.), I assume /u/-fronting to be one of the sound-patterns that separated Zuberoan from Roncalese.

xii- Raising of [õ]: Raising of contextually nasalized [õ] (cf. §7.2) necessarily follows /u/-fronting, given that the instances of /u/ from older nasalized [õ] do not show fronting. Given that early authors of neighboring dialects such as Dechepare show graphic variability when writing this segment, this raising is placed not long before their time.

xiii- Nasal restitution after /ĩ/: This sound pattern has tentatively been placed in Archaic Zuberoan, but it seems to have been productive independently in all Basque dialects (with different results) and for long periods of time. In fact, Zuberoan shows intradialectal variation even today: There are no written attestations of any Zuberoan variety of words such as *hariña* (> *háiña*) 'sand' or *erregiña* 'Queen' without the added palatal nasal, but some varieties have *khatiña* 'chain' while other varieties use *khatía* even today.

xiv- Loss of /ɾ/: The loss of the tap is the only sound pattern with a clear date: the generation born in 1840 was the last to produce the tap in Zuberoan (Camino, p.c.).

xv- Processes affecting vowel clusters (after xiv)**:** After the loss of the tap during the 19th century, the hiatus created by this loss has gradually diphthongized or it has been simplified to a single vowel. Nevertheless, there is speaker-to-speaker variation even today, with some speakers maintaining the hiatus while others diphthongize or simplify it.

(A.1) *Processes involved in the development of Modern Zuberoan*

	Process	Native words	Old loanwords		Compounds	

LATE PROTO-BASQUE (2nd-4th century)

| | Reconstructed form | *ardano* 'wine' | Lat. *arēna* 'sand' | Lat. *libru*(m) 'book' | *ardano* + *tegi* 'winery' | *argi* + *izar* 'bright star' |

COMMON BASQUE (5th-7th century)

	Process	Native words	Old loanwords		Compounds	
i	Phrase-level accentuation	*ardano[']	*arena[']		*ardano-tegi[']	*argi-izar[']
ii	'-addition in compounds	-	-		*ardano'tegi[']	*argi'izar[']
iii-a	-V neutralization and loss	-	-		*ardan'tegi[']	*arg'izar[']
iii-b	-T neutralization	-	-		-	*art'izar[']
iii-c	Marked accentuation	-	-		*ardán-tegi	*árt-izar
	Introduction of (Vlg.) Lat. *libru*			*libúru		
iv	/n/ > /h̃/ /V_V	*ardaño[']	*areh̃a[']	-	-	-

DIALECTAL DIVISION (8th-10th century)

	Process	Native words	Old loanwords		Compounds	
v	Peninitial stress	*ardáh̃o [ar'dãh̃õ]	*aréh̃a [a'rɛh̃ã]	*líburu		
vi-a	Metathesis of /h̃/ in σ>2	-	*harḗ̃ã	-		
vi-b	Deletion of /h̃/ in σ>2	*ardǎ̃õ	-	-		
vii	[+2] > [-2] stress reanalysis	*ardǎ̃õ	*harḗ̃ã	*libúru		
viii	Nasalization in σ́	*ardǎõ	*harḗ̃ã	-		

	Process	Native words	Old loanwords		Compounds
		MEDIEVAL ZUBEROAN (11th-14th century)			

	Process	Native words	Old loanwords	Compounds

	Process	Native words	Old loanwords	Compounds

Process · **Native words** · **Old loanwords** · **Compounds**

	Process	Native words	Old loanwords	Compounds
		MEDIEVAL ZUBEROAN (11th-14th century)		
ix-a	e.V raising	-	*harĩa*	-
ix-b	V.V blending/simplification	*ardő*	-	-
x	/u/-fronting	-	-	*libúrü*
xi-a	/u/ to /y/ assimilation	-	-	libűrü
xi-b	/i/ to /y/ assimilation	-	-	lübűrü
		ARCHAIC ZUBEROAN (15th-16th century)		
xii	Raising of [õ]	ardű	-	-
xiii	Restitution of /n/ /i_	-	haríña	-
		LITERARY ZUBEROAN (17th-19th century)		
xiv	Loss of /ɾ/	-	haíña	lübűű
		MODERN ZUBEROAN (20th-21st century)		
xv-a	V.V diphthongization	-	háiña	-
xv-b	V.V simplification	-	-	lübű

Appendix II

In this second appendix, I list most of the words mentioned in the examples throughout the dissertation. This appendix is divided into two lists. The first list encompasses loanwords mentioned in the dissertation with their source in the donor language. In the second list, I list native words mentioned in the dissertation or, more precisely, words that are not clear borrowings, alongside the etymologies that have been proposed for them and the scholar who proposed those etymologies. Whenever a word has been proposed to be a loan but its borrowed status is not necessarily widely accepted, I have placed it in the second list (***Etymologies***) with a reference in the first one (***Loanwords***).

Many etymologies mentioned in this appendix are due to Michelena. Although his etymological proposals are scattered throughout his extensive work, many of them have been compiled by Arbelaiz (1978) and can be found there. Thus, Arbelaiz (1978) has been one of the primary sources for this appendix, alongside *Fonética histórica vasca* (Michelena 1977 [2011]), other works by Michelena (1950 [2011a], 1964 [2011c], 1974 [2011c], i.a.) and several works by Lakarra (2006b, 2009a, 2011b, 2014, i.a.). Etymological dictionaries of Basque include Agud and Tovar (1988-1995) and *Euskal Hiztegi Historiko Etimologikoa* [*Historical Etymological Basque Dictionary*] (Lakarra et al. in prep.). The only historical dictionaries of Basque are *Euskal Hiztegi Historiko Etimologikoa* and *Orotariko Euskal Hiztegia* [General Basque Dictionary] (Michelena & Sarasola 1987-2005).

The biggest difference between the two main sources of reconstructions in the literature, namely the reconstructions by Michelena and those by Lakarra, is foocused on the stage of the language the authors are reconstructing. While Michelena's reconstructions follow a Common Basque word-structure and phonotactics —dating from around the periods I have referred to as Late Proto-Basque and Early Common Basque—, Lakarra tries to reconstruct an older state of affairs involving CVC monosyllabic roots and

prefixation, which belongs to what he called Old Proto-Basque. Lakarra's proposals are reconstructed for a stage of the language prior to the processes discussed in this dissertation and require additional assumptions not developed in this work. Nevertheless, I have added Lakarra's etymologies to the second list for the sake of being comprehensive. In addition, Lakarra does not gloss all of his reconstructed roots, and so, I follow him in listing some of the Proto-Basque forms without glosses.

Given that many of the etymological proposals in this appendix were not published in works listed in the references, a list of the journals where those papers were published follows the lists of etymologies. The names of the journals mentioned in this appendix have been abbreviated. Those abbreviations can be found at the end of this appendix. Some widely agreed upon etymologies are unreferenced, as their original source is unclear.

List of mentioned loanwords (LW)

1.	*abere*	From Lat. *habēre* or Rom. *aver*(*e*), *abere* 'catter'.
2.	*adreilu*	From Sp. *ladrillo*, *adr*(*e*)*illu* 'brick' (cf. Old L *ardillu*), probably reanalyzed from the det. sg. *el ladrillo*.
3.	*agur*	From Vlg. Lat. *agurĭu*(*m*) 'omen, portent' (Schuchardt, *ZRPh* 30, 212).
4.	*ahate*	From Lat. *anăte*(*m*), comm. (*ah*)*ate*, Z *ãháte* 'duck'
5.	*aihen*	See Etymologies.
6.	*aihotz*	See Etymologies.
7.	*aingeru*	From Lat. *angĕlu*(*m*), comm. *aingeru*, Lit. Z *aingürü* 'angel'.
8.	*aizkora*	From Lat. *asciola*, (*h*)*aizkora* 'ax' (cf. Gorostiaga, *Euskera* 3, 61). The initial /h-/ results from the influence of *haitz* 'rock'.
9.	*akto*	From Sp. *acto* 'act'.
10.	*alfer*	See Etymologies.
11.	*alkandora*	From Sp. *alcandora* 'shirt'.
12.	*alpargata*	From Sp. *alpargata* 'espadrille'.
13.	*amoina*	From Brn. Gsc. *aumoina* 'alms, hand out', older Z *aumoina*, comm. *amoina*, Mod. Z *amuina*.
14.	*amore*	From Lat. *amōre*(*m*) 'love'.
15.	*amorio*	From Sp. *amorío* 'sentimental relationship'.
16.	*anhoa*	Lat. *annōna* > **annoh̃a* > **anoh̃a* > comm. *anhoa*, Z *anhúa*

'portion' (cf. Omaecheverría, *BAP* 4, 311f.).

17.	*apaindu*	From Rom. *apañar* 'to adorn, decorate' (cf. Michelena 1974 [2011c]).
18.	*apaiz*	See Etymologies.
19.	*apezpiku*	See Etymologies.
20.	*apostru*	From Lat. *apostŏlu*(*m*) 'apostle', **aposturu* > *apostru*.
21.	*arau*	See Etymologies.
22.	*ardura*	From Old Sp. *ardura* 'unease, distress' (cf. Michelena, *BAP* 9, 569).
23.	*ar*(*h*)*an*	See Etymologies.
24.	*ar*(*h*)*in*	See Etymologies.
25.	*arrabote*	From Sp. *rebote* 'rebound', comm. *errebote*, Z *arrabotü* 'pelota court'.
26.	*arrangura*	From Brn. Gsc. *arrancura* 'concern'.
27.	*arrasto*	Cf. Sp. *rastro* 'trace'.
28.	*arratoi*	Cf. Sp. *ratón*, Brn. *arraton* 'mouse', comm. *arratoi*, Z *arratũ*.
29.	*arrazoi*	Cf. Sp. *razón*, Gsc. *arrason*; comm. *arrazoi*(*n*), Z *arrazũ* 'reason' (cf. Michelena, *Homenaje a A. Tovar* [1972], 305).
30.	*arropa*	From Sp. *ropa* 'clothes', *arropa*, *erropa*.
31.	*arrunt*	From Brn. Gsc. *arrond* 'common' (Larrasquet 1939).
32.	*auhen*	See Etymologies.
33.	*ausartu*	From Brn. Gsc. *ausar* 'to dare', cf. Vlg. Lat. *ausāre* (cf. *ausart* 'brave' < Brn. Gsc. *ausard*).
34.	*azeri*	Lat. *Asenarius* > **azeh̃ari* > **hazẽãri* > (*h*)*azeri* 'fox' (cf. Meyer-Lübke, *ZRPh* 41, 564).
35.	*bake*	From Lat. *pāce*(*m*), *bake*, *pake* 'peace'.
36.	*balea*	From Lat. *ballaena*, **baleh̃a* > *balea* 'whale'
37.	*balentiús*	From Brn. Gsc., *valentia* + -*us* 'swaggerer'.
38.	*baliús*	From Brn. Gsc. *valiós* 'valuable'.
39.	*barantaila*	From Vlg. Lat. *parantalia*, comm. *barantaila*, Z *banthalla* 'February' (cf. Gorostiaga, *Euskera* 1958, 53).
40.	*baratze*	According to Corominas (*FLV* 11, 302), from Arch. Occ. *baratz* 'enclosure'.
41.	*barkatu*	From Lat. *parcĕre* 'to forgive', comm. *barkatu*, *pharkatu*.
42.	*baso*	From Sp. *vaso* 'glass'.
43.	*bedezí̃*	From Brn. Gsc. *medecin* 'physician'.
44.	*bek*(*h*)*atu*	From Lat. *peccātum*, *bekhatu* > *phekatu* 'sin'.

45.	*belaun*	See Etymologies.
46.	*belena*	From Fr. *venelle*, Old HN *benela* > HN, R, S *belena* (Michelena, *BAP* 12, 368).
47.	*bienke*	From Sp. *bien que* 'good that'.
48.	*bigá̃*	See Etymologies.
49.	*bikhe*	From Lat. *pĭce*(*m*) 'pitch, tar', *bikhe* > *phike* (cf. Michelena 1974 [2011c]).
50.	*billṹ*	From Brn. Gsc. *bilhon* 'hewn tree trunk'.
51.	*bonet*	From Brn. Gsc. *bonet* 'beret'.
52.	*borondate*	From Lat. *voluntāte*(*m*), *borondate*, *borontháte* 'will'.
53.	*boronde*	From Lat. *fronte*(*m*), *boronde* 'front'.
54.	*borroka*	From Old Sp. *boruca*, *buruca* 'commotion, uproar' (Tovar, *ASJU* 5, 74).
55.	*botere*	From Vlg. Lat. *potēre 'power', *bot*(*h*)*ere* > *p*(*h*)*otere*.
56.	*botila*	From Sp. *botella* /boteʎa/, *boteila* > *botila* 'bottle'.
57.	*briṹ*	From a Gsc. form of Lat. *ēbriu*(*m*) 'drunk', cf. Mod. Gsc. *briac* with no *e-*.
58.	*buket*	From Brn. Gsc. *boquet* 'bouquet (of flowers)'.
59.	*bunbṹ*	From Brn. Gsc. *bonbon* 'bonbon'.
60.	*buskatu*	From Sp. *buscar* 'to search'.
61.	*busti*	From Rom. *musteu*(*m*) 'moist' (cf. Schuchardt, *ZRPh* 23).
62.	*butṹ*	From Brn. Gsc. *boton* 'button'.
63.	*dantzatu*	From Sp. *danzar* 'to dance'.
64.	*debekatu*	From Lat. (*im*)*pedicātu*(*m*), *bedekatu* > *debekatu* 'forbidden'.
65.	*denbora*	From Lat. *tempŏra*, pl. of *tempus* 'time'.
66.	*denda*	From Lat. *tenda 'shop'.
67.	*desondra*	From Sp. *deshonra* 'dishonor' + the suffix *-garri*.
68.	*desonest*	From Old Gsc. *desonèst* (cf. Mod. Gsc. *desonèste*) 'dishonest'.
69.	*despendiús*	From Brn. Gsc. *despendio* 'expense' (cf. Sp. *dispendio*) and the Gsc. suffix *-ós*, 'costly'.
70.	*deus*	A Lat. loan of unclear source. Proposals include Lat. *deus* 'God' and *nec unus* 'not one' (cf. Michelena 1974 [2011c]).
71.	*dolu*	From Lat. *dŏlu*(*m*) 'mourning'.
72.	*dontzeila*	From Sp. *doncella* 'maid'.
73.	*drole*	From Brn. Gsc. *dròlle* 'boy'.
74.	*duda*	From Sp. *duda* 'doubt'.

75.	*ehun*	See Etymologies.
76.	*elhe*	See Etymologies.
77.	*erlatibo*	From Sp. *relativo* 'relative (adv.)', with prothesis (*errelatibo*) and syncope.
78.	*erlazio*	From Sp. *relación* 'relation', with prothesis (*errelazio*) and syncope.
79.	*erlijio*	From Sp. *religión* 'religion', with prothesis (*errelijio*) and syncope.
80.	*erloju*	From Sp. *reloj* 'clock', with prothesis (*erreloju*) and syncope.
81.	*ernegatu*	From Sp. *renegado* 'renegade', with prothesis (*errenegatu*) and syncope.
82.	*erraldoi*	From the Rom. name *Roldán*, *erroldane > *erroldãhe > *erroldae > erraldoi (Michelena 1977 [2011]).
83.	*errau*	From Sp. (*a*)*rroba*, *errua*, *errau* 'unit of weight'.
84.	*errege*	From Lat. *rēge*(*m*) 'King'.
85.	*erregiña*	From Lat. *regīna* 'Queen', *erregina > *erregĩha > erregĩã > erregiña.
86.	*errekobratu*	From Sp. *recobrar*, *errekobratu* 'to recover'.
87.	*errepublika*	From Sp. *república* 'republic', cf. the metathesized form *erreplubika*.
88.	*erresuma*	Romance loanword, 'kingdom'. Unclear source.
89.	*errieta*	From Sp. *reyerta* 'brawl', after prothesis and with (*errie*(*r*)*ta*) or without (*erreie*(*r*)*ta*) syncope.
90.	*eskapatu*	From Sp. *escapar* 'to run away', cf. the metathesized form *espakatu*.
91.	*eskola*	From Lat. *schŏla* 'school'.
92.	*eskribau*	From Rom. *escribanu*, *eskribãhu > *eskribãũ > eskribaun, comm. *eskribau* 'scribe' (cf. also the metathesized form *eskibraun*).
93.	*eskritura*	From Sp. *escritura* 'writing, scripture'.
94.	*esponja*	From Sp. *esponja* 'sponge'.
95.	*esposa*	From Sp. *esposa* 'spouse'.
96.	*estonatu*	From Brn. Gsc. *estonar* 'to astonish'.
97.	*estrata*	From Lat. (*via*) *strata* 'path, track', cf. the metathesized form *estarta*.
98.	*estudiatu*	From Sp. *estudiar*, comm. *estudiatu*, Z *üstüdiatü* 'to study'.
99.	*ezabatu*	Cf. Rom. *effaciare*, Occ. *esfaçar*, Old Fr. *esfacier* 'to erase, delete'.

100. ezkondu	From Lat. *spondĕo*, *ezkondu* 'to marry' (Bouda, *BAP* 5, 415).
101. ezperǘ	From Brn. Gsc. *esperon* 'spur'.
102. fabrika	From Sp. *fábrica* 'factory'.
103. faizǘ	From Brn. Gsc. *faison* 'manners'.
104. faktura	From Sp. *factura* 'receipt'.
105. fanfarrǘ	From Brn. Gsc. *fanfarron* 'swaggerer'.
106. ferrǘ	From Brn. Gsc. *ferron* 'crimson clover'.
107. fĩ	From Brn. Gsc. *fin* 'fine, prudent'.
108. figura	From Sp. *figura* 'figure'.
109. finaziús	From Brn. Gsc. *financiar* 'to nitpick' + the suffix *-ós*.
110. fripǘ	From Brn. Gsc. *fripon* 'rascal, rogue'
111. froga	From Lat. *prŏba* 'evidence, proof' (cf. Brn. Gsc. *pròva*).
112. ganbara	From Rom. *cambra*, *ganbara* 'loft, attic' (cf. Michelena 1977 [2011]).
113. garau	From Lat. *grānu*(*m*) > **garanu* > **garañu* > *garãu* > *garau*(*n*) 'grain, zit'
114. garizuma	From Sp. *Cuaresma* 'Lent', *garizuma*, *goroxima*, *gorozüma*.
115. gau	See Etymologies.
116. gauza	From Lat. *causa* (cf. Brn. Gsc. *cause*) 'thing'.
117. gerezia	From Vlg. Lat. *ceresĭa* 'cherry', cf. the metathesized form *gereiza*.
118. gorputz	From Lat. *corpus*, comm. *gorputz* > *korputz*, Z *khorpitz* 'body'.
119. gozo	See Etymologies.
120. gurutz(*e*)	From Rom. **crŭce*(*m*), *gurutze* 'cross'; *gurutz* after the loss of the final vowel (cf. Sp. *cruz*).
121. gutizia	From Rom. *cobdiçia* 'greed'.
122. harea	From Lat. *arēna* > **aréña* > **haréa* > comm. (*h*)*area*, mod. Z *haíña*, R *ária* 'sand' (cf. Michelena 1977 [2011]).
123. harma	From Lat./Sp. *arma* 'weapon'. Segurola (Lakarra et al. in prep.) proposes the /h/ to have originated in the usual idiom *harmak hartu* 'take arms'.
124. haro	From Lat. *phăru*(*m*) 'lighthouse', with Rom. mediation.
125. harrapatu	From Rom. *arrapar* 'to catch' (cf. Michelena 1977 [2011]).
126. harroka	From Brn. Gsc. *arròca* (cf. Sp. *roca*) 'rock', influenced by *harri* 'stone'.
127. hautatu	From Lat. *aptāre* (cf. Michelena 1977 [2011]). However, the Lat. form does not show /h-/.

128. hauzu	From Lat. *ausus* (*sum*) 'allowed'. However, the Lat. form does not show /h-/.
129. haxe	From Lat. *fasce*(*m*) 'beam', with Rom. mediation.
130. heri	From Brn. Gsc. *heri* 'to wound', comm. *heri*, Z *ei* 'sick'.
131. herratu	From Brn. Gsc. *herrar*, *herratu* 'to shoe (a horse)'.
132. herratu	From Lat. *errāre*, *errātu*(*m*) 'to wander', (*arima*) *herratü* 'lost (soul)'.
133. herresilṹ	From Brn. Gsc. *resilhon* 'fine mix of flour'. However, the Gsc. form does not show /h/.
134. hezkabia	From Lat. *scăbie*(*m*) 'ringworm', influenced by *hatz* 'pruritus' (cf. Michelena 1977 [2011]: 172).
135. hira	From Lat. *īra* 'wrath'. However, the Lat. form does not show /h/.
136. hiru(n)	From Lat. *fīlu*(*m*) 'spin', cf. Brn. Gsc. *hiu* (< **hilu*).
137. holla	From Old Gsc. *holha* > Mod. Brn. Gsc. *huelha* 'leaf'.
138. hondar	See Etymologies.
139. horma	From Lat. *fõrma* 'wall', with Rom. mediation.
140. infernu	From Lat. *īnfernu*(*m*) 'hell'.
141. ingude	From Lat. *incūde*(*m*) 'anvil', cf. the metathesized form *ungide*.
142. inguru	From Lat. *in gȳru*(*m*) /ingiru/, comm. *inguru* > Z *üngürü* 'surroundings'.
143. iratiús	From Gsc. *iratiós* 'durable'.
144. izkiriatu	From Lat. *scrībe*(*re*) 'write', *izkiribatu* > *izkiriatu*.
145. jipoi	From Rom. *jubón* 'jerkin', *jipoi* (modern 'beating').
146. Johanne	From Lat. *Iōhannēs* 'John'.
147. justu	From Lat. *iūstu*(*m*) 'fair'.
148. kabestru	From Lat. *capistru*(*m*), (cf. Sp. *cabestro*) 'leading ox', *krab/pestu*, *kab/prestu*, *kab/pestru*.
149. kabezṹ	From Brn. Gsc. *caveçon* 'bridle'.
150. kafe	From Sp. *café* 'coffee'.
151. kandidatura	From Sp. *candidatura* 'candidacy'.
152. kantṹ	From Brn. Gsc. *canton* 'corner, angle'.
153. kapitain	From Lat. *capitāne*(*um*), Arch. B *kapitãẽ*, comm. *kapitain* 'captain'.
154. kargatu	From Sp. *cargar* 'to charge'.
155. kasu	From Lat. *cāsu*(*m*), 'attention'.
156. katea	Lat. *catēna* > **gateh̃a* > *gatẽã* > comm. *katea* 'chain'. For the Z form, Lat. *catēna* > **gateh̃a* > **katẽ̃ã* > *katĩa* > Z *khatíña*.

157.	*kherestū́*	From Brn. Gsc. *crestador* 'job of gelding'.
158.	*kipula*	From Lat. *cēpulla* 'onion'.
159.	*kokī́*	From Brn. Gsc. *coquin* 'rascal, scoundrel'.
160.	*komentu*	From Sp. *convento* 'convent'.
161.	*konde*	From Sp. *conde* 'count'.
162.	*konparatu*	From Sp. *comparar* 'to compare'.
163.	*konpasione*	From Sp. *compasión* 'mercy'.
164.	*kontatu*	From Sp. *contar* 'to tell'.
165.	*kontent*	From Brn. Gsc. *content* 'happy'.
166.	*kontra*	From Sp. *contra* 'against'.
167.	*kontserbatu*	From Sp. *conservar* 'to preserve'.
168.	*kontu*	From Rom. *contu* 'story, account' (cf. Lat. *compŭtu*(*m*)).
169.	*koroa*	From Lat. *corōna* > **koroh̃a* > *korõã* > *koroa* 'crown'.
170.	*kosī́*	From Brn. Gsc. *cosin* 'cousin'.
171.	*kosĩa*	From Brn. Gsc. *cosia* 'cousin (fem.)', Z *kosĩa*, *khüzüña*.
172.	*krabarroka*	From Sp. *cabrarroca* 'large-scaled scorpion fish'.
173.	*kreatura*	From Lat. *creatūra* 'creature'.
174.	*kristau*	From Brn. Gsc. *crestian* 'christian', Z *khiristī́*, R *kristiãĩ*, comm. *kristau*.
175.	*kuntrabandixte*	From Brn. Gsc. *contrabandista* 'smuggler'.
176.	*kuntzentzia*	From Sp. *conciencia* 'conscience'.
177.	*kuriús*	From Brn. Gsc. *curiós* 'curious'.
178.	*labana*	From Nav. Rom. *navalla* 'knife', *nabala* > *labana*.
179.	*laborari*	From Sp. *labor* 'task' + the suffix -*ari*, 'farmer'.
180.	*laket*	From Lat. *placet* 'to like'.
181.	*laño*	From Sp. *llano*, *llano* > *laño* 'modest, affable'.
182.	*latī́*	From Brn. Gsc. *latin* 'Latin'.
183.	*laudatu*	From Lat. *laudāre* 'to laud'.
184.	*Laudio*	From. Lat. *Claudiānu*(*m*) '(name)'.
185.	*laudorio*	'Praise', cf. Lat. *laudātōrĭus* 'laudatory'.
186.	*lehengusu*	See Etymologies.
187.	*lehoi*	From Lat. *leōne*(*m*), **leoh̃e* > **leh̃oi* > comm. *lehoi*, L, LN *lehoin*, Z *lehū́* 'lion'.
188.	*leka*	From Lat. *thēca*, *deka > comm. *leka*, Z *theka* 'pod'.
189.	*leku*	From Rom. *lueco* 'place' (cf. Lat. *locu*(*m*)).

190.	*leun*	From Lat. *plānu*(*m*), comm. *leun*, Z *lein* 'soft'.
191.	*lĩ*	From Brn. Gsc. *lin* 'linen', Z *lĩ*, R *lũ*.
192.	*liburu*	From. Lat. *libru*(*m*), comm. *liburu*, Z *lübürü* 'book'.
193.	*llapĩ́*	From Brn. Gsc. *lapin* 'rabbit'.
194.	*lleperĩ́*	From Brn. Gsc. *lèpe* + the diminutive suffix *-in* 'little hare', Z *lleperĩ*, R *lleprõĩ* 'hare'. The word *lèpe* shows a final *-r* in compounds, cf. *leperàs* 'big hare' (Biu, p.c.).
195.	*lukainka*	From Lat. *lūcānicā*, **lukanika* > **lukãhika* > *lukãika* > comm. *lukainka*, Z *lükhainka*, L *lukhinka* 'spicy sausage'.
196.	*lukuru*	From Lat. *lūcru*(*m*) 'profit, gain'.
197.	*luma*	From Lat. *plūma* 'feather'.
198.	*maite*	Michelena (1964 [2011c]) cites Old Ir. *maith* 'good'.
199.	*malenkonia*	From Sp. *melancolía* 'melancholy'.
200.	*malerus*	From Brn. Gsc. *malerós* 'unhappy'.
201.	*manteliña*	From Sp. *mantellina*, cf. Old G *mantellina* > *manteliña* 'headscarf'.
202.	*mañhatü*	From Brn. Gsc. *banhar* 'to bath'.
203.	*masorka*	From Sp. *mazorca* 'loom shuttle'.
204.	*Martĩ́*	From Brn. Gsc. *Martin* 'Martin'.
205.	*materia*	From. Sp. *materia* 'matter'.
206.	*mediku*	From Lat. *medĭcu*(*m*) 'physician'.
207.	*melũ̃*	From Brn. Gsc. *melon* 'melon'.
208.	*mendi*	See Etymologies.
209.	*merkatu*	From Lat. *mercātu*(*m*) 'market'.
210.	*milioi*	From Rom. *milione* 'million'.
211.	*moda*	From Sp. *moda* 'style'.
212.	*molde*	From Sp. *molde* 'mold', Bsq. 'manner'. Cf. *moldatu* 'to adapt', from Sp. (*a*)*moldar*.
213.	*morroi*	From Rom. **borrone*. **morrone* > ** morrõhe* > comm. *morroi*, Old B *morroe*, R *morrõĩ* 'boy' (cf. Michelena, *BAP* 12, 369).
214.	*motz*	See Etymologies.
214.	*mundu*	From Lat. *mundu*(*m*) 'world'.
215.	*munstra*	From Lat. *monstrāre* 'to show', *monstra* > Z *munstra* 'showing, sample'.
216.	*musde*	From Brn. Gsc. *mos de* 'Sir of', cf. Fr. *Monsieur de*.
217.	*mutil*	According to Lafon (*RIEV* 25, 666), from Lat. *putillu*(*m*) 'boy', cf. *motil*, Z *mithil* '(young) boy'.

218. negu   See Etymologies.

219. neska   See Etymologies.

220. noble   From Sp. *noble* 'noble'.

221. numero   From Sp. *número* 'number'.

222. ohalano   See Etymologies.

223. ohore   From Lat. *honōre*(*m*), comm. (*oh*)*ore*, Z *uh̃ue* 'honor'.

224. oilo   From Sp. (or Rom.) *pollo* 'chicken', *oilo* 'hen'.

225. oliñe   From Sp. *hollín* 'soot', B *oliñe*.

226. on   See Etymologies.

227. onest   From Lat. *honestu*(*m*) 'honest' and Old Gsc. *onèst* (cf. Mod. Gsc. *onèste*) 'honest', comm. *on*(*h*)*est*(*u*), Z (*h*)*unest*.

228. ontza   From Sp. *onza* 'ounce'.

229. orga   See Etymologies.

230. orguilu   From Sp. *orgullo* 'pride', *o*/*urguilu*, Z *ürgüillü*.

231. orhe   See Etymologies.

232. orhoitu   See Etymologies.

233. paradisu   From Lat. *paradīsu*(*m*), older *baradizu*, comm. *paradisu* with Rom. mediation.

234. patroi   A Rom. loan, cf. Lat. *patrōnu*(*m*) 'protector', Sp. *patrón*, Brn. Gsc. *patron* > comm. *patroi*, Z *patrũ* ' patron'.

235. pertsona   From Sp. *persona* 'person'.

236. petatxu   From Sp. *petacho* 'patch', cf. the metathesized form *petxatu*.

237. phastoral   From Sp. *pastoral*, Mod. Z *phastual* 'literary genre'.

238. phausa   From Brn. Gsc. *pausar* '(to take a) break, rest'

239. phika   From Lat. *pīca* 'magpie', *p*(*h*)*ika*, *mika*.

240. phintakoste From Lat. *Pentēcostē* 'Pentecost, Whitsun'.

241. phozǘ   From Brn. Gsc. *poson* 'poison'.

242. phuntxǘ   From Brn. Gsc. *ponchon* 'punch'.

243. pihǘ   From Brn. Gsc. *pihon* 'indigent'.

244. pijǘ   From Brn. Gsc. *pijon* 'pidgeon'.

245. piku   From Lat. *fīcu*(*m*), *biku*, *fiku*, *p*(*h*)*iku* 'fig'.

246. pintǘ   From Brn. Gsc. *pinton* 'bottle of wine'.

247. piper   From Lat. *pǐper* 'pepper', *bipher* > *p*(*h*)*iper*.

248. polit   From Brn. Gsc. *polit* 'beautiful'.

249. presǘ   From Brn. Gsc. *preson* 'prison'.

250. *preziús*	From Brn. Gsc. *preciós* 'precious'.
251. *pühüllü*	From Rom. *fenu(*i*)*clu* (cf. Gsc. *holh*, *henolh*, Occ. *fenolh*, Cat. *fonoll*, Fr. *fenouil*), Z *pühüllü*, HM *milu*; R *mullu*; L *mehula* 'fennel'.
252. *punta*	From Sp. *punta* 'top'.
253. *puru*	From Lat. *pūru*(*m*) 'pure'.
254. *pusatu*	From Brn. Gsc. *possar* 'to push'.
255. *saindu*	From Lat. *sānctu*(*m*) 'saint' (cf. Gsc. *sent*), *santu*, *saindu*.
256. *saloi*	From Sp. *salón* 'living room', comm. *saloi*. From Brn. Gsc. *salon*, Z *salǘ*.
257. *salto*	From Sp. *salto* 'jump'.
258. *saltsa*	From Sp. *salsa* 'sauce'.
259. *sardiña*	From Lat. *sardīna*, cf. Old B *sardĩã* 'sardine'.
260. *sarrasĩ́*	From Brn. Gsc. *sarrasin* 'Saracen'.
261. *sasoi*	From Sp. *sazón*, Brn. Gsc. *sason*, comm. *sasoi*(*n*), Z *sasǘ* 'season, time'.
262. *seguru*	From Sp. *seguro* 'sure'.
263. *señale*	From Sp. *señal* 'signal', cf. the metathesized form *senalle*.
264. *soltura*	From Sp. *soltura* 'pardon, alleviation', comm. *soltura*, Z *solthüra* 'permission, liberation'.
265. *Susdiakre*	From Fr. *sous-diacre* 'sub-deacon', cf. Occ. *sosdiacre*.
266. *taulǘ*	From Brn. Gsc. *taulon*, Z *taulǘ* 'garden tile'.
267. *terko*	From Sp. *terco* 'stubborn', cf. the metathesized form *treko*.
268. *tranpa*	From Sp. *trampa* 'trap'.
269. *tronpatu*	From Brn. Gsc. *trompar* 'to err; deceive'.
270. -(*t*)*ura*	A Rom. suffix, cf. Sp. -*tura*, Gsc. -*tura*, Fr. -*ture*, etc.
271. *turko*	From Sp. *turco* 'Turkish', cf. the metathesized form *truko*.
272. *txintxǘ*	From Brn. Gsc. *chinchon* 'pork rind, crackling'.
273. *uñhu*	From Brn. Gsc. *onhon* 'onion'.
274. *uros*	From Brn. Gsc. *urós* 'happy'.
275. *usantza*	From Sp. *usanza* 'usage'.
276. *usu*	From Lat. *ūsu*(*m*) 'use, habit'.
277. *usurpatu*	From Sp. *usurpar* 'to usurp'.
278. *xabǘ*	From Brn. Gsc. *savon* 'soap'.
279. *xahu*	From Lat. *sānu*(*m*) 'healthy', comm. *xahu*, R *xãĩ* 'clean'.
280. *zamau*	From Lat. *sabănu*(*m*), **zamah̃u* > *zamau* 'tablecloth'.

281.	*zebatu*	From Sp. *avezado*, cf. *bezatu* > *zebatu* 'gotten used to'.
283.	*zemai*	See Etymologies.
284.	*zerbitzatu*	From Sp. *servir* 'to serve'.
285.	*zeru*	From a Rom. continuant of Lat. *caelu*(*m*) 'sky'.
286.	*zizeilu*	From. Lat. *subsellĭu*(*m*), **zuzelu* > *zizeilu* 'bench' (Michelena & Sarasola).
287.	*zorte*	From Lat. *sorte*(*m*), *zorte* 'luck'. From Sp. *suerte, suerte*.
288.	*zurratu*	From Sp. *zurrar* 'to tan, to dress (a skin)'.

List of mentioned etymologies (E)

1.	*abarrots*	From *abar* + *hots* lit. 'foliage noise', nowadays just 'noise' (cf. Michelena & Sarasola).
2.	*adar*	According to Lakarra (2011a), reduplication of **dar* > **da(r)-dar* > *adar* 'horn'.
3.	*afari*	From *gau-hari* > **auhari* > comm. *afari* mod. Z *aihai* 'dinner' (cf. Michelena 1977 [2011]).
4.	*ahal*	Michelena (1977 [2011]) relates it to Z * ah̃alke* 'shame', although Z *ahal* 'to be able to' does not show nasalization. If it were related to *ah̃alke*, then **anal* may be reconstructed. Lakarra (p.c.) reconstructs **na-nal*.
5.	*ahantzi*	**enantze* or **anantze* > **ah̃antze* > Z *ah̃atze* LN, L *ahantzi*, R *ãtze* 'to forget' (Uhlenbeck, *E.-J.* 1, 574). Lakarra (p.c.) reconstructs **na-nan-tz-i*. See *ahaztu*.
6.	*ahari*	**anari* > *ah̃ari* > comm. (*ah*)*ari*, mod. Z *ah̃ái* 'ram' (cf. Michelena, *BAP* 12, 361).
7.	*ahaztu*	From **anaztu* > *ah̃aztu* > Arch. B *ãztu*, comm. (*ah*)*aztu* 'to forget'. See *ahantzi*.
8.	*ahizpa*	From **aniz-ba* > Z *ah̃izpa*, R *ãĩzpa*, comm. *a*(*h*)*izpa* (cf. Michelena 1950 [2011a]). See *alhaba*.
9.	*aho*	According to Lakarra (p.c.), from the root **han-* and related to *eho* 'to grind'. However, nasalization is not attested.
10.	*ahuntz*	**anunz* > Z *ah̃untz* > comm. *a*(*h*)*untz* 'goat', cf. the last name *Anuncibay* (*ahuntz* + *ibai*). Gorrochategui and Lakarra (1996) identify an initial element **han-* 'animal'. See *akher* and *ahari*.
11.	*aihen*	According to Lakarra (2009a: 581f), Gsc. *afenà* > **ahen* > *aihen* 'vine'.

12.	*aihotz*	According to Lakarra (2009a: 581f), Gsc. *afodz* > **ahotz* > *aihotz* 'sickle' (cf. also the metathesized Cl. L *haiotz*).
13.	*aita*	According to Holmer (*BAP* 6, 404), from **ata* with expressive palatalization *atta* and segmentalization of the palatality *aita*.
14.	*aizto*	**anizto* > R *ãĩzto*, comm. *aizto* 'knife'. See *aizter*.
15.	*aiztur*	**anizte/ur* > R *ãĩzter*, comm. (*h*)*aiztur* 'scissors' (cf. Michelena, *Hom. Urquijo*).
16.	*akher*	According to Gorrochategui and Lakarra (1996), **han* 'animal' + **ger* 'crooked', *akher* 'billy-goat'. See *ahuntz* and *ahari*.
17.	*alargun*	Corominas (*FLV* 5, 169ff) proposes **ez-lagun* 'without companion' (lit. 'no-companion') > **erlagun* > *elhargun*, *al*(*h*)*argun* 'widow(er)'.
18.	*alde*	Can be divided as *al-de* 'place', cf. *albo* 'side'.
19.	*alfer*	**aulher* > comm. *alfer*, Z *au*(*r*)*her*, R *aurer*, B, G, HN *alper* 'lazy', cf. the metathesized *arpel*. Lakarra (p.c.) proposes this word to come from a Rom. equivalent of Lat *pauper*.
20.	*alhaba*	The suffix *-ba* is found in different names for relatives such as *arreba* 'sister or a brother', *ahizpa* 'sister of a sister', *osaba* 'uncle' or *izeba* 'aunt'. Lakarra (2014) derives the initial component from Gsc.
21.	*amama*	From *ama-ama*, lit. 'mother-mother', 'grandmother'.
22.	*andere*	Bsq. *and*(*e*)*re* 'woman' has been linked to Old Irish *ander* 'young (woman)', but this link is far from established (cf. Michelena, *BAP* 12, 124; cf. also Gorrochategui 1987).
23.	*apaiz*	Michelena proposes it to come from Lat. *abbas* 'priest', but not without difficulties (cf. Michelena 1977 [2011]).
24.	*apezpiku*	From Lat. *episcopu*(*m*) 'bishop' and influenced by *apaiz* 'priest', **apezkipu* > Z *aphezküpü*, comm. *apezpiku* 'bishop' (cf. Michelena 1974 [2011c]).
25.	*arau*	According to Michelena (*BAP* 10, 375), *arau* 'rule' may come from Romance. He proposes **alau*.
26.	*ardi*	The final *-di* is also found in other animals such as *zaldi* 'horse' or *idi* 'ox'. See Lakarra 2011 [2014] for parallels.
27.	*ardo*	**ardano* > **ardaño* > **ardãõ* > **ardõ* > comm. *ardo*, L *arno*, Z *ardũ* 'wine', cf. the comb. form *ardan-* in *ardandegi* 'winery' (cf. Lafon, *BAP* 15, 107f). Lakarra (2011a) reconstructs **e-da-ra-dan-o*.
28.	*argi*	It has been compared to Hit. *harki-* 'white, pale' (cf. Michelena 1977 [2011]: 180). Lakarra (p.c.) identifies the suffix *-gi* and relates **ar-* to **har* in *hartz* 'bear' and *harre* 'ochre'.
29.	*ar*(*h*)*an*	Potentially related to Cel. **agrinja* or Rom. **agranio* 'plum' (cf. Michelena 1964 [2011c]). Lakarra prefers to derive it from Lat.

balana (pl.) 'acorns, nuts'.

30.	*ar(h)in*	'Fast', Lakarra (2014) derives it from Gsc. *hariu* 'fast runner'.
31.	*arlo*	Related to *alhor* 'field, area'. Either variant can be older than the other: *alhor* > *alor* > *arlo* and *harlo > *halor > *alhor* are potential sequences that result in both forms.
32.	*aro*	Older *haro* 'time, epoch'.
33.	*arrain*	*arrani > *arrahĩ > Arch. B *arrãĩ* > *arrain* 'fish', cf. the comb. form *arran-* in *arrantzale* 'fisherman' (cf. Michelena 1977 [2011]). Lakarra (2006b) reconstructs it as *e-da-ra-don-i (lit. 'the one that is despoiled'), from the root *don 'to despoil, steal'.
34.	*arte*	'Until, between'. Lakarra (p.c.) reconstructs *bar-te, with the initial component found in *barru* 'inside'.
35.	*artzain*	**art-* (comb. form of *ardi* 'sheep') + *zani 'guardian' > *artzahĩ > R *artzãĩ* > comm. *artzain* 'shepherd' (cf. Michelena 1977 [2011]). See *zain*.
36.	*asto*	*harz-to > *asto* (cf. Azkue, *Euskera* 1, 5).
37.	*asun*	Michelena (1977 [2011]: 115) proposes *ausun. Modern variants include (*h*)*ausin*, (*h*)*asuin*, *asun* 'nettle'.
38.	*atera*	From *ate-ra* 'to the door/entrance', *atera* 'to leave'.
39.	*atze*	'Back', Michelena (1977 [2011]) relates it to (*h*)*atz* 'trace'.
40.	*auhen*	Lakarra (2009a) proposes it to come from Rom. **anue-*, *ahũe(*n*) > comm. *auhen* > *haben* 'lament, moan'.
41.	*aurre*	'Front', Michelena (*FLV* 3) relates it to *ahur* 'palm (of the hand)'.
42.	*aurtiki*	Comm. (*j*)*aurt*(*h*)*iki*, Z *urthuki* 'to throw'. Lakarra (2006b) proposes *e-da-gor-i.
43.	*ausiki*	From *ausi* (older *adausi* 'bark') + the suffix *-ki*, 'to bite'.
44.	*auzo*	Older *hauzo* 'neighbor(hood)'.
45.	*azkon*	*azkone > *azkohẽ* > R *azkõĩ*, Z (*h*)*azkǘ*, comm. (*h*)*azko*(*i*)*n* 'badger' (Michelena, *Hom. Urquijo*). Some forms show *-r-* (cf. Z *harzkǘ*).
46.	*azkonar*	Variant of *azkon* 'badger', maybe with the addition of *har* 'male'. See *azkon*.
47.	*azkordin*	From *hatz* 'pruritus, scabies' + *gordin* 'raw', *azkordin*, *hazkurdin* 'zit, chilblains' (cf. Michelena 1977 [2011]: 43).
48.	*barau*	Older *baraur* 'fasting'. Lakarra (*Suppl. ASJU* 44) reconstructs it as (*a*)*bari* 'dinner + *aurre* 'before'.
49.	*barruki*	From *barru* 'inside' + the suffix *-ki*, *barruki* 'stable, barn'.
50.	*bart*	Older *barda* 'last night'. According to Lakarra (*Suppl. ASJU* 44) from *gau-haur-da 'is this night'.
51.	*bat*	From *bade 'one' (cf. Michelena 1977 [2011]), cf. *bederatzi* 'nine'

and *bedera* 'each one, self'.

52.	*bazkari*	**baraz-hari* > *barazkari* > comm. *bazkari* 'lunch' (Lakarra *Suppl. ASJU* 51)
53.	*bederatzi*	Lakarra (*Veleia* 27, 228) proposes *bada 'one' + *eradontzi 'to take away' > *bederadontzi > *bederatzi* 'nine'. See *bat*.
54.	*begi*	Lakarra (2014) derives it from **bi-* 'upper' + *hegi* 'edge, border', *begi* 'eye'.
55.	*behi*	According to Holmer, related to *behe* 'down'.
56.	*belarri*	From *berarri 'ear' (Michelena 1977 [2011]).
57.	*belaun*	According to Lakarra (p.c.), from the loaned *berna* 'leg' + *-bun* (cf. *gune* 'place' and *bun-ño > *muño* 'hill') > *belaun* 'knee'.
58.	*beldur*	Older *bildur* 'fear', attested as *Don Bildur* 'Mister Fear' in Berceo.
59.	*beltz*	Michelena (1977 [2011]) relates it to Aq. *Belex* and reconstructs *beletz 'black'. Lakarra (1995) proposes *bel-z instead.
60.	*berau*	From **ber-* 'same' (cf. *bertze* 'other', *berezi* 'special') + *haur* 'this', *berau(r)* 'the (very) same'.
61.	*berezi*	From **ber-* + *ez* 'no' + the suffix *-i*, *bere(i)zi* 'special, to separate'.
62.	*beste*	Older *bertze* (cf. Lafon, *BAP* 6, 306). Lakarra (p.c.) proposes *ber-* 'same' + *eze* 'no' + the nominalizer *-te*, *bertze*, *beste* 'other'. Another proposal (ibid.) is to derive it from *berri* 'new'.
63.	*betzain*	**bet-* (comb. form of *behi* 'cow') + *zani 'guardian' > *betzañi > **betzã̃* > comm. *betzain* 'cowboy'. See *artzain*, *zain*.
64.	*bide*	Lakarra (2014) proposes to derive it from *bi-* 'upper' + the nominalizer *-de*, *bide* 'way'.
65.	*bigã́*	According to Michelena (1977 [2011]), from Lat. *bimus+-ana*, influenced by *bi*, *biga* 'two', *bigana > *bigañá > *bigã́* '2-year-old heifer', cf. the comb. form *bigan-* in *bigantxa* '10-month heifer'.
66.	*bihar*	Lakarra (2014) proposes to derive it from *bi-* 'upper' + *har, *bihar* 'tomorrow'.
67.	*biharamun*	From *bihar-egun 'the day after (lit. 'tomorrow-day')' (cf. Michelena 1977 [2011]).
68.	*bihur*	Lakarra (2014) proposes to derive it from *bi-* 'upper' + *hor, *bihur* 'crooked'.
69.	*bilgor*	'Tallow, lard', related to *gilbor* 'tallow, paunch' (cf. Michelena & Sarasola).
70.	*bost*	According to Lakarra (2011b), *bor-z + *-te* (cf. *beste*) > *bortz*, *bost* 'five'.
71.	*burdina*	From *burdina or *burnina, with assimilation or dissimilation, comm. *burdina*, G *burnia*, Z *bürdüña*, Arch. B *burdĩã* (cf. Michelena 1977 [2011]).

72.	*buztan*	According to Lakarra (*Suppl. ASJU* 44), **p/butz* 'air, ventosity' + *gain* 'up', *buzta(i)n* 'tail'.
73.	*ebatsi*	According to Lakarra (2006b), from **e-ban-tsi* 'to steal'.
74.	*ediren*	Probably older *eriden* 'to find', cf. also *ediro, erido*. According to Lakarra (p.c.), from **e-ra-din*.
75.	*eguzki*	Related to *ekhi* 'sun'. According to Lakarra (p.c.), from **egun* 'day' + (*-z*) + *-gi*, *eguzki* 'sun'.
76.	*ehiza*	**eniz-* or **iniz-* > comm. *e(h)iza*, Z *ihize*, R *iĩze* 'hunt' (Michelena, *BAP* 6, 449).
77.	*eho*	'To grind, to mill', may be related to *erho* 'to kill' (**e-ra-ho* > **erhao* > *erho*. Lakarra reconstructs it as **e-non*.
78.	*ehun*	From **enun* 'hundred' (cf. Michelena 1964 [2011c]).
79.	*eihar*	*eihar* 'dry, arid' is probably the oldest variant, cf. *ihar, aihar, igar, iger*, etc.
80.	*ekharri*	Can be divided as **e-khar-i* 'to bring'.
81.	*elai*	From (**ernala* >) **erlana* > **erlah̃a* > **erlãã* > **erlae* > *erlai* > *elai* 'swallow' (cf. Egurtzegi & Ariztimuño 2014). See *enara*.
82.	*elhe*	'Discourse, word', Lakarra (2014) derives it from Gsc. *helè* 'pain, affliction', cf. *helecàt* 'indiscreet'.
83.	*elkar*	From *hark* 'he (erg.)' + *har* 'he (abs.)'. The variants *alkar, arkal, elkar, erkal* point either to a dissimilation or a metathesis.
84.	*emakume*	From *eme* 'female' + (*k*)*ume* 'offspring' (Michelena, *Emerita* 18, 468f.).
85.	*enara*	From (**erlana* >) **ernala* > **ernara* > *ernara* > *enara* 'swallow' (cf. Egurtzegi & Ariztimuño 2014). See *elai*.
86.	*entzun*	According to Michelena (1977 [2011]), it may come from **enezun*, with intervocalic *-n-*. However, there is no attested form with /h/.
87.	*erakharri*	Causative of *ek(h)arri* 'to bring', *erak(h)arri* 'to attract'.
88.	*erakhutsi*	Causative of *ikusi* 'to see', *erakutsi* 'to show'.
89.	*eraman*	Causative of *joan* 'to go', *eraman* 'to carry', from **eraoan* (apud Michelena). According to Lakarra (p.c.) from older **e-da-ra-non*.
90.	*erhi*	'Finger', according to Lakarra (2014), from **her-i*, cf. *hertsi* 'to close'.
91.	*eritzi*	'To think', according to Lakarra (p.c.), maybe from **e-ra-dun-tz-i*.
92.	*erran*	According to Trask (1997), causative of *esan* 'to say', from < **esran*, see Lakarra (2006), cf. *erasan* 'to say'.
93.	*errepide*	From the comb. form of *errege* 'king' *erret-* and bide 'path, way', *errepide* 'highway'.
94.	*esku*	According to Lakarra (p.c.), from **hertz-gu* 'hand'.

95.	*eskuin*	Based on *esku* 'hand', **eskune* > comm. *eskui(n)*, R *eskõĩ* 'right hand' (cf. Michelena 1977 [2011]). According to Lakarra, from **hertz-gu-one*. See *esku*.
96.	*esne*	From older **ezene* 'milk' (cf. Michelena 1977 [2011]). According to Lakarra (p.c.), from *behi* 'cow' + *seni* 'son' + *edabe* 'drink', *esene* > *esne*.
97.	*eten*	From **eden* 'to break, tear'. The *-d-* was devoiced in constructions such as *eteten* 'breaking', cf. Lakarra, *Suppl. ASJU* 51.
98.	*etorri*	Can be split as **e-thor-i* 'to come'.
99.	*etxe*	Older *etse* 'house'. Lakarra (*Suppl. ASJU* 44) proposes < **hertse* < **hertz-te*.
100.	*euskara*	From *enautsi* + *-kara* (Irigoyen, *Euskera* 22) > *(h)euskara*, *euskera*, *eskuara*, *eskuera*, *üska*, etc. 'Basque (language)' (cf. the comb. form *euskal* 'Basque (adj.)').
101.	*ez*	From older **eze* (Michelena 1977 [2011]).
102.	*gabe*	Cf. older *baga* 'without'. Michelena (1977 [2011]: 209) identifies a suffix *-ga* in *baga*.
103.	*gaixo*	Sound-symbolic nature (Michelena 1977 [2011]: 160).
104.	*gar(h)aitu*	'To win', from *gar(h)ai* 'high, upper side' + the verbal suffix *-tu*.
105.	*gatz*	From older **gaz* 'salt', cf. *gazi* 'salty'.
106.	*gau*	According to Lakarra (p.c.), from Lat. *cadĕre* 'to fall'.
107.	*gazta*	**gaztana* > **gaztañ̃a* > **gaztã̃ã* > Arch. B *gaztaẽ*, Z *gasná*, R *gã́zta*, comm. *gazta* 'cheese' (cf. Michelena 1977 [2011]).
108.	*gibel*	Lakarra (1995) divides it in **gi-* '(partitive)' + **bel* 'black', *gibel* 'liver', cf. *gizen* 'fat', *gihar* 'muscle'.
109.	*gihau(r)*	Older *guhaur* 'we ourselves'. From *gu* 'we' + *haur* 'this', cf. Z *gih̃au*, with analogical spread of /h̃/. See *nihaur*.
110.	*gizon*	Lakarra (2011b) divides it in **gi-* '(partitive)' + **zon* 'matter', *gizon* 'man'. Cf. the irregular comb. form *giza-*. See *gibel*.
111.	*gogor*	Reduplication of **gor* > *gor-gor* > **go-gor* > *gogor* 'hard', cf. Mod. Bsq. *gor* 'deaf' (Michelena, *Apellidos Vascos* [1973]).
112.	*gozo*	'Sweet, tasty', unclear origin. Van Eys tries to derive it from Sp. *gozo* 'joy, pleasure' and Larrasquet from Brn. Gsc. *gost* 'taste' (cf. Agud & Tovar).
113.	*gutxi*	Older *guti* 'few'. After expressive palatalization, *gutti*, comm. *gutxi*.
114.	*guzti*	According to Lakarra (p.c.), from **e-guz-ti* > comm. *guzti*, *guzi* 'all'.
115.	*habuin*	**babune* > **abune* > **abuh̃e* > **habũĩ* > *habuin*, Z *gahün* 'foam' (cf. Michelena 1977 [2011]).

116.	*hain*	From *haren* > *hain* 'that (much)'(Michelena).
117.	*haitz*	**anitz* > **ah̃itz* > *haitz* 'rock' (cf. Michelena 1950 [2011a]).
118.	*hamar*	According to Lakarra (*Veleia* 27, 208), from **han* 'big' and **bor* 'round'. See *handi*.
119.	*han*	From *har* 'he' + *-n* '(locative)', *han* 'there', cf. the more modern form *har-tan*.
120.	*handi*	'Big', can be divided as **han* + the suffix *-di*.
121.	*hantura*	From *hand(i)* 'big' + the Rom. suffix *-tura*, *hantura* 'swelling, bump'.
122.	*har*	Comm. Bsq. *anar* > comm. (*h*)*ar*, R *ãr* 'worm' (cf. Michelena 1950 [2011a]). Lakarra (p.c.) proposes a reduplication **na-nar* (cf. *nar* 'sled').
123.	*haragi*	According to Lakarra (p.c.), from **e-ra-non-gi* > *haragi* 'meat'. However, nasalization is not attested.
124.	*harri*	'Stone', Michelena (1977 [2011]) relates it to a substrate form **karr-*.
125.	*hartu*	Older **har-i* 'to take', cf. *haritu*, attested in Etxepare.
126.	*hartz*	From **har-z* 'bear' (Lakarra).
127.	*hasi*	Can be split as **has-i* 'begin'.
128.	*hatz*	From **haz*, modern *hatz* 'pruritus, scabies'.
129.	*hau*	Older *haur* 'this'. R *kau*(*r*) is an innovation (cf. Lakarra 2011 [2014]).
130.	*haur*	'Baby', according to Lakarra (p.c.), from **han* 'animal' + **bur* 'little'.
131.	*hebain*	From **ebane* > **ebañe* > **hebãĩ* > *hebain* 'disabled'.
132.	*herrauts*	From older *erhauts* 'dust', compound based on *hauts* 'dust'.
133.	*hertsi*	'To close', can be related to *hesi* 'fence'. Lakarra (p.c.) derives it from **her-z* + *-te* with the addition of a verbal suffix *-i*.
134.	*hesi*	'Fence', related to *hertsi* 'to close'.
135.	*hezur*	**enazur* > **heazur* > comm. *hezur*, B *azur*, R *ẽzur* 'bone' (cf. Michelena 1950 [2011a]). Lakarra (p.c.) proposed **berna-zur* (lit. 'leg-wood').
136.	*hibai*	According to Lakarra (2009a), from **(h)u(r)-ban-i*. Arch. Bsq. *ubahi*, *ibahi* and comm. (*h*)*ibai* 'river' show /h/, but there is no evidence of nasalization in any variant. What is more, the name *Anuncibay* (Mod. Bsq. *ahuntz-hibai* 'goat river', fossilized in Sp.) shows the intervocalic *-n-* only in the first member of the compound. While *-h-* is lost in Sp., *-n-* is expected to be regularly maintained.

137.	*higuin*	*(*h*)*iguni* > *iguh̃i* > *higũĩ* > Z *hügǘ*, comm. *higuin* 'stink' (cf. Michelena 1977 [2011]).
138.	*hiru*	From older *hirur* 'three'. Lakarra (*Veleia* 27) proposes *her-bur* (cf. *heren* 'third').
139.	*hodei*	From *hodoe* (cf. Michelena 1977 [2011]: 323), comm. *hodei*, B, L, LN *hedoi* 'cloud'. Lakarra reconstructs *e-don-i/e*.
140.	*hona*	'Here (all.)', *hon-* is the allomorph of *haur* used in oblique cases.
141.	*hondar*	From *hondo* 'bottom, depth' + the suffix *-dar*, and this from Rom. *fondo* (cf. Medieval Gsc. *fonds* with <f> → /h/).
142.	*hori*	'Yellow', Lakarra (2011b) relates it to *hor* 'dog'.
143.	*hur*	From *unur* > *uh̃ur* > *ũũr* > comm. (*h*)*ur*, R *ũr*, Z *hür* 'hazelnut'
144.	*hur*	*hur* /huɾ/ 'water'.
145.	*hura*	'That', from *haur* 'this' + *ha* 'that', *hura* 'that' (Lakarra p.c.).
146.	*huri, hiri*	Lakarra (*Veleia* 27, 225) relates the word for 'city' to the root *her* 'to close, enclosure'.
147.	*ihardetsi*	From *e-nar-* + *etsi* 'to deem', *i*(*n*)(*h*)*ardetsi* 'to respond' (cf. Michelena 1977 [2011a], 295f).
148.	*ihardun*	From *e-nar-* + *dun* 'to have', cf. *edun* 'to have', *i*(*n*)(*h*)*ardun* 'to be doing something' (cf. Michelena 1977 [2011a], 295f).
149.	*iharrosi*	Older *iharrausi* 'to shake'. From *e-nar-* + *hau*(*t*)*si* 'to deem', *i*(*n*)(*h*)*arrausi* (cf. Michelena 1977 [2011a], 295f).
150.	*iakoitz*	Older *ebiakoitz* 'Saturday', from *egu-bakoitz* (Michelena 1977 [2011]: 99).
151.	*igaran*	The variant *iragan* 'to pass, go by' is older, provided it is a causative.
152.	*iguriki*	From *egun* 'day' + *eduki* 'to have', *eguruki*, comm. *iguriki* 'to hope, to wait' (cf. Michelena 1977 [2011]: 368).
153.	*ihau*(*r*)	From *hi* 'you' + *haur* 'this', *ihaur* 'you yourself', Z *ih̃au*, with analogical spread of /h̃/. See *nihaur*.
154.	*ihes*	*enes* > comm. *ihes*, Z *ih̃es*, B *iñes* (cf. Michelena, *Hom. Urquijo*).
155.	*ihi*	From *ini* > comm. *i*(*h*)*i*, Z *ih̃i* 'rush, reed' (Meyer-Lübke apud *Etim*.).
156.	*ihitz*	*ini*(*n*)*tz* > comm. *i*(*h*)*i*(*n*)*tz*, Z *ih̃itz* 'dew, frost' (Uhlenbeck 1903).
157.	*ikara*	'Fear', Lakarra reconstructs *hegi-ara*.
158.	*ikhusi*	Can be split as *e-khus-i* 'to see'.
159.	*ikuzi*	Can be split as *e-kuz-i* 'to clean'.
160.	*ilargi*	From the comb. form of *hile* 'month' *hila-* (cf. *hilabete* 'full month') and *argi* 'light', *il*(*h*)*argi* 'moon' (cf. Michelena 1977 [2011]).

161.	*ilun*	Bonaparte (cf. Michelena, *Etim*., 80) suggests it to be derived from *hil* 'month', older 'moon', comm. *il(h)un*, Z *ülhün* 'dark'.
162.	*inoiz*	From **e-noiz > *iñoiz* > comm. *iñoiz*, Z *ih̃uiz* 'never'. See *inor*.
163.	*inola*	From **e-nola > *iñola* > comm. *iñola*, Z *ih̃ula* 'in no way'. See *inor*.
164.	*inon*	From **e-non > *iñon* > comm. *iñon*, Z *ih̃un* 'nowhere'. See *inor*.
165.	*inor*	From **e-nor > *iñor* > comm. *iñor*, Z *ih̃ur*, L *nehor*, R *ẽũr* 'nobody' (cf. Michelena, *BAP* 11, 288).
166.	*iñauteri*	From a nominalized verb **inau-te* + the suffix *-iri*, *iñauteri*, *i(n)hauteri* 'carnival' (Michelena 1977 [2011]: 424).
167.	*iñurri*	According to Lakarra (p.c.), from **e-da-ra-dur-i > iñurri* 'ant'.
168.	*irakurri*	An old causative, 'to read', older meaning 'to de-kernel, choose' (cf. Michelena, *Zephyrus* 21-22, 281ff.).
169.	*irauli*	According to Lakarra (p.c.), from **e-ra-dul-i > irauli* 'to spin, turn over/around'.
170.	*iraun*	'To last', according to Schuchardt (cf. Agud & Tovar), from **eragon*, causative of *egon* 'to be, stay'.
171.	*irentsi*	According to Michelena (1977 [2011]), probably a causative**i-ra/e-no/uts-i* > comm. *ire(n)tsi* 'to swallow'.
172.	*irudi*	Maybe a fossilized causative, cf. the metathesized variant *iduri* 'picture'.
173.	*isuri*	Older *esuro* 'to flow, pour', attested in *Refranes y Sentencias*.
174.	*itsu*	Comm. *itsu* 'blind', according to Michelena (1977 [2011]: 108), R *utsi* comes from **utsu*.
175.	*iturri*	'Fountain, source', Lakarra (p.c.) derives it, not without problems, from *edun* 'to have' + *hur* 'water'.
176.	*itzuli*	'To go back', Lakarra (p.c.) derives it from *atze* 'back' + **dul-i*.
177.	*janhari*	From *jan* 'to eat' + *hari*, 'lunch'. See *bazkari*, *afari*.
178.	*jantzi*	Older *jauntsi* 'to dress'. Lakarra (2006b) derives it from **e-da-don-z-te-i*.
179.	*jarraitu*	Older *jarrain* 'to continue'. Lakarra (p.c.) derives it from **e-da-ra-din*.
180.	*jaun*	'Sir', Lakarra (2011b) relates it to *jabe* 'owner' and proposes **e-da-dun*.
181.	*jauzi*	'To jump', according to Lakarra (2011b), from **e-da-dutz-i*.
182.	*joan*	'To go', according to Lakarra (2011b), from **e-da-non*, cf. the old forms *johan* and *doha* 'he goes'.
183.	*khino*	From **keno > R kĩo*, Z *khiño* 'stink' (cf. Michelena 1977 [2011]).
184.	*kosk* (*egin*)	Onomatopoetic, 'bite, to bite'.

185.	*kuluxka*	Sound-symbolic, 'nap'.
186.	*kunde*	'Kind, species', it may be related to the nominalizer *-kunde*.
187.	*kurrinka*	Sound-symbolic, 'growl, grunt'.
188.	*lagun*	'Friend', older 'companion'.
189.	*lau*	Older *laur* 'four'. According to Lakarra (*Veleia* 27) from *labur* 'short'.
190.	*lehen*	From a superlative *lenen (Michelena 1959 [2011a]).
191.	*lehengusu*	From *lehen* 'first' + *-gusu*, from Rom. *cosinu* 'cousin'.
192.	*lodi*	According to Lakarra (p.c.), from *loh*(*i*)- 'body' + the suffix *-di* (*handi* 'big'), *lodi* 'fat'.
193.	*lohakartu*	From *loak hartu* 'get asleep' (lit. 'sleep-take').
194.	*lohi*	According to Lakarra (p.c.), from *don-i > *lohi* 'body, dirt'. Michelena links it to the suffix *-doi*.
195.	*ludardara*	From *lur* 'ground' + *dardara* 'trembling', 'earthquake'.
196.	*lugorri*	From *lur* 'ground' + *gorri* 'red', 'red soil (uncultivated)'.
197.	*luhartz*	From *lur* 'ground' + *hartz* 'bear', 'European mole cricket'.
198.	*luhesi*	From *lur* 'ground' + *hesi* 'fence', 'soil wall'.
199.	*lühidor*	From *lur* 'ground' + *idor* 'dry', 'land (*terra firma*)'.
200.	*luhikara*	From *lur* 'ground' + *ikara* 'fear', 'earthquake'.
201.	*lur*	According to Lakarra (2006b), from *dur 'ground'.
202.	*mahai*	From *bana(*n*)*i* > **mah̃a*(*h̃*)*i* > comm. *ma*(*h*)*ai*(*n*) 'table'.
203.	*mahats*	From *banats > *mah̃ats* 'grape'.
204.	*mehe*	From *bene > Z *meh̃e*, comm. *mehe* 'thin' (cf. Michelena 1977 [2011]).
205.	*mendi*	According to Michelena (1964 [2011c]), it may come from *men-ti 'mountain' (cf. Lat. *mons*).
206.	*mihi*	From *bini > *mini > Z *mih̃i* > comm. *mihi*, B *mi*(*i*)*n*, *miñ* 'tongue' (cf. Michelena 1977 [2011]).
207.	*motz*	Meyer-Lübke proposes a Rom. origin (cf. Sp. *mocho* 'which lacks a sharp end'), cf. Michelena (*Emerita* 18, 195). However, the Sp. word is of unknown origin (Blevins, p.c.) and Bsq. has the verb *moztu* 'to cut' besides *motz* 'short'.
208.	*musker*	'Lizard', Lakarra (p.c.) identifies the root *ger 'bad, crooked'.
209.	*nagusi*	According to Lakarra (2011b: 110), from *da-dun-tz-i 'boss, owner'.
210.	*nahi*	Lakarra (p.c.) reconstructs *nan-i 'to want' and relates it to *ahantzi* 'to forget (*na-nan-tz-i).

211.	*larru*	Cf. B *narru* 'skin, leather'. Lakarra (*Suppl. ASJU* 44) reconstructs **dar-u*.
212.	*lasai*	Cf. L, LN, Z *nasai* 'calm'.
213.	*negu*	'Winter', Schuchardt derives it from Brn. *neu* 'snow'.
214.	*neska*	'Young girl', Rohlfs (1977) relates it to Gsc. *anesco* 'sheep with one year'. De Bernardo (unpublished) proposes a Cel. origin.
215.	*ni*	1st pers. sg. pronoun, cf. the 2nd pers. sg. *hi*.
216.	*nihau*(*r*)	From *ni* 'me' + *haur* 'this', 'me myself'. *h is nasalized through the morpheme boundary and spreads by analogical change to the rest of the paradigm (§4.4.3).
217.	*odol*	According to Lakarra (1995), reduplicated form of *dol > *dol-dol > *do-dol > *odol* 'blood'.
218.	*ogi*	From *hor* 'dog' + *-gi* 'matter' 'bread' (cf. Lakarra 2014).
219.	*ohalano*	Compound of *hor* 'dog' + *alano* (from Sp. *alano*), *ohalano* 'Spanish bulldog, mastiff' (cf. Lakarra 2014).
220.	*ohara*	Derived from *hor* 'dog', *ohara* 'female dog in heat' (cf. Lakarra 2014).
221.	*ohildu*	Derived from *hor* 'dog', *ohildu* 'howl, shoo'.
222.	*ohitura*	From *ohi* 'to use to' + the Rom. suffix *-tura*, *ohitura* 'usage'.
223.	*ohoin*	From *onoi > Old Z *oh̃oin* > comm. *ohoin*, Z *uhuiñ* 'thief' (cf. Michelena 1977 [2011]). Lakarra (p.c.) proposes a reduplicated *no-non-i.
224.	*ohol*	From *onol > Z *oh̃ol* > comm. *ohol*, R *õl* 'board' (cf. Michelena 1977 [2011]). Lakarra (2011b) proposes a reduplicated *no-nol.
225.	*oihan*	Lakarra (2009a) proposes the semivowel to be non-etymological, thus *ohan 'forest'.
226.	*oin*	Potentially from *one > **oh̃e* > comm. (*h*)*oin*, Arch. B *õĩ*, Z *hu*(*i*)*ñ* 'foot'. However, the comb. form shows an unexpected /r/, cf. *ortutsik* 'barefoot'.
227.	*on*	From older *hon* 'good'. It may be related to Aq. *bon*(*n*). Lat. *bonus* 'good' has been proposed as a source since Schuchardt.
228.	*onheritzi*	*hon* 'good' + *eritzi* 'to deem', *onheritzi* 'to love, approval' (cf. Lakarra 2009a).
229.	*onherran*	*hon* 'good' + *erran* 'to say, benediction', *onherran* 'to laud' (cf. Lakarra 2009a).
230.	*onsa*	*Onsa*, *untsa* 'well'. Derived from *hon* 'good'. See *on*.
231.	*orga*	From *organa > **orgah̃a* > *orgã́ã* > comm. *orga*, Z *orgã́* 'cart' (Michelena 1977 [2011]). Gavel relates this form to the pl. of Lat. *organum*.

232.	*orhe*	Lakarra (2014) proposes a Gascon origin.
233.	*orhoitu*	Michelena (1977 [2011]) proposes a Rom. origin from Old Gsc. *coreit* (cf. Lat. *collectum*), *or(h)oitu* 'to remember'. Lakarra (2014) proposes Gsc. *horehèyt* to account for the /h/.
234.	*orrazi*	'Comb', according to Lakarra (p.c.), from *hor-haz-i*, cf. *orratz* 'needle' (< *hor-haz*).
235.	*orro*	Cf. Z *orrũ̃a* 'roar, bellow' with a nasalized vowel.
236.	*ozar*	Derived from *hor* 'dog' + -(*t*)*zar* 'augmenter', *ozar* 'big dog' (cf. Lakarra 2014).
237.	*sagarroi*	Cf. R *sagarrõĩ* 'hedgehog'.
238.	*saguzar*	From *sagu* 'mouse' + *zahar* 'old', *saguzar* 'bat' (lit. 'old-mouse').
239.	*saroi*	Formed by *sare* + *ohe* 'bed', *saroe* 'meadow'. The nasalization in R *sarõĩ* is due to the influence of words ending in -*õĩ* < *-one* (Michelena, *BAP* 11, 261).
240.	*sehi*	From *seni* (Bähr, *Euskera* 16, 10) > Z *sehĩi*, L *sehi* 'servant', Arch. B *sẽĩ*, B *sein* 'boy'. See *sein*. *sen-* also in *sen-har*, *sen-be*. See *senar*, *seme*.
241.	*sei*	'Six', Lakarra (*Veleia* 27) relates it to *sehi* 'boy'.
242.	*seme*	From *sen-be* > Aq. *Sembe-* > *seme* 'son' (cf. Michelena 1977 [2011]). *sen-* also in *sen-i*, *sen-har*. See *sehi*, *senar*.
243.	*senar*	From *sen-har* > *sen(h)ar* 'husband' (cf. Michelena 1977 [2011]). *sen-* also in *sen-i*, *sen-be*. See *sehi*, *seme*.
244.	*sinhets*	From *zin* + *hets* > *zinhets* (in Etxepare) > comm. *sin(h)ets* 'to believe' (Michelena 1977 [2011]).
245.	*soin*	From *son-i* 'body', Potentially related to the root *sor-* in *sortu* 'create, give body' and *sorbalda* 'shoulder'.
246.	*soineko*	Derived from *soin* 'body' + -(*e*)*ko*, *soineko* 'dress'.
247.	*sugandila*	From *suga-* 'snake' + *andere/a* 'lady', comm. *sugandila*, Z *süskandera* 'lizard, gecko' (cf. Michelena, *BAP* 13, 495).
248.	*suhi*	From *suni* > comm. *suhi*, Z *sühĩi*, R *sũ*, *sĩ* 'son-in-law' (cf. Michelena 1977 [2011]).
249.	*sukalde*	Cf. Old B *sutalde*, Z *sükhalte* 'kitchen, brazier' (Michelena 1977 [2011]: 204).
250.	*toki*	According to Lakarra (2006b), from *don* (cf. *don-i* 'body') + -*gi* 'matter', *toki* 'place'.
251.	*txerri*	Older *zerri* 'pig'. Lakarra (p.c.) divides *zer-i*.
252.	*txerriki*	Derived from *txerri* 'pig' + the suffix -*ki*, 'pork'.
253.	*txerrizain*	Late compound of *txerri* 'pig' + *zani* 'guardian', 'swineherd'. It does not lose final -*i*. See *artzain*, *zain*.

254.	*txiki*	Sound-symbolic word, *txiki*, *ttipi* 'little'.
255.	*ubarroi*	Compound of *hur* 'water' + *barroi*, 'cormorant'.
256.	*ubi*	Compound of *hur* 'water + *bide* 'path', 'ford' (cf. Michelena 1977 [2011]).
257.	*uda*	'Summer', according to Lakarra (p.c.), from *e-da-don.
258.	*uhain*	Derived from *hur* 'water', *uhain* 'otter' (cf. Lakarra 2014).
259.	*uhaitz*	Compound of *hur* 'water' + *haitz* 'rock', 'river' (cf. Lakarra 2014).
260.	*uhalde*	Compound of *hur* 'water' + *alde* 'place, side', 'shore' (cf. Lakarra 2014).
261.	*uharte*	Compound of *hur* 'water' + *arte* 'between', 'island' (cf. Lakarra 2014).
262.	*uholde*	Compound of *hur* 'water' + *olde* 'instinct, vigour', 'flood' (cf. Lakarra 2014).
263.	*ukatu*	'To negate, reject', from *ukho* 'refusal' + the verbal suffix *-tu*.
264.	*ukhan*	From *edukan 'to have', cf. *eduki* 'to have'.
265.	*ukitu*	Maybe from older *hunkitu* 'to touch'.
266.	*ume*	Aq. *Ombe-* > *Umme* (Lerga) > *ume* 'child' (cf. Michelena 1964 [2011b]). Unlike the oldest attestations, Z *hüme* shows initial *h-*.
267.	*unai*	Cf. *unhain*, *ulhain* 'cow-boy', according to Lakarra (p.c.), from *e-da-don-i.
268.	*urde*	'Pig', cf. the comb. form *urdan-* in *urdandegi* 'sty'.
269.	*urdin*	From *hur* 'water + the suffix *-din* (cf. Michelena, *FLV* 2, 69ff.). However, it does not show /h-/.
270.	*ürgaiztü*	Older *urgatzi* 'to help'. Lakarra (p.c.) proposes *e-da-ra-gotz-i.
271.	*urrats*	Older *urhats* 'step'. Lakarra (p.c.) proposes *hur-hats (cf. *hurbil* 'near', *hats* 'breath').
272.	*urre*	Older *urhe* 'gold'.
273.	*urtarril*	*Urtharril* 'January', from *urta-barr(*i*)-*hil* 'year-new-month' (cf. Michelena, *BAP* 21, 100f.).
274.	*urte*	'Year', Lakarra (p.c.) derives it from *hur* 'water' + the suffix *-te*.
275.	*usain*	From *usani > *usañi > Arch. B *usãĩ* > comm. *usain* 'smell'.
276.	*usna*(*tu*)	From *susmo* 'suspicion', *susmatu*, *usmatu*, *usnatu* 'to sniff, suspect', and from there *usna* 'sense of smell, instinct' (Michelena 1977 [2011]).
277.	*uso*	The older variant is *urzo*, cf. *uso*, *ürso*, etc. (cf. Michelena 1977 [2011]).
278.	*uste*	According to Lakarra (p.c.), from *edun 'to have' + *-z-te*
279.	*ustel*(*du*)	Older *b/pustel* 'rotten'. Michelena (1977 [2011]: 412) speaks of a

probable unidentified loanword.

280.	*ustiatu*	From *ustio* 'completely, exhaustively' + the verbal suffix *-tu*, *ustiatu* 'make the most of'.
281.	*utzi*	Older *eutzi* 'to leave'. Lakarra (2006b) reconstructs **e-dutz-i* and relates it to luze 'long'.
282.	*uzki*	Lakarra (p.c.) reconstructs **b/putz* 'ventosity' + *-gi* 'matter'. See *buztan*.
283.	*Xiberŭ*	Cf. comm. *Zuberoa* '(region)'.
284.	*zabal*	'Wide, open', Lakarra (p.c.) analyzes **za-bal* (cf. *za-kur* 'dog', *za-kar* 'crust, scab').
285.	*zahar*	Attested as *Sahar* in Lerga.
286.	*zain*	From **zani* 'guard, protector' (cf. Michelena 1977 [2011]).
287.	*zakur*	Diminutive *txakur*, older *zakur* 'dog'. Lakarra (*Suppl. ASJU* 44) divides **za-gur*.
288.	*zal(h)u*	Cf., *zaul(h)i*, *zail(h)u*, *zalui* 'flexible, skillful'.
289.	*zauri*	'Wound', Lakarra (2011b) proposes it to come from Lat. *sanguĭne*(*m*) 'blood'.
290.	*zedarri*	From **zede* (modern *xede* 'limit') + *harri* 'stone', *zedarri* 'boundary marker, milestone' (cf. Michelena & Sarasola).
291.	*zein*	From *zeren* > **zeen* > *zein*, *zoin*, *zuin* 'which one, how much' (cf. Michelena 1977 [2011]).
292.	*zemai*	According to Lakarra (*Suppl. ASJU* 44), from Rom. *menaza* > **zemana* > **zemaha* > **zemae* > *zemai* 'menace'. Hualde (p.c.) sees problems with the chronology.
293.	*zeu*	Older *zuhaur* 'you yourself'. From *zu* 'you' + *haur* 'this', cf. Z *zih̃au*, with analogical spread of /h̃/. See *nihaur*.
294.	*zezen*	According to Lakarra (2011a), reduplication of **zen* > **zen-zen* > **ze-zen* > *zezen* 'bull' (cf. the attested God name *Sesen-co*).
295.	*zi*	May come from **zini*, but no /H/ is attested, R *zii*, *zĩ* 'accorn' (cf. Michelena 1977 [2011]).
296.	*zomorro*	Probably older *mozorro* 'insect, mask', Michelena (1977 [2011]) attributes sound-symbolic value to the initial *m-*.
297.	*zubi*	According to Michelena (1977 [2011]), from *zur-* 'wood' + *-bi* (< *bide* 'way, road'), *zubi* 'bridge'.
298.	*zühain*	Derived from *zur* 'wood' + **gan-i* (Lakarra p.c.), 'tree'.
299.	*zuhaitz*	Compound of *zur* 'wood' + *gaitz* 'big' (Lakarra p.c.), 'tree'.
300.	*zuhar*	Derived from *zur* 'wood', 'pony keg'.
301.	*zuhur*	**zunur* (cf. Michelena 1950 [2011a]) > comm. *z(uh)ur*, Z *zuh̃ur* 'wise, prudent'. Lakarra identifies the suffix *-or* 'prone to'.

302.   *zutabe*   *zur* 'wood' + *habe* 'pillar' > *zutabe* 'pole, column'.

List of journals and books mentioned in Appendix II

ASJU: *Anejos del Seminario de Filología Vasca 'Julio de Urquijo'* [*International Journal of Basque Linguistics and Philology*].

Suppl. ASJU: *Supplements of ASJU*.

BAP: *Boletín de la Real Sociedad Vascongada de los Amigos del País*.

E.-J.: *Eusko Jakintza*.

Etim.: *Las etimologías en la obra de Luis Michelena*; cf. Arbelaiz (1978).

Euskera: *Euskera, Trabajos y actas de la Academia de la Lengua Vasca*.

FLV: *Fontes Linguae Vasconum*.

Hom. Urquijo: Michelena, *Homenaje a Don Julio de Urquijo* II [1949].

RIEV: *Revista Internacional de Estudios Vascos*.

ZRPh: *Zeitschrift für romanische Philologie*.

11 SOURCES AND REFERENCES

Sources

Anonymous, 1596 [1996], *Refranes y sentencias (1596). Ikerketak eta edizioa*, Bilbao: Euskaltzaindia [edited by J.A. Lakarra].

_____, ca. 1676 [1998], "Pronus singulis diebus Dominicis clarè & distinctè immediatè post Evangelium populo legendus", *International Journal of Basque Linguistics and Philology* [*ASJU*] 32, 1-46 [edited by P. Agirre Sarasola].

Axular [P. Agerre], 1643 [1976], *Gero (Después)*, Oñati: Jakin [edited by L. Villasante].

Azkue, R.M. de, 1905-1906, *Diccionario vasco-español-francés / Dictionnaire basque-espagnol-français* (2 vols.), Bilbao/Paris: Paul Geuthner [1984, Bilbo: Euskaltzaindia].

Aznar Martínez, E., 2009, *Principales topónimos euskéricos de La Rioja* [Online: http://www.errioxa.com/7_toponimia_rioja/toponima_rioja.htm].

Bakker, P., G. Bilbao, N.G.H. Deen, J.I. Hualde, 1991, *Basque pidgins in Iceland and Canada* (*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 23), Donostia-San Sebastián: Diputación Foral de Gipuzkoa.

Belapeire, A., 1696 [1997], *Athanase Belapeire: Catechima laburra (1696). Autorearen garaia, nortasuna eta idazlanak. Grafiak eta fonologia. Edizio kritikoa eta hiztegia* [edited by P. Agirre Sarasola, PhD dissertation, UPV/EHU].

Betolaza, J.P. de, 1596 [1998], "La doctrina cristiana de Betolaza (1596)" [edited by L. Michelena, reedited in H. Knörr & K. Zuazo, *Arabako euskararen lekukoak. Ikerketa eta testuak*, Eusko Legebiltzarra: Vitoria-Gasteiz, 467-501].

Bilbao, G., R. Gomez, J.A. Lakarra, J. Manterola, C. Mounole & B. Urgell, in prep., *Gabriel Echart zuberotarraren eta Miguel Ros erronkariarraren arteko gutuneria (1615-1617)*, University of the Basque Country.

Camino, I., 2013, "*Alphonsa Rodriguez Jesusen compagnhaco aitaren guiristhinho perfeccioniaren praticaren pparte bat* (1782). Edizioa eta azterketa", *International Journal of Basque Linguistics and Philology* [*ASJU*] 47(1).

Dechepare, B. [Etxepare, B.], 1545 [1980], *Linguæ Vasconum Primitiæ. Edizio kritikoa*, Bilbao: Euskaltzaindia & Mensajero [edited by P. Altuna].

Deen, N.G.H., 1937 [1991], *Glossaria Duo Vasco-Islandica*, PhD dissertation, Amsterdam [translation by G. Bilbao in *International Journal of Basque Linguistics and Philology* [*ASJU*] 25, 321-426; also in Bakker et al. 1991].

Eguiateguy, J., 1785 [1983], *Lehen liburia edo filosofo Huskaldunaren Ekheia* [edited by Tx. Peillen, Bilbao].

Etxahun [Topet, P.], 1969-1970, "L'oeuvre poètique de Pierre Topet-Etchahun. Texte, traduction, variantes, notes", *Euskera* 14-15 [edited by J. Haritschelhar].

Euskaltzaindia, 2010, *Hiztegi Batua*, Bilbao, San Sebastián: Euskaltzaindia, Elkarlanean [http://www.euskaltzaindia.net/hiztegibatua/, accessed on 27-09-2013].

Eusko Media Fundazioa, 2013, *Auñamendi Eusko Entziklopedia: Bernardo Estornés Lasa Fondoa*, [Online: http://www.euskomedia.org/aunamendi, accesed on 03-04-2013].

Gorrochategui, J., 1984, *Estudio sobre la onomástica indígena aquitana*, Bilbao: University of the Basque Country, University of Salamanca.

Iker, 2009, *Norantz Proiektua: datu basea*. Bayonne: Iker, UMR 5478 [Online at http://norantz.org].

Iribarren, J.M., 1952 [1984], *Vocabulario navarro*, Pamplona: Instituto Príncipe de Viana [2nd edition extended by R. Ollaquindia].

Landucci, N. [Landuchio, N.], 1562 [1958], *N. Landuchio, Dictionarium linguae Cantabricae (1562)* [*Publicaciones del Seminario "Julio de Urquijo"*], Donostia-San Sebastián: Diputación Foral de Guipúzcoa [edited by L. Michelena]; reissued J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011b, 199-380.

Larramendi, M., 1729, *El impossible vencido: arte de la lengua bascongada*, Salamanca: Antonio Joseph Villagordo Alcaraz [online: http://books.google.es/books/about/El_imposible_vencido.html?id=7RNKAAAAcAAJ, accessed on 21-7-2014].

Larrebat, J., 1926, *Poésies gasconnes. Nouvelle édition annotée avec deux portraits de l'auteur, une notice biographique et une étude sur le gascon de Bayonne, par H. Gavel*, París: Société des sciences, lettres, arts et d'études régionales de Bayonne [edited by H. Gavel].

Lazarraga, J.P., 1567-1605 [2013], *Lazarraga eskuizkribua. Edizioa eta azterketa* [edited by Monumenta Linguae Vasconum, online: http://www.ehu.es/monumenta/lazarraga/, accessed on 15-04-2014].

Leiçarraga, I. [Leizarraga, J.], 1571 [1900], *I. Leiçarragas baskische Bücher von 1571 (Neues Testament, Kalender und Abc)*, Strasbourg [edited by Th. Linschmann & H.E. Schuchardt].

Lespy, V. & P. Raymond, 1887 [1998], *Dictionnaire Béarnais Ancien et Moderne*, Pau: Marrimpouey.

Lhande, P., 1926-1938, *Dictionnaire basque-français (Dialectes labourdin,bas-navarrais et souletin)*, Paris: Gabriel Beauchesne.

Maiora Mendia, F., 2011, *Reino de Navarra - Euskera: Injurias, coplas, frases*, Villatuerta: Graphycems.

Michelena, L. [Mitxelena, K.], 1953 [2011a], "Contribución al conocimiento del dialecto roncalés", *Boletín de la Real Sociedad Vascongada de los Amigos del País* 9, 499-536; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 571-608.

_____, 1964 [2011b], *Textos Arcaicos Vascos*, Madrid: Minotauro; reissued J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011b, 1-179.

Michelena, L. [Mitxelena, K.] & I. Sarasola, 1987-2005, *Orotariko Euskal Hiztegia* [*General Basque Dictionary*] (16 vols.), Bilbao: Euskaltzaindia [http://www.euskaltzaindia.net/oeh/, accessed on 27-09-2013].

Oihenart, A. d', 1657 [2003], *Euskal atsotitzak eta neurtitzak* (*IKER* 15), Bilbao: Euskaltzaindia [ed. by P. Altuna & J.M. Mujika].

Oyharçabal, B. [Oihartzabal, B.], 1991, *La pastorale souletine. Édition critique de Charlemagne*, [*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 16, *Corpus Pastoralium Vasconicarum* 1], Donostia-San Sebastián: Diputación Foral de Guipúzcoa, University of the Basque Country.

_____ (ed.), 1999, *Euskal Herriko hizkuntz atlasa: ohiko euskal mintzamoldeen antologia*, Bilbao: Euskaltzaindia.

Palay, S., 1932-34 [1980], *Dictionnaire du béarnais et du gascon modernes*, Pau: Marrimpouey [3rd ed., Paris: CNRS Editions].

Santazilia, E., in prep., "703. Urdiñarbe, 705. Larraine, 706. Altzai.", in G. Aurrekoetxea (ed.), *Euskal Atlas Sozio-geolinguistikoa* (EUDIA).

Sauguis, B. de [Zalgize, B.], 1908-1909, "Los refranes vascos de Sauguis traducidos y anotados", *Revista Internacional de los Estudios Vascos* 2, 677-724; *Revista Internacional de los Estudios Vascos* 3, 144-157 [edited by J. de Urquijo].

Tartas, J. de, 1666 [1995], *Iván de Tartas. Onsa Hilceco Bidia. Edizio kritikoa Patxi Altunak paratua*, Bilbao: Universidad de Deusto [edited by P. Altuna].

_____, 1672 [1996], *Iván de Tartas. Arima penitentaren occupatione devotaq*, Bilbao: Mensajero [edited by P. Altuna].

Urkizu, P., 1989, "Garibairen eskuzkribu galdu bat (1592)", *Mundaiz* 38-39, 33-85.

Zubiaur, J.R. & J. Arzamendi, 1976, "El léxico vasco de los refranes de Garibay", *International Journal of Basque Linguistics and Philology* [*ASJU*] 10, 47-144.

References

Agirre Sarasola, P., 2001, "Catechima laburra, zubereraren ezaugarri fonologikoen lekukoa", *International Journal of Basque Linguistics and Philology* [*ASJU*] 35, 653-787.

Agud, M. & A. Tovar, 1988-1995, *Materiales para un diccionario etimológico de la lengua vasca (A-Orloi), Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*], Donostia-San Sebastián: 7 vols.

Anderson, S.R., 1970, "On Grassmann's Law in Sanskrit", *Linguistic Inquiry* 1, 387-396.

_____, 1976, "Nasal consonants and the internal structure of segments", *Language* 52, 326-344.

Anglade, J., 1921, *Grammaire de l'Ancien Provençal ou Ancienne Langue d'Oc*, Paris: Klincksieck.

Antilla, R., 1989, *Historical and Comparative Linguistics*, Amsterdam: John Benjamins.

Arbelaiz, J.J., 1978, *Las etimologías vascas en la obra de Luis Michelena*, Tolosa: Kardaberaz.

Ariztimuño, B., 2011, *Antzinateko euskal idazkunak eta aitzineuskararen berreraiketa: corpusa, analisia eta ondorioak*, Master thesis, University of the Basque Country.

Ariztimuño, B. & A. Egurtzegi, 2011, "Enarak, elaiak eta testuinguruaren garrantzia", *International Journal of Basque Linguistics and Philology* [*ASJU*] 45, 403-410.

Artiagoitia, X., 1990, "Sobre la estructura de la sílaba en (proto)vasco y algunos fenómenos conexos", *International Journal of Basque Linguistics and Philology* [*ASJU*] 24, 327-349.

_____, 1993, "Syllable Structure in Basque and Proto-Basque", in J.I. Hualde & J. Ortiz de Urbina (eds.), 263-287.

Atutxa, U. & Zuloaga, E., 2014, "La neutralización de las sibilantes en vasco: una perspectiva diacrónica", F. Jiménez Berrio, A. Jimeno Zuazu, A. de Lucas Vicente y N. Celayeta Gil (eds.), *Variación geográfica y social en el panorama lingüístico español*, Pamplona: Universidad de Navarra, 21-32.

Baer, Th., Th. Gay & S. Niimi, 1976, "Control of fundamental frequency, intensity, and register of phonation", *Haskins Laboratories Status Report on Speech Research* 45/46, 175-185.

Bailey, C.-J.N., 1970, "Toward specifying constraints on phonological metathesis", *Linguistic Inquiry* 1, 347-349.

Bailey, G., 1997, "When did Southern American English begin?", in E. Schneider (ed.), *Englishes Around the World 1: Studies in Honour of Manfred Görlach*, Amsterdam: John Benjamins, 255-275.

Baranowski, M., 2008, "The fronting of the back upgliding vowels in Charleston, South Carolina", *Language Variation and Change* 20, 527-551.

Barnes, J., 2006, *Strength and Weakness at the Interface: Positional Neutralization in Phonetics and Phonology*, Berlin: Mouton de Gruyter.

Bec, P., 1968, *Les Interférences linguistiques entre gascon et languedocien dans les parlers du Comminges et du Couserans: Essai d'aréologie systématique*, Paris: PUF.

Beckman, M.E., 1986, *Stress and non-stress accent* (*Netherlands Phonetics Archives* 7), Dordrecht: Foris Publications.

Beddor, P.S., 1982, *Phonological and phonetic effects of nasalization on vowel height*, PhD dissertation, University of Minnesota, reproduced by Indiana University Linguistics Club.

_____, 2009, "A Coarticulatory Path to Sound Change", *Language* 85, 785-821.

Beddor, P.S., J.D. Harnsberger & S. Lindemann, 2002, "Language-Specific Patterns of Vowel-to-Vowel Coarticulation: Acoustic Structures and their Perceptual Correlates", *Journal of Phonetics* 30, 591-627.

Beddor, P.S., R.A. Krakow & L.M. Goldstein, 1986, "Perceptual constraints and phonological change", *Phonology* 3, 197-217.

Bell, A., D. Jurafsky, E. Fosler-Lussier, C. Girand, M. Gregory & D. Gildea, 2003, "Effects of disfluencies, predictability, and utterance position on word form variation in English conversation", *Journal of the Acoustical Society of America* 113, 1001-1024.

Benveniste, E., 1935, *Origines de la formation des noms indo-européens*, Paris: Maisonneuve.

Bhat, D.N.S., 1975, "Two Studies on Nasalization", in C.A. Ferguson, L.M. Hyman & J.J. Ohala (eds.), *Nasálfest: Papers from a Symposium on Nasals and Nasalization*,

Standford: Standford University Press, 27-48.

Blevins, J., 2004, *Evolutionary phonology: the emergence of sound patterns*, Cambridge: Cambridge University Press.

_____, 2005, "The role of phonological predictability in sound change: Privileged reduction in Oceanic reduplicated substrings", *Oceanic Linguistics* 44, 455-464.

_____, 2006, "A theoretical synopsis of Evolutionary Phonology", *Theoretical Linguistics* 32, 117-165.

_____, 2008, "Consonant Epenthesis: Natural and Unnatural Histories", in J. Good (ed.), *Linguistic Universals and Language Change*, Oxford: Oxford University Press, 79-197.

_____, 2009, "Structure-preserving sound change: A look at unstressed vowel syncope in Austronesian", in A.A. Adelaar & A. Pawley (eds.), *Austronesian historical linguistics and culture history: a festschrift for Robert Blust*, Camberra: Pacific Linguistics, 33-49.

_____, 2012, "Duality of patterning: Absolute universal or statistical tendency?", *Language and Cognition* 4, 275-296.

_____, 2014, "Evolutionary Phonology: a holistic approach to sound change typology", in P. Honeybone & J. Salmons (eds.).

_____, to appear, "Areal Sound Patterns: From Perceptual Magnets to Stone Soup", in R. Hickey (ed.), *The Cambridge Handbook of Areal Linguistics*, Cambridge: Cambridge University Press.

Blevins, J. & A. Garrett, 1993, "The evolution of Ponapeic Nasal Substitution", *Oceanic Linguistics* 32, 199-236.

Blevins, J. & A. Garrett, 1998, "The origins of consonant-vowel metathesis", *Language* 74, 508-556.

_____ & _____, 2004, "The evolution of metathesis", in B. Hayes, R. Kirchner & D. Steriade (eds.), *Phonetically based phonology*, Cambridge: Cambridge University Press, 117-156.

Blevins, J. & A. Wedel, 2009, "Inhibited sound change: An evolutionary approach to lexical competition", *Diachronica* 26, 143-183.

Bloch, J., 1915, *La formation de la langue marathe* [*Bibliothèque de l'Ecole des hautes études, sciences historiques et philologiques*, 215], Paris: E. Champion.

Bloomfield, L., 1946, "Algonquian", In H. Hoijer, C. Osgood (eds), *Linguistic Structures of Native America* [*Viking Fund Publications in Anthropology* 6], New York, 85-129.

Bonaparte, L.-L., 1962, *Langue basque et langues finnoises*, London.

_____, 1869 [1991], *Le verbe basque en tableaux*, London: Strangeways and Walden [reissued in Bonaparte (1991), vol. 1: 175-442].

_____, 1991, *Opera omnia vasconice* (4 vol.), Bilbao: Euskaltzaindia.

Boomer, D.S. & Laver, J.D.M., 1968, "Slips of the tongue", *International Journal of Language & Communication Disorders* 3, 2-12.

Bourciez, É., 1967, *Phonétique française: Étude historique*, Paris: Klincksieck.

Bradlow, A., 1995, "A comparative acoustic study of English and Spanish vowels", *Journal of the Acoustical Society of America* 97, 1916-1924.

Brugmann, K., 1904 [1970], *Kurze vergleichende Grammatik der indogermanischen Sprachen*, Strassburg: Trübner [Berlin: Walter de Gruyter].

Buckley, E., 1994, *Theoretical Aspects of Kashaya Phonology and Morphology*, Standford, CA: CSLI Publications.

_____, 2009, "Phonetics and phonology in gallo-romance palatalisation", *Transactions of the Philological Society* 107, 31-65.

Camino, I., 2004, "Nafarroa Behereko euskara", *Fontes Linguae Vasconum* 97, 445-486.

_____, 2009a, "Mugako hiztun eta aldaerak ipar-mendebaleko Zuberoan", *Fontes Linguae Vasconum* 111, 153-218.

_____, 2009b, "Hizkuntza-aldakortasunari Amiküzetik so", *Lapurdum* 13, 61-80.

_____, 2011 [2014], "Ekialdeko euskararen iraganaz", in I. Epelde (ed.), 87-153.

_____, 2013, [see **Sources**].

Campbell, L., 2012, "La investigación histórica de las lenguas aisladas, o ¿es raro el vasco?", in J.A. Lakarra, J. Gorrochategui & B. Urgell (eds.), *2nd Conference of the Luis Michelena Chair* [*"Koldo Mitxelena" Katedraren Argitalpenak* 4], Vitoria-Gasteiz: University of the Basque Country, 23-40.

Carnigan, Ch., R. Shosted, Ch. Shih & P. Rong, 2011, "Compensatory articulation in American English nasalized vowels", *Journal of Phonetics* 39, 668-682.

Chambon, J.P. & Y. Greub, 2002, "Note sur l'âge du (proto)gascon", *Revue de linguistique romane* 66, 473-495.

_____ & _____, 2009, "L'émergence du protogascon et la place du gascon dans la Romania", in G. Latry (ed.), *La voix occitane. Actes du VIIIe Congrès de l'Association Internationale d'Etudes Occitanes. Bordeaux, 12-17 octobre 2005*, Vol. 2, Bordeaux:

Presses universitaires de Bordeaux, 787-794.

Chomsky, N. & M. Halle, 1968, *The Sound Pattern of English*, Cambridge, MA: MIT Press.

Churchward, C.M., 1940, *Rotuman Grammar and Dictionary*, Sydney: Methodist Church of Australasia.

Clements, J.C., 1996, *The genesis of a language: The formation and development of Korlai Portuguese*, Amsterdam: John Benjamins.

Cohn, A.C., C. Fougeron & M.K. Huffman (eds.), 2012, *The Oxford Handbook of Laboratory Phonology*, Oxford: Oxford University Press.

Coromines [Corominas], J., 1970, "Hurgando en los nombres de parentesco", *Fontes Linguae Vasconum* 5, 169-182.

Cox, F. & S. Palethorpe, 2001, "The Changing Face of Australian English Vowels", in D.C. Blair & P. Collins (eds.), *Varieties of English Around the World. English in Australia*, Amsterdam: John Benjamins Publishing, 17-44.

Coyos, J.-B., 2001, "A propos de *Les emprunts de la langue basque à l'occitan de Gascogne* de Txomin Peillen", *Lapurdum* 6, 391-419.

_____, 2006, "L'apport lexical de l'occitan gascon béarnais au basque souletin", *Territoires et Vies / Herrialde eta Bizialdi* [*Bulletin du Musée basque*, hors série], Bayonne: Société des Amis du Musée basque, 201-223.

_____, 2011, "Zubereraren eta bearneraren arteko harremanez: lexiko mailegatua eta ahoskatzea − Lehen balantzea", in A. Sagarna, J.A. Lakarra & P. Salaberri-Zaratiegi (eds.), 877-907.

_____, 2012, "Euskararen eta gaskoieraren arteko harremanak: zubereraren adibide batzuk", in I. Igartua (ed.), 151-164.

Cresci, M., 2014, *The sound patterns of Camuno: description and explanation in Evolutionary Phonology*, PhD dissertation, CUNY Graduate Center.

Czaplicki, B., 2009, "Non-teleological approaches to metathesis: Evidence from dialects of Polish", *Poznań Studies in Contemporary Linguistics* 45, 353-367.

Dell, G.S., 1986, "A spreading-activation theory of retrieval in sentence production", *Psychological Review* 93, 283-321.

Demolin, D., 2007, "Phonological universals and the control and regulation of speech production", in M.-J. Solé, P.S. Beddor & M. Ohala (eds.) *Experimental Approaches to*

Phonology, Oxford: Oxford University Press, 75-92.

de Reuse, W.J., 1981, "Grassmann's law in Ofo", *International Journal of American Linguistics* 47, 243-244.

de Rijk, R.P.G., 1970, "Vowel interaction in Bizcayan Basque", *Fontes Linguae Vasconum* 5, 149-167.

Donegan, P. & D. Stampe, 1983, "Rhythm and the holistic organization of language structure", in J.F. Richardson, M. Marks & A. Chukerman (eds.), *Papers from the Parasession of phonology, morphology and syntax*, Chicago, IL: Chicago Linguistics Society, 337-353.

Dumenil, A., 1983, *A rule-account of metathesis in Gascon*, PhD dissertation, University of South Carolina.

Echenique, M.T., 1988, "Stress and pitch; Luis Mitxelena zenak utzitako langaia", *Euskera* 23, 495-521.

_____, 1997, *Estudios lingüísticos vasco-románicos*, Madrid: Ediciones Istmo.

_____, 2008, "Léxico vasco y latino-románico en contacto", *Oihenart* 23, 61-75.

_____, 2012, "Euskera y románico: su contacto ininterrumpido a través de la historia", in I. Igartua (ed.), 85-92.

Egurtzegi, A., 2011, "Euskal metatesiak: abiaburua haien ikerketarako", *International Journal of Basque Linguistics and Philology* [*ASJU*] 45, 1-79.

_____, 2013a, "Phonetics and Phonology", in M. Martínez-Areta (ed.), 119-172.

_____, 2013b, "Diferentes tipos de aspiración en vasco (con análisis espectrales del dialecto suletino actual)", in E. Blasco, P. Francalacci, A. Nocentini & G. Tanda (eds.), *Iberia e Sardegna. Legami linguistici, archeologici e genetici dal Mesolitico all'Età del Bronzo*, Firenze: Le Monnier, 151-169.

_____, 2014, "Zubereraren /y/: bere sorrera eta hedapenaren inguruan", in M.J. Ezeizabarrena & R. Gómez (eds.), 149-162.

_____, in prep., "[õ] sudurkarituaren igoera ekialdeko euskalkietan", manuscript.

Egurtzegi, A. & B. Ariztimuño, 2013, "Remarks on the Etymology of the Basque Word for 'swallow' and its Potential Relation to Celtic", *Ériu* 63, 79-90.

Egurtzegi, A. & G. Elordieta, 2013, "Euskal azentueren historiaz", in R. Gómez, J. Gorrochategui, J.A. Lakarra & C. Mounole (eds.), 163-186.

Elordieta, G., 1997, "Accent, tone and intonation in Lekeitio Basque", in F. Martinez-Gil

& A. Morales-Front (eds.), *Issues in the phonology and morphology of the major Iberian languages*, Washington DC: Georgetown University Press, 4-78.

_____, 1998, "Intonation in a pitch-accent variety of Basque", *International Journal of Basque Linguistics and Philology* [*ASJU*] 32, 511-569.

_____, 2003, "Intonation", in J.I. Hualde & J. Ortiz de Urbina (eds.), 72-112.

_____, 2007a, "A constraint-based analysis of the intonational realization of focus in Northern Bizkaian Basque", in T. Riad & C. Gussenhoven (eds.), *Tones and tunes: Volume I, Typological studies in word and sentence prosody*, Berlin: Mouton de Gruyter, 201-234.

_____, 2007b, "Constraints on intonational prominence of focalized constituents", in Ch. Lee, M. Gordon & D. Büring (eds.), *Topic and focus: Cross-linguistic perspectives on meaning and intonation*, Dordrecht: Springer, 1-22.

_____, 2007c, "Minimum size constraints on Intermediate Phrases", in J. Trouvain & W.J. Barry (eds.), *Proceedings of the XVI International Congress of Phonetic Sciences*, Saarbrücken: Universität Saarland, 1021-1024.

_____, 2011a, "Euskal azentuaren bilakaera: hipotesiak eta proposamenak", *Euskaltzaindiaren XVI. Biltzarra: Pirinioetako hizkuntzak: lehena eta oraina* [*Iker* 26], 989-1014.

_____, 2011b, "Basque word accents in the sentence", in G. Aurrekoetxea & I. Gaminde (eds.), *Prosodiaz eta Hezkuntzaz I. Jardunaldiak*, Bilbao: University of the Basque Country, 47-62.

Elordieta, G. & J.I. Hualde, 2003, "Experimental test of a hypothesized diachronic change in Basque accentuation", in M.-J. Solé, D. Recasens & J. Romero (eds.), *Proceedings of the 15th International Congress of Phonetic Sciences*, Barcelona: Futurgraphic, 67-70 [reissued in J.A. Lakarra & J.I. Hualde (eds.), 293-301].

_____ & _____, 2014, "Intonation in Basque", in S.-A. Jun (ed.), *Prosodic Typology II: The Phonology of Intonation and Phrasing*, Oxford: Oxford University Press.

Entenman, G., 1977, *The development of nasal vowels*, PhD dissertation, University of Texas at Austin.

Entwistle, W.J., 1936, *The Spanish language, together with Portuguese, Catalan and Basque*, London: Faber & Faber.

Epelde, I., 2003, *Larresoroko euskara*, PhD dissertation, University of the Basque Country.

_____ (ed.), 2011 [2014], *Euskal dialektologia: lehena eta oraina* (*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 69), Bilbao: University of the Basque Country.

Estebas-Vilaplana, E. & Prieto, P., 2010, "Castilian Spanish intonation", in P. Prieto & P. Roseano (eds.), *Transcription of Intonation of the Spanish Language*, Munich: Lincom Europa, 17-48.

Etxebarria, P., 1990, *Zaldibiako bokalen azterketa akustikoa*, Donostia-San Sebastián: Mundaiz.

Ezeizabarrena, M.J. & R. Gómez (eds.), 2014, *Eridenen du zerzaz kontenta: Sailkideen omenaldia Henrike Knörr irakasleari (1947-2008)*, Bilbao: University of the Basque Country [in press].

Face, T.L., 2002, *Intonational marking of contrastive focus in Madrid Spanish*, Munich: Lincom Europa.

Fant, G., 1960, *Acoustic theory of speech production*, The Hague: Mouton.

Flemming, E., 2001, "Scalar and Categorical Phenomena in a Unified Model of Phonetics and Phonology", *Phonology* 18, 7-44.

_____, 2003, "The Relationship between Coronal Place and Vowel Backness", *Phonology* 20, 335-373.

Foley, J., 1975, "Nasalization as Universal Phonological Process", in C.A. Ferguson, L.M. Hyman & J.J. Ohala (eds.), *Nasálfest: Papers from a Symposium on Nasals and Nasalization*, Standford: Standford University Press, 197-212.

Forni, G., 2013, "Evidence for Basque as an Indo-European Language", *Journal of Indo-European Studies* 41, 39-180.

Fouché, P., 1958, *Phonétique historique du français, vol. II: Les voyelles*, Paris: Klincksieck.

Fowler, C.A., 2005, "Parsing Coarticulated Speech in Perception: Effects of Coarticulation Resistance", *Journal of Phonetics* 33, 199-213.

Fowler, C.A. & E. Saltzman, 1993, "Coordination and coarticulation in speech production", *Language and Speech* 36, 171-195.

Fridland, V., 2008, "Patterns of /uw/, /ʊ/, and /ow/ Fronting in Reno, Nevada", *American Speech* 83, 432-454.

Friedrich, H., 1955, *Gwara kurpiowska. Fonetyka*, Warsaw: Państwowe Wydawnictwo

Naukowe.

Frigeni, Ch., 2005, "The development of liquids from Latin to Campidanian Sardinian: The role of contrast and structural similarity", *Toronto Working Papers in Linguistics* 24, 15-30.

_____, 2009, *Sonorant relationships in two varieties of Sardinian*, PhD dissertation, University of Toronto.

Fromkin, V.A., 1971, "The non-anomalous nature of anomalous utterances", *Language* 47, 27-52 [reprinted in Fromkin 1973, 215-242].

_____, 1973, *Speech errors as linguistic evidence*, The Hague, Paris: Mouton.

Gaminde, I., 1995, *Bizkaieraren azentu-moldeez*, Bilbao: Labayru Ikastegia.

_____, 1998a, *Euskaldunen azentuak*, Bilbao: Labayru Ikastegia.

_____, 1998b, "Bilbo eta euskara 700 urte geroago", in F. Rodríguez Bornaetxea & I. Esnaola Arbiza (eds.), *Euskara mintzatuaren erronkak*, Bilbao: University of the Basque Country, 103-115.

Gaminde, I. & J.I. Hualde, 1995, "Euskal azentu-ereduen atlaserako: zenbait isoglosa", *International Journal of Basque Linguistics and Philology* [*ASJU*] 29, 175-197.

Gárate, A. & H. [E.] Knörr, 1982, "El itinerario de los recaudadores de San Millán: problemas, deducciones, hipótesis", *Vitoria en la Edad Media: Actas del I Congreso de Estudios Históricos celebrado en esta ciudad del 21 al 26 de setiembre de 1981, en conmemoración del 800 aniversario de su fundación*, Vitoria-Gasteiz: Ayuntamiento de Vitoria-Gasteiz, 533-558.

Garrett, A., 2001, "Reduplication and Infixation in Yurok: Morphology, Semantics, and Diachrony", *International Journal of American Linguistics* 67:3, 264-312.

Garrett, A. & K. Johnson, 2013, "Phonetic Bias in Sound Change", in A.C.L. Yu (ed.), 51-97.

Gavel, H., 1920, *Eléments de phonétique basque*, Paris: Édouard Champion.

Geisler, H., 1994, "Metathese im Sardischen", *Vox Romanica* 53, 106-137.

Gèze, L., 1873, *Éléments de grammaire basque, dialecte souletin, suivis d'un vocabulaire basque-français et français-basque*, Bayonne: Imprimerie de Veuve Lamaignère.

Goldstein, M., 1968, "Some slips of the tongue", *Psychological Reports* 22, 1009-1013.

Gómez, R., J. Gorrochategui, J.A. Lakarra & C. Mounole (eds.), 2013, *3rd Conference of the Luis Michelena Chair* [*"Koldo Mitxelena" Katedraren Argitalpenak* 5], Vitoria-

Gasteiz: University of the Basque Country.

Gordon, E., L. Campbell, J. Hay, M. Maclagan, A. Sudbury & P. Trudgill, 2004, *New Zealand English: Its Origins and Evolution*, Cambridge: Cambridge University Press.

Gordon, M. & A. Applebaum, 2006, "Phonetic structures in Turkish Kabardian", *Journal of the International Phonetic Association* 36, 159-186.

Gorrochategui, J., 1984, [see **Sources**].

_____, 1987, "Vasco-Celtica", *International Journal of Basque Linguistics and Philology* [*ASJU*] 21, 951-959

_____, 1995, "The Basque Language and its Neighbors in Antiquity", in J.I. Hualde, J.A. Lakarra & R.L. Trask (eds.), 31-63.

_____, 2009, "Vasco antiguo: algunas cuestiones de geografía e historia lingüísticas", *Palaeohispanica* 9, 539-555.

_____, 2012, "Euskaratiko osagaiak gaztelaniaren lexikoan", in I. Igartua (ed.), 103-150.

Gorrochategui, J. & J.A. Lakarra, 1996, "Nuevas aportaciones a la reconstruccion del protovasco", in F. Villar & J.D. Encarnaçao (eds.), *La Hispania prerromana. Actas del VI Coloquio sobre lenguas y culturas prerromanas de la Península Ibérica (Coimbra 13-15 de octubre de 1994)*, Salamanca: University of Salamanca, University of Coimbra, 101-145.

_____ & _____, 2001, "Comparación lingüística, filología y reconstrucción del protovasco", in F. Villar, M.P. Fernández-Álvarez (eds.), *Religión, lengua y cultura prerromanas de Hispania*, Salamanca: University of Salamanca, 407-438.

_____ & _____, 2013, "Why Basque cannot be, unfortunately, an Indo-European language", *Journal of Indo-European Studies* 41, 203-237.

Grammont, M., 1908, "La métathèse en arménien", in *Mélanges de linguistique offerts à M. Ferdinand de Saussure*, Paris: Honoré Champion, 231-243.

_____, 1933, *Traité de phonétique*, Paris: Librairie Delagrave.

Grassmann, H., 1863, "Über die Aspiraten und ihr gleichzeitiges Vorhandensein im An- und Auslaute der Wurzeln", *Zeitschrift für vergleichende Sprachforschung auf dem Gebiete des Deutschen, Griechischen und Lateinischen* [*Kuhns Zeitschrift*] 12.2, 81-138.

Guiter, H., 1989, "Elementos de cronología fonética del vascuence", *International Journal of Basque Linguistics and Philology* [*ASJU*] 23, 797-800.

Gussenhoven, C., 2004, "Northern Bizkaian Basque", in C. Gussenhoven (ed.), *The Phonology of Tone and Intonation*, Cambridge: Cambridge University Press, 170-184.

Gussenhoven, C. & H. Jacobs, 2005, *Understanding Phonology,* Londres: Hodder Arnold.

Haase, M., 1990, "Erdal hitzen mailegatzea Iparraldeko euskaraz", *Euskara* 35, 405-415.

_____, 1992, *Sprachkontakt und Sprachwandel im Baskenland: Die Einflüsse des Gascognischen und Französischen auf das Baskische*, Hamburg: Helmut Buske Verlag.

_____, 2002, "Basque et gascon en Basse-Navarre", in M. Aurnague & M. Roché (eds.), *Hommage à Jacques Allières. Romania et Vasconia. Tome 1 : Domaines basque et pyrénéen*, Anglet: Atlantica, 109-117.

Haden, E.F. & E.A. Bell, Jr., 1964, "Nasal Vowel Phonemes in French", *Lingua* 13, 62-69.

Hajek, J., 1993, "Old French Nasalization and the Universals of Sound Change", *Journal of French Language Studies* 3, 145-164.

_____, 1997, *Universals of Sound Change in Nasalization*, Oxford: Blackwell Publishers.

Hall, R.A., 1976, *Proto-Romance Phonology*, New York: Elsevier.

Halle, M. & G.N. Clements, 1983, *Problem Book in Phonology*, Cambridge, MA: MIT Press.

Harrington, J., 2012, "The Coarticulatory Basis of Diachronic High Back Vowel Fronting", in M.-J. Solé & D. Recasens (eds.), *The Initiation of Sound Change: Perception, Production and Social Factors*, Amsterdam: John Benjamins Publishing, 103-122.

Harrington, J., F. Kleber & U. Reubold, 2008, "Compensation for Coarticulation, /u/-fronting, and Sound Change in Standard Southern British: An Acoustic and Perceptual Study", *Journal of the Acoustical Society of America* 123, 2825-2835.

Harrington, J., P. Hoole, F. Kleber & U. Reubold, 2011, "The physiological, Acoustic, and Perceptual Basis of High Back Vowel Fronting: Evidence from German Tense and Lax Vowels", *Journal of Phonetics* 39, 121-131.

Harris, M., 1988, "French", in M. Harris & N. Vincent (eds.), 209-245.

Harris, M. & N. Vincent (eds.), 1988, *The Romance Languages*, London: Routledge.

Haudricourt, A. & A. Juilland, 1949, *Essai pour une histoire structurale du phonétisme français*, Paris: Klincksieck.

_____ & _____, 1970, *Essai pour une histoire structurale du phonétisme français*, The Hague: Mouton [2nd ed.].

Hawkeys, S. & J. Midgley, 2005, "Formant Frequency of RP Monophthongs in Four Age

Groups of Speakers", *Journal of the International Phonetic Association* 35, 183-199.

Henton, C., 1983, "Changes in the Vowels of Received Pronunciation", *Journal of Phonetics* 11, 353-371.

Hetzron, R., 1969, "Two notes on Semitic laryngeals in East Gurage", *Phonetica* 19, 69-81.

Hirose, H. & T. Gay, 1972, "The activity of the intrinsic laryngeal muscles in voicing control: an electromyographic study", *Phonetica* 25, 140-64.

Hock, H.H., 1985, "Regular metathesis", *Linguistics* 23, 529-546.

_____, 1991, *Principles of Historical Linguistics*, Berlin: Mouton de Gruyter.

Honeybone, P. & J. Salmons (eds.), 2014, *The Oxford Handbook of Historical Phonology*, Oxford: Oxford University Press.

Hualde, J.I., 1984, "Icelandic Basque Pidgin", *Journal of Basque Studies in America* 5, 41-59 [reissued in *International Journal of Basque Linguistics and Philology* [*ASJU*] 25, 427-437].

_____, 1988, "A theory of pitch-accent, with particular attention to Basque", *Euskara Bitzarra / Congreso de la Lengua Vasca* vol. 1, 53-60 [reissued in *International Journal of Basque Linguistics and Philology* [*ASJU*] 22, 915-919].

_____, 1989, "Acentos vizcaínos", *International Journal of Basque Linguistics and Philology* [*ASJU*] 23, 275-325.

_____, 1991a, *Basque Phonology*, London & New York: Routledge.

_____, 1991b, "Foreword to Glossaria duo Vasco-Islandica", *International Journal of Basque Linguistics and Philology* [*ASJU*] 25, 317-319.

_____, 1991c, "Manuel de Larramendi y el acento vasco", *International Journal of Basque Linguistics and Philology* [*ASJU*] 25, 737-749.

_____, 1993a, "On the historical origin of Basque accentuation", *Diachronica* 10, 13-50.

_____, 1993b, "Topics in Souletin phonology" in J.I. Hualde & J. Ortiz de Urbina (eds.), 289-327.

_____, 1995, "Reconstructing the ancient Basque accentual system: Evidence and hypotheses", in J.I. Hualde, J.A. Lakarra & R.L. Trask (eds.), 171-188.

_____, 1997a, *Euskararen azentuerak* (*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 42), San Sebastián, Bilbao: Gipuzkoako Foru Aldundia, University of the Basque Country.

_____, 1997b, "Aitzineuskararen leherkariak", *International Journal of Basque Linguistics and Philology* [*ASJU*] 31, 411-424.

_____, 1999a, "Basque accentuation", in H. van der Hulst (ed.), *Word prosodic systems in the languages of Europe*, Berlin: Mouton de Gruyter, 947-993.

_____, 1999b, "Pre-Basque plosives", in J. Franco & A. Landa (eds.), *Grammatical analyses in Basque and Romance Linguistics*, Amsterdam: John Benjamins, 77-104.

_____, 2000, "On system-driven sound change: Accent shift in Markina Basque", *Lingua* 110, 99-129.

_____, 2003a, "Segmental phonology", in J.I. Hualde & J. Ortiz de Urbina (eds.), 15-65.

_____, 2003b, "Accentuation", in J.I. Hualde & J. Ortiz de Urbina (eds.), 65-72.

_____, 2003c, "From phrase-final to post-initial accent in Western Basque", in P. Fikkert & H. Jacobs (eds.), *Development in prosodic systems*, Berlin: Mouton de Gruyter, 249-281.

_____, 2006a, "Estado actual de las investigaciones sobre la acentuación en lengua vasca", *Oihenart* 21, 149-177.

_____, 2006b, "Laringalak eta euskal azentuaren bilakaera", in B. Fernández & I. Laka (eds.), *Andolin gogoan: Essays in honour of Professor Eguzkitza*, Bilbo: University of the Basque Country, 497-511.

_____, 2007, "Historical convergence and divergence in Basque accentuation", in C. Gussenhoven & T. Riad (eds.), *Tones and tunes*, Berlin: Mouton de Gruyter, 291-322.

_____, 2012, "Two Basque accentual systems and the notion of pitch-accent language", *Lingua* 122, 1335-1351.

Hualde, J.I. & X. Bilbao, 1992, "A phonological study of the Basque dialect of Getxo", *International Journal of Basque Linguistics and Philology* [*ASJU*] 26, 1-117 [reprinted in *Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 29, San Sebastián, Bilbao: Gipuzkoako Foru Aldundia, University of the Basque Country].

_____ & _____, 1993, "The prosodic system of the Basque dialect of Getxo: A metrical analysis", *Linguistics* 31, 59-85.

Hualde, J.I., G. Elordieta & A. Elordieta, 1994, *The Basque dialect of Lekeitio* (*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 34), San Sebastián, Bilbao: Gipuzkoako Foru Aldundia, University of the Basque

Country.

Hualde, J.I., G. Elordieta, I. Gaminde & R. Smiljanic, 2002, "From pitch-accent to stress-accent in Basque", in C. Gussenhoven & N. Warner (eds.), *Laboratory Phonology VII*, Mouton de Gruyter, Berlin, 547-584.

Hualde, J.I., J.A. Lakarra & R.L. Trask (eds.), 1995, *Towards a history of the Basque language*, Amsterdam: John Benjamins.

Hualde, J.I. & O. Lujanbio, 2008, "Goizuetako azentuera", in X. Artiagoitia & J. A. Lakarra (eds.), *Gramatika jaietan. Patxi Goenagaren omenez* (*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 51), San Sebastián, Bilbao: Gipuzkoako Foru Aldundia, University of the Basque Country, 377-394.

Hualde, J.I., O. Lujanbio & F. Torreira, 2008, "Lexical tone and stress in Goizueta Basque", *Journal of the International Phonetic Association* 38, 1-24.

Hualde, J.I. & J. Ortiz de Urbina (eds.), 1993, *Generative Studies in Basque linguistics*, Amsterdam: John Benjamins.

_____ & _____, 2003, *A grammar of Basque*, Berlin & New York: Mouton de Gruyter.

Hualde, J.I., M. Simonet & M. Nadeu, 2011, "Consonant lenition and phonological recategorization", *Laboratory Phonology* 2, 275-300.

Hume, E., 1997, "Metathesis in phonological theory: The case of Leti", *Lingua* 104, 147-186.

_____, 1998, "The role of perceptibility in consonant/consonant metathesis", in S. Blake, E.-S. Kim & K. Shahin (eds.), *WCCFL XVII Proceedings*, Stanford: CSLI, 293-307.

_____, 2001, "Metathesis: formal and functional considerations", in E. Hume, N. Smith & J. van de Weijer (eds.), 1-25.

_____, 2004, "The indeterminacy/attestation model of metathesis", *Language* 80, 203-237.

Hume, E., N. Smith & J. van de Weijer (eds.), 2001, *Surface syllable structure and segment sequencing*, Leiden: HIL.

Hurch, B., 1988, *Über Aspiration. Ein Kapitel aus der natürlichen Phonologie*, Tübingen: Gunter Narr Verlag.

Hyman, L.M., 1975, *Phonology: theory and analysis*, New York: Holt, Rinehart & Winston.

_____, 1976, "Phonologization", in A. Juilland (ed.), *Linguistic studies presented to Joseph H. Greenberg*, Saratoga: Anna Libri, 407-418.

_____, 1977, "On the nature of linguistic stress", in L.M. Hyman (ed.), *Studies in stress and accent*, Los Angeles: Southern California Occasional Papers in Linguistics, 37-82.

_____, 2013, "Enlarging the Scope of Phonologization", in A.C.L. Yu (ed.), *Origins of Sound Change: Approaches to Phonologization*, Oxford: Oxford University Press, 3-28.

Igartua, I., 2001, "La aspiración en vasco: ensayo tipológico y diacrónico", *International Journal of Basque Linguistics and Philology* [*ASJU*] 35, 185-213.

_____, 2002, "Euskararen hasperena ikuspegi tipologiko eta diakronikotik", in X. Artiagoitia, P. Goenaga & J.A. Lakarra (eds.), *Erramu Boneta. Festschrift for Rudolf P.G. de Rijk* (*Supplements of the International Journal of Basque Linguistics and Philology* [*ASJU*] 44), Bilbao: University of the Basque Country, 367-389.

_____, 2006, "Del origen de la aspiración como elemento morfofonológico en vasco", in J.A. Lakarra & J.I. Hualde (eds.), 519-530.

_____, 2008, "La aspiración de origen nasal en la evolución fonética del euskera: un caso de rhinoglottophilia", *International Journal of Basque Linguistics and Philology* [*ASJU*] 42, 171-189.

_____, 2011, "Historia abreviada de la aspiración en lenguas circumpirenáicas", *Pirinioetako hizkuntzak: lehena eta oraina*, Bilbao: Euskaltzaindia.

_____ (ed.), 2012, *Euskara eta inguruko hizkuntzak historian zehar*, Vitoria-Gasteiz: Eusko Jaurlaritza / Gobierno Vasco.

Irigoien, A., 1997, "Las lenguas de los vizcaínos: Antroponimia y toponimia medievales", *Opera selecta*, 373-429.

Irurtzun, A., 2003, "Stress on Accent: Errenteria Basque Revisited", in M.-J. Solé, D. Recasens & J. Romero (eds.), *Proceedings of the 15th International Congress of Phonetic Sciences*, Barcelona: Futurgraphic, 2075-2078.

Iverson, P. & P.K. Kuhl, 1995, "Mapping the perceptual magnet effect for speech using signal detection theory and multidimensional scaling", *Journal of the Acoustical Society of America* 97, 553-562.

Jacques, G., 2011, "A panchronic study of aspirated fricatives, with new evidence from Pumi", *Lingua* 121, 1518-1538.

Jakobson, R., C.G.M. Fant & M. Halle, 1952, *Preliminaries to speech analysis: The distinctive features and their correlates* [*Acoustics Laboratory Technical Report* 13], Cambridge, MA: MIT Press.

Jauregi, O., 2007, *Euskararen silaba: egitura eta historia*, PhD dissertation, University of the Basque Country.

_____, 2008, "Sobre la naturaleza de la sílaba y la estructuración de sus elementos en euskera", *International Journal of Basque Linguistics and Philology* [*ASJU*] 42, 337-352.

Jauregi, O. & I. Epelde, 2013, "The loss of aspiration in Northern Basque", in R. Gómez, J. Gorrochategui, J.A. Lakarra & C. Mounole (eds.), 245-262.

Jessen, M., 2001, "Phonetic implementation of the distinctive auditory features [voice] and [tense] in stop consonants", in T.A. Hall (ed.), *Distinctive Feature Theory* (Phonology and Phonetics 2), Berlin: Mouton de Gruyter, 237-294.

Johnson, K., 1997, "Speech perception without speaker normalization", in K. Johnson & J.W. Mullennix (eds.), *Talker variability in speech processing*, San Diego: Academic Press, 145-165.

Jun, S.-A. & G. Elordieta, 1997, "Intonational structure of Lekeitio Basque", in A. Botinis, G. Kouroupetroglou & G. Carayiannis (eds.), *Intonation: Theory, Model and Applications*, Athens: ESCA, 193-196.

Jungemann, F.H., 1955, *La teoría del sustrato y los dialectos hispano-romances y gascones*, Madrid: Gredos.

Jurafsky, D., A. Bell, M. Gregory & W.D. Raymond, 2001, "Probabilistic relations between words: Evidence from reduction in lexical production", in J. Bybee & P. Hopper (eds.), *Frequency and the emergence of linguistic structure*, Amsterdam: John Benjamins, 229-254.

Kaji, S., 1996, "Tone reversal in Tembo (Bantu J.57)", *Journal of African Languages and Linguistics* 17, 1-26.

Kawasaki, H., 1986, "Phonetic explanation for phonological universals: the case of distinctive vowel nasalization", in J.J. Ohala (ed.), *Experimental phonology*, New York: Academic Press, 81-103.

Kelly, R.C., 1973, *A Descriptive analysis of Gascon*, The Hague-Paris: Mouton.

Kingston, J., 2003, "Mechanisms of tone reversal" in S. Kaji (ed.), *Proceedigns of the Symposium Cross-Linguistic Studies of Tonal Phenomena: Historical development, phonetics of tone and descriptive studies*, Tokyo: Tokyo University of Foreign Studies, 57-120.

Knörr, H. [E.], 1995, "La huella del latín en la lengua vasca", in V. Valcárcel (ed.), *Didáctica del latín: Actualización científico pedagógica*, Madrid: Ediciones Clásicas / Colegio de Doctores y Licenciados de Vizcaya, 214-225.

Koops, C., 2010, "/u/-Fronting is not Monolithic: Two Types of Fronted /u/ in Houston Anglos", *University of Pennsylvania Working Papers in Linguistics* 16:2, 113-122.

Krakow, R.A., P.S. Beddor, L.M. Goldstein & C.A. Fowler, 1988, "Coarticulatory influences on the perceived height of nasal vowels", *Journal of the Acoustical Society of America* 83, 1146-1158.

Kubozono, H., 1993, *The organization of Japanese prosody*, Tokyo: Kurosio Publishers.

Kuhl, P.K., 1991, "Human adults and human infants show a 'perceptual magnet effect' for the prototypes of speech categories, monkeys do not", *Perception and Psychophysics* 50, 93-197.

_____, 1995, "Mechanisms of developmental change in speech and language", *Proceedings of the 13th International Congress of Phonetic Sciences*, vol. 2, 132-139.

_____, 2000, "Language, mind, and brain: Experience alters perception", in M.S. Gazzaniga (ed.), *The new cognitive neurosciences* (2nd ed.), Cambridge, MA: MIT Press, 99-115.

Kuhl, P.K. & P. Iverson, 1995, "Linguistic experience and the 'perceptual magnet effect.'", in W. Strange (ed.), *Speech Perception and Linguistic Experience: Theoretical and Methodological Issues in Cross-Language Speech Research*, Timonium, MD: York Press, 121-154.

Labov, W., 1994, *Principles of Linguistic Change Vol. 1: Internal Factors*, Oxford: Blackwell.

_____, 2008, "Triggering events", in S. Fitzmaurice & D. Minkova (eds.), *Empirical and Analytical Advances in the Study of English Language Change*, Berlin, New York: Mouton de Gruyter, 11-54.

Labov, W., S. Ash and C. Boberg, 2006, *The Atlas of North American English: Phonetics, Phonology and Sound Change*, New York: Mouton de Gruyter.

Ladefoged, P., 1967, *Three Areas of Experimental Phonetics: Stress and Respiratory Activity, the Nature of Vowel Quality, and Units in the Perception and Production of Speech*, London: Oxford University Press.

_____, 1993, *A course in phonetics*, Fort Worth: Harcourt Brace Jovanovich.

Ladefoged, P. & G. Loeb, 2009, "Preliminary studies on respiratory activity in speech", manuscript [Online: http://www.linguistics.ucla.edu/people/ladefoge/LadefogedAndLoebRespiration.pdf].

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

Ladefoged, P., I. Maddieson & M.T.T. Jackson, 1988, "Investigating phonation types in different languages", in O. Fujiyama (ed.), *Vocal physiology: Voice production, mechanisms and functions*, New York: Raven, 297-317.

Lafon, R., 1937 [1999], "Tendance à la palatalisation de la sonante *u* dans les parlers basques du Nord-Est", *Revue de Linguistique Romane* 13, 73-82; reissued in Lafon (1999), 85-93.

_____, 1948, "Remarques sur l'aspiration en basque", *Melanges offerts a M. le prof. Henri Gavel*, Toulouse: É. Privat, 55-61.

_____, 1958 [1999], "Contribution a l'étude phonologique du parler basque de Larrau (Haute-Soule)" in D. Catalán (ed.), *Estructuralismo e historia. Miscelánea homenaje a André Martinet* (Vol. 2), La Laguna: Universidad de La Laguna, 77-106; reissued in Lafon (1999), 113-133.

_____, 1962a [1999], "Contact de langues et apparition d'une nouvelle voyelle: *u* et *ü* en basque", *Actes du Xe Congrès International de Linguistique et Philologie Romanes III. Strasbourg*, 901-909; reissued in Lafon (1999), 135-143.

_____, 1962b [1999], "Sur la voyelle *ü* en basque", *Bulletin de la Société de Linguistique de Paris* 57, 83-102; reissued in Lafon (1999), 95-111.

_____, 1999, *Vasconiana* (Iker 11), Bilbao: Euskaltzaindia [collected writings, J. Haritschelhar & P. Charritton (eds.)].

Lafont, R., 1971, "Deux types ethniques", in R. Lafont (ed.), *Le sud et le nord, dialectique de la France*, Toulouse: Privat, 101-136.

Lakarra, J.A., 1995, "Reconstructing the pre-Proto-Basque root", in J.I. Hualde, J. Lakarra & R.L. Trask (eds.), 189-206.

_____, 1997, "Euskararen historia eta filologia: arazo zahar, bide berri", *International Journal of Basque Linguistics and Philology* [*ASJU*] 31, 447-535.

_____, 2005, "Prolegómenos a la reconstrucción de segundo grado y al análisis del cambio tipológico en (proto)vasco", *Palaeohispanica* 5 [*Acta Palaeohispanica* IX], 407-459.

_____, 2006a, "Protovasco, munda y otros: Reconstrucción interna y tipología holística diacrónica", *Oihenart* 21, 229-322.

_____, 2006b, "Notas sobre iniciales, cambio tipológico y prehistoria del verbo vasco", in J.A. Lakarra & J.I. Hualde (eds.), 561-622.

_____, 2008, "Antiguas extensiones radicales y prehistoria del verbo vasco", in preparation for *International Journal of Basque Linguistics and Philology* [*ASJU*].

_____, 2009a, "Adabakiak /h/-aren balio etimologikoaz", *International Journal of Basque Linguistics and Philology* [*ASJU*] 43, 565-596.

_____, 2009b, "*h_3 > h_1, *h_2 > h_1 eta horiei datxezkien zenbait fenomenoz", *Lapurdum* 13, 211-231.

_____, 2011a, "Aitzineuskararen berreraiketaz: egindakoaz eta eginkizunez", in A. Sagarna, J.A. Lakarra & P. Salaberri-Zaratiegi (eds.), 617-694.

_____, 2011b, "Erro monosilabikoaren teoria eta aitzineuskararen berreraiketa: zenbait alderdi eta ondorio", *Fontes Linguae Vasconum* 113, 5-114.

_____, 2011 [2014], "Gogoetak euskal dialektologia diakronikoaz: Euskara Batu Zaharra berreraiki beharraz eta haren banaketaren ikerketaz", in Epelde (ed.), 155-241.

_____, 2012, "Mailegaketa eta berreraiketa euskararen historiaurrearen ikerketan", in I. Igartua (ed.), 17-74.

_____, 2013, "Root Structure", in Martínez-Areta (ed.), 173-221.

_____, 2014, "Hiru hasperen haboro gehi bi", in M.J. Ezeizabarrena & R. Gómez (eds.), 349-383.

Lakarra, J.A. & J.I. Hualde (eds.), 2006, *Studies in Basque and Historical Linguistics in Memory of R.L. Trask* (*International Journal of Basque Linguistics and Philology* [*ASJU*] 40: 1-2), San Sebastián, Bilbao: Diputación Foral de Gipuzkoa, University of the Basque Country.

Lakarra, J.A., Manterola, J., Segurola, I., in prep., *Euskal Hiztegi Historiko Etimologikoa* [*Historical Etymological Basque Dictionary*].

Lakarra, J.A. & C. Mounole, in press, "Euskara arkaikoa (1400-1600)", in J. Gorrochategui, I. Igartua & J. Lakarra (eds.), *Euskararen historia*, Vitoria-Gasteiz: Eusko Jaurlaritza.

Lakarra, J.A. & Í. Ruiz Arzalluz (eds.), 2011a, *Obras completas VII: Fonética y fonología. Morfosintaxis. Dialectología*, Donostia-San Sebastián, Vitoria-Gasteiz: Diputación

Foral de Guipúzcoa, University of the Basque Country.

_____ & _____, 2011b, *Obras completas XII: Textos arcaicos vascos. N. Landuchio, Dictionarium Linguae Cantabricae (1562)*, Donostia-San Sebastián, Vitoria-Gasteiz: Diputación Foral de Guipúzcoa, University of the Basque Country.

_____ & _____, 2011c, *Obras completas V: Historia y geografía de la lengua vasca*, Donostia-San Sebastián, Vitoria-Gasteiz: Diputación Foral de Guipúzcoa, University of the Basque Country.

Landerman, P. 1994. "Glottalization and aspiration in Quechua and Aymara reconsidered", in P. Cole, G. Hermon & M.D. Martin (eds.), *Language in the Andes*, Newark, DE: University of Delaware, 332-378.

Larrasquet, J., 1928, *Action de l'accent dans l'évolution des consonnes étudiée dans le Basque Souletin*, Paris: Libraire Vrin.

_____, 1932, "Phonétique du Basque de Larrajá (quartier de Barcus)", *Revista Internacional de los Estudios Vascos* 23, 153-191.

_____, 1934, *Le basque souletin nord-oriental*, Paris: Maisonneuve.

_____, 1939, *Le Basque de la Basse-Soule Orientale*, Paris: Klincksieck.

Lehiste, I., 1970, *Suprasegmentals*, Cambridge, MA: MIT Press.

Luchaire, A., 1874, *Remarques sur les noms de lieux du pays basque*, Pau: Ve Vignancour; reissued in Luchaire (1879).

_____, 1877, *Les origines linguistiques de l'Aquitaine*, Pau: Imprimerie et Lithographie Veronese.

_____, 1879, *Etudes sur les idiomes pyrénéens de la région française*, Paris: Maisonneuve.

_____, 1881, "Sur les noms propres basques contenus dans quelques documents pyrénéens des XIᵉ, XIIᵉ et XIIIᵉ siècles", *Revue de Linguistique et de Philologie Comparée* 14, 150-171.

MacEachern, M.R., 1999, *Laryngeal Co-occurrence Restrictions*, New York, NY: Garland Publishing.

MacKay, D.G., 1970, "Spoonerisms: The structure of errors in serial order of speech", *Neuropsychologia* 8, 323-350.

Maclagan, M. & J. Hay, 2007, "Getting fed up with our Feet: Contrast maintenance and the New Zealand English Vowel Shift", *Language Variation and Change* 19, 1-25.

Maddieson, I., 1984, *Patterns of Sounds*, New York: Cambridge University Press.

_____, 2013, "Front rounded vowels", in M.S. Dryer & M. Haspelmath (eds.), *The World Atlas of Language Structures Online*, Munich: Max Planck Digital Library, feature 7A [Online at http://wals.info/chapter/11].

Maiora Mendia, F., 2011, *Reino de Navarra - Euskera: Injurias, coplas, frases*, Villatuerta: Graphycems.

Manterola, J., 2006, "-a euskal artikulu definituaren gainean zenbait ohar", in J.A. Lakarra & J.I. Hualde (eds.), 651-676.

_____, 2008, "Euskarazko artikuluak erdi aroko agiri bilduma batean (Basque articles in a middle age document)", in *Oihenart* 23, 371-379.

Martinet, A., 1950 [1970], "De la sonorisation des occlusives initiales en basque", *Word* 6, 224-233 [included in Martinet 1955 [1970]].

_____, 1955 [1970], *Économie des changements phonétiques: Traité de phonologie diachronique*, Bern: Éditions A. Francke.

_____, 1965, "Les voyelles nasales du français", *Linguistique* 2, 117-122.

_____, 1981, "La phonologie synchronique et diachronique du basque", in *Euskalarien nazioarteko jardunaldiak* [*Iker*-1], Bilbao: Euskaltzaindia, 59-74.

Martínez-Areta, M., 2004, "El acento proto-vasco", *International Journal of Basque Linguistics and Philology* [*ASJU*] 38, 135-206.

_____, 2006, *El consonantismo proto-vasco*, PhD dissertation, University of the Basque Country.

_____, 2009, "The category of number in Basque: I. Synchronic and historical aspects", *Fontes Linguae Vasconum* 110, 63-98.

_____ (ed.), 2013a, *Basque and Proto-Basque. Language-Internal and Typological Approaches to Linguistic Reconstruction* [*Mikroglottika* 5], Frankfurt am Main: Peter Lang.

_____, 2013b, "Basque Dialects", in M. Martínez-Areta (ed.), 31-87.

Matisoff, J.A., 1975, "Rhinoglottophilia: the mysterious connection between nasality and glottality", in Ch.A. Ferguson, L.M. Hyman & J.J. Ohala (eds.), *Nasálfest: Papers from a symposium on nasals and nasalization*, Standford: Standford University Press, 265-287.

Matte, E.J., 1982, *Histoire des modes phonétiques du français*, Geneva: Librairie Droz.

McDougall, K. & F. Nolan, 2007, "Discrimination of Speakers using the Formant

Dynamics of /uː/ in British English", in J. Trouvain & W.J. Barry (eds.) *Proceedings of the 16th International Congress of Phonetic Sciences*, Saarbrucken: Universität des Saarlandes, 1825-1828.

Menéndez Pidal, R., 1964, *Orígenes del español: Estado lingüístico de la Península Ibérica hasta el siglo XI*, Madrid: Espasa-Calpe [5th edition].

Meringer, R., 1908, *Aus dem Leben der Sprache: Versprechen, Kindersprache, Nachahmungstrieb. Festschrift der K. K. Kar-Franzens-Universität in Graz aus Anlass der Jahresfeier am 15, November 1906,* Berlin: B. Behr's Verlag.

Meringer, R. & Mayer, K., 1895 [1978], *Versprechen und Verlesen: Eine psychologisch-linguistische Studie*, Stuttgart: G.J. Göschensche Verlagshandlung. [2nd edition, Amsterdam: J. Benjamins].

Merlingen, W., 1977, *Artikulation und Phonematik des* h. *Mit einem Anhang über Phonematik*, Wien: Verband der wissenschaftlichen Geselschaften Österreichs.

Meyer-Lübke, W., 1890, *Grammaire des langues romanes*, Paris: E. Welter.

_____, 1921, "Beiträge zur romanischen Laut- und Formenlehre. 5. Die Entwicklung von zwischensilbischem *n*", *Zeitschrift für romanische Philologie* 41, 555-565.

Michelena, L. [Mitxelena, K.], 1950 [2011a], "De fonética vasca. La aspiración intervocálica", *Boletín de la Real Sociedad Vascongada de los Amigos del País* 6, 443-459; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 3-20.

_____, 1951 [2011a], "De fonética vasca. La distribución de las oclusivas aspiradas y no aspiradas", *Boletín de la Real Sociedad Vascongada de los Amigos del País* 7, 539-549; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 21-32.

_____, 1953 [2011a], [see **Sources**].

_____, 1954 [2011a], "La posición fonética del dialecto vasco del Roncal", *Via Domitia* 1, 123-157; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 611-647.

_____, 1956 [2011a], "F. Jungemann, *La teoría del sustrato y los dialectos hispano-romances y gascones*, Madrid 1955", *Boletín de la Real Sociedad Vascongada de los Amigos del País* 12, 117-129; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 109-122.

_____, 1957 [2011a]: "Las antiguas consonantes vascas", in D. Catalán (ed.), *Estructuralismo e historia. Miscelánea homenaje a André Martinet* (Vol. 1), La Laguna: Universidad de La Laguna, 113-157; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.),

2011a, 57-91 [in English in J.I. Hualde, J.A. Lakarra & R.L. Trask (eds.), 101-135].

_____, 1957-58 [2011a], "À propos de l'accent basque", *Bulletin de la Société de Linguistique de Paris* 53, 204-233; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 123-152.

_____, 1958 [2011b], "Introducción", in M. Agud & L. Michelena, *N. Landuchio, Dictionarium linguae Cantabricae (1562)* [*Publicaciones del Seminario "Julio de Urquijo"*], Donostia-San Sebastián: Diputación Foral de Guipúzcoa, 7-48; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011b, 202-232.

_____, 1964 [2011b], [see ***Sources***].

_____, 1964 [2011c], *Sobre el pasado de la lengua vasca*, San Sebastián: Editorial Auñamendi; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011c, 1-115.

_____, 1972 [2011a], "A note on Old Labourdin accentuation", *International Journal of Basque Linguistics and Philology* [*ASJU*] 6, 110-120; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 163-175.

_____, 1972 [2011c], "Nota marginal sobre la huella latina en la lengua vasca", *Fontes Linguae Vasconum* 4, 5-25; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011c, 277-301.

_____, 1974 [2011c], "El elemento latino-románico en la lengua vasca", *Fontes Linguae Vasconum* 6, 183-209; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011c, 305-336.

_____, 1977 [2011], *Fonética histórica vasca* [*Publicaciones del Seminario "Julio de Urquijo"*], Donostia-San Sebastián: Diputación Foral de Guipúzcoa [1961, 2nd ed. 1977]; reissued in J.A. Lakarra & Í. Ruiz Arzalluz (eds.), 2011, *Obras completas VI: Fonética histórica vasca*, Donostia-San Sebastián, Vitoria-Gasteiz: Diputación Foral de Guipúzcoa, University of the Basque Country.

_____, 1977 [2011a], "Notas sobre compuestos verbales vascos", *Revista de dialectologia y tradiciones populares* 33, 245-271; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 269-300.

_____, 1981 [2011a], "Lengua común y dialectos vascos", *International Journal of Basque Linguistics and Philology* [*ASJU*] 15, 291-313; reissued in J.L. Lakarra & Í. Ruiz Arzalluz (eds.), 2011a, 517-542.

_____ & I. Sarasola, 1987-2005, [see ***Sources***].

Mielke, J., 2004, *The emergence of distinctive features,* PhD dissertation, Ohio State University [2008, Oxford: Oxford University Press].

Mielke, J. & E. Hume, 2001, "Consequences of word recognition for metathesis", in E. Hume, N. Smith & J. van de Weijer (eds.), 135-158.

Miller, B., 2012, *Feature Patterns: Their Sources and Status in Grammar and Reconstruction*, PhD dissertation, Cambridge University.

Mirones, Lozano, E., 2009, "Mehe: un apellido vasco escrito en aljamía hebraico-navarra", *Fontes Linguae Vasconum* 110, 117-123.

Moon, S.-J. & B. Lindblom, 1994, "Interaction between Duration, Context and Speaking Style in English stressed Vowels", *Journal of the Acoustical Society of America* 96, 40-55.

Mounole, C., 2004, "Zubererazko herskarien azterketa akustikoa", *International Journal of Basque Linguistics and Philology* [*ASJU*] 38, 207-248.

Múgica, M., 1996, "Notas de fonética histórica y toponimia 1. Sobre cronología de los cambios fonéticos", *International Journal of Basque Linguistics and Philology* [*ASJU*] 30, 219-238.

Nash, J.A., 1992, "Underlying low tones in Ruwund", *Studies in African Linguistics* 23, 223-278.

Navarro Tomás, T., 1944 [1974], *Manual de entonación española*, Madrid: Guadarrama.

Nobiling, O., 1903, "Die Nasalvokale im Portugiesischen", *Die neueren Sprachen* 11, 129-153.

Ohala, J.J., 1974, "Experimental historical phonology", in J.M. Anderson & C. Jones (eds.), *Historical linguistics*, Amsterdam: North-Holland, vol. 2, 353-389.

_____, 1975, "Phonetic explanations for nasal sound patterns", in Ch.A. Ferguson, L.M. Hyman & J.J. Ohala (eds.), *Nasálfest: Papers from a symposium on nasals and nasalization*, Standford: Standford University Press, 289-316.

_____, 1981, "The listener as a source of sound change", in C. Masek, R.A. Hendrick & M.F. Miller (eds.), *Papers from the Parasession on Language and Behavior*, Chicago: Chicago Linguistic Society, 178-203.

_____, 1983. "The origin of sound patterns in vocal tract constraints", in P.F. MacNeilage (ed.), *The production of speech*, New York: Springer-Verlag, 189-216.

_____, 1989, "Sound change is drawn from a pool of synchronic variation", L.E. Breivik

& E.H. Jahr (eds.), *Language Change: Contributions to the study of its causes* [*Trends in Linguistics, Studies and Monographs* 43], Berlin: Mouton de Gruyter, 173-198.

_____, 1990, "Respiratory activity in speech", in W.J. Hardcastle & A. Marchal (eds.), *Speech Production and Speech Modelling*, Dordrecht: Kluwer, 23-53.

_____, 1993, "The phonetics of sound change", in C. Jones (ed.), *Historical Linguistics: Problems and Perspectives*, Londres: Longman, 237-278.

_____, 2003, "Phonetics and historical phonology", in B.D. Joseph & R.D. Janda (eds.), *The handbook of historical linguistics*, Oxford: Blackwell, 669-686.

_____, 2012, "The listener as a source of sound change: An update", in M.-J. Solé & D. Recasens (eds.), *The Initiation of Sound Change: Perception, Production and Social Factors*, Amsterdam: John Benjamins Publishing, 21-36.

Ohala, J.J. & M. Ohala, 1972, "The problem of aspiration in Hindi phonetics', *Annual Bulletin of the Research Institute of Logopedics and Phoniatrics* 6, 39-46.

Öhman, S., 1966, "Coarticulation in VCV utterances: Spectrographic measurements", *Journal of the Acoustical Society of America* 39, 151-168.

Ó Maolalaigh, R., 2003, "Processes in nasalization and related issues", *Ériu* 53, 109-132.

Oñederra, M.L., 1990, *Euskal fonologia. Palatizazioa, asimilizazioa eta hots sinbolismoa*, Zarautz: University of the Basque Country.

_____, 2009a, "Diacronía y motivación fonética", in F. Sánchez Miret (ed.), *Romanística sin complejos. Homenaje a Carmen Pensado*, Bern: Peter Lang, 47-67.

_____, 2009b, "Ohar batzuk bokal batez: Zubereraren [y]", *International Journal of Basque Linguistics and Philology* [*ASJU*] 43, 663-678.

_____, 2013, "*Fonética histórica vasca*, hitz eraketaren morfonologia eta neutralizazio erraldoiak", in R. Gómez, J. Gorrochategui, J.A. Lakarra & C. Mounole (eds.), 699-716.

Orduña, E., 2011, "Los numerales ibéricos y el protovasco", *Veleia* 28, 125-139.

Oyharçabal, B. [Oihartzabal, B.], 1991, [see **Sources**].

_____ (ed.), 1999, [see **Sources**].

Oyharçabal, B., J. Salaberria & I. Epelde, 2011, "Norantz datu-basea: Aurkezpena eta aditz komunztadurako datuak", in I. Epelde (ed.), 1-36.

_____, _____ & _____, 2012, "La base de données Norantz : vers un observatoire des parlers basques d'Aquitaine", *Lapurdum* 16, 27-67.

Peillen, Tx., 1992, "Zubereraren bilakaeraz ohar batzuk", in Euskaltzaindia (ed.),

Nazioarteko Dialektologia Biltzarra. Agiriak (*Iker* 7), Bilbao: Euskaltzaindia, 247-272.

_____, 1998, *Les emprunts de la langue basque à l'occitan de Gascogne*, Madrid: Estudios de la UNED.

Penny, R., 1991, *A History of the Spanish Language*, Cambridge: Cambridge University Press.

_____, 2006, *Gramática histórica del español*, Barcelona: Ariel.

Pierrehumbert, J., 2001, "Exemplar dynamics: word frequency, lenition, and contrast", in J. Bybee & P. Hopper (eds.), *Frequency and the emergence of linguistic structure*, Amsterdam: John Benjamins, 137-158.

Pierrehumbert, J. & M.E. Beckman, 1988, *Japanese tone structure*, Cambridge, MA: MIT Press.

Pope, M.K., 1934, *From Latin to Modern French*, Manchester: Manchester University Press.

Pouplier, M. & L. Goldstein, 2010, "Intention in Articulation: Articulatory timing in alternating consonant sequences and its implications for models of speech production", *Language and Cognitive Processes* 25, 616-649.

Quilis, A., 1993 [1999], *Tratado de fonología y fonética españolas*, Madrid: Gredos.

Ravnæs, E., 1991, *The chronology of the sound changes from Proto-Indo-European to Classical Armenian*, PhD dissertation, University of Oslo.

Recasens, D. & M.D. Pallarès, 2001, "Coarticulation, assimilation and blending in Catalan consonant clusters", *Journal of Phonetics* 29, 273-301.

Reguero-Ugarte, U., 2010, "Euskararen kronologia erlatiboa finkatzeko hurbilketa", unpublished paper, University of the Basque Country.

Rohlfs, G., 1927, "Baskische Kultur im Spiegel des lateinischen Lehnwortes", in B. Schädel & W. Mulertt (eds.), *Philologische Studien aus dem Romanisch-Germanischen Kulturkreise: Karl Voretzsch zum 60. Geburtstage und zum Gedenken an seine erste akademische Berufung vor 35 Jahren*, Halle an der Salle: M. Niemeyer, 58-87.

_____, 1977, *Le Gascon: Études de philologie pyrénéenne*, Tübingen: Niemeyer [3rd Ed.].

Ruhlen, M., 1978, "Nasal Vowels", in J.H. Greenberg, C.A. Ferguson & E.A. Moravcsik (eds.), *Universals of Human Language, Vol. 2: Phonology*, Standford: Standford University Press, 203-242.

Sagarna, A., J.A. Lakarra & P. Salaberri-Zaratiegi (eds.), 2011, *Euskaltzaindiaren XVI.*

Biltzarra. Pirinioetako Hizkuntzak: Lehena eta oraina [*Iker* 26], Euskaltzaindia.

Salaberri, P., 2013, "*Apellidos Vascos* eta Mitxelenaren onomastika lanak", in R. Gómez, J. Gorrochategui, J.A. Lakarra & C. Mounole (eds.), 673-697.

Saltarelli, M., M. Azkarate, D. Farwell, J. Ortiz de Urbina & L. Oñederra, 1988, *Basque*, New York: Croom Helm.

Sampson, R., 1999, *Nasal Vowel Evolution in Romance*, Oxford: Oxford University Press.

Samuels, B., 2009, *The Structure of Phonological Theory*, PhD dissertation, Harvard University.

Sawashima, M., 1997, "Phonetic control of the glottal opening", in S. Kiritani (ed.) *Speech Production and Language: In Honor of Osamu Fujimura*, Berlin: de Gruyter, 69-110.

Schadeberg, Th.C., 1989, "The velar nasal in Nyole", *Annales Aequatoria* 10, 169-179.

Schmidt, R., 1981, *Grammatik des klassisch-armenischen mit sprachvergleichenden Erläuterungen* [Innsbrucker Beiträge zur Sprachwissenschaft, 32], Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.

Schourup, L., 1973, "A Cross-Language Study of Vowel Nasalization", *Ohio State Working Papers in Linguistics* 15, 190-221.

Schuchardt, H.E., 1906, "Baskisch und Romanisch", *Zeitschrift fur romanische Philologie*, Beiheft 6, Halle.

_____, 1908, "Die iberische Deklination", *Sitzungsberichte der Wiener Akademie der Wissenschaften* 157:2, 1-90.

Selkirk, E. & G. Elordieta, 2010, "The role of prosodic markedness constraints in phonological phrase formation in two pitch accent languages", paper presented at *Tone and Intonation in Europe 4*, Stockholm.

Shattuck-Hufnagel, S., 1987, "The role of word-onset consonants in speech production planning: New evidence from speech error patterns", in E. Keller & M. Gopnik (eds.), *Motor and sensory processes of language*, Hillsdale, NJ: Lawrence Erlbaum Associates, 17-52.

Shevelov, G.Y., 1964, *A prehistory of Slavic: The historical phonology of Common Slavic*, Heidelberg: Carl Winter.

Shosted, R., Ch. Carignan & P. Rong, 2012, "Managing the distinctiveness of phonemic nasal vowels: Articulatory evidence from Hindi", *Journal of the Acoustical Society of America* 131.1, 455-465.

Sosa, J.M., 1999, *La entonación del español*, Madrid: Cátedra.

Subak, J., 1906, "Zum Judenspanischen", *Zeitschrift für romanisches Philologie* 30: 129-85.

Thompson, L.C. & M.T. Thompson, 1969, "Metathesis as a grammatical device", *International Journal of American Linguistics* 35, 213-219.

Tilsen, S.E., 2009a, *Hierarchical spatiotemporal dynamics of speech rhythm and articulation*, PhD dissertation, University of California Berkeley.

_____, 2009b, "Multitimescale dynamical interactions between speech rhythm and gesture", *Cognitive Science* 33, 839-879.

Trask, R.L., 1985, "On the reconstruction of Pre-Basque Phonology", in J.L. Melena (ed.), *Symbolae Ludovico Mitxelena septuagenario oblatae*, Vitoria-Gasteiz: University of the Basque Country, 885-891.

_____, 1997, *The history of Basque*, London: Routledge.

Turner, R.L., 1962-1966, *A comparative dictionary of the Indo-Aryan languages*, London: Oxford University Press.

Uhlenbeck, C.C., 1903, *Beiträge zu einer vergleichenden Lautlehre der baskischen Dialekte*, Amsterdam: J. Müller [French translation: 1909-1910, "Contribution à une phonetique comparative des dialectes basques", *Revista Internacional de los Estudios Vascos* 3, 465-503, *Revista Internacional de los Estudios Vascos* 4, 65-120].

Ulibarri, K., 2013, "External History", in M. Martínez-Areta (ed.), 89-117.

_____, in prep., *Dotrinazko Sermoitegia: galdutako hizkera berriak eta dialektologia historikoa*, PhD dissertation, University of the Basque Country.

Ultan, R., 1978, "A Typological View of Metathesis", in J. Greenberg (ed.), *Universals of Human Language* (vol. 2), Stanford, CA: Stanford University Press, 368-399.

Webster, W., 1881, "The early Basque Vocabulary", *Revue de Linguistique et de Philologie Comparée* 14, 125-126 [a letter from L.L. Bonaparte].

Wheeler, M., 1988, "Occitan", in Harris, M. & N. Vincent (eds.), 246-278.

Williams, E.B., 1938, *From Latin to Portuguese: Historical Phonology and Morphology of the Portuguese Language*, Philadelphia: University of Pennsylvania Press.

Wright, J., 1980, "The Behavior of Nasalized Vowels in the Perceptual Vowel Space", *Report of the Phonology Laboratory* (University of California Berkeley) 5, 127-163.

Yu, A.C.L. (ed.), 2013, *Origins of Sound Change: Approaches to Phonologization*, Oxford:

Oxford University Press.

Zarabozo, C., 1972, "Two borrowed sound changes in Basque", *International Journal of Basque Linguistics and Philology* [*ASJU*] 6, 174-182.

Zauner, A., 1898, "Zur Lautgeschichte des Aquitanischen", *Siebenunddreissigstes Programm der I. deutschen Staats-Realschule in Prag*, Prague.

Zduńska, H., 1965, *Studia nad fonetyką gwar mazowieckich. Konsonantyzm*, Wrocław: Zakład Narodowy im. Ossolińskich.

Zuazo, K., 1998, "Euskalkiak gaur", *Fontes Linguae Vasconum* 78, 191-233.

_____, 2008, *Euskalkiak. Euskararen dialektoak*, Donostia-San Sebastián: Elkar.