

# Positional factors in Lenition and Fortition

*Philippe Ségéral and Tobias Scheer*

## Abstract

This chapter reports on positional factors that bear on lenition and fortition. In a first step, a number of definitions are made explicit: 1) positional influence refers only to the position of a segment in the linear string, that is to its syllabic status; 2) positional effects are opposed to effects that are due to adjacency (the latter, but not the former kind of phenomenon is characterised by a transmission of melodic primes and a melodically defined trigger); 3) stress (and hence the position in related constituents such as the foot) is disregarded: stress is a plug-in, i.e. it may or may not bear on a pattern in addition of positional factors.

In a second step, the basic positional pattern is worked out: the five logically possible positions for a consonant to occur in cluster into two disjunctions and one singleton context. The strong position disjunction identifies as {#,C]\_\_, while the Coda disjunction is known as \_\_{#,C} – the two contexts are symmetric regarding both positional description and effect (strength vs. weakness). A special case is made for branching Onsets, an area where the empirical record is scarce.

Finally, the parametric variation of positional influence is studied. Two factors of variation are identified: on the one hand, languages may or may not make word edges follow the internal part of the two disjunctions. That is, the word-initial position may or may not be strong (while the post-Coda position is always strong), and the word-final position may or may not be weak (while internal Codas are always weak). On the other hand, the strength of post-Coda consonants may depend on whether the preceding Coda is occupied by a sonorant or not: post-sonorant consonants may or may not be strong (while post-obstruent consonants are always strong).

## 1. Introduction

### 1.1. Approaching the object: stress, lenition, position, adjacency

This chapter sets out to identify in which way the position of a segment in the linear string bears on its lenition and fortition.<sup>1</sup> We will not be concerned with stress, another conditioning factor that may influence lenition: "positional" in this chapter is understood with exclusive reference to the linear string of segments (i.e. not regarding the position of a segment in a foot or some other met-

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<sup>1</sup> For expository reasons, in the remainder of this chapter we only talk about lenition when we actually mean lenition and fortition.

rical constituent). Bye and de Lacy (this volume) cover stress-conditioned lenition in a specific chapter. In our understanding, stress-conditioning is a plug-in that may kick in, but does not modify the positional influence, which in a given system is constant: both factors are independent. In languages where stress is relevant for lenition, a given segment may thus be exposed to both layers of influence, and will react accordingly. Stress and positional factors seem to entertain an implicational relationship: the former may or may not come to bear in addition of the latter, but systems where lenition is only defined by stress without the position of the segment playing any role do not appear to exist (see Scheer 2004a:§113).

Another preliminary question is what exactly counts as lenition and fortition: positional influence can only be addressed if the identity of the processes discussed has been determined beforehand. Here again, a specific chapter is devoted to this question: we broadly adhere to Szigetvári's (this volume a) findings, even though some eventually disputed detail (laryngeal specifications for example) does not really matter: nothing will depend on this. Also, it is not quite probable that phonologists one day will agree on exactly which processes count as lenition and fortition.

We thus work with the two-way lenition trajectory that Szigetvári (this volume a) works out: damage on segments may show as an increase of sonority ( $t \rightarrow r$ ), or as a loss of place (and laryngeal properties,  $s \rightarrow h$ ). Szigetvári calls the former vocalic, the latter consonantic lenition: consonants become more vowel-like when they move up the sonority scale, but more consonant-like when they lose place or laryngeal specifications (i.e. they approach muteness: complete loss is the ultimate stage of this trajectory). Fortition appears to be the reverse of vocalic lenition, i.e. a movement down the sonority scale ( $j \rightarrow \bar{d}3$ ). An equivalent of consonantic lenition (at least regarding place), however, does not appear to be on record: segments are not observed to gain place specifications in strong position.

Let us now take a closer look at the conditioning factor that lies at the heart of this chapter. The position of a segment in the linear string defines its syllabic identity. The kind of things that we will be concerned with therefore reduce to those phenomena which have a syllabic causality: we are interested in effects that are produced by the specific syllabic status of a segment. This means that the melodic environment is irrelevant: no melodic prime is transmitted from one segment to another, and triggers of the processes at hand are not defined by melodic criteria.

Lenition thereby contrasts with the other major family of phonological processes, adjacency effects. Adjacency may result from a contact of two items in the linear string (e.g. palatalisation of a consonant by a following vowel), or

from a more distant relationship (e.g. vowel harmony). In all cases, assimilation transports a melodic prime from one segment to another; also, only a melodically defined subset of items will qualify as a trigger. Positional factors, on the other hand, are unheard of in assimilatory processes: there is no palatalisation that demands, say, "palatalise velars before front vowels, but only in word-initial position" (see Scheer 2004a:§§112, 567).

The same distinction between adjacency and positional phenomena is argued for by Smith (this volume), who contrasts positional constraints and those that are defined by a segmental context.

## 1.2. Empirical basis and parametric variation

Based on an empirical record that we have tried to make as cross-linguistically relevant as possible, the purpose of this chapter is to establish appropriate empirical generalisations. These may then be used as an input for theories of lenition: here are the patterns, here are some challenges, this is what all theories need to be able to explain. Of course we are aware of the fact that there is no such thing as a theory-neutral description. However, there are degrees of theory-specificity. Chapters of the first two parts of the book try to be as theory-unspecific as possible, and we take this ambition seriously: the goal is to make the content accessible to the largest audience possible, including one that is not interested in knowing which theory is best suited to account for the patterns described. Even though there is no description without analysis and analytic bias, the distinction between description and analysis is piece and parcel of scientific methodology – and rightfully so.

The chapter divides into two main parts: we first describe the basic regularity, i.e. what appears to be cross-linguistically stable (§2). Three relevant patterns are discussed: the strong position  $\{ \#, C \} \_$  ("word-initially and after a heterosyllabic consonant"), the Coda  $\_ \{ \#, C \}$  ("word-finally and before a heterosyllabic consonant") and the intervocalic position  $V \_ V$ . The two latter are weak and hence favour lenition, while the former shields against lenition and favours fortition.

In a second step, we are concerned with parametric choices that individual languages can make within this general frame. They appear to be of two kinds: the margins of words may or may not participate in the phenomenology (§3). That is, an effect may be encountered only in "half of the Coda" (i.e. either in internal or in final Codas), or only in "half of the strong position" (i.e. either word-initially or after Codas). In this case, however, the choice is not arbitrary: no variation is encountered morpheme-internally (all post-Coda consonants are strong, all internal Codas are weak), while the left and the right margin may or

may not follow the internal pattern. That is, word-initial consonants may (e.g. French) or may not (e.g. Greek) be strong, and word-final consonants may (e.g. l-vocalisation in Brazilian Portuguese) or may not (e.g. l-vocalisation in French) be weak. Cases where consonants are strong word-initially but not after Codas, or where final Codas are weak but their internal peers are not, do not appear to exist.<sup>2</sup>

The second parametric variation that we describe is something which should not exist according to the purely positional definition of lenition that was introduced in §1.1. That is, the melodic properties of adjacent segments may influence the strength of consonants – or rather, one specific property: sonority, and in one specific context: the post-Coda position. Post-Coda consonants in some languages are always strong no matter what: in the evolution of French for instance, Latin *t* is shielded against lenition both after obstruents (*rupta* > *route* "road") and after sonorants (*cantare* > *chanter* "to sing"), while it is lost in intervocalic position (*vita* > *vie* "life") (see §2.2). In other languages, however, post-Coda consonants are only strong after obstruents: they line up with weak intervocalic consonants if the preceding Coda is a sonorant. American English varieties illustrate this pattern (see §4.3): flapping of /t/ occurs after sonorants (*quarter*) and intervocalically (*city*), but not after obstruents (*doctor*).

Finally, a word regarding the evidence presented is in order. We only discuss selected data sets which we believe are typical representatives of the pattern at hand. Each situation is substantiated by more evidence (which we refer to as much as we can) and represents what we believe is cross-linguistically relevant. At the risk of being corrected by evidence that is out there and which we do not know about, our ambition is to provide an overview of those patterns that natural language does, and of those that it does not produce.

Another issue is the fact that most data discussed are of diachronic nature. While this mirrors the situation that is found in the literature, there are of course also synchronically active patterns (among which the American English flapping discussed in §4.3). These often lie on the phonetic side and have not (yet) acquired a distinctive quality. More than other phonological phenomena, lenition seems to be bound to diachronic data. Rather than delving into this

<sup>2</sup> Please note that we use the familiar syllabic vocabulary in a purely descriptive fashion that does not imply any theoretical or representational positioning: the lingua franca term "Coda" in our text for example refers to word-final consonants (final Coda) and to those that occur before a heterosyllabic consonant (internal Coda). A "branching Onset", along the same lines, is a cluster of rising sonority, typically obstruent-liquid, to which phonologists traditionally assign a tautosyllabic status. A "Coda cluster" is a sequence of consonants with a falling or a constant sonority slope (Coda-Onset). Finally, "T" in this chapter is shorthand for obstruents, and "R", for sonorants.

issue or trying to provide a more balanced picture between synchronic and diachronic patterns, this chapter rests on the traditional record. Other chapters of this book are more closely concerned with synchronic data (e.g. Bye and de Lacy this volume). Our general assumption is that diachronic and synchronic evidence is just phonological evidence: there is only one phonology, which marshals both synchronic and diachronic phenomena – and hence only one set of generalizations regarding strong and weak positions.

## 2. The basic pattern: strong vs. weak positions

### 2.1. The five basic positions and their clustering into three major groups

Consonants may occur in five different positions of the linear string: 1) word-initially #\_\_, 2) after a Coda C.\_\_, 3) intervocalically V\_\_V, 4) before a heterosyllabic consonant \_\_.C and 5) word-finally \_\_#.

These exhaust the logically possible positions as long as branching Onsets, i.e. typically *muta cum liquida*, are lain aside. Branching Onsets are discussed in a specific section below (§2.7). In their absence, table (1) shows how the five basic positions lump together in many languages.

#### (1) the five basic positions and their grouping

	position	usual name			
a.	#_V	word-initial	}	strong position	
b.	VC.__V	post-Coda			
c.	V__CV	internal Coda	}	Coda	
d.	V__#	final Coda			
e.	V__V	intervocalic			
			}		
			weak positions		

Positions have been arranged according to their effect. It does not really take much to convince phonologists that the generalisation regarding the Coda disjunction \_\_{#,C} is real. This disjunctive context played a prominent role in the late 70s: it was one of the major arguments at the origin of the autosegmental idea, which (re-)introduced syllable structure into the hitherto linear SPE model. Coda effects are very common, and everybody knows that they typically provoke lenition of the Coda consonant: all textbooks mention relevant evidence (e.g. Harris 1994:66ff, Blevins 1995:227ff).

On the other hand, (1) identifies the exact mirror context, i.e. "after a heterosyllabic consonant and word-initially" {C,#}\_\_ as the "strong position". This is how the disjunction at hand has been called in the Romanicist literature since the 19<sup>th</sup> century (among many others Bourciez and Bourciez 1967:122)

on account of its effect, which is also opposite in regard of the Coda: consonants in this position are shielded against lenition, and in some cases undergo fortition.

The constitution of (1a) and (1b) as a disjunctive context whose members share a common fate is much less well established in the general phonological literature than the Coda disjunction. We have collected relevant synchronic and diachronic evidence from genetically unrelated languages elsewhere (Ségéral and Scheer 2001a) in order to support the reality of the strong position disjunction. The following section discusses a case at hand, and §2.4 addresses the issue as such.

Finally, consonants in intervocalic position are certainly prone to damage and therefore must be said to occur in a weak position. However, the effects produced are different in kind from those that are observed in the other weak position, the Coda. Some illustration of this fact is provided in the following section, and §2.3 provides further discussion. Also note that of all environments, the strength of the intervocalic position is most inclined to fall under the influence of stress. Relevant evidence is discussed in Bye and de Lacy (this volume) and Kristó (this volume: §3.2.3).

The overall picture thus divides the five basic positions into three blocks, two of which are disjunctions: The disjunctive strong position is opposed to weak positions, which fall into the (disjunctive) Coda and the intervocalic context.

## 2.2. The strong position: evolution of Latin obstruents in French

The evolution of Latin obstruents in French is particularly suited to accompany the foregoing discussion: it illustrates all divisions mentioned. Relevant evidence appears under (2) below.<sup>3</sup>

<sup>3</sup> The data presented, as well as the discussion below, are a digest version of a more intricate philological situation that is considered at greater length in Ségéral and Scheer (2001a) and Scheer (2004a:§117). For example, the conservation of certain bilabial plosives in Coda position (in form of an [f], e.g. \*cap(u) > chef, trabe OFr. tref/tre), the regular continuation of velar stops as yod in certain environments, as well as the existence of palatalisations in strong position require further discussion.

Vowels that are lost at some (early) stage of the evolution appear in brackets, stressed vowels are underscored, and vowel length is not indicated. In each column, the Latin forms precede their French cognates.

Glosses for table (2): a) "door, well, canvas, tooth, heart, face, hunger, snake"; b) "mole, grass, to sing, ardour, rancour, fear, hell, to pour"; c) \_\_C "road, elbow, plane (tree, dia-

(2)

	a. #		b. post-Coda	
p	<u>p</u> orta	porte	tal <u>p</u> a	tau <u>p</u> e
b	<u>b</u> ene	bien	her <u>b</u> a	her <u>b</u> e
t	<u>t</u> ela	toile	can <u>t</u> are	chan <u>t</u> er
d	<u>d</u> ente	dent	ar <u>d</u> ore	ar <u>d</u> eur
k	<u>c</u> or	cœur	ran <u>c</u> ore	ran <u>c</u> œur
g	<u>g</u> ula	gueule	ang <u>u</u> stia	ang <u>u</u> isse
f	<u>f</u> ame	faim	in <u>f</u> ernu	en <u>f</u> er
s	<u>s</u> erpente	serpent	vers <u>s</u> are	vers <u>s</u> er

	c. Coda		d. V__V			
	<u>C</u>	<u>#</u>				
p	ru <u>p</u> a	route	lu <u>p</u> (u)	leu [lø]	ri <u>p</u> a	rive
b	cu <u>b</u> (i)tu	coude	u <u>b</u> (i)	où	fa <u>b</u> a	fève
t	pl <u>a</u> t(a)nu	plane	mar <u>i</u> t(u)	mari	vi <u>t</u> a	vie
d	ad <u>v</u> enire	avenir	nu <u>d</u> (u)	nu	co <u>d</u> a	queue
k	fa <u>c</u> a	faite	*ve <u>r</u> ac(u)	vrai	lactu <u>c</u> a	laitue
g	rig <u>i</u> (u)du	raide			*ag <u>u</u> stu	août
f	ste <u>p</u> h(a)nu	Etienne			de <u>f</u> oris	dehors
s	mu <u>s</u> a	mouche	no <u>s</u>	[nu]	ca <u>s</u> a	chose [z]

Let us first consider the behaviour of obstruents in intervocalic position as under (2d). All of them undergo lenition. That is, labial stops spirantise, dental and velar stops as well as [f] disappear altogether, and [s] voices.

In contexts under (2c), i.e. before a (heterosyllabic) consonant and word-finally, Latin obstruents are lost. The identical behaviour of consonants in this disjunctive context \_\_{C,#} reflects their common syllabic status: they occur in Codas.

Hence the fate of Latin obstruents in intervocalic position and in Codas is different. Even though [t,d] for example are lost in both environments, voicing (Latin s) and spirantisation (Latin labials) are observed in intervocalic position, while no such process occurs in Codas. This notwithstanding, both intervocalic and Coda contexts produce damage.

Let us now turn to obstruents that occur word-initially (2a) and after Codas (2b). The first thing to observe is that all consonants behave in exactly the same way in both environments: a given input produces the same result word-initially and in post-consonantal position. The disjunctive context {C,#}\_\_ that emerges is the strong position.

The second relevant observation is that consonants in strong position remain stable in the evolution from Latin to French (which has certainly gone

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lectal), future, done, rigid, Stephen, flee"; c) \_\_# "wolf, where, husband, naked, true, we"; d) "shore, broad bean, life, tail, lettuce, August, outside, thing".

through intermediate stages, none of which, however, has produced damage). Thus the contrast between the strong position on the one hand and the Coda and the intervocalic position on the other is maximal.

In sum, damage or preservation of Latin obstruents depends on the position in which they occur, and the five basic situations cluster as shown under (1).

### 2.3. Two ways of being weak

The evolution of Latin obstruents demonstrates that the effects of the Coda and the intervocalic position may occasionally coincide, but do not need to. Therefore two weak positions must be distinguished.

This is confirmed by other phenomena. On many occasions and regarding a number of processes, the damage provoked by Codas is not found intervocalically, and vice-versa (see Szigetvári *this volume a*, Szigetvári 1999, Ségéral and Scheer 1999a, Scheer 2004a:§131). Devoicing for example typically occurs in Codas, but is never observed intervocalically. Other candidates for Coda-specific lenition include deaspiration, velarisation ( $l, n \rightarrow l, \eta$ ), s-debuccalisation ( $s \rightarrow h$ ), liquid gliding ( $r, l \rightarrow j$ ), depalatalisation ( $\eta \rightarrow n$ ), l-vocalisation ( $l \rightarrow w$ ), r-vocalisation or loss (of the English or German kind:  $r/\text{ʀ} \rightarrow \text{v}$ ) and the homorganisation of nasals.

On the other hand, rhotacism is a form of lenition that appears to occur only in intervocalic position. Spirantisation is also a typical intervocalic event; it may, however, occur in Codas as well (the oft-quoted Tiberian Hebrew spirantisation illustrates this pattern). It remains true, nonetheless, that spirantisation in Codas supposes the spirantisation of intervocalic stops: cases where stops spirantise in Codas but not intervocalically do not appear to be on record. The reverse of course is not true: spirantisation occurs only intervocalically in many systems.

The same point can also be made when looking at lenition trajectories: Szigetvári (*this volume a*, see also Szigetvári 1999, *in press*, Honeybone 2001:227f, Ségéral and Scheer 1999b) argues that there are two major paths on which strong segments can engage when experiencing damage: while one is bound to the intervocalic position, the other is observed in Codas. There are two ways of being weak.



## 2.4. Cross-linguistic relevance of the strong position

As was mentioned earlier, the fact that the Coda is a lenition-inducing position today does not require any specific empirical grounding. Abundant evidence has been produced in traditional philological, neogrammarian, structuralist and generative work. The same holds true for the intervocalic position: its lenition-generating character across languages is undisputed and amply documented.

The strong position, however, has received far less attention from all quarters, theoretical and descriptive, present and past. Even though it represents as much a disjunction as the Coda context and hence raises the same challenge for phonological theory (i.e. to be able to address the disjunction as a unified phonological object), only occasional discussion appears in the literature (Kenstowicz and Kisseberth 1977:16, Kenstowicz 1994:35), and the theoretical challenge is never made explicit.<sup>4</sup>

We have therefore tried to collect as much data as we could where segments share a common fate in the strong position. The evidence that has been gathered in Ségéral and Scheer (2001a,b, 2005), Scheer (2004a:§§110, 556), Szigetvári (1999, to appear), Dienes (2000) aims at establishing the cross-linguistic validity of the strong position, which is relevant for synchronic alternation as much as in diachronic evolution, and active in languages of various genetic origin such as Romance, Germanic, Greek, Armenian, Semitic, Cushitic and Korean. Particular phenomena that have been shown to make reference to the strong position are the evolution of Ibero-Romance sonorants, the distribution of stop-allophones in Somali, Tiberian Hebrew spirantisation, the High German (or 2<sup>nd</sup>) Consonant Shift (on which more below, also in Holsinger this volume and Honeybone 2001, 2002:60ff, 272ff, 2003), Sievers' Law, the evolution of Indo-European yod in Classical Greek, spirantisation in Castilian, so-called betacismo ( $v > b$ ) and  $s > \text{ts}$  in Italian dialects (all in Ségéral and Scheer 2001a, see also Scheer 2004a:§§110, 556), the evolution of

<sup>4</sup> As far as we can see, the OT literature on positional phenomena (among others, Beckman 1997, 1998), which is often cue- or effort-oriented (Kirchner 1998, 2004, Steriade 1997, Zoll 2004, Vijayakrishnan 2003) and sometimes especially focuses on fortition (Smith 2002, 2004), does not mention the strong position disjunction as a relevant linguistic object at all. The empirical grounds for segmental strength (hence abstracting away from stress-based diagnostics) reduce to "the beginning of X" where X can be the word, the syllable, the morpheme, the root, the stem, the foot, the prosodic word or any other relevant phonological unit. Also, the strong position disjunction, or the post-Coda position for that matter, is entirely absent from Kirchner's (1998:8ff) cross-linguistic survey of positional influence on lenition. The literature in question seems to be unaware of the fact that the post-Coda position is strong in many languages and lines up with the word-initial position. Smith (this volume) addresses this issue.

Latin yod in French (Ségéral and Scheer 2001b, on which more in §3.3), the lenition of plosives in Liverpool English (Honeybone 2001, 2002:192ff, 2003), the distribution of so-called lax stops in Korean and consonant gradation in Finnish (more on the three latter cases in §4.3).

Our window on the cross-linguistic reality is of course very narrow. The literature offers only relatively scarce evidence; among other things, this is certainly due to the fact that, contrary to Coda phenomena, phonologists have had no particular reason to watch out for strong position effects since most of the time these are non-events: consonants in strong position manifest their strength by resisting lenition (which goes into effect elsewhere) much more frequently than by actually undergoing fortition. Phonologists, however, tend to accept only observable modifications as a phonologically relevant event – even if, as Lass (1973) points out, stability, rather than change, is surprising in diachronic evolution.

In any event, we are confident that the above record, which has been established on the grounds of a limited set of languages and in a relatively short period of time, is cross-linguistically relevant. It has the same heuristic status as the Coda disjunction.

## 2.5. Positional strength is relative, not absolute

Another aspect of positional strength is the fact that it is relative, not absolute. The foregoing discussion may suggest that the strong position protects consonants against damage no matter what – hence that we do not expect lenition to occur word-initially or after a heterosyllabic consonant. This impression is wrong. The strong position does not generate phonological processes – no more than the weak positions. Rather, processes do or do not occur independently of positional criteria; once they are active, however, they will be able to affect segments more or less according to the position in which they occur: the output will never be weaker in the strong position than it is in weak positions. In other words, there may well be lenition in strong environments, and fortition in weak contexts. It cannot be predicted whether a given position – strong or weak – will experience lenition (or not), fortition (or not), what kind of lenition or fortition, and how much of it. The only generalisation that we see is relative: for a given input in a given language and regarding a given phenomenon, strong positions are *relatively* stronger than weak positions, i.e. they will produce outputs that are at least as strong as those that appear in weak positions.

Hence we do not expect to find a language where the same input experiences lenition in the strong position, but remains undamaged (or even strengthens) in one or both of the weak positions. Or where strengthening occurs in a

weak position, but does not affect the same segments in the strong position (or, worse, where the same input lenites in strong position).

On the other hand, it is perfectly trivial and unimpressive to observe lenition across the board, i.e. in all positions, including strong environments. Many "spontaneous", that is context-free sound shifts illustrate this pattern.

### 2.5.1. *An apparent counter-example: progressive assimilation (NC → NN)*

We know of one recurrent pattern that appears to violate this generalisation. It may be characterised as a progressive assimilation of the kind  $C_1C_2 \rightarrow C_1C_1$ . Two cases need to be considered:  $NC \rightarrow NN$  and  $Ls/Ln \rightarrow LL$  (where L is a liquid). That is, a strong post-Coda consonant seems to fall prey to its weak neighbour, which occurs in coda position.

The former pattern concerns almost exclusively NC clusters where C is voiced. A typical example is found in the evolution from Middle High German (MHG) to New High German (NHG) (e.g. Paul *et al.* 1989:146): compare MHG *zimber*, *lember*, *imbe* with NHG *Zimmer*, *Lämmer*, *Imme* "room, lamb pl, bee" (note that the geminate value of the double nasals is safe for MHG, while the modern standard, unlike many dialects, has eliminated all geminates). The same phenomenon also occurs in Southern Italian dialects (e.g. Calabrese *chiummu* < *plumbu* "lead (metal)", *quannu* < *quando* "when" Rohlfs 1966-69:I §§253-255), in Gascon (*paloumo* < *palumba* "wild pigeon"), Spanish (*paloma* < *palumba* "wild pigeon") and Catalan (*coloma* < *columba* "pigeon", *segona* < *secunda* "second") (all of which are documented by Rohlfs 1935:103).

The  $Ls/Ln \rightarrow LL$  pattern is illustrated in Latin (Niedermann 1985:§§72f, 82f, Palmer 1954:231): *\*vel-se* > *velle* "to want", *\*tol-no* > *tollo* "to remove, to take away", *\*fer-se* > *ferre* "to carry" (apparent counter-examples such as *pulsus* "chased", *farsi* "to stuff pf 1sg", *alnu* "alder", *ulna* "forearm" represent secondary groups that are born through the loss of an intermediate consonant: *farsi* < *\*fark-s-i*). Somali (Cushitic) may also be cited (Orwin 1995:19): *waannu hellay* (< /hel-n-ay/) "we found (it)", *waannu dirray* (< /dir-n-ay/) "we sent (it)". More of the same is found in Korean (Kang 2000:85): *pur* "fire" followed by *na-* "to happen" comes out as *pulla-* "detection of (fire)".

Two comments are in order. For one thing, we are obviously facing an assimilation – one that is unexpected, but an assimilation nonetheless: the weak Coda rules over the strong post-Coda. In other words, the phenomenon is not positional: it has an assimilatory motor. Also, the result is always a geminate, i.e. a strong object. For a similar case in the Gallo-Romance evolution we have proposed a compensatory lengthening scenario (Ségéral and Scheer 2001b): the Coda consonant drops, the post-Coda consonant expands on its position,

but then – crucially – the melodic primes of the Coda, which have been dissociated but not lost, dock onto the geminate and hence produce the impression of a progressive assimilation.

2.5.2. *The High German consonant shift: damage in strong, but less than in weak position*

A case where all targets are damaged, but less so in strong than in weak positions, is the High German (or 2<sup>nd</sup>) Consonant Shift. Voiceless Common Germanic stops [p,t,k] (which appear unmodified in English) have lenited in strong and weak positions alike in the Southern half of present-day Germany (which is the origin of "Standard German"). However, more damage is produced intervocally and in Codas (where fricatives are observed) than in the strong position (where affricates occur). Some illustration appears under (3) below, where in each column unshifted English forms are followed by their High German cognates.<sup>5</sup>

(3) High German (2<sup>nd</sup>) Consonant Shift

	a. #		b. post-Coda		c. Coda		d. V _ V	
p	path	<b>P</b> fad	car <b>p</b>	Kar <b>p</b> fen	shee <b>p</b>	Schaf	po <b>p</b> e	Pfaff <b>e</b>
t	ten	[ <b>ts</b> ]ehn	salt	Sal[ <b>ts</b> ]	that	das	hate	hassen
k	corn	[ <b>kx</b> ]orn	thank	dan[ <b>kx</b> ]e	streak	Strich	make	machen

The description according to which lenition is observed in strong, but less so than in weak position, is subject to caution in two respects. For one thing, it has been disputed that affrication is lenition at all (Foley 1977, Escure 1977). Also, we may face a two-, rather than a one-step evolution: in the former perspective, there has been spontaneous affrication everywhere, followed by an independent contextual change that took affricates to fricatives in weak positions; following the latter scenario, the same process has turned voiceless stops

<sup>5</sup> See Holsinger this volume, §2.3) for further discussion. Note that the velar affricate [kx] has only survived in High Alemannic (elsewhere [k] was restored), and that there are no examples for internal Codas since all inputs in this context have been previously eliminated by Grimm's Law. Again, we cannot present full philological and diachronic detail in the frame of this chapter. The phenomenon is well known, and the literature abundant since Braune (1874). Davis and Iverson (1995), Davis et al. (1999) and Honeybone (2002:60ff, 272ff, 2003, 2005) have recently looked at the 2<sup>nd</sup> Shift from the point of view of lenition, the latter especially inquiring on the environments and causes for total blocking (stops remain unshifted in homorganic contexts).

into affricates in strong position, while the result in weak positions were fricatives.

Honeybone (2001:228f) convincingly refutes the doubts that affrication is lenition. These doubts are based on a phonetic definition of lenition ("lenition is the loss of perceptual salience"), according to which the addition of a fricative component to a stop augments its perceptual salience. On this count, however, regular spirantisation (e.g.  $p > f$ ) is no lenition either, a position that nobody will want to seriously entertain.

The second objection is more serious, since the point that we want to make here – lenition in strong position, but less than in weak positions – is fictitious if affrication has applied across the board: on the two-step analysis there is no differential in lenition promotion according to strong vs. weak contexts. Our argument thus supposes the one-step analysis. The literature generally favours the two-step perspective, although the one-step scenario has also been advocated.<sup>6</sup> Scheer (2004b, also 2004a:§572) reviews the evidence in detail and concludes that no compelling argument has been produced in favour of the two-step perspective, or in disfavour of the one-step analysis for that matter.

On the other hand, the two scenarios make different predictions: while on the two-step analysis there must have been affricates in weak positions (affrication has first applied across the board), the one-step scenario holds that affricates have never existed in this context. Dialects may act as a referee. The record is without entirely unambiguous: despite meticulous scrutiny, the existence of a great amount of dialectal variation and a relatively vast territory, dialectologists could not find any trace of affricates in weak positions (Scheer 2004b).

## 2.6. Languages where phonology applies across word boundaries

Some languages do not take word boundaries into account: phonology works as if they were not there.<sup>7</sup> This phenomenon is sometimes called connected

<sup>6</sup> Two-step defenders (e.g. Penzl 1969:65f, Szulc 1974:134, Davis and Iverson 1995) have not come up with any new argument since Braune (1874) and, if any evidence is brought to bear at all, repeat his two points: the gemination of resulting fricatives and the graphically witnessed secondary affricate > fricative simplification in post-Coda position due to non-homorganicity (e.g. *helfen* > *helfen*). Scherer (1870:265), Fourquet (1948:80f, 91f), Schatz (1927:95), Schmitt (1949:20f) argue for the one-step scenario, which is explicitly admitted as a valid option by Braune (1874:47f) himself.

<sup>7</sup> Of course, this is a phonologist's statement: it needs to be moderated by syntactic parameters. Boundaries may be more or less transparent according to the syntactic relationship that the two words at hand entertain. Exactly which relationship allows phonol-

speech (e.g. Kaisse 1985). In systems of this kind, word-initial consonants behave like their peers in post-Coda position if the preceding word ends in a consonant, while they line up with intervocalic consonants when the preceding word ends in a vowel.

Two cases where phonology applies across word boundaries are described in this book: Jaskula (this volume) discusses Celtic, while Marotta (this volume) reports on Tuscan Italian. Connected speech is indeed a typical feature of Central Italo-Romance (i.e. the middle part of the Italian peninsula including the islands of Corsica and Sardinia, see Giannelli and Savoia 1978-79, Dalbera-Stefanaggi 2001b), of which Tuscan is a representative. Another example is Corsican, where word-initial stops are lenited when the preceding word ends in a vowel, but remain stable in case they are preceded by a consonant-final word. Compare *un* [d]ente "a tooth" with *dui* [ð]enti "two teeth", and *in* [g]ola "in the throat" with *di* [w]ola "of the throat" (Dalbera-Stefanaggi 2001a:61ff, Dalbera and Dalbera-Stefanaggi 2004).

This kind of sandhi phenomenon of course does not constitute counter-evidence for the basic pattern discussed in §2.2; neither are we facing a case of initial weakness (in the sense of §3.2). The languages at hand have simply "decided" to ignore certain word boundaries before applying phonological computation. That is, word-initial consonants are simply *not* word-initial when phonology applies: according to the end of the preceding word, they are either post-consonantal or intervocalic and therefore show the regular behaviour of these positions. Rather than with a parameter on the strength of the initial site, we are dealing with one that operates on the visibility of boundaries, in the present case of word boundaries.<sup>8</sup>

In sum, thus, what may appear to be a specific pattern of lenition in fact represents a more general parametric choice regarding the visibility of boundaries, which may have a secondary effect on lenition. It is not anything that a theory of lenition needs to account for: influence of positions on phonological computation is the same everywhere – only are positions sometimes defined exclusively within the limits of words, at other times across word boundaries.

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ogy to seep through is a special field of investigation that has been covered by Prosodic Phonology in the past. This question is orthogonal to the purpose of the present chapter.

<sup>8</sup> Note that morpheme boundaries show identical behaviour: they may or may not be visible to the phonology. A classical example is the well-known contrast between class 1 and class 2 affixes in English (e.g. Siegel 1974, Mohanan 1986): the boundary of the former is invisible (e.g. consistent penultimate stress in both *párent* and *parént-al*), while the boundary of the latter affects phonology (compare with the "irregular" stress of *párent-hood*).

That is, certain morpho-syntactic divisions are visible in the phonology, others are not; the choice is of parametric nature.

## 2.7. Branching Onsets

Let us now have a look at branching Onsets. The evidence available is rather scarce for an obvious typological reason: branching Onsets stand on the far end of the syllabic complexity that natural language allows for. If a system tolerates clusters, these will either be restricted to Coda-Onset sequences, or encompass both raising and falling sonority slopes. Systems with branching Onsets but without Coda clusters do not appear to exist.<sup>9</sup> Hence branching Onsets imply the existence of Coda clusters, but the reverse is false.

In addition to the fact that evidence is thus naturally scarce; traditional descriptions often do not pay attention to the specific pattern of branching Onsets. Their behaviour under the pressure of lenition is therefore significantly less well documented than the behaviour of consonants in other configurations. In recognition of this fact, our position is one of caution: while we can report on documented and resident patterns elsewhere, we are only at the stage of collecting data when it comes to branching Onsets. This being said, the pieces of data that we are aware of produce a concordant picture, which we expose below.

Two cases of lenition in branching Onsets are discussed in other contributions to this book: Celtic (Jaskula this volume) and Tuscan Italian (Marotta this volume). Let us complete these data sets with the evolution of Latin *muta cum liquida* in French – recall that we already know the result for simplex obstruents from §2.2: they appear without any damage in word-initial and post-Coda position, but systematically experience lenition intervocalically.<sup>10</sup>

<sup>9</sup> Common Slavic is the one alleged counter-example that is known in the literature. Kristó (this volume), however, calls this interpretation of the Common Slavic evidence into question.

<sup>10</sup> As before, the evidence shown is selected and incomplete (but representative). For example, clusters where the liquid is a lateral as well as those where the obstruent is a velar are not illustrated. In the latter case, this is because in addition to the action of lenition proper, the surrounding vowels bear on the result. Also, we do not distinguish primary (Lat. *umbra*) from secondary (Lat. *purp(u)ra*) clusters: their behaviour is identical. Finally, note that the Coda column is missing since of course TR clusters are absent from Codas. Relevant literature includes Bourciez and Bourciez (1967: §§132, 144, 168).

(4) evolution of Latin *muta cum liquida* in French (*muta* = labial and dental)

		#__		post-Coda		V__V	
pr	> vr	<b>pr</b> una	<b>pr</b> une	<b>purp</b> (u)ra	pour <b>pr</b> e	<b>cap</b> ra	chèvre
br	> vr	<b>br</b> achiu	<b>br</b> as	<b>um</b> bra	om <b>br</b> e	<b>lab</b> ra	lèvre
tr	> r	<b>tr</b> es	<b>tr</b> ois	cap <b>ist</b> ru	chevê <b>tr</b> e	pe <b>tr</b> e	père
dr	> r	<b>dr</b> appu	<b>dr</b> ap	per <b>d</b> (e)re	per <b>d</b> re	quadr <b>at</b> u	carré

It appears that for any given position, obstruents engaged in *muta cum liquida* behave exactly as their simplex peers. Compare (4) with (2): labials for example are preserved in strong position (**pr**una = **p**orta, **tal**pa = **purp**(u)ra), but spirantise intervocalically (**rip**a = **cap**ra > [v]). The reader may verify that the behaviour of dentals in isolation and before a liquid is also identical.

Celtic and Tuscan Italian (Jaskula and Marotta this volume) follow exactly the same pattern, and the Hessian German evidence discussed by Holsinger (this volume, §3) does not seem to be incompatible.<sup>11</sup> There is thus some reason to believe that the equivalence between singleton obstruents and obstruents that are engaged in a branching Onset has more general value: they appear to experience the same phonological conditions. Further study must show whether this pattern is really cross-linguistically robust.

### 3. Parametric variation I: edges may or may not follow the internal half of the two disjunctions

The two disjunctions that are motivated by lenition are exactly symmetric both in their structural description and regarding the effect produced: the Coda \_\_{#,C} induces weakness, while the strong position {#,C}\_\_ confers strength. This can hardly be accidental and thus raises a challenge: phonological theory needs to be able to characterise each disjunction as a non-disjunctive, single and unique phonological object; also, the two non-disjunctive identities at hand must somehow be the opposite of one another (Ségéral and Scheer 2001a).

Significantly, the same perfect symmetry is found when looking at possible parametric choices. We will see indeed that edges may, but do not need to follow the internal part of the disjunction that they are involved in. If they do, the regular pattern described in §2 is derived: \_\_# behaves like \_\_.C, and #\_\_ follows C.\_\_. In some languages, however, word-final consonants part com-

<sup>11</sup> Further evidence from French, Occitan and Franco-Provençal dialects (i.e. the record of the ALF, Atlas Linguistique de la France) is produced by Brun-Trigaud and Scheer (forth): the isoglosses of the various reflexes of Latin obstruents that occur alone or are followed by a liquid by and large coincide.



pany with internal Codas, in which case the only Coda position is \_\_.C. This situation is classically accounted for by extrasyllabicity. The same is true on the other end of the string: in some languages, word-initial consonants do not pattern with their peers in post-Coda position. Instead, they behave like intervocalic consonants. In these systems, the only strong position is after Codas.

Quite strikingly, languages where the halves of the two disjunctions have the reverse distribution do not appear to exist: if only one half of the Coda disjunction is subject to some lenition while the other remains unaffected, damage will concern internal Codas. Cases where final Codas react while their internal peers do not are not on record.<sup>12</sup> In the same way, we do not know of systems where the initial, but not the post-Coda position is strong. Imparity of the two strong and the two coda positions is thus only one way: edges, but not internal sites, may part company.

The behaviour of edges in regard of positional strength is thus parameterised across languages. By contrast, the behaviour of morpheme-internal positions is not: here the same effect is provoked everywhere: post-Coda consonants are always strong, and consonants in internal Codas as well as intervocalic consonants are always weak (with the additional proviso discussed according to which the latter display two different kinds of weakness). Hence the five basic positions may not only be organised into two disjunctive clusters and one singleton as under (1): another meaningful classification is according whether or not they are adjacent to a word boundary: the behaviour of #\_\_ and \_\_# is subject to parametric variation, while the three internal positions show invariable behaviour across languages.

### 3.1. Variation is caused by morphology: the parametric space

Just like the for connected speech, there is good reason to believe that the variation at hand has got nothing to do with phonology; rather, it is the result of parametric choices that concern locations where morphology has a word to say, i.e. at morpheme edges. That is, phonology itself does not vary throughout the

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<sup>12</sup> At first sight, of course, final devoicing appears to be a massive counter-example to this generalisation. For one thing, this phenomenon is a notorious troublemaker: given that (intervocalic) voicing is a typical instantiation of lenition, devoicing must be regarded as strengthening – but it occurs in Coda position, a lenition-inducing environment. Another issue to be mentioned is the utterance-final position (which however is not the same thing as the word-final position): Patrick Honeybone reports that debuccalisation (t → h) in Liverpool English occurs utterance-finally, but does not affect /t/ in utterance-internal (word-final and word-internal) Codas.

patterns mentioned: domestic phonological activity (i.e. which is uninfluenced by extra-phonological factors) is invariable; it produces the stable morpheme-internal situation at hand, which in addition may or may not be subjected to morphological influence.<sup>13</sup>

The following table shows the parametric space that is opened by the variability of edges.

(5) parametric variation of the positional strength of edges

	strong position		V _ V	Coda	
	# _	C. _		_ C	_ #
a. French	strong	strong	weak A		
b. Greek	not strong	strong	weak A		
c. Polish			weak A	weak B	not weak B
d. Braz. Portuguese, French			weak A	weak B	weak B

The situations under (5a) and (5d) have already been illustrated by the evolution of Latin obstruents in French (§2.2) where both the strong position and the Coda is disjunctive. Among many others, Brazilian Portuguese is another case in point concerning (5d): in this language l-vocalisation affects laterals in both internal and final Codas (compare for example Europ. Port. *sa[t]eiro*, *sa[t]*, *sa[t]-gar*, *ca[t]sa* with Braz. Port. *sa[w]eiro*, *sa[w]*, *sa[w]-gar*, *ca[w]sa* "salt cellar, salt, to salt, trousers").

The pattern that is commonly referred to as extrasyllabic, i.e. (5c), does not really need further illustration: the literature on extrasyllabicity has firmly established the cross-linguistic reality of cases where word-final consonants escape Coda effects, while internal Codas are damaged (e.g. Hulst and Ritter 1999, Rubach 1999:292ff). Polish is a case in point. In this language, the palatal nasal "implodes" in internal, but not in final Codas: the result is the nasalised glide [ɲ̃] (e.g. Ostaszewska and Tambor 2000:51f, 61f, Scheer 2004a:§582). The words for "horse" and "rogue" for example are *koń* [kɔɲ] and *drań* [draɲ] in NOMsg, and *konia* [kɔɲa], *drania* [draɲa] in GENsg: the palatal nasal appears undamaged. When the adjectival marker *-ski* is suffixed, however, the result is *koń-ski* [kɔɲski] "of the horse" and *drań-ski* [draɲski] "of the rogue" with a glidified nasal. The damage of the palatal nasal may also be observed morpheme-internally: *taniec* [tapɛts] means "dance NOMsg"; its last vowel alternates with zero and is absent when a vowel-initial suffix is added.

<sup>13</sup> Note that this does not tell us whether the word-initial and the word-final position is strong or weak "by nature", i.e. when phonology is the only conditioning factor.

Since this puts the preceding palatal nasal into contact with the following consonant, the nasal lenites: *tańc-a* [taʃtsa] "dance GENsg", *tańcz-yc* [taʃtʃitɕ] "to dance" (a verb whose imperative is *tańcz!* [taʃtʃ] "dance!").

We now set out to introduce the missing parametric situation (5b) where word-initial consonants are not strong. Since little attention was paid to the strong position disjunction in the past, its parametric variation also needs to be empirically established. We therefore review two cases in point, Greek and the Mazovian dialect of Polish.

### 3.2. When word-initial consonants are weak I: Greek

The Greek evidence to be discussed concerns the evolution from Classical to Modern Greek. The philological and socio-linguistic situation (diglossia: Demotic vs. Katharevusa) is quite intricate and cannot be exposed. Seigneur-Froli (2003, 2006) provides relevant discussion; data and analysis below are hers.

Classical Greek possesses three series of stops: plain voiced β, δ, γ [b, d, g], plain voiceless π, τ, κ [p, t, k] and aspirated voiceless φ, θ, χ [p<sup>h</sup>, t<sup>h</sup>, k<sup>h</sup>]. In the evolution towards Modern Greek, some of these stops were lenited and now appear as fricatives. This spirantisation is conditioned by three factors: 1) the position in the string, 2) the voice value of the stops and 3) aspiration. Voiced stops have spirantised across the board no matter which position they occurred in (except in homorganic NC clusters). Plain voiceless stops have spirantised in Coda position (e.g. κλέπτῃς *kleptēs* > κλέφτῃς [klefʲis] "thief"), but appear without damage everywhere else: word-initially (πατήρ *patēr* > πατέρας [pateras] "father"), after Codas (ἐκπλέω *ek-pleō* > εκπλέω [ek-pleo] "to set out (ship)") and in intervocalic position (ἐπειδὴ *epeidē* > επειδὴ [epiði] "because").

The remaining series, aspirated voiceless stops, is the witness for the weakness of word-initial consonants. Consider its evolution under (6) below (in each column, Classical Greek forms are followed by their Demotic reflexes).<sup>14</sup>

<sup>14</sup> Classical Greek allows for unorthodox initial clusters: #pt, #kt (as well as their voiced and aspirated counterparts) and #mn. There is ample evidence to the end that these groups are heterosyllabic (Steriade 1982), and they indeed show regular behaviour along these lines (i.e. C<sub>1</sub> shows the reaction of Codas, C<sub>2</sub> of post-Codas). We will come back to the existence of these clusters in §3.4 below. Evidence for blank cells is missing. Glosses for table (6) (line by line): "I carry, anxiousness, eye, arrival, sea, eye, veil, grace, support with uneasiness, height, rock".

## (6) evolution of Classical Greek voiceless aspirated stops in Demotic

	a. #	b. post-Coda	c. Coda	d. V__V
p <sup>h</sup>	<b>p<sup>h</sup>ero</b> <b>fero</b> φέρω    φέρω		<b>op<sup>h</sup>t<sup>h</sup>almos</b> <b>oftalmos</b> ὀφθαλμός    οφθαλμός	<b>ap<sup>h</sup>iksis</b> <b>afiksi</b> ἄφιξις    ἀφιξη
t <sup>h</sup>	<b>t<sup>h</sup>alassa</b> <b>thalassa</b> θάλασσα    θάλασσα	<b>op<sup>h</sup>t<sup>h</sup>almos</b> <b>oftalmos</b> ὀφθαλμός    οφθαλμός		<b>ot<sup>h</sup>onion</b> <b>othoni</b> ὀθόνιον    οθόνη
k <sup>h</sup>	<b>k<sup>h</sup>aris</b> <b>xari</b> χάρις    χάρη	<b>dusk<sup>h</sup>eraino</b> <b>diskerenō</b> δυσχεραίνω    δυσχεραίνω	<b>ok<sup>h</sup>t<sup>h</sup>e</b> <b>oxti</b> ὄχθη    ὄχθη	<b>brak<sup>h</sup>os</b> <b>vraχos</b> βράχος    βράχος

As may be seen, classical φ,θ,χ spirantise intervocalically, in Coda *and* in word-initial position. Stopness on the other hand is retained only in post-Coda position. The strong position in Greek thus is not disjunctive: only consonants in post-Coda position are shielded against damage (though not completely: they lose aspiration) – consonants in all other contexts spirantise, including in word-initial position. The beginning of the word is thus a weak environment in Greek, which instantiates pattern (5b). This is confirmed by evidence from first language acquisition of Modern Greek (Sanoudaki 2007).

## 3.3. When word-initial consonants are weak II: Mazovian Polish

3.3.1. *Polish soft labials and their behaviour in Mazovian dialects*

A classical topic in Polish phonology are so-called soft labials, i.e. labials "with a palatal appendix" that are traditionally transcribed p',b',v',f' and m'.<sup>15</sup> The opposition between soft and plain labials appears most clearly in root-final position: the regular masculine singular suffix for adjectives is -y [-i] (e.g. *młod-y* [mwɔd-i] "young masc."). Before soft labials, however, [-i] surfaces: *glupi* [gwupi] "idiotic masc." (compare with the regular behaviour of plain labials: *grub-y* [grubi] "fat masc."). The identity of the [p] as a soft labial may also be established when looking at the feminine form of the adjective where the regular marker is -a (e.g. *młod-a* "young fem."): in the result *glupia* [gwupja] "idiotic fem.", the presence of the vocalic suffix makes appear the palatal appendix on the surface (compare with plain labials: *gruba* [gruba] "fat fem.").

Now consider what soft labials have become in North-Eastern dialects of Polish, especially in Northern Mazovia and a particular subdivision thereof, the

<sup>15</sup> The literature opposes two interpretations around the question (originally raised by Baudouin de Courtenay) whether soft and plain labials represent one or two series of phonemes: e.g. Press (1986:25ff), Jassem (1966), Rubach (1984:165ff), Gussmann (1992, 2004). Only labials can have this kind of soft appendix.

Kurp region. For the sake of exposition, we illustrate only *b'* (the behaviour of *p'*, *f'*, *v'* and *m'* is analogous).<sup>16</sup>

(7) soft labials in two Polish dialects: Northern Mazovian and Kurp

	Polish spell- ing	Polish	North. Mazovian	Kurp	gloss
initial	biały	bjaŵi	bjaŵi	bʑaŵi	white
medial	kobieta	kobjeta	kobjeta	kobjɛta	woman
final	drób	drup	drupɕ	drupɕ	poultry

The two dialects present a fricative in place of the Polish palatal element. In both dialects, this fricative agrees in voicing with the preceding obstruent (also note that word-final *b'*, followed by the palatal element, undergoes regular final devoicing). The nature of the fricative is different in the two dialects at hand: a straight palatal [ç, j] in Northern Mazovian, against what the IPA calls "alveolo-palatal" (also commonly called "prepalatal") fricatives [ç, ʝ] in Kurp.

Given the segmental change from a glide to a fricative, we are certainly entitled to talk about fortition, especially in the case of the result produced in Kurp. We therefore do not need to debate whether soft labials represent one single segment (i.e. with a secondary articulation in the spirit of *kʷ*) or two independent phonological items (also called synchronous vs. asynchronous, e.g. Klemensiewicz *et al.* 1964:131 and note 15). Given that the post-Coda position is strong and hence promotes fortition, a two-segment status for soft labials in the dialects at hand must be assumed. The strengthening of secondary articulations of single (contour) segments is indeed unheard of. It is only when secondary articulations emancipate from their host that they can be addressed as an independent phonological object – they are then found to undergo strengthening.

A case in point is reported from many Occitan dialects where Latin *kʷ* as in *aqua* [akʷa] "water" comes out as [jg]: Occitan *aigue* [ajgə] "water" (Dalbera 1994:434ff). *Aigue* can only be derived on the assumption that the secondary articulation has been linearised. The result is a heterosyllabic cluster /ak.wa/ with [k] in Coda- and [w] in post-Coda position. The former then lenites to [j]

<sup>16</sup> The phenomenon at hand is fairly well studied in the Polish dialectological literature, e.g. Friedrich (1955), Furdal (1955), Dejna (1994: map 18). Our presentation draws on Czaplicki (1998) and Kijak (2005:122ff).

in weak position (like elsewhere in the language), while the latter strengthens to [g] in strong position.<sup>17</sup>

Whether Polish soft labials are one or two segments may thus be subject to debate – their Mazovian equivalent, though, must have been split into two independent segments prior to strengthening of the palatal element.

If this is true, we also expect strengthening of yod word-initially: the strong position is disjunctive. Word-initial yod, however, does not strengthen in either of the dialects considered, which respond to Polish *jabłko*, *jagoda*, *jeleń*, *jutro* (all [j-]) "apple, berry, deer, tomorrow" with unaltered initial yod. Also, [j] comes out unchanged in all weak positions: V\_\_V *jajeczko*, *zajac* "small egg, hare", \_\_C *bajka*, *czajnik* "fairy tale, kettle", \_\_# *bój*, *kraj* "battle, country".<sup>18</sup>

An issue is the fact that yod only seems to strengthen after labials, i.e. when it originates in a soft labial: no fortition is observed in *Maria* [marja] "Maria" or *definicja* [definiʦja] "definition". This pattern is recurrent among cases of yod strengthening: Kristó (this volume; §2.3) describes the Common Slavic evidence, and the parallel with the French situation is drawn below. The regular explanation is that unlike labials, dentals and velars may be palatalised. The only solution for the resolution of labial+yod sequences is the strengthening of the latter.

This difficulty notwithstanding, the overall situation is the same as in Greek: the only strong position in the Polish dialects at hand is after a heterosyllabic consonant. Word-initial consonants are not strong: they pattern with weak positions.

### 3.3.2. *Comparison with Gallo-Romance yod strengthening*

It is instructive to contrast the Polish situation with a development in Gallo-Romance, which is exactly parallel except that, as expected when looking at (2), word-initial consonants line up with post-Coda consonants (rather than with consonants in weak positions as in Polish).

<sup>17</sup> A parallel case is Meillet's Law (Meillet 1925:6f, Lamberterie 1998): in Armenian, Indo-European \**dwoo* "two" comes out as *erku* "two" where [d] in Coda position is lenited to [r], while post-Coda [w] is strengthened to [k].

<sup>18</sup> To the extent that yod in Coda position is an autonomous consonant, rather than the second part of a diphthong, something that probably is analysis-dependent but does not impact ongoing discussion: if there is no Coda-yod, we can still build on the behaviour of its intervocalic instantiation. Also note that Kijak (2005) reports on some variation in pre-consonantal position, where yod is sometimes dropped.

In Gallo-Romance, Cy clusters were produced when Latin short high and mid vowels became glides before another vowel in late Latin, e.g. *filia*, *vidua* "widow, daughter" > *filja*, *vedwa* (as under (2) above and (8) below, under-scored vowels bear stress). As for Polish dialects, the literature makes a difference between cases where yod follows a labial and those where it comes to stand after other consonants (e.g. Bourciez and Bourciez 1967:§§28, 30-3°).<sup>19</sup> Consider relevant evidence under (8) below.

(8) evolution of Gallo-Romance yod in strong position

a. #				b. post-Coda			
#j > 3	jocu	3ø	game	pj > ʃ	sepia	seʃ	cuttlefish
#j > 3	jurare	zyʁe	to swear	bj > 3	rabia	raʒ	rabies, rage
#j > 3	jugu	3u	yoke	vj > 3	cavea	kaʒ	cage
#j > 3	jacere	zeziʁ	to lie	mj > ~3	simiu	sẽʒ	monkey

As in the Polish dialects, the resulting fricative has a palatal colour and agrees in voicing with the preceding obstruent (also note that the original result of the strengthening were the affricates [dʒ, tʃ] which, like all other affricates in the language, have lost their stop element in further evolution). Subsequently to the strengthening process, this obstruent has been regularly lost in Coda position (like all other labials, cf. (2)).

This time, though, word-initial yod also undergoes fortition, with exactly the same result ( $\overline{dʒ} >$ ) [ʒ]. Fortition in the two strong positions contrasts with the weakening of yod that is observed in Codas and intervocalically: *maj(u)* > *mai* [me] "May", *raja* > *raie* [re] "ray". Hence the same process, fortition of yod to a palatal fricative, occurs in both word-initial and post-Coda position in Gallo-Romance, while it is observed only in the latter context in the Polish dialects discussed.

The typological picture thus is consistent: Gallo-Romance illustrates the parametric situation (5a), while the Polish dialects at hand follow (5b).

<sup>19</sup> We actually believe that this distinction is wrong: Gallo-Romance C+j always leads to the strengthening of yod, no matter what the preceding consonant. This is what Ségéral and Scher (2001b) aim to show. A more careful introduction to the subject may also be found there. In any event, whether yod strengthens only after labials or also elsewhere leaves the ongoing discussion untouched.

## 3.4. Conclusion: relation with restrictions on initial consonant clusters?

Typologically speaking, Greek and the two Polish dialects on the one hand are thus opposed to (Gallo-) Romance and German(ic) (recall the High German Consonant Shift discussed in §2.5.2) on the other. The former group has only one strong position, which is located after Codas (5b), while consonants are strong both in post-Coda and word-initial position (5a) in the latter.

Seigneur-Froli (2003, 2006) and Kijak (2005) observe that these two groups are opposed with respect to yet another feature that regards the beginning of the word. Romance and Germanic are languages which observe sonority sequencing: only word-initial consonant clusters of rising sonority are admitted. By contrast, Polish and Greek allow for sequences that violate sonority sequencing. Classical Greek for example features #pt, #kt and #mn, while clusters such as in *rdza*, *rteć*, *rwać* [rvatɕ], *lgać*, *mgła*, *mżawka* [mʒafka], *msza* [mʃa], *mleko*, *mrugać*, *ptak*, *tkać*, *dbać* "rust, mercury, to tear up, to lie, mist, drizzle, mass (rel), milk, to wink, bird, to weave, to care" are found in Polish.

Following Scheer (2004a:§87), Seigneur-Froli and Kijak contend that this typological agreement is not a coincidence: the word-initial position in Polish and Greek is weak *because* these languages allow for initial clusters that go beyond the obstruent-sonorant pattern.<sup>20</sup> Conversely, the initial position is strong in Romance and Germanic *because* these languages restrict initial sequences to #TR. Or rather, the two agreeing typological properties are manifestations of the same parameter setting that regulates the properties of the left edge of the word (see Ségéral and Scheer this volume b for an interpretation of this parametric variation in terms of an empty CV unit).

If this is correct, we do not expect word-initial consonants to be strong in languages that tolerate initial non-TR sequences; and we would be surprised to see weak initial consonants in #TR-only languages. Whether this typological prediction holds true or not is an empirical question – in any case we believe it is interesting enough to be considered seriously.

Finally, we wish to make another prediction regarding edges. It makes perfect sense to us that morphology may override domestic phonological law: this is how the variation at word boundaries (#\_\_ and \_\_#) is produced, which contrasts with a typologically invariable situation within morphemes (C\_\_, V\_\_V and \_\_.C). Hence if in some language only half of the Coda disjunction is

<sup>20</sup> Seigneur-Froli and Kijak argue that the behaviour of the second member of Polish and Greek initial clusters is strong evidence against the classical extrasyllabic interpretation of their first member: fortition (or protection against lenition) is observed in post-Coda position; hence if C<sub>2</sub> of a #C<sub>1</sub>C<sub>2</sub> cluster is strong, C<sub>1</sub> must be a Coda (rather than extra-syllabic).



weak (the other half being non-weak), or only half of the strong position disjunction is strong (the other half being non-strong), the halves that are singled out for weakness and strength will be morpheme-internal. That is, we do not believe that languages exist where word-initial consonants are strong, while their peers in post-Coda position are non-strong; or, for that matter, where word-final consonants are weak, while their peers in internal Codas show non-weak behaviour.

In sum, thus, the variation at word edges that has been described is not of phonological origin. It translates the fact that morpho-syntactic intervention may alter the domestic course of phonology. Hence a theory of lenition that attributes the variation at edges to a phonological mechanism, we argue, is unwarranted. The phonological computation that produces lenition is the same everywhere irrespectively of the status of edges: there is only one lenition mechanism, which is phonological in kind. Therefore a theory of lenition must not take into account the variation at edges – but of course it needs to be coupled with an interface theory in such a way that 1) the unattested patterns (post-Coda weak, initial position strong; internal Coda strong, final Coda weak) are ruled out and 2) the attested variation follows from the properties of the interface.

#### **4. Parametric variation II: post-Coda consonants may or may not be strong after sonorants**

Let us now look at another parametric variation, which concerns the behaviour of consonants in post-Coda position. In this context, consonants may either be strong no matter what, or only after obstruents (while following a weak pattern after sonorants). The variation thus depends on the preceding Coda: either languages "look" at its content, or they do not. In case they do, the effect appears to be cross-linguistically stable: preceding sonorants provoke weakness of the post-Coda consonant, while preceding obstruents induce (regular positional) strength. An example is flapping (of underlying /t/) in American varieties of English (on which more in §4.3) that goes into effect in intervocalic position (*city*) and after sonorants (*quarter*, *winter*), but is blocked after obstruents (*chapter*, *doctor*). The reverse distribution (i.e. strength after sonorants, weakness after obstruents) does not seem to exist.

The common sense analysis of this pattern builds on the sonority hierarchy: sonorants are more "vowel-like" than obstruents and hence more likely to make the following consonant believe it is preceded by a vowel: in traditional descriptions, the VR portion of VR.T strings is often referred to as a "diphthong with a sonorant second element". This orientation is probably on the right

track: all theories that set out to encode the parameter at hand will have to somehow make reference to sonority and the fact that sonorants have a greater affinity with vowels than obstruents.

Note that the parameter on the behaviour of consonants after sonorants is independent of the one that was discussed in §3: consonants in post-sonorant position may or may not be strong both in systems where word-initial consonants are strong and in systems where they are weak. The two parameters may be crossed, which means that we expect a four-way empirical record. This is indeed what we find.

#### 4.1. "Post-Coda strong no matter what"

We have already come across the pattern "post-Coda strong no matter what", associated to the option "word-initial consonants strong": Latin obstruents in the evolution towards French behave like that (§2.2). In actual fact, table (2b) only illustrates the evolution of post-Coda consonants after sonorants – with a strong result: just like their word-initial peers, obstruents remain undamaged. Hence we are fixed with respect to the parameter at hand. For the sake of exhaustivity, however, the following examples show that the same effect obtains after obstruents: [p] *suppa* > *soupe* "soup", *crispare* > *crêper* "to crimp", [t] *rupta* > *route* "road", *gutta* > *goutte* "drop", *vectura* > *voiture* "car", *festa* > *fête* "party" (velars are not illustrated for the same reasons as before, see note 10).

French is thus a language "where nothing happens", e.g. where post-Coda consonants do not look at the content of the preceding Coda in order to determine their behaviour, which is uniform.

Another instance of the same pattern is Mazovian Polish (§3.3), which however is associated to the option "initial position not strong". Strengthening of yod indeed occurs in both post-sonorant (*pamiętam* = *pa[m.j]etam* "I remember") and post-obstruent (*zdrowie* = *zdro[v.ʐ]e* "health") position, but not word-initially (*jablko* = *jablko* "apple").

#### 4.2. "Strong after obstruents, weak after sonorants" plus "weak word-initially": Greek and Grimm's Law

A language that instantiates the other parametric choice has already been mentioned: Greek. The full evidence, however, has not been presented in §3.2: table (6) only mentions words where voiceless aspirated stops occur after obstruents. In this case, stopness is retained (ὀφθαλμός *op<sup>h</sup>thalmos* > οφθαλμός

*oftalmos* "eye"). When the preceding Coda is a sonorant, however, aspirated stops spirantise.<sup>21</sup>

(9) evolution of Classical Greek voiceless aspirated stops after sonorants

	a. r__		b. l__		c. N__	
p <sup>h</sup>	orp <sup>h</sup> anos ὀρφανός	orfanos ορφανός	adelp <sup>h</sup> os ἀδελφός	adelfos αδελφός	amp <sup>h</sup> i- ἀμφί	anjfi- αμφί
t <sup>h</sup>	ort <sup>h</sup> ios ὄρθιος	orθios όρθιος			ent <sup>h</sup> ymios ἐνθύμιος	e(n)θimios ενθύμιος
k <sup>h</sup>	ark <sup>h</sup> o ἄρχω	arxo άρχω				

Greek thus combines the two parameter settings that take flesh off the strong position: consonants are neither strong in post-sonorant nor in word-initial position. That is, the position after obstruents is the only strong environment that is left in Greek.

The same pattern produces Grimm's Law, one of the most studied lenition processes (although not necessarily under this label). Grimm's Law is usually described as a spontaneous sound shift whose relevant part for the present purpose has affected all Indo-European aspirated voiced and plain voiceless stops, which are spirantised without any contextual condition (see Holsinger this volume for illustration and further discussion). Textbooks then mention some "exceptions" (Streitberg 1895:113 is one example in a long tradition): stops that occur after obstruents remain undamaged.<sup>22</sup> Compare for example Lat. *specio*, *captus*, *nocte* with Old High German *spehōn*, *haft*, *naht* "to look out, captivity, night". On the other hand, stops do undergo spirantisation after sonorants: compare for example Lat. *mentum*, *uerto* with Gothic *munPs*, *wairPan* "mouth, to become". The correct description of the environment of Grimm's Law is thus "everywhere (including the word-initial position) except after obstruents".

The striking parallel between Grimm's Law and the aforementioned Greek spirantisation has been pointed out by Fourquet (1948).

<sup>21</sup> Glosses (line by line): "orphan, brother, around, right/straight, who causes worry/remorse, I begin". Safe examples are missing for blank cells.

<sup>22</sup> Formulations found in the literature vary (e.g. Schrodtt 1976): most often, this generalisation is not established because a special case is made for s+C clusters.

#### 4.3. "Strong after obstruents, weak after sonorants" plus "strong word-initially": Korean, Finnish, Liverpool English (London and New York English)

Another group of languages also illustrates the pattern "strong after obstruents, weak after sonorants", but with the reverse parameter setting for the word-initial location, where consonants are strong.

One case in point is Korean (e.g. Kang 1993, Silva 1993). This language has three series of plosive phonemes, all of which are usually assumed to be voiceless underlyingly: "lax" or "plain" /p,t,c,k/, "tense" or "glottalised" (but whose phonetic realisation is not ejective) /p',t',c',k'/ and aspirated /p<sup>h</sup>,t<sup>h</sup>,c<sup>h</sup>,k<sup>h</sup>/ (Labrune 1999:133, Kang 2000:53f). Only the four-way allophony of the two former series is relevant for the present discussion: as is shown under (10) below, regular voiceless stops [p,t,c,k] appear word-initially, either voiced [b,d,j,g] or tense [p',t',c',k'] plosives are found after Codas, voiced stops [b,d,j,g] are observed intervocalically and unreleased voiceless stops [p̚,t̚,k̚] occur in both Codas (where in addition the contrast between /t/ and /c/ is neutralised in favour of the former).

##### (10) allophonic variation of plain voiceless stops in Korean

	a. #	b. post-Coda	c. Coda	d. V__V	gloss	
			__C	__#		
p	pap̚	pi	sil-bi	pap̚	pabi	boiled rice, rain, fine rain, bowl for rice, rice, rice +subj.
		poda	kuk̚-p'oda			rather, rather than the soup
t	tal	tal	pan-dal	tat̚	pada	moon, id., half moon, to close and..., to receive, id.+ mark.
		to	ot̚-t'o			too, the cloth too
c	cip̚	cabi	son-jabi	c'it̚	naji	house, to take+ marker, handle, to tear up and, day, id.+marker
		cip̚	pap̚-c'ip̚			house, cheap restaurant
k	kuk̚	kogi	pul-gogi	mok̚	kugi	soup, meat, grilled meat, to eat and, soup, id.+ subj.
		pap̚	pap̚- k'irit̚			boiled rice, bowl for rice

First consider the behaviour of consonant clusters (columns (10b) and the first half of (10c)), which may only be controlled when looking at compounds. The word for "thread" *sil* [sil], when combined with *pi* [pi] "rain", produces *sil-bi* [silbi] "fine rain", where the underlying plain /p/ is voiced after a sonorant. As may be seen one line down, however, plain voiceless stops appear as strong

tense stops when preceded by an obstruent (*kuk* [kukʰ] "soup" plus *poda* [poda] "rather than" comes out as *kuk-poda* [kukʰpʰoda] "rather than the soup").<sup>23</sup> Hence plain stops lenite after sonorants, but on the contrary strengthen after obstruents.

Also, Korean provides interesting information regarding the identity of the post-sonorant position. We see that post-sonorant consonants are not strong, but unlike in Greek where no indication is given as to the type of weakness (intervocalic or Coda) that they experience, Korean allows to tell that they are intervocalic: they voice (did they have Coda status, they would be unreleased). Greek is mute on this count because the result of lenition is identical in intervocalic and in Coda position. We are inclined to believe that the Korean testimony reveals the true identity of post-sonorant consonants in languages that make this environment weak: languages like Greek and Korean consider sonorants as vowels, which means that the following consonant stands in intervocalic, rather than in Coda position.

Let us now briefly turn to another set of data that illustrates the weakness of post-sonorant consonants: Finnish Consonant Gradation. This phenomenon has received quite some attention in the literature (e.g. Campbell 1981, Keyser and Kiparsky 1984); it is described in detail by Pöschtrager (this volume). The ground rule here is "onsets appear in strong grade in open, in weak grade in closed syllables". Along these (somewhat exotic) lines, a variety of strong and weak incarnations of segments is distributed.

Consider for example the alternation between *kulta*, *ranta* "gold, beach NOMsg" and *kulla-n*, *ranna-n* "id. GENsg": the concatenation of the genitive marker, which closes the last syllable, triggers lenition of the last consonant of the stem, which in case of RT clusters results in the loss of the obstruent and the expansion of the preceding sonorant. That we face lenition may be seen when looking at the spirantising effect of the genitive on simplex intervocalic stops: *leipä* "bread NOMsg" comes out as *leivä-n* "id. GENsg". However, post-Coda obstruents are shielded against damage if the preceding Coda is an obstruent as well: the genitive of *matka* "journey NOMsg" is *matka-n* (not \**mata-*

<sup>23</sup> The picture is further complicated by the kind of morpho-syntactic relation that both members of the compound contract. There are in fact two different kinds of compounds, which are defined on morpho-syntactic grounds and produce contrasting phonological results. Type A compounds are illustrated under (10). Type B compounds are called *sai-sios*. Unlike under (10b), their effect on plain voiceless stops in post-Coda position is uniform no matter what the content of the preceding Coda: tense stops are observed after obstruents (*kuk* [kukʰ] "soup" plus *pap* [papʰ] "rice" produces *kukpap* [kukʰpʰapʰ] "rice soup") as well as after sonorants (*pom* [pom] "spring" plus *pi* [pi] "rain" comes out as *pom-pi* [pompi] "spring rain").

n). Finally, Finnish goes along with Korean, rather than with Greek and Common Germanic: word-initial consonants are shielded against damage as well. In order to see this, compare the action of the familiar pattern on *riidellä* "to argue, infinitive" (against non-lenited *riitelen* "id., 1<sup>st</sup> sg") with the fact that word-initial consonants remain undamaged even in closed syllables (*tulla* "to come, infinitive").

Honeybone (2001, 2002:192ff, 2003) draws attention to another case in point: Liverpool English. The lenition pattern at hand has been described before in the literature, but he presents freshly collected and detailed data. The picture looks very much like the High German Consonant Shift that was mentioned in §2.5.2: while the word-initial position is strong, stops experience less lenition after obstruents than after sonorants (something that due to space restrictions we did not show for the High German Shift), except if the sonorant is homorganic (according to Honeybone's 2005 motto "sharing makes us stronger"). The interleaving of positional, melodic (post-sonorant vs. post-obstruent) and sharing (homorganic vs. non-homorganic) factors is characteristic for the High German Shift and Liverpool lenition. The latter phenomenon, however, is the most complete (or most complex) lenition pattern that we have come across for in addition to all the factors mentioned it is also sensitive to stress.

Post-tonic t-lenition in various varieties of English is another phenomenon that is conditioned by multiple factors; it is also reported to be sensitive to whether the preceding consonant is a sonorant or an obstruent (Harris and Kaye 1990:265, Harris 1994:222ff). While flapping (New York) and glottaling (London) (of underlying /t/) are observed in post-tonic position after sonorants<sup>24</sup> (*quarter*, *winter* are pronounced with a flap or a glottal stop, respectively), neither damage occurs after obstruents (*after*, *custard*, *chapter*, *doctor* appear with a [t]).

Finally, the well-known Spanish (Castilian) spirantisation further illustrates the crossing of conditioning factors (e.g. Harris 1984, Harris-Northall 1990). Voiced stops /b,d,g/ spirantise in Coda position and intervocalically, while stops [b,d,g] appear word-initially and after Codas: [d]inero "money", an[d]ar "to go", a[ð]mirar "to admire", na[ð]a "nothing". However, stops appear in post-Coda position only if the preceding Coda is a (homorganic) nasal, or a lateral in the case of /d/ (e.g. al[d]ea "village"). In all other combinations, spirantisation prevails: e.g. ar[β]ol "tree", al[β]a "dawn", dez[β]okado "packed

<sup>24</sup> Except after the lateral in New York – but this is obviously due to the particularly intimate relationship between the two members of *lt*, *ld* clusters that is also known from Spanish spirantisation, which is inhibited in the same context (see the following paragraph).

up", *a[βδ]ikar* "to abdicate". Even though the exact conditioning needs to be sorted out (lateral-dental stop sequences, but not rhotic-dental stop clusters seem to be "homorganic"), the basic regularity "weak version after sonorants" also governs the Castilian pattern.

#### 4.4. Lenition and stress show that sonority is not a melodic prime

Even though this part of the book ought to be as pre-theoretical as possible, we would like to point out a striking parallel between lenition and stress that involves a theoretical point: both phenomena, as a parametric choice, may be sensitive to sonority – but are never affected by any other melodic variation such as place of articulation, nasality, voicing and so on.

At the outset of this chapter we have followed a definition of lenition according to which this process, unlike assimilation, is positional and *only* positional: no exchange of melodic primes, no sensitivity to the melodic properties of neighbouring segments. Hence the parameter discussed in §4 should not exist in the first place: the melodic quality of an adjacent segment, the Coda consonant, bears on the strength of its righthand neighbour.

On the face of it, thus, the definition that builds on the strict separation between the assimilatory and the positional phenomenology appears to be wrong. But a second thought is worthwhile: there does not seem to be any language on record where other melodic properties such as, say, labiality, voicing or palatality, bears on the strength of an adjacent consonant. That is, roles are not distributed randomly: of all features, sonority alone is a lenition-relevant player.

Interestingly, the same generalisation holds for stress: of all melodic properties, only sonority may influence stress placement, which is otherwise a pure matter of positional computation. The fundamental parameter is commonly called Weight by Position (after Hayes 1989): languages may count closed syllables (CVC) as either heavy (hence patterning with CVV), or light (hence patterning with CV). A third parametric situation, although rare, has been identified, most clearly in native American Algonquian-Wakashan languages (Kwakwala and Nuuchahnulth, see Boas 1947, Wilson 1986, Zec 1988, 1995:103ff, Gordon 2002:923f). Here, closed syllables are heavy only if their Coda is a sonorant (i.e. CVR, CVV heavy, against CVT, CV light). By contrast, the rather advanced cross-linguistic record that owes a lot to Hayes (1995) does not mention cases where other segmental features influence stress placement. This is also confirmed by Gordon's (1999, 2004) typological work on weight distinctions.

The same holds true for stress algorithms that look at the quality of vowels, rather than of consonants. Paul de Lacy has studied this question in detail. He writes:

"One issue this typology raises is not why stress is sensitive to sonority, but rather why it is not sensitive to so many other properties. There are no stress systems in which subsegmental features such as Place of Articulation or backness in vowels plays a role in assigning stress. The same goes for features such as [round], [nasal], and secondary articulation." de Lacy (2002:93)

Evidence regarding sonority is thus converging: sonority is opposed to all other melodic primes. We are thus set back to a foundational question in phonology: what kind of animal are we facing? Sonority has always been central in phonology: the 19<sup>th</sup> century talked about strength directly (Fortis, Lenis, also regarding the associated terms *Mediae* and *Tenues*, see Honeybone this volume), while the take of classical generative work was to make it a regular feature (or regular features: [±son], [±syll] etc.) on a par with all other melodic primes such as palatality, roundness, voice etc. (eventually segregated on a particular branch of a feature-geometric tree). There have also been attempts at understanding sonority as a non-primitive property that derives from true melodic primes: the notion of complexity that is used in Government Phonology (Harris 1990, Scheer 2004a:§36) and Rice (1992) is a case in point (the more primes a segment is made of, the more/the less sonorous it is).

The conclusion which we incline to draw from the absence of melodic conditions on lenition and stress is that melodic primes have no bearing on positional events at all. The influence of Coda sonority on the strength of the following consonant is not an action of melody since sonority is not a melodic prime (a feature) – it is something else. Something that is visible for syllable structure and stress, i.e. for things that are located in the representational area above the skeleton. Proposals in this direction are made by Jensen (1994), Szigetvári and Scheer (2005), Ségéral and Scheer (this volume b;§4, Szigetvári (to appear, this volume a:§8) and Pöchtrager (2006). If this is on the right track, it follows that phonological theory must not encode sonority as a lexical object in its own right: sonority has no featural (melodic) existence.

## 5. Conclusion

The goal of this chapter was to identify the positional patterns that influence lenition and fortition. Positions may be strong or weak according to the ground rule that was introduced in §2. On this basis, languages make parametric



choices along two lines: edges may or may not be special, and consonants that occur after sonorants may or may not be strong.

Regarding the former parameter, the emerging picture is perfectly symmetric: edges may go along with the other half of the disjunction that they are engaged in. That is, word-initial consonants may either follow their internal strong mate (yielding a disjunctive strong position {#,C}\_) or not (in which case the only strong position is internal: C.\_). Word-final consonants may follow their internal weak mate (creating the familiar Coda disjunction \_{#,C}) or not (in which case the only Coda position is internal: \_.C).

We believe that this pattern reflects a deeply rooted phonological reality. For one thing, symmetry does not arise through chance. Also, the obvious role that is played by morphology (or by syntax) makes sense: positions that escape extra-phonological influence, i.e. those located within morphemes (\_.C, V\_\_V, \_.C), are not subjected to cross-linguistic variation. Only positions that are adjacent to a morpho-syntactic division show variable behaviour (#\_, \_#). This means that parametric choices regarding the visibility of morpho-syntactic divisions may (but do not have to) impact the course of domestic phonology.

Therefore theories somehow need to express the variable effect of word edges by the (non-)translation of morpho-syntactic divisions: a domestic phonological solution will not do.

The empirical generalisations that we have made also prompt some predictions: there are patterns that we would be surprised to see in natural language. They are summarized under (11) below and may serve as a check list for lenition phenomena.

(11) lenition patterns: those that occur, and those that should not

are attested	we believe do not occur
a. a strong position is at least as strong as a weak position; a weak position is at least as weak as a strong position.	a weak position is stronger than a strong position; a strong position is weaker than a weak position..
b. C._ strong, #_ weak	C._ weak, #_ strong
c. _.C weak, _# non-weak	_.C non-weak, _# weak
d. C._ weak after sonorants, strong after obstruents	C._ weak after obstruents, strong after sonorants

The parametric space that is opened by the variation (and the non-variation) described is shown under (12). Only the intervocalic position does not show

any variation (always weak A).<sup>25</sup> Strong positions vary according to two parameters: word-initial as well as post-sonorant consonants may or may not be strong. The resulting four-way typology is illustrated in the first four lines of the table. The remaining two lines show the variation that is observed in Codas: word-final consonants may or may not be weak. In the table below, cells that are irrelevant for the variation at hand are grey-shaded.

(12) positional factors: the parametric space

example	strong positions			weak positions		
	initial # _	post-Coda T. _ R. _		V _ V	Coda _ C _ #	
a. Gallo-Romance	strong	strong	strong	weak A		
b. Mazovian Polish	weak	strong	strong	weak A		
c. Greek, Grimm's L.	weak	strong	weak	weak A		
d. Korean, Liverpool English (NY and London English)	strong	strong	weak A	weak A		
e. Gallo-Romance, Braz. Portuguese				weak A	weak B	weak B
f. Polish				weak A	weak B	not weak B

Finally, there are two ways of being weak, and in some cases languages do not allow to tell whether the context that deviates from the strong position disjunction lines up with intervocalic or Coda weakness. In this case, i.e. under (12b-c), the above table mentions only "weak" without indicating which weakness is at work (A or B). The symmetric situation is found under (12f): Polish word-final palatal nasals do not react like internal Codas – but the language does not tell us whether they have intervocalic or even strong value. As it stands, we are unable to make generalisations as to what happens when consonants in a position whose strength is parameterised do not follow the canonical disjunction. This question is left open for further study.

In sum, thus, the empirical situation raises the following four challenges for phonological theory that need to be added to the coverage of the patterns under (11) and (12).

<sup>25</sup> Recall from §1.1 that this is only true if stress is left out of consideration.

- (13) theories of lenition must be able to
- a. reduce the two disjunctions:  
the Coda context  $\_\{ \#, C \}$  and the strong position  $\{ \#, C \}\_\$  represent one single and unique phonological object each. Theory must be able to state this non-disjunctive phonological identity.
  - b. explain the mirror effect:  
the Coda and the strong position are opposite in both their structural description and effect. Hence whatever the non-disjunctive identity for either context that is proposed, it must somehow be symmetric with respect to the other.
  - c. explain the distribution of strength and weakness:  
why does  $\{ \#, C \}\_\$  provoke strength rather than weakness, and  $\_\{ \#, C \}$  weakness, rather than strength?
  - d. differentiate between two weak positions:  
there are two ways of being weak: intervocalic weakness and Coda weakness; both may, but do not need to produce the same effect.

At the end of this survey, it is worth recalling the narrowness of our empirical window: the generalisations that have been formulated rest on our fragmentary visibility, which we have tried to broaden through the study of relevant literature. Nonetheless, our judgement remains rooted in certain language families more than in others: Romance, Germanic, Slavic, Semitic and Cushitic. It certainly needs to be confronted with evidence from a larger genetic variety.

## References

References followed by

ROA are available at <http://roa.rutgers.edu/index.php3>

SZIG are available at <http://seas3.elte.hu/szigetva/papers.html>

SCH are available at <http://www.unice.fr/dsl/tobias.htm>.

Beckman, Jill

1997 Positional faithfulness, positional neutralisation and Shona vowel harmony. *Phonology* 14: 1-46.

1998 Positional Faithfulness. Ph.D. dissertation, University of Massachusetts at Amherst. Published by Garland Press, New York 1999. ROA.

Blevins, Juliette

1995 The Syllable in Phonological Theory. In *The Handbook of Phonological Theory*, Goldsmith John (ed.), 206-244. Oxford, Cambridge, Mass: Blackwell.

Boas, Franz

1947 Kwakiutl grammar with a glossary of the suffixes. *Transactions of the American Philosophical Society. New Series* 37, Part 3.

Bourciez, Edouard, and J. Bourciez

1967 *Phonétique française*. 9e édition Paris: Klincksieck.

Braune, Wilhelm

1874 Zur Kenntnis des Fränkischen und zur hochdeutschen Lautverschiebung. *Beiträge zur Geschichte der deutschen Sprache und Literatur* 1: 1-56.

Brun-Trigaud, Guylaine, and Tobias Scheer

forth La lénition des attaques branchantes en français et dans les dialectes de l'ALF. In *Nouvelles approches de la variation linguistique gallo-romane*, Mario Barra-Jover, Guylaine Brun-Trigaud, Jean-Philippe Dalbera, Patric Sauzet and Tobias Scheer (eds).

Campbell, Lyle

1981 Generative phonology vs. Finnish phonology: retrospect and prospect. In *Phonology in the 80's*, Didier Goyvaerts (ed.), 147-182. Ghent: Story-Scientia.

Czaplicki, Bartolomiej

1998 Palatalization in the Kurp dialect of Polish with reference to English. MA thesis. University of Warsaw.

Dalbera, Jean-Philippe

1994 *Les parlers des Alpes-Maritimes. Etude comparative. Essai de reconstruction*. London: AIEO.

Dalbera, Jean-Philippe, and Marie-José Dalbera-Stefanaggi

2004 Grands corpus dialectaux ou la phonologie indiscreète. *Corpus* 3: 399-433.

- Dalbera-Stefanaggi, Marie-José  
 2001a Essais de linguistique corse. Ajaccio: Piazzola.  
 2001b *La Corse au regard de la lenition consonantique: aires, strates, systèmes*: (Essais de linguistique corse). Ajaccio: Piazzola.
- Davis, Garry, and Gregory Iverson  
 1995 Segment Organization in the High German Consonant Shift. *American Journal of Germanic Linguistics and Literatures* 7: 111-127.
- Davis, Garry, Gregory Iverson, and Joseph Salmons  
 1999 Peripherality and Markedness in the Spread of the High German Consonant Shift. *Beiträge zur Geschichte der deutschen Sprache and Literatur* 121: 177-200.
- De Lacy, Paul  
 2002 The formal expression of markedness. Ph.D dissertation, University of Massachusetts.
- Dejna, Karol  
 1994 *Atlas polskich innowacji dialektalnych*. Warszawa, Łódź: PWN.
- Dienes, Péter  
 2000 VC phonology: A theory of consonant lenition and phonotactics. MA thesis, Eötvös Loránd University, Budapest.
- Escure, Geneviève  
 1977 Hierarchies and phonological weakening. *Lingua* 43: 55-64.
- Foley, James  
 1977 *Foundations of theoretical phonology*. Cambridge: CUP.
- Friedrich, Henryk  
 1955 *Gwara Kurpiowska. Fonetyka*. Warszawa: PWN.
- Furdal, Antoni  
 1955 *Mazowieckie Dyspalatalisacje Spółgłosek Wargowych Miękkich*. Wrocław.
- Giannelli, Luciano, and Leonardo Savoia  
 1978-79 L'indebolimento consonantico in Toscana (I). *Rivista Italiana di Dialettologia* 2: 23-58.
- Gordon, Matthew  
 1999 Syllable Weight: Phonetics, Phonology and Typology. Ph.D dissertation, UCLA.  
 2002 Weight-by-position adjunction and syllable structure. *Lingua* 112: 901-931.  
 2004 Syllable weight. In *Phonetic Bases for Phonological Markedness*, Bruce Hayes, Robert Kirchner and Donca Steriade (eds.), 277-312. Cambridge: Cambridge University Press.
- Gussmann, Edmund  
 1992 Back to front: non-linear palatalization and vowels in Polish. In *Phonological Investigations*, Jacek Fisiak and Stanisław Puppel (eds.), 5-66. Amsterdam: Benjamins.  
 2004 Polish front vowels or Baudouin de Courtenay redivivus. *Studies in Polish Linguistics* 1: 103-130.

- Harris, James  
1984 La espirantización en castellano y la representación fonológica autosegmental. *Working Papers in Linguistics of the Autonomous University of Barcelona* 1: 149-167.
- Harris-Northall, Ray  
1990 *Weakening processes in the history of Spanish consonants*. London: Routledge.
- Harris, John  
1990 Segmental complexity and phonological government. *Phonology* 7: 255-300.  
1994 *English sound structure*. Oxford: Blackwell.
- Harris, John, and Jonathan Kaye  
1990 A tale of two cities: London glottaling and New York City Tapping. *The Linguistic Review* 7: 251-274.
- Hayes, Bruce  
1989 Compensatory Lengthening in Moraic Phonology. *Linguistic Inquiry* 20: 253-306.  
1995 *Metrical Stress Theory. Principles and Case Studies*. Chicago, London: University of Chicago Press.
- Honeybone, Patrick  
2001 Lenition inhibition in Liverpool English. *English Language and Linguistics* 5: 213-249.  
2002 Germanic Obstruent Lenition: Some Mutual Implications of Theoretical and Historical Phonology. Ph.D dissertation, University of Newcastle.  
2003 Process inhibition in historical phonology. In *Historical Linguistics 2001*, B. Blake and K. Burridge (eds.), 181-203. Amsterdam: Benjamins.  
2005 Sharing makes us stronger. In *Headhood, Elements, Specification and Contrastivity: Phonological Papers in Honour of John Anderson*, Phil Carr, Jacques Durand and Colin Ewen (eds.), 167-192. Amsterdam: Benjamins.
- Hulst, Harry van der, and Nancy Ritter  
1999 Theories of the syllable. In *The Syllable, Views and Facts*, Harry van der Hulst and Nancy Ritter (eds.), 13-52. Berlin, New York: de Gruyter.
- Jassem, Wiktor  
1966 The distinctive features and the entropy of the Polish phoneme system. *Biuletyn Polskiego Towarzystwa Językoznawczego* 24: 87-108.
- Jensen, Sean  
1994 Is ? an element? Towards a Non-segmental Phonology. *SOAS Working Papers in Linguistics and Phonetics* 4: 71-78.
- Kaisse, Ellen  
1985 *Connected Speech. The interaction of Syntax and Phonology*. London, New York: Academic Press.
- Kang, Mi-Young  
2000 L'interaction entre la morphologie et les conditions lexicales et phonologiques du coréen. Ph.D dissertation, Université Paris 7.

- Kang, Ongmi  
1993 Prosodic Word-Level Rules in Korean. In *Japanese/ Korean Linguistics. Volume 2*, Patricia Clancy (ed.), 147-163. Stanford: Stanford Linguistics Association.
- Kenstowicz, Michael  
1994 *Phonology in Generative Grammar*. Oxford: Blackwell.
- Kenstowicz, Michael, and Charles Kisseberth  
1977 *Topics in Phonological Theory*. New York: Academic Press.
- Keyser, Samuel, and Paul Kiparsky  
1984 Syllable structure in Finnish phonology. In *Language Sound Structure*, Mark Aronoff and Richard Oehrle (eds.), 7-31. Cambridge, Mass.: MIT Press.
- Kijak, Artur  
2005 Polish and English complex consonantal onsets: a contrastive analysis within the Government Phonology framework. Ph.D dissertation, University of Katowice.
- Kirchner, Robert  
1998 An effort-based approach to consonant lenition. Ph.D dissertation, University of California at Los Angeles. ROA.  
2004 Consonant Lenition. In *Phonetically Based Phonology*, Bruce Hayes, Robert Kirchner and Donca Steriade (eds.), 313-345. Cambridge: Cambridge University Press.
- Klemensiewicz, Zenon, Tadeusz Lehr-Splawiński, and Stanisław Urbańczyk  
1964 *Gramatyka historyczna języka polskiego*. Warszawa: PWN.
- Labrune, Laurence  
1999 Variation intra et inter-langue. Morpho-phonologie du rendaku en japonais et du sai-sios en coréen. *Cahiers de Grammaire* 24, 117-152.
- Lamberterie, Charles de  
1998 Sur la "Loi de Meillet". *Comptes rendus de l'Académie des inscriptions et belles-lettres*: 881-905.
- Lass, Roger  
1973 A case for making phonological rules state things that don't happen. *Edinburgh Working Papers in Linguistics* 3.
- Meillet, Antoine  
1925 *La méthode comparative en linguistique historique*. Paris 1970: Champion.
- Mohanan, Karuvannur  
1986 *The Theory of Lexical Phonology*. Dordrecht: Reidel.
- Niedermann, Max  
1985 *Précis de phonétique historique du latin*. Paris: Klincksieck.
- Orwin, Martin  
1995 *Colloquial Somali*. London, New York: Routledge.
- Ostaszewska, Danuta, and Jolanta Tambor  
2000 *Fonetyka i fonologia współczesnego języka polskiego*. Warszawa: PWN.
- Palmer, Leonard  
1954 *The Latin Language*. London: Faber and Faber.

- Paul, Hermann, Peter Wiehl, and Siegfried Grosse  
 1989 *Mittelhochdeutsche Grammatik*. 23th edition Tübingen: Niemeyer.
- Penzl, Herbert  
 1969 *Geschichtliche Deutsche Lautlehre*. München: Hueber.
- Pöchtrager, Markus  
 2006 The structure of length. Ph.D dissertation, University of Vienna.
- Press, Ian  
 1986 *Aspects of the phonology of the Slavonic languages. The vowel y and the consonantal correlation of palatalization*. Amsterdam: Rodopi.
- Rice, Keren  
 1992 On deriving sonority: a structural account of sonority relationships. *Phonology* 9: 61-99.
- Rohlf, Gerhard  
 1935 *Le gascon. Etudes de philologie pyrénéenne*. Halle/ Saale: Niemeyer.  
 1966-69 *Grammatica storica della lingua italiana e dei suoi dialetti*. 3 Vols. Torino: Einaudi.
- Rubach, Jerzy  
 1984 *Cyclic and Lexical Phonology: The Structure of Polish*. Dordrecht: Foris.  
 1999 The syllable in phonological analysis. *Rivista di Linguistica* 11: 273-314.
- Sanoudaki, Eirini  
 2007 A CVCV model of consonant cluster acquisition: evidence from Greek. Ph.D dissertation, University College London.
- Schatz, Josef  
 1927 *Althochdeutsche Grammatik*. Göttingen: Vandenhoeck and Ruprecht.
- Scheer, Tobias  
 2004a *A Lateral Theory of Phonology. Vol.1: What is CVCV, and why should it be?* Berlin: Mouton de Gruyter.  
 2004b How minimal is phonological change? *Folia Linguistica Historica* 25: 69-114.
- Scherer, Wilhelm  
 1870 Rezension von Rumpel's System der Sprachlaute. *Zeitschrift für die österreichischen Gymnasien* 12: 632-660. Reprinted in Burdach, Konrad (ed) 1893. *Kleine Schriften zur altdeutschen Philologie von Wilhelm Scherer*, 238-268. Berlin: Weidmannsche Buchhandlung.
- Schmitt, Alfred  
 1949 Zur germanischen und hochdeutschen Lautverschiebung. *Zeitschrift für Phonetik und allgemeine Sprachwissenschaft* 3: 1-25.
- Schrodt, Richard  
 1976 *Die germanische Lautverschiebung und ihre Stellung im Kreise der indogermanischen Sprachen*. 2nd ed. Vienna: German. Institut.
- Ségéral, Philippe, and Tobias Scheer  
 1999a The Coda Mirror. Ms, slightly less evolved English version of Ségéral and Scheer 2001a. SCH.  
 1999b The Strong Position - Statement of the Problem. Paper presented at the *First Annual Meeting of the GDR 1954 "Phonologie" on Lenition and Fortition*, Nice. SCH.



Ségéral, Philippe, and Tobias Scheer (continued)

- 2001a La Coda-Miroir. *Bulletin de la Société de Linguistique de Paris* 96: 107-152. SCH.
- 2001b Les séquences consonne + yod en gallo-roman. *Recherches Linguistiques de Vincennes* 30: 87-120. SCH.
- 2005 What lenition and fortition tells us about Gallo-Romance *Muta cum Liquida*. In *Romance Languages and Linguistic Theory 2003*, Twan Geerts, Ivo van Ginneken and Haike Jacobs (eds.), 235-267. Amsterdam: Benjamins.

Seigneur-Froli, Delphine

- 2003 Diachronic consonant lenition and exotic word-initial clusters in Greek: a unified account. In *Studies in Greek Linguistics. Proceedings of the 23rd annual meeting of the department of linguistics*, M. Stavrou-Sifaki and A. Fliatouras (eds.), 345-357. Thessaloniki: University of Thessaloniki. SCH.
- 2006 Le Statut phonologique du début de mot grec. Lénitions consonantiques et libertés phonotactiques initiales dans la diachronie de la langue commune et dans le dialecte de Lesbos. Ph.D dissertation, University of Nice. SCH.

Siegel, Dorothy

- 1974 Topics in English Morphology. Ph.D. dissertation, MIT.

Silva, David

- 1993 A Phonetically Based Analysis of [Voice] and [Fortis] in Korean. In *Japanese/ Korean Linguistics. Volume 2*, Patricia Clancy (ed.), 164-174. Stanford: Stanford Linguistics Association.

Smith, Jennifer

- 2002 Phonological Augmentation in Prominent Positions. Ph.D dissertation, University of Massachusetts.
- 2004 Making constraints positional: Toward a compositional model of CON. *Lingua* 114: 1433-1464.

Steriade, Donca

- 1982 Greek Prosodies and the Nature of Syllabification. Ph.D dissertation, MIT.
- 1997 Phonetics in Phonology: The case of Laryngeal Neutralization. Ms, University of California, Los Angeles.

Streitberg, Wilhelm

- 1895 *Urgermanische Grammatik*. 4. Aufl. Heidelberg 1974: Winter.

Szigetvári, Péter

- 1999 VC Phonology: a theory of consonant lenition and phonotactics. Ph.D dissertation. Eötvös Loránd University, Budapest. SZIG.
- to appear Manner as a skeletal relation. In *Phonologica 2002: Structure and Melody: 9th International Phonology Meeting*, F. Neubarth, M. Pöchtrager and J. Rennison (eds.). Berlin: de Gruyter.

Szigetvári, Péter and Tobias Scheer 2005. Unified representations for the syllable and stress. *Phonology* 22: 37-75.

Szulc, Alexander

- 1974 *Diachronische Phonologie und Morphologie des Althochdeutschen*. Warszawa: PWN.

Vijayakrishnan, K.G

- 2003 Weakening processes in the Optimality Framework. In *The Phonological Spectrum. Vol I: Segmental Structure*, Harry van der Hulst, Vincent van Heuven and Jeroen van de Weijer (eds.), 241-255. Amsterdam: Benjamins.

Wilson, Stephen

- 1986 Metrical Structure in Wakashan Phonology. In *Proceedings of the Twelfth Annual Meeting of the Berkeley Linguistics Society*, Vassiliki Nikiforidou, Mary van Clay, Mary Niepokuj and Deborah Feder (eds.), 283-291. Berkeley: Berkeley Linguistics Society.

Zec, Draga

- 1988 Sonority constraints on prosodic structure. Ph.D dissertation, Stanford University.

- 1995 Sonority constraints on syllable structure. *Phonology* 12: 85-129.

Zoll, Cheryl

- 2004 Positional Asymmetries and Licensing. In *Optimality Theory in Phonology: a Reader*, John McCarthy (ed.), 365-378. Oxford: Blackwell. ROA #282.