What and where?

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Abstract

The chapter attempts at a pretheoretical definition of lenition. After a brief introduction to the taxonomic and theoretical interpretation of theoretical terms (§1), the role of sonority hierarchies in lenition is discussed in §2, with the conclusion that the traditional one-dimensional hierarchies are not fit for defining lenition trajectories. In fact, problems occur even in what is supposed to be the prime motivation for such scales, namely, sonority sequencing within the syllable. The next section (§3) discusses some lenition networks, which supersede sonority scales in being multi-dimensional, thus allowing for more than one direction for lenition to proceed. However, such trajectories do no more than encode a corpus of observations, therefore they do not carry too much explanatory force, unless they can be shown to be usable in other domains of phonology. Lenition and assimilation are delineated in §4, giving a formal definition for both, and discussing the status of these processes in an autosegmental framework working with privative phonological primes. With the help of this definition, lenition types are categorized in §4.3, the environments where lenition is expected and where it is not expected are collected in §5. The relationship of lenition and neutralization is discussed in §6, showing that the two terms are not synonymous, and neither contains the other. Two types of change, affrication and aspiration, are the topic of §7, since both are treated as lenition by some, fortition by others. The next section (§8) contemplates the status of (de)gemination with respect to lenition, followed by the conclusions in §9.

1. Introduction

Technical terms, like lenition, can be interpreted in two different ways, either as a taxonomic term, or as a theoretical term. A taxonomic term assigns a place for a given entity or phenomenon in the universe of the discussion: it relates it to other entities. A theoretical term, on the other hand, is justified by, i.e., follows from, the assumptions made by a given framework. The lack of a clear distinction between the two uses of a term often leads to bigotry in academic discussion.[1] The importance of making this distinction is further underpinned by the potential contradiction between the two interpretations. On the one hand, unlimited extension of the taxonomic definition of a technical term is unfortunate in that it dilutes its classificatory power to the extent of it becoming utterly useless. At the same time the theoretical unification of previously disparate phenomena is

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[1] For example, refraining from the use of the term 'Coda' by adherents of a theory that rejects it as a syllabic constituent.

typically considered an advancement in science. To use a concrete, if extreme, example: defining lenition such that any phonological phenomenon fall within its confines makes the term lenition meaningless in the taxonomic sense: if every phenomenon is labelled as lenition, the term is totally nondistinctive. But then, if Occam was right, it ought to be the theorist's dream to show that all phonological changes boil down to a single cause, call it, say, lenition.

The scope of a taxonomic term is largely conventional; it depends on how much the author follows previous definitions, as opposed to creating their own. Any definition, however, inherently carries some degree of theoretical specificity in it. The definition provided in (9a), for example, is based on phonological representation and only holds in a phonological framework that strictly applies privative primes. But even if there were a complete consensus regarding the definition of lenition and fortition, the interpretation of any given change would still be subject to the theory the analyst adopts. For example, seeing lenition as the loss of melodic material is no guarantee that a given change is interpreted as lenition, since the sets of primes assumed by different frameworks differ widely. Thus any theory-neutral discussion of lenition is bound to fail. This chapter will, nevertheless, start out as if this were possible, slowly abandoning the idea as the discussion proceeds.

2. Lenition and sonority

By claiming that a given phonological change Y > X is lenition (weakening),[2] the analyst inevitably takes the position that X is weaker than Y. To do so, she must produce some device for gauging the strength of sounds. An often used standard device is the so-called sonority scale. Sonority scales are primarily based on the universal phonotactic constraints defining the structure of possible syllables, viz., the sonority sequencing principle, according to which sonority steadily falls away from the peak of any syllable. In fact, the notion of sonority scales can also be employed to explain, i.e., categorize the participants of, other phonological phenomena, like stress assignment (Kenstowicz 1994), or syllable weight (Zec 1995). This enhances their explanatory value, provided they make acceptable predictions. By the end of this section, however, we will see that they do not always do so.

The simplest sonority scale imaginable is depicted in (1), where the higher index number indicates higher sonority.

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[2]   Following most authors discussing the topic, I use the terms lenition and weakening synonymously. See Honeybone (this volume) for a more subtle approach.

(1) *The simplest sonority hierarchy*

index	sounds
1	vowels
0	consonants

This scale looks oversimplified, and thus useless for the degree of detail the sonority sequencing principle requires in languages possessing consonant clusters. It is only adequate for CVCV languages.[3] but it very clearly indicates a weakness of any one-dimensional sonority hierarchy in designating the direction of lenition: if lenition is defined as an upward shift on this scale, then leniting consonants ought to ultimately become vowels, and, similarly, the strengthening of vowels ought to yield consonants. Both processes exist of course – e.g., London English *field* [fɪɒd] (Wells 1982 : 313); Cypriot Greek /aðerfi+a/ > [aðer-fca] 'brother, pl.' (Kaisse 1992) – and may be conceived of as lenition and fortition, respectively, yet these two types of change do not exaust the set of phenomena referred to by these terms.

The next simplest sonority hierarchy is, in fact, seriously proposed by Zec (1995). It is shown in (2).

(2) *The second simplest sonority hierarchy*

index	sounds
2	vowels
1	sonorant consonants
0	obstruent consonants

Not being devised for their exemplification, such scales do not record many steps of a standard lenition trajectory, e.g., voicing and spirantization do not show as an increase in sonority on this scale.

Standard textbook presentations of the sonority hierarchy are usually more elaborate, fostering both the needs of the sonority sequencing principle and lenition. The scale in (3), for example, can be found in, e.g., Carr (1993 : 198), Durand (1990 : 210), Giegerich (1992 : 133), Goldsmith (1990 : 112), Hogg and McCully (1987 : 33), Katamba (1989 : 104), and Ladefoged (1993 : 246).

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[3] Nonetheless, several authors of this volume (Carvalho, Cyran, Pöchtrager, Ségéral and Scheer, Szigetvári) implement exactly the hierarchy in (1) in their representation of the phonological skeleton universally, i.e., for all languages.

(3) *A standard sonority hierarchy*

index	sounds
10	low vowels
9	mid vowels
8	high vowels
7	rhotics
6	laterals
5	nasals
4	voiced fricatives
3	voiceless fricatives
2	voiced plosives
1	voiceless plosives

Certain details of the scales referred to above vary but most features are common, e.g., the ranking of vowels according to their height, the position of nasals between liquids and obstruents, and the separation of obstruents according to continuancy and/or voicing. It is exactly these features of the sonority hierarchy that demonstrate its inability to simultaneously serve two purposes – organizing syllables and defining the steps of lenition trajectories.

Vowels are ranked according to their height in (3), an order reflecting the idea that if a Nucleus contains a diphthong, the part containing a lower vowel is the better candidate for being the peak of the syllable. Incidentally, this is false, cf., for example, the obsolescent centring diphthongs of the Received Pronunciation, [ɪə] and [ʊə] (in words like *peer* and *poor*), or the syllabic+nonsyllabic vowel sequences of Standard German, e.g., *ihr* [iːɐ̯] 'you-pl.', *Uhr* [uːɐ̯] 'hour'. Even if the latter are not diphthongs, these sequences still defy the sonority sequencing principle: sonority does not fall away from the nuclear high vowel.[4] In the light of these data and those in (5) further below, one may be tempted to assign different sonority values to the syllabic and nonsyllabic counterpart of segments (i.e., [ɐ] and [ɐ̯], [l̩] and [l], etc.), ranking the syllabic ones higher on the hierarchy. This would, however, lead to an obvious circularity: we set out trying to determine syllabicity *from* the sonority value of the segments, now we are trying to assign sonority values based on syllabicity.[5]

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[4] Neef (2004) calls our attention to the fact that sonority sequencing also breaks down on long vowels in flavours of the theory that calculate sonority sequencing on the timing tier and that do not allow sonority plateaus to occur within syllables (like that of Sievers (1881)). A solution for this problem will be offered in §4.2.

[5] Such a move would also break with the Saussurean (1931) tradition of distinguishing syllabic and nonsyllabic elements merely by whether they are part of the implosive or the explosive chain, not by assigning them to different steps on the sonority scale. The circularity of any sonority scale that assigns different ranks to vowels and glides can be criticized. Nevertheless, as the data in (5) will suggest, rejecting such a scale right away

Vowel reduction (which may be taken to be a case of lenition) also calls into question the ranking in (3), since it does not exclusively involve lowering, but also raising and centralization (cf. Crosswhite 2001, 2004; Harris 2005). In fact, Prince and Smolensky (1993) posit peak prominence hierarchies which rank central vowels lowest, i.e., least sonorous in our terminology. It may be argued that while consonants lenite by shifting up the scale, vowels lenite in the opposite direction: [e]/[ɛ] > [i] and [o]/[ɔ] > [u] are typical cases of vowel reduction in, e.g., Brazilian Portuguese (Mateus and d'Andrade 2000 : 134). But there are also cases of vowel reduction involving the "consonantal" direction, that is, up the scale: [o] > [a], e.g., Southern Russian [dóm]∼[damá] 'house, sg.∼pl.', or [o]/[ɔ] > [a], e.g., Trigrad Bulgarian (Crosswhite 2001 : 59, 203). The point I wish to make is not simply that the standard sonority hierarchies exemplified in (3) are problematic, but that they cannot be based exclusively on the openness of the vocal tract, since the resulting order will not be adequate for either sonority sequencing or vowel reduction.

The consonantal section of the sonority scale is also based on the observation that syllables are organized around a highly sonorous peak on the two sides of which the sonority of segments gradually falls towards the edges of the syllable. From this point of view, the separation of different classes of obstruents is unnecessary, since obstruents do not typically cooccur on either side of a syllable, and when they do, their order does not seem to be governed by sonority: e.g., word-final [ks] is just as viable as [sk], [st] occurs both to the left and to the right of a syllable peak within the same system (e.g., English), and while [pt] may be attested initially in some systems (e.g., Greek) and finally in others (e.g., English), [tp] is unattested in both either finally or initially. That is, obstruent+obstruent sequences cannot be governed by any sonority ranking. Accordingly, sonority hierarchies used for sonority sequencing may merge obstruents into one category (e.g., Clements 1990, Zec 1995). It is lenition phenomena that call for the typical classification according to continuancy and/or voicing. In some traditions (e.g., Anderson and Ewen 1987), voiced stops and voiceless fricatives are ranked on the same level, but on a different path, exactly because they do not typically turn into each other in lenition or fortition (cf. the [t d ð θ] quadrangle in (7) below).

Another point where the syllable-lenition mule hierarchy is unsuccessful is the juxtaposition of fricatives and nasals. There is no evidence for fricatives turning into nasals, and very little for them turning into laterals[6] (cf. Hock's solution

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may turn out to be too hasty: glides in English do show symptoms of being relatively low – in fact, below all other sonorants – on the sonority scale. If we were to follow this path, syllable structure must be supposed to be a lexical property, not derived from sonority. This is suggested by Kaye and Lowenstamm (1981), for example.

[6] Cser lists two cases: Pashto [θ] > [l], e.g., *caθu̯ārah > *calor* 'four' and Ob-Ugric [ð] > [l], e.g., *piđe- > Ostyak *pằl* 'high' (2003 : 77f).

of treating nasals separately mentioned in the next section). The inventory of changes where a noncontinuant obstruent turns into a nasal or liquid or a fricative turns into a glide is, on the other hand, large. Some examples from Cser's handy compendium: Northern Altaic Turkic *mȫri* ∼ Southern A. T. *bȫrü*; Pashto **pitāram > plār* 'father', **škafa- > cǝw-* 'cleave' (2003 : 76f). We can conclude that the sonority hierarchy cannot be viewed as a one-dimensional scale where each step from x to $x+1$ may be considered lenition.

In fact, it is not only the absence of lenition phenomena that challenge the fricative–nasal section of the sonority hierarchy, but also its other empirical source, syllable structure. It is well known, for example, that a schwa followed by a sonorant may be omitted in English, leaving only its syllabicity behind on the sonorant, e.g., *button* [bʌ́tən, -tn̩], *hassle* [hásəl, -sl̩]. The conditions for syllabic sonorant formation include that the ∂C_{son} sequence be preceded by a consonant which is lower on the sonority scale: (4a) lists environments in which syllabic sonorant formation is possible, while it is deemed nonexistent by Wells (1990) in the words in (4b).

(4) *Syllabic consonants in English*

	a. colonel	kɜ́:nəl	∼ -nl̩	b. melon	mɛ́lən	∼ *-ln̩
	camel	káməl	∼ -ml̩	column	kɔ́ləm	∼ *-lm̩
	plenary	plí:nəri	∼ -nr̩-	canon	kánən	∼ *-nn̩
	camera	kámərə	∼ -mr̩-	minimum	mínɪməm	∼ *-mm̩
	salary	sáləri	∼ -lr̩-	lemon	lɛ́mən	∼ *-mn̩
	Belgian	bɛ́lʤən	∼ -ʤn̩	venom	vɛ́nəm	∼ *-nm̩
	Benjamin	bɛ́nʤəmɪn	∼ -ʤm̩-			
	luxury	lʌ́kʃəri	∼ -ʃr̩-			
	special	spɛ́ʃəl	∼ -ʃl̩			

The motivation for this condition appears to be straightforward: the syllabic consonant will constitute a sonority peak only if it is preceded by a less sonorous consonant.[7]

(5) *Syllabic consonants in English after glides*

	a. barrel	bárəl	∼ -rl̩	b. narwhal	ná:wəl	∼ -wl̩
	barren	bárən	∼ -rn̩	equal	í:kwəl	∼ -wl̩
	quorum	kwɔ́:rəm	∼ -rm̩	loyal	lɔ́ɪjəl	∼ -jl̩
	terrorist	tɛ́rərɪst	∼ -rr̩-	lawyer	lɔ́:jər	∼ -jr̩
				collier	káljər	∼ -jr̩

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7   This is not exactly true with respect to the vowel that follows, which is obligatory in the nonrhotic RP in the case of [ɹ̩], because any /r/ in this dialect, syllabic or not, must be followed by a syllabic segment.

The data in (5), however, blatantly defy the reasonably explained rule: nasals and /l/ may be syllabic after glides.[8] If syllabic sonorant formation is indeed restricted to cases where the consonant preceding the site is lower on the sonority hierarchy than that about to become syllabic, then these data argue that glides are lower on the sonority hierarchy than all other sonorants. Accordingly, glides – normally either equated with high vowels or placed between all other consonants and vowels – should be ranked right above voiced fricatives, lower than nasals. Such a scale would be more in line with the facts of lenition, too: it has been pointed out that fricative-to-nasal changes are nonexistent, fricative-to-lateral are rare, while fricative-to-glide is well-documented.[9] Unfortunately, some of the data in (4a), for example, *plenary, camera, salary,* argue against such a reranking. The fact that [r] may turn syllabic after another [r] (*terrorist*) calls for a separation of the sonority values of nonsyllabic and syllabic sonorants, but this is also an undesirable solution because of its circularity – as already noted above. Alternatively, this is another argument supporting the hypothesis that syllable structure is lexically given.

A further deficiency of standard sonority hierarchies is the usual absence of certain sound classes, like glottals, aspirates, affricates, implosives, clicks or prenasalised consonants (Lavoie 2001). Non-textbook hierarchies do make occasional mention of some of these categories, but the diversity of their rankings provides a straightforward explanation for their omission in the bowdlerized scale of (3). The two glottals, for example, are inserted at practically all imaginable locations: below all other sounds (e.g., Dogil 1988 : 93, 1992 : 330), or among the glides (e.g., Zwicky 1972, cited by Lass 1984 : 183), or above all other sounds (e.g., Hume and Odden 1996 : 359),[10] or one of them ([h]) between sonorants and obstruents, the other ([ʔ]) at the bottom of the hierarchy, together with glottalized stops (Vijayakrishnan 1999).[11] This last scale is presented in (6).[12]

This scale makes an explicit effort to include not only voicing, but also aspiration and glottalization (ejectives) of the different laryngeal states, as well as the two glottal consonants. The fact that *ceteris paribus* consonants characterized by

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8   In want of the relevant RP forms, the last two items of (6b) are General American forms; together with [j] and [w], [r] is here considered to be a glide.

9   This is an oversimplification. Actually, sibilant fricatives lenite to [r], nonsibilant fricatives to glides – as András Cser points out.

10   To be faithful to the source, it must be mentioned that Hume and Odden (1996) talk about the impedance of sounds not their sonority. They replace sonority with impedance so that they can place laryngeals above vowels without losing the phonetic basis of the classification.

11   See Churma and Shi 1996 for a collection and discussion of the relevant data.

12   The original /z/ of this chart is replaced by /ɻ/, which is the symbol originally meant (Vijayakrishnan *p.c.*).

spread glottis are lower than those that are not, and that the same relation holds between stiff and slack vocal cords is an indication that these changes constitute another direction in the lenition trajectory, one which is different from general sonorization. Another noteworthy feature of this hierarchy is that [h] can only be ranked on the borderland between obstruents and sonorants by assigning it the [+consonantal] value, contrary to the SPE tradition. The fact that [h] lacks an oral place of articulation also puts it higher, thus place of articulation is also assigned a role in the hierarchy.

The uncertainty about the position of [ʔ] and [h] in the sonority hierarchy is probably the reason for their typically implicit omission. Clements (1990) omits them explicitly, claiming that laryngeals do not have a place on the sonority hierarchy, since they have no sonority value at all. In his model, sonority is derived from the value of the major class features in the supralaryngeal node, which laryngeals lack by definition.

(6) *A sonority scale for consonantal features* (Vijayakrishnan 1999 : 5f)

index	features	sounds
13	[+son, −cons]	/j w/
12	[+son, +cons, +cont]	/ʋ ɻ/
11	[+son, +cons, ±lat]	/l r/
10	[+son, +cons, spread glottis, ±lat]	/lʰ rʰ/
9	[+son, +cons, nasal]	/m/
8	[+son, +cons, spread glottis, nasal]	/mʰ/
7	[−son, +cons, +cont]	/h/
6	[−son, +cons, +cont, slack vocal cords, oral place]	/v/
5	[−son, +cons, +cont, stiff vocal cords, oral place]	/f/
4	[−son, +cons, slack vocal cords]	/b/
3	[−son, +cons, spread glottis, slack vocal cords]	/bʰ/
2	[−son, +cons, stiff vocal cords]	/p/
1	[−son, +cons, spread glottis, stiff vocal cords]	/pʰ/
0	[−son, +cons, constricted glottis]	/ʔ pˀ/

If so, however, it follows that either lenition is not exclusively a matter of change in sonority – Lass (1984), Harris (1997), Kirchner (1998 : 17ff), Ségéral and Scheer (1999), and many others share this view –, or debuccalization is not lenition – this alternative view is typically held by those who delimit lenition to intervocalic position, like, for example, Lavoie (2001 : 7), but also others, e.g., Cser (2003 : 26). In this chapter we will assume that lenition does not only involve a shift up the sonority hierarchy or, alternatively, standard sonority hierarchies are not elaborate enough to explain all sorts of lenition.

In the following section, I will look at scales devised explicitly for consonant lenition. Quite unsurprisingly these will show a better fit. The price to pay is that,

unlike sonority scales, they cannot be used for any other purpose than what they were devised for, which greatly decreases their explanatory value.

3. Lenition trajectories

To keep to the venerable tradition in phonological discourse on lenition, Vennemann's omnipresent dictum is to be cited:[13] "a segment X is said to be weaker than a segment Y if Y goes through an X stage on its way to zero." Hence, we can call the change lenition if the segment is eventually going to disappear, that is, to tell whether a change is lenition or not presupposes that we know the future fate of the given segment. While this may be the case in diachronic studies of language, it is certainly not in synchronic analyses.[14] Accordingly, if at all, the definition can only be used as follows: "since we frequently see that the change Y > X is a step in a trajectory leading to the loss of Y in the history of a number of languages, we consider the same change lenition in the particular language we are analysing."

A comprehensive picture of possible trajectories is offered by Hock. A modified version of this network is shown in (7). Each step downwards in the network is an instance of lenition. Hock's lines have been supplemented with arrowheads to indicate this. Furthermore the paths immediately leading to zero, which have been omitted by Hock, are also added. On the other hand, Hock's dashed lines, indicating unattested lenition steps, are omitted. (To make the original recoverable: there were two dashed lines linking [tt] and [dd], as well as [ʔ] and [h].) To conform to the notation of this chapter, Hock's *y* is replaced by IPA *j*.

"For notational convenience, dentals have been chosen to represent the different segment classes" claims Hock (1986 : 82), implying that similar networks may be set up by exchanging the nodes with the appropriate segments of other places of articulation. Clearly, place of articulation must be taken in the loose, phonological sense here: dental means coronal, as the inclusion of [j] shows. Although the glottal [ʔ] and [h] also feature towards the end of the lenition trajectories of consonants of other places of articulations, this does not seriously undermine the homorganic nature of the network, since these consonants do not possess a place of articulation (cf. Lass 1984 : 115). But, quite unexpectedly for Hock's hierarchy, further place-modifying changes may be subsumed under the

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[13]   Some sources of the written records of this personal communication, probably "a good candidate for the most cited" one, are collected in Honeybone (2002 : 41). The quote was made immortal by Hyman (1975 : 165).

[14]   The notion of trajectories is problematic even in diachrony, "since language (or a segment) never 'remembers' where it came from. [. . .] Long-term sequentiality does not exist in human languages" (Cser 2003 : 17).

cover term lenition: [k] > [j] (as in Vulgar Latin [lacte-] > Portuguese [lɐjtɨ] 'milk', [l] > [w] (as in Brazilian Portuguese *pape*[l]*ão* 'cardboard'~*pape*[w] 'paper'; Harris 1997:319), [t] > [k] (e.g., Tahitian *mata* 'eye' vs. Hawaiian *maka* id., etc.; Otsuka 2005) or [n] > [ŋ] (Spanish examples in §4; where the classification of these changes is also given a reason for).
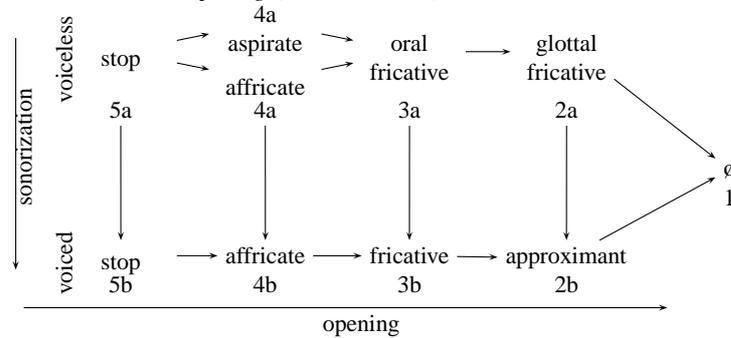
(7) *Hock's weakening hierarchy* (1986:83)
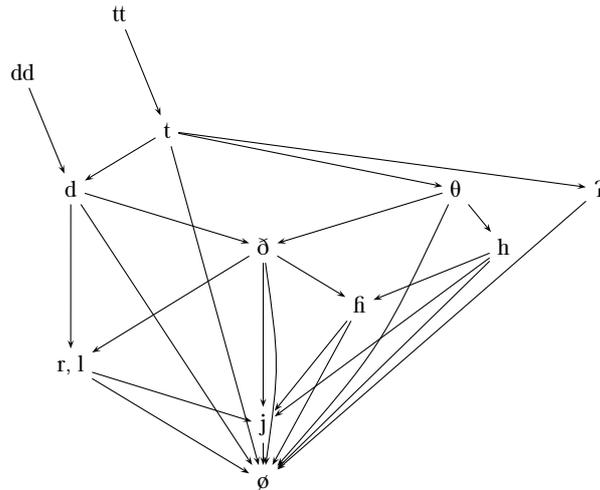
As for nasals, Hock claims that "their (nasal) stop characteristics take precedence over their sonorant qualities" (1986:82), that is, a network similar to (7) is posited not only for other places of articulations, but also for nasal consonants, presumably at each place of articulation. It is hardly an accident that the network for nasals is not depicted by Hock, but at least this explains the lack of fricative-to-nasal lenitions generally.

Another tradition in which lenition is not limited to a one-dimensional scale also involves two possible directions: sonorization and opening (Lass and Anderson 1975:152ff, Lass 1984:177ff). Despite its name, sonorization exclusively means voicing, while opening is partly moving up the sonority hierarchy – from stop to fricative –, partly debuccalization – from oral fricative to glottal fricative, as well as total loss. (8) shows this schematically.

(8) *Sonorization and opening* (Lass 1984 : 178)

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                              4a
         voiceless            aspirate          oral              glottal
                      stop  →             →     fricative   →     fricative
                            →             →
sonorization                  affricate
                      5a      4a                3a                2a
                                                                         →  ∅
                                                                            1
                                                                         →
         voiced        stop  →   affricate  →  fricative  →  approximant
                      5b        4b              3b             2b
                                        opening
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The paths 5a–3a and 5b–3b–2b are available in standard sonority scales of the type in (3), too. In being two-dimensional, (8) surpasses such a scale, explicitly stating that lenition may proceed in more than one direction. This distinction is not imaginable in the traditional one-dimensional sonority scale. On the other hand, the chart in (8) lacks the glottal stop, and it is difficult to see where it could be fitted in such a way that it is kept two-dimensional. This is a problem, because it appears that fricative-to-[h] changes are often paralleled by stop-to-[ʔ] changes in lenition systems, subsumed under the name debuccalization (or de-oralization).

Both steps 5a–4a, that is, a plain voiceless stop becoming either an aspirated one or an affricate, are debatable and debated. We will return to these cases in §7.

An even more diverse picture of lenition is given by Foley (1977).[15] He posits several strength scales, for example, for place of articulation ("<" means "is weaker than"): k < t < p (α-strength), for manner, voicing and geminates: ð < d < t < tt (β-strength), for sonority (or resonance): t < s < n < l < j < e (ρ-strength), for vowel (aperture and backness): i < u/e < o/a ($\eta\omega$-strength), as well as others. Foley sets up very strong principles, which accordingly can be – and, in fact, are – easily refuted. Harris shows that on the one hand, the argumentation used to set up the hierarchies is circular, and, on the other, there are several sets of data that blatantly defy the principles not only as universals, but even within a language. These scales are still worth mentioning because they also corroborate the idea that lenition need not be measured along a single dimension.

In §2, it was shown that sonority scales cannot be used simultaneously as lenition scales and look-up tables for syllabification. This is unfortunate, because if they have a single function, the reasoning becomes circular: syllables look what they look like because of the way the sonority scale is built up, but the sonority scale is based on observations about the shape of syllables. To make

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[15] I discuss Foley's theory on the basis of Harris (1985 : 71ff).

things worse, sonority scales are often inadequate even for the single function of driving syllabification.

The alternative of setting up independent lenition networks leads to the same circularity: if and when lenition networks show a better fit between the types of lenition observed and represented in the network or scales, that is only because these devices are specifically drawn up for this purpose. Therefore, lenition networks are no more than graphical summaries of generalizations on lenition data, allowing the analyst to easily spot changes that do not fit the general pattern. We must proceed to provide something more explanatory.

4. Lenition and assimilation

Equipped with the notions of lenition trajectories and sonority hierarchies, one would be tempted to identify a change like [t] > [s] as lenition. If, however, examined together with a context like Epic Greek /plat+sa/ > [plássa][16] 'to mould, aorist 1sg', the analyst might just as well classify this change as assimilation. In the Attic Greek context /plat+tos/ > [plastós] 'moulded in clay or wax', on the other hand, the "same" change could even be analysed as dissimilation.

Similarly, the voicing change [d] > [t] is standardly analysed as assimilation in a case like Russian *podkóp* [pʌtkóp] 'tunnel', but as lenition (or, alternatively, fortition) in *pód* [pót] 'under' (cf. *podól* [pʌdól] 'lower part of a garment'). The two segmental changes so far involved manner of articulation ([t] > [s]) and laryngeal properties ([d] > [t]). Place of articulation changes are no less ambiguous: in Spanish, for example, *n*-velarization may occur both before velars (*u*[ŋ] *gato* 'a cat') – assimilation – and word-finally (*u*[ŋ], cf. *u*[n]*a* indefinite article, masc. and fem., respectively) – lenition. The same difference in categorization can be found in vowels too: [a] > [ə] is assimilation (more commonly called vowel harmony, or more specifically ATR harmony) in Kpokolo *glā* 'teeth' vs. *glə̄jì* 'tooth' (Kaye et al. 1985:316), but lenition (reduction) in English *ac*[a]*demy* vs. *ac*[ə]*demic*. The immediate conclusion we can draw is that a phonological change cannot be categorized without context: the melodic change in itself is insufficient to tell whether a given change is lenition, fortition, or something else. The context of the change cannot be ignored.

To tell assimilation/dissimilation and lenition/fortition apart, we may go by taxonomic definitions. Phonological changes which are conditioned by some other segment are cases of assimilation/dissimilation. Those conditioned by the position occupied by the target of the change in the prosodic hierarchy are cases

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[16] The Attic equivalent, [ɛ́plasa], was subject to regular degemination and exhibits an augment too.

of lenition/fortition. Such a distinction follows Trubetzkoy's concept of contextually and structurally conditioned neutralization (1969 : 229ff; also cf. §6.).

Even on the basis of the definition above, drawing the line of demarcation between assimilation and lenition cannot always be done pretheoretically. The [d] > [t] change, illustrated by word-final devoicing in the case of Russian *pod* [pot] was categorized as lenition above, but it may just as well be analysed as assimilation to the following pause, which is not voiced; thus the change is not conditioned by a prosodic position (call it Coda position), but by the following null segment or word boundary (e.g., Hock 1986 : 80). In fact, Hock extends this assimilation-analysis first from prepausal to word-final, then to syllable-final position (1986 : 239f), claiming that since prepausal segments are always word final, analogy explains word-final devoicing. By the same token, since prepausal segments are also syllable final, we encounter systems with devoicing in this position: e.g., in many varieties of High German *Re*[t]*ner* 'speaker', (cf. *re*[d]*en* 'speak'), *ra*[t]*le* 'I cycle' (cf. *Rä*[d]*er* 'wheels'). However, since devoicing also occurs before voiced obstruents (e.g., *kün*[t]*bar* 'terminable' vs. *kün*[d]*en* 'announce'), Hock must give up his original idea that devoicing is assimilation.

It is also common to treat the intervocalic spirantization or voicing of obstruents as cases of assimilation. Lass, for example, writes: "if [k] → [x] context-free, this is simply *spirantization* [a type of lenition]; but if the same thing happens between vowels, this can count as assimilation" (1984 : 171; emphasis in original, comment mine). Pretheoretically, intervocalic spirantization and voicing can easily qualify as assimilation, since "all vowels are specified as $\begin{bmatrix} +\text{voice} \\ +\text{cont} \end{bmatrix}$", as Lass and Anderson (1975 : 164) claim. On the other hand, if assimilation is modelled as feature spreading – as it standardly is in the autosegmental milieu –, treating intervocalic voicing (and spirantization) as voicing assimilation is highly spurious for at least two reasons. For one thing, sonorants, which allegedly voice the obstruent, are not phonologically voiced themselves: their voicedness is not a phonological property, it is a phonetic consequence of their other properties (cf. Chomsky and Halle 1968 : 300f, Harris 1994 : 135, Harris 2003), accordingly they cannot spread this feature on a neighbouring segment. Similary, it is difficult to see which phonological feature of vowels should spread onto a plosive to make it a fricative, if vowels are not specified [+cont], which they are not in most current models. For another thing, intersonorant voicing assimilation is unique in that it requires there to be a trigger on both sides of the target: obstruents are voiced by only two sonorants, one is not enough (cf. Cser 2003 : 23).[17]

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[17] An apparent counterexample, English plural and past suffixation, is arguably fake, involving the devoicing of the lexically voiced obstruent, but occurs in a morphologically very restricted environment anyway.

These attempts at extending the scope of assimilation nevertheless bear clear evidence for the theoretically desirable endeavour to subsume one category under another, in this case, to show that lenition is a subcategory of assimilation. There is another option, too: trying to show that assimilation is a subcase of lenition. This idea is again not unprecedented, cf., for example, Kiparsky (1988: 377) or, in fact, Hock (1986: 84). According to the definition of lenition and assimilation to be introduced in the next section, assimilation is a separate phenomenon, which may be triggered off by a previous instance of lenition.

4.1. Privative primes

At this point, the categorization inevitably becomes theory-specific. Depending on how one models the sonorization and voicing of an obstruent, different analyses will follow. Returning to the case of word-final devoicing, if it is seen as the spreading of the feature [voiceless] or [−voiced], the change may be analysed as assimilation – although it is not easy to conceive of a phonological object at the end of the word containing the relevant feature specification, [−voiced].[18]

An alternative solution is offered by theories employing privative features. There is good reason to assume that voicelessness will be expressed by the absence of any feature, while voicing is marked by the presence of one (cf., e.g., Harris 1994, Lombardi 1995b). In such a framework, devoicing consists in the loss of that feature, [voiced], the remaining [voiced]-less segment is interpreted as voiceless. In a given taxonomy, this change could be called assimilation inasmuch as the devoicing segment becomes more similar to the following "segment" in not possessing the [voiced] feature. If, on the other hand, we take assimilation as a formally defined, i.e., theoretical category, it should only cover cases in which some feature value is extending its domain of interpretation over another segment. Accordingly, word-final devoicing cannot be treated as assimilation, since there is no spreading taking place, it should rather be analysed as lenition, i.e., the loss of a feature, happening in a weakly cued or unlicensed position. As Trubetzkoy put it: a final devoiced [t] "from a phonological point of view is neither a voiced stop nor a voiceless stop but 'the nonnasal dental occlusive in general'" (1969: 79).

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[18]   The issue does not arise in theories which do not constrain the insertion of phonological material, and which can introduce feature specifications without a local source. But there is no need for that in this specific case: Chomsky and Halle state that like other segments the word boundary (#) is a fully specified feature matrix (1968: 371), thus implicitly claiming that it includes [−voiced], in fact, Lass and Anderson explicitly say that "/#/ is a voiceless obstruent" (1975: 178f).

In fact, in a theory applying privative phonological features – [voiced] among them –, devoicing of an obstruent can never be analysed as assimilation, since it involves the loss of the feature [voiced], not the spreading of the nonexistent feature [voiceless]. In return, such a theory gives us a very straightforward, though inherently theory-internal definition of lenition: it is the loss, i.e., delinking, of a feature. The interpretation of this definition depends on the framework one adopts not only because it cannot be applied to nonprivative models,[19] but also because the set of primes is not identical in different privative theories of melodic representation. It is widely accepted (but see Vaux and Samuels (2005) for an opposing view) that the representation of nonspontaneous voicing in obstruents, or of aspiration, is some manifestation of a feature [voiced] and [aspirated], respectively.[20] Hence devoicing and deaspiration are both instances of lenition. Similarly, if place of articulation in consonants is modelled as the presence of features like [labial], [coronal] or [velar], while the absence of a place feature is interpreted as glottalness, debuccalization, the loss of these features, is also lenition.

A possible theory-specific definition of lenition and assimilation is formulated in (9).

(9) *A theory-specific definition of lenition and assimilation*
    a. Lenition is the delinking of a privative feature.
    b. Assimilation is the spreading of a privative feature.

Under these conditions, an instance of regressive devoicing, for example, [bt] > [pt], could be represented as in (10), using the Trubetzkoyan convention of P and T as archiphonemes.

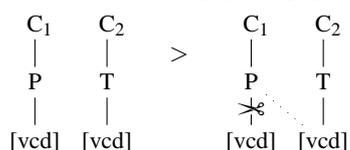(10) *Regressive devoicing in a privative framework*

<pre>
    C₁   C₂   C₁   C₂
    | | > | |
    P   T   P   T
    | ⫣
 [voiced]   [voiced]
</pre>

---
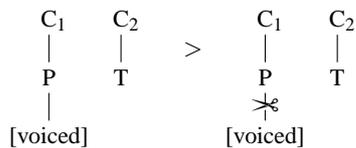
[19] It must be admitted that one might argue for [+F] turning into [−F] to be lenition in such a framework: the practice of categorically distinguishing positive and negative feature values is followed by, e.g., Clements (1990).

[20] For example, Lyman's law in Japanese (Itô and Mester 1995 : 819ff) and Grassmann's law in Greek (Collinge 1985 : 47ff) argue for these two features – as opposed to one encoding voicelessness or absence of aspiration. Lyman's law inhibits the occurrence of two voiced obstruents within a morpheme, Grassmann's has a similar effect for aspirated consonants. The reason why no similar constraint limits the occurrence of voiceless unaspirated consonants must be that such an alleged rule would have no feature to refer to.

Regressive devoicing, taxonomically an obvious case of assimilation, thus can be analysed as lenition. The same process devoices obstruents word finally. If a preconsonantal Coda loses its [voiced] feature in a given system, the "change"[21] [bd] > [bd] ought to be analysed in the same system as shown in (11).

(11) *The concatenation of* [-b] and [d-]

$$
\begin{array}{ccccc}
C_1 & C_2 & & C_1 & C_2 \\
| & | & > & | & | \\
P & T & & P & T \\
| & | & & \nmid & | \\
[vcd] & [vcd] & & [vcd] & [vcd]
\end{array}
$$

Although superficially no change is apparent, both lenition (delinking) and assimilation (spreading) take place in (11). These changes in the representation are not only necessary to satisfy the obligatory contour principle, but more importantly to be consistent with the analysis of regressive devoicing shown in (10). In fact, this analysis neatly explains the devoicing of Coda obstruents even before voiced obstruents (cf. German *kün*[d]*en* vs. *kün*[t]*bar* above): in this system only delinking (i.e., lenition), but not spreading (i.e., assimilation) takes place (cf. Lombardi 1995a).

Defining lenition as feature loss entails that lenition leads to the neutralization of phonological contrasts. While this is often indeed the case, in §6 I will show that lenition and neutralization are not two names for the same phenomenon. The definition in (9a) is also compatible with that of Vennemann: losing features may eventually result in the loss of all the features a given segment possesses, but even if this is not the final outcome of the change, the direction is still indicated by feature loss.

4.2. Autosegmental representations

The relevance of the context of a given phonological change cannot be overestimated. This is especially so if the analyst works in an autosegmental framework, since here segments – somewhat misleadingly indicated by discreet symbols in conventional transcriptions – are not autonomous entities. Accordingly, a change like [s] > [t], which, based simply on some sonority or strength scale, one would be tempted to identify as fortition, may receive totally different analyses. For one thing, in a context like Sanskrit [vastu] > Pali [vattʰu][22] 'thing', this change

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[21]   This is a change if some morphological/syntactic concatenation is involved, i.e., if a morpheme-final [b] comes to be followed by a morpheme-inital [d].

[22]   The regular aspiration of the resulting geminate is ignored here.

might as well be classified as assimilation, especially, if we consider that [s] turns into any stop following it: Skt [apaskara] > P [avakkaːra] 'faeces', Skt [bṛhaspati] > P [bihappai] 'Jupiter' (Masica 1991 : 177).

More importantly, if we examine the standard autosegmental representation of the change, given in (12), we see that what at first sight looked like fortition is, in fact, partly lenition, i.e., delinking of melodic material, partly assimilation, i.e., spreading of melodic material.

(12) *The* [st] > [tt] *change*

$$
\begin{array}{ccccc}
C_1 & C_2 & & C_1 & C_2 \\
| & | & > & \cancel{|} & | \\
s & t & & s & t
\end{array}
$$
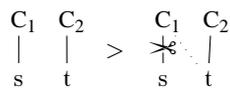
The strength of the segment represented by C_1 after the changes have taken place is dependent on whether we include or ignore the association of multiply-linked melodic material in the calculation of strength. To be less cryptic: the melodic primes defining [t], associated with C_2, make the segment represented by C_2 strong. It seem reasonable, however, not to calculate the same set of melodic primes again when determining the strength of C_1. One reason for doing so is the fact that geminates are a very unmarked consonant cluster type,[23] a fact that complies with the Complexity Condition (Harris 1990) only if the complexity of – i.e., number of primes in – the first member is 0. Viewed from the perspective of segment C_1 the process that took place is radical lenition: the position has lost all its melodic primes. The fact that this – now empty – position is included in the domain of interpretation of a following segment does not add to its own melodic complexity. Entertaining a similar idea, Suh (1995) argues that the first part of a geminate is not even linked to (much of) the melodic primes defining its identity.[24] Thus a geminate might be represented as in (13), where X denotes the relevant set of melodic primes.

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[23] One might ask, if geminates are unmarked why are they banned in systems which otherwise allow consonant clusters. Geminates are probably the least marked cluster type, and as such, they might be disallowed in languages, similarly to the fact that the glottal stop, although the least marked, prototypical consonant, is not part of many consonant inventories. Probably the ban on empty Onsets in some languages is the manifestation of the same principle: not only marked, but also extremely unmarked objects are dispreferred in language (Szigetvári 2006).

[24] Note that such a representation means a departure from the standard autosegmental model, where the interpretation of a skeletal slot is a function of the melodic primes associated with it – as a reviewer points out.

(13) *The representation of a geminate*

$$C_1 \quad C_2$$
$$|$$
$$X$$

Recall the problem raised by Neef (footnote 4): some versions of the sonority sequencing principle inhibit tautosyllabic segments of the same sonority rank. This would rule out long vowels, which create sonority plateaus. That problem is also solved by assuming the representation in (13), or, at least, that multiply-linked melodic material is counted only once. Hence a long vowel exhibits a steep fall in sonority, i.e., complexity,[25] and does not constitute a sonority plateau at all.

4.3. Types of lenition

With the definion of lenition given in (9a), the types of lenition available can be categorized as in (14).
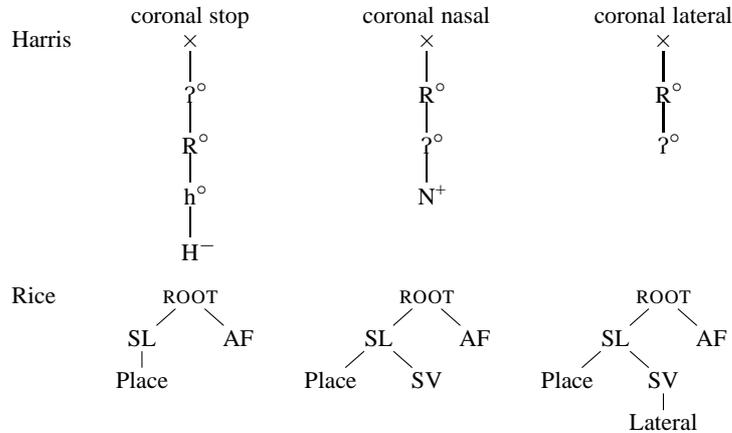
(14) *Types of lenition*

   a. loss of place features: debuccalization: [t] > [ʔ], [f] > [h], depalatalization: [ɲ] > [n], delabialization: [kʷ] > [k], etc.
   b. loss of laryngeal features: devoicing: [d] > [t], deaspiration: [tʰ] > [t]
   c. sonorization: spirantization: [t] > [θ], gliding: [p] > [w], rhotacism: [s] > [r], etc.

Of these three types of lenition, it is only (14c) that the standard sonority scales embody. Whether and what features are lost in sonorization is a highly problematic issue. There are two opposing views about the relationship of sonority and complexity. One may be exemplified by Harris's position (1990, 1994, 1997): here consonantal sonority is accompanied by decomplexification. Rice's (1992) model represents the other view (also shared by Scheer (1996)), according to which more structure entails more sonority. (15) is Rice's (52)[26] (1992: 91) clearly showing the contrast: a putative t > n > l trajectory is structure loss for Harris, but structure building for Rice.

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25 The idea of deriving sonority from complexity is discussed by Harris (1994: 176f).

26 ʔ° = occluded, R° = coronal, N⁺ = nasal, h° = noisy, H⁻ = stiff vocal cords; SL = supralaryngeal node, AF = air flow node, SV = sonorant voice node.

(15) *A comparison of views on the complexity–sonority connection*

coronal stop	coronal nasal	coronal lateral

Harris

$\times$ $\times$ $\times$

$?^{\circ}$ R° R°

R° $?^{\circ}$ $?^{\circ}$

h° N^{+}

H^{-}

Rice

ROOT   ROOT   ROOT

SL   AF   SL   AF   SL   AF

Place   Place   SV   Place   SV

Lateral

Rice's representations are untenable for a theory that treats sonorization as lenition and at the same time wants to maintain that lenition is loss of phonological primes.[27] On the other hand, it encodes the marked status of sonorants vis-à-vis stops: stops are less marked than sonorants since they incorporate less structure.

Harris's representations fit in well with the idea that the sonorization type of lenition is loss of phonological primes, but they fail in showing that sonorant consonants are marked. In fact, it is an embarrassing paradox that sonorization as lenition results in more marked segments. Lenition typically entails the neutralization of a contrast – cf. §6 though –, this does not let us expect sonorization to qualify as lenition.

I leave this an open issue here, only hinting at the possible direction of an explanation: the other two dimensions of lenition, (14a, b), clearly involve feature loss, yet it is exactly these two types that are less successfully incorporated in lenition scales. If sonorization is to be subsumed under the cover term lenition, the definition has to be made context-specific. I will make an attempt elsewhere in this volume.

5. Lenition and context

It has already been pointed out in §4 that it is impossible to categorize a phonological change without reference to the context it occurs in. To systematize contexts, Escure sets up the environmental hierarchy cited in (16).

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[27] This does not disqualify Rice's representations, of course, since her theory does not want to maintain that lenition is loss of phonological primes.

Within the three general categories, labelled here by letters, the numbered subcategories indicate "subhierarchies of deletability" (Escure 1977 : 58), i.e., she does not claim these subcases to be relevant for all types of lenition. The hierachy, she claims, represents an implicational relationship of environments favouring lenition: if lenition occurs in environments (15b), then it also occurs in environments (15a), if it occurs in (15c), then it occurs in all possible environments. In the examples she mentions, the implication holds: e.g., some non-rhotic accents of English lose [r] in environments (15a), others in *both* (15a) and (15b). In other cases, however, it does not: for example, flapping in several English dialects occurs in environments (15b), but not in (15a). In fact, I will argue elsewhere in this volume that different environments promote different types of lenition, movement along different lenition trajectories.

(16) *Environmental hierarchy for lenition* (Escure 1977 : 58)

a. Final	1	$V\_C_1^n\#\#$ or $VC_1^n\_\#\#$
	2	$V\_C_1^n\#$
	3	$V\_\#C$
	4	$V\_\#\#$
b. Intervocalic	5	V_V
	6	$V\_\#V$
	7	$V\#\_V$
c. Initial	?	$\#\#\_V$

Besides being empirically inadequate, Escure's collection of environments also ignores the fact that consonant clusters cannot be treated on a par with single consonants. No mention is made of the V_CV or VC_V environments, although adjacent consonants may "protect" their neighbours against lenition (Lass and Anderson 1975 : 159ff), or they may "promote" the deletion of their neighbours (Côté 2004). The question whether the total deletion of a segment qualifies as lenition or not is left open in this chapter (cf. footnote 30). Irrespective of the answer, however, it is clear that these environments require separate treatment.

It is a phonological commonplace that consonant lenition is typical in Coda position, as formulated by different coda, cluster and licensing constraints (Steriade 1982, Itô 1988, Yip 1991, Lombardi 1995a, etc.), the essence of which is that the set of possibilities for contrast is curtailed: certain features are either banned in this position, or allowed only if shared with the following position.[28] Such a

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[28] Borowsky (1989) unifies the two options by a linking constraint, i.e., that association lines in structural descriptions are exhaustive. A given feature which is banned in the Coda position sneaks out of this constraint be being simultaneously linked to the following position.

limitation of contrasting potential inevitably leads to neutralization, which is a possible effect of lenition (cf. §6). However, restricting the process to Coda position leads to analysing intervocalic Onsets (in some languages only posttonic or nonpretonic intervocalic Onsets) as Codas, in order to maintain the uniformity of the environment. This is a highly undesirable consequence, going against the well-established principle of Onset Maximization (Harris 1997 : 329f).

Although the inventory of lenition-promoting environments one sets up is evidently a function of what the particular analyst treats as lenition,[29] there is a fair consensus that the typical lenition environments include Coda (preconsonantal and/or word-final) position and intervocalic position (cf., e.g., Escure 1977, Harris 1997 : 323, Kirchner 1998 : 180ff, Ségéral and Scheer 1999, Honeybone 2001 : 230), whatever analysis is given for their syllabic affiliation.

To get a rough approximation of factors promoting and inhibiting lenition, let us abstract away from interferences, like metrical prominence (i.e., stress), connected speech phenomena, melodic factors, as well as rising-sonority consonant clusters (the type standardly referred to as branching Onset). Under such hygienic conditions, the nine theoretical possibilities listed in (17) lend themselves.

(17) *Strong (↑) and weak (↓) environments*

	__#	__C	__V
#__	?#__#	?#__C	↑#__V
C__	?C__#	?C__C	↑C__V
V__	↓V__#	↓V__C	↓V__V

Of the nine possible environments, the four preceded by a question mark are excluded from further discussion for various reasons. #__#, for example, is not a very relevant environment for consonant lenition, while the status of C__# is not clear: within the same language it may retain a consonant unchanged – e.g., *nest* *[nɛsʔ] –, but it may also incite radical lenition – e.g., *nest* [nɛs] (Wells 1982 : 567).[30]

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[29] Lass and Anderson, for example, say that word-initial position favours lenition (1975 : 166), since they see [t] > [tʰ], i.e., aspiration, as lenition. More on this in §7.

[30] This fact may be used as an argument for the claim that total loss is not an instance of lenition (Cser 2003 : 18). The definition in (9a) does not necessarily contradict such a claim: total loss may result from the gradual loss of privative primes, as well as the instant loss – or, rather, loss of licensing – of not the primes themselves, but the skeletal slot containing the primes involved. If so, the instant loss of a consonant is a phenomenon different from its gradual lenition, although the latter also concludes to the same zero-stage.

Looking at the remaining cases, what we observe is that strong environments are exceptionlessly prevocalic, while weak environments are exceptionlessly postvocalic: a following vowel inhibits the lenition of a consonant, while a vowel preceding it promotes lenition. It follows that a preceding nonvowel inhibits lenition, while a following nonvowel promotes it. From these statements the demi-environments – paraphrasing Clements's (1990) demisyllables – in (18) can be abstracted.

(18) *Strong (↑) and weak (↓) demi-environments*

    a. ↑ #__   b. ↑ C__   c. ↓ V__
    d. ↓ __#   e. ↓ __C   f. ↑ __V

The environments shown in (17) are combinations of those in (18). We can see that the strong environments are combinations of exlusively strong subcomponents, that is environments where both sides of the environments is a strong one. In other words, environmental strength is carried by a recessive gene, as it were. The weakening factor is dominant: if it turns up on either side, the resulting combination is a weakening environment.[31]

In fact, the strength of postconsonantal consonants may, in some systems, depend on the melodic identity of the left-hand environment: consonants being strong after obstruents, but weak after sonorants, e.g., *winter* with [ʔ] in London English and [ɾ] in New York English, but *mister* without the possibility of such lenition (Harris and Kaye 1990, Harris 1994 : 217ff). In such systems, C is to be interpreted as "obstruent" and V as "sonorant", including, of course, vowels. A similar variation in the interpretation of C and V can be observed in the case of the right-hand environment as well: a consonant in V__[son] position may behave as if it were intervocalic (e.g., Vulgar Latin *patre* > Portuguese *padre* 'father', parallelling VL *site* > P *sede* 'thirst') or it may not, like in English, where a presonorant [t] does not normally flap.[32]

It can also be observed that while some of the lenition types catalogued in (14) are very likely in some of the environments in (18), others are much less so. Devoicing, for example, is not attested in intervocalic – or, for that matter, any prevocalic – position, while sonorization is a preferred change here. In exchange, loss of place or laryngeal properties is more characteristic of nonprevocalic positions (word-final, preconsonantal), while sonorization is, if not nonexistent, but rarer there.

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[31] This claim may have to be revoked if we should accept the option that total loss of a segment is not treated as lenition, but rather as some alternative prosodic change. If C__# is a strong environment then that is because of its being postconsonantal.

[32] Wells claims that flapping is possible before syllabic *l,* e.g., in *battle* but not before syllabic *n,* e.g., in *button* (1990 : 251).

6. Lenition and neutralization

Despite the formal separation of lenition and assimilation given in (9), the two processes are intimately related, hence the two change types are often collectively referred to as neutralization, distinguished as assimilative and reductive neutralization (Trubetzkoy 1969).

Assimilation – that is, the extension of the domain a feature is interpreted in – typically targets positions that are weak, positions which potentially underwent lenition previously. Consonant-to-consonant assimilations are more often regressive than not: a possible explanation is that preconsonantal consonants are in a weak position – cf. (18e) – therefore more prone to lenition and subsequent assimilation (Katalin Balogné Bérces *p.c.*). Similarly, the trigger of vowel-to-vowel assimilations is the strong (stressed) Nucleus, or the root morpheme, the targets being the prosodically weak Nuclei. Under this interpretation, vowel reduction is the vocalic counterpart of consonant lenition, while vowel harmony is equivalent to assimilation in consonants. The same distinction can be made in connection with vowel-to-consonant interactions. If, for example, in a language consonants are palatalized when followed by a high vowel or glide, the change first happens in unstressed syllables, the Onset of which is in a prosodically weak position, later extending to stressed ones (e.g., English (RP) *virtue* [vɜ́ːtʃuː] vs. *tuna* [tjúːnə]).[33]

In a framework applying exclusively privative features, the loss of such a feature is expected to limit the contrastive possibility of the segment involved. This is obviously so: a 3-strong segment, made up of the features *A, B,* and *C,* has all the contrastive capacities that a 2-strong segment, made up of *A* and *B,* does, in addition to the extra contrasts that its third feature activates. Thus any feature loss tightens the system, increasing the possibility of the neutralization of some contrast. The loss of the [voiced] feature, for example, extinguishes the contrast between voiced and voiceless obstruents, irrespective of whether assimilation also ensues. Similarly, vowel reduction leaves unstressed vowels noncontrastive: e.g., European Portuguese [murár] 'to live' and 'to enclose' are homonymous, while their stems, in which the first vowel is stressed, hence unreduced, contrast: [mɔ́rɐ] 'he lives' vs. [múru] 'wall'. As Harris states: "a maximal inventory of vocalic contrasts manifests itself in dominant [i.e., stressed] nuclei, while reduced inventories show up in recessive [i.e., unstressed] nuclei" (1997 : 359; comments mine).

In fact, consonant lenition (or vowel reduction) may, but does not necessarily, lead to neutralization. Glottalization, for example, in English leads to neutralization in only those dialects where stops other than the coronal [t] are also thus

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[33] While both [vɜ́ːtjuː] and [tʃúːnə] exist, I predict that no speaker has the palatalized consonant in the stressed *and* the nonpalatalized one in the unstressed syllable.

reduced: *ma*[ʔ] contrasts with both *map* and *mac,* unless one or both of the latter two also undergo the change and become *ma*[ʔ]. Spanish [s] debuccalization – e.g., *después* > *de*[h]*pué*[h] 'afterwards' (Harris 1997: 318) – also fails to merge any contrast, until this change is the only source of [h] in the language. Moreover, lenition and assimilation can pave the way for phonemic splits, thereby producing exactly the opposite of neutralization. The voiced fricatives of English and the front rounded vowels of German are two well-know cases of sound sets that developed in this way.

Not only are there cases of lenition that do not lead to the suspension of a contrast, but neutralization may also be achieved by processes other than lenition (and/or assimilation). The development of Greek consonant clusters provide a fine illustration of this – as András Cser (*p.c.*) points out. Modern Greek imposes strict constraints on voiceless obstruent clusters: they may be either fricative+stop or stop+s clusters. As a result, the contrast between classical *w+stop/s,* stop+stop/*s,* as well as that between later (here represented by "learned" forms) fricative+fricative clusters is neutralized, as the examples in (19)[34] show. (Since it is irrelevant in the process, accent is not marked; the glosses refer to the Modern Greek derivates.)

(19) *Greek voiceless obstruent clusters*

	Classical	"learned"	"popular"	gloss
a.	kʰtʰes	xθes	<u>xt</u>es	'yesterday'
	oktɔː	okto	o<u>xt</u>o	'eight'
b.	ewtʰus	efθis	e<u>ft</u>is	'at once'
	pʰtʰanɔː	fθano	<u>ft</u>ano	'arrive-1sg'
	awtos	aftos	a<u>ft</u>os	'that, he'
	hepta	epta	e<u>ft</u>a	'seven'
c.	ewkʰɛː	efxi	e<u>fk</u>i	'wish'
	ewkolos	efkolos	e<u>fk</u>olos	'easy'
d.	—	epikalesθo	epikale<u>st</u>o	'appeal-aor.fut.-1sg'
	stenos	stenos	<u>st</u>enos	'narrow'
e.	pawsɔː	pafso	pa<u>ps</u>o	'finish-aor.fut.-1sg'
	grapsɔː	grapso	gra<u>ps</u>o	'write-aor.fut.-1sg'

The merger[35] of the underlined "popular" clusters indicates the neutralization of all the different inputs in each group, but while some of the changes

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34   I am grateful to András Mohay for all his help with the data. "Learned" and "popular" are used to replace the traditional but dated labels "Katharevusa" and "Dhimoitki".

35   Hypercorrect forms like [ektes] for [xtes] ("original" [xθes]) show that the merger is complete, the source of [xt] cannot be recovered.

themselves can be labelled lenition, others fortition; many are instances of dissimilation, but none of them is an assimilation.

We can conclude that the terms lenition and neutralization are not synonymous: the neutralization of a contrast may be a result of assimilation or dissimilation, as well as lenition or fortition, furthermore, not all instances of lenition result in the neutralization of a contrast.

7.   Debated cases: affrication, aspiration

While the status of some segmental changes (like, for example, the spirantization of a stop or the gliding of a fricative) is accepted with consensus – these are clear cases of lenition –, opinions about other changes vary. Two of these changes will be discussed in this section, affrication and aspiration.

The term affrication is itself ambiguous in this respect, as Lavoie's dilemma reveals: "The strength status of affrication might depend on the segment that is affricating" (2001 : 46). Indeed, it makes a difference if a stop or a fricative turns into an affricate: the former is probably a case of lenition, the latter one of fortition. Nonetheless, if one bases a strength hierarchy on notions like articulatory effort or phonetic saliency (like, e.g., Kirchner), a scale like the one in (20) may be arrived at.

(20) *An effort-based strength hierarchy* (Kirchner 1998 : 118)

strident affricate > strident fricative > stop > nonstrident fricative

According to the scale in (20), changes like [p] > [p͡f] and [t] > [t͡s] or [p] > [f] and [t] > [s] count as fortition, apparently refuting the claim made above about the consensus on the status of spirantization. Kirchner, however, makes it clear on several occasions (1998 : xiv, 4, 100) that there exist no cases of synchronic (or direct) changes where a stop would turn into a sibilant fricative:[36] such changes – he claims – exclusively occur via a nonsibilant fricative. Liverpool (Honeybone 2001 : 236ff) and Merseyside (Harris 1994 : 121) English spirantization, for example, yield slit fricatives (*letter* with [θ̠] and *lesser* with [s] are kept in contrast), the merger of the slit and the phonemic grooved fricatives is a later development (Kirchner 1998 : 106).[37] Thus, in Kirchner's view, spirantization is lenition, [t] > [s] is fortition. This, nevertheless, is not a contradiction,

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[36]   A similar position is also held by Scheer, who calls [p] > [f] false, and [p] > [ɸ] true spirantization, the former triggered by aspiration, the latter by a sonorous environment (1996 : 233ff, 281; 2004).

[37]   Honeybone also notes that the result of *t*-lenition is more commonly the slit [t͡θ̠] and [θ̠] than the grooved [t͡s] and [s] (2001 : 238).

since [t] > [s] does not occur: as it was claimed in footnote 14 above, the noncontiguous stages of a lenition trajectory are unconnected, a given sound does not remember where it came from. Honeybone's (2001 : 228f) argument that stop-to-affricate changes must be lenition if spirantization is lenition is effectively made void by such a consideration.

Even so, the putative trajectory [t] > [θ̠] > [s], obtaining in the speech of those English speakers for whom *letter* and *lesser* are homonymous, would exemplify a rare zigzagging movement on the strength scale ([t] > [θ̠] representing lenition, [θ̠] > [s] representing fortition). But perhaps the second step of this path, being a merger of phonetically close segments (whatever that means), is not on a par with the first one, i.e., it is not a step on a strength scale at all.

The second, High German consonant shift is a very similar case. It includes the context-sensitive spirantization or affrication of Germanic voiceless stops. The outcome of the change is a fricative in the canonical lenition sites, V＿ and ＿#, and an affricate elsewhere (Collinge 1985 : 65). In the light of the present discussion, one may ask if the shift is an across-the-board lenition which affects consonants in strong position to a lesser degree – these only affricate –, and those in weak position weaken all the way to fricatives, or if these are two separate processes: fortition in strong position and lenition in weak position. A sample trajectory like Gothic *itan* > OHG *ezzan* > NHG *essen* 'to eat' makes the first option more likely: if the stops became fricative through an affricate stage, then it is more plausible to assume that all stops turned into affricates, and later those in weak position further lenited to fricatives. Collinge, however, notes that "-*zz*- cannot with safety be phonetically described" (1985 : 65), it may have represented the fricative already. Honeybone (2002) argues that the change *did* pass through an affricate stage, and thus it is a two-step lenition process, which stops earlier in strong positions.

Looked at from the representational side, the status of affrication is not any clearer. In a framework limiting itself to privative features, an affricate cannot be represented as a single root node with two contrasting feature specifications ([−continuant, +continuant] in the case of affricates), since privative features cannot have contrasting specifications (and in a privative model the null hypothesis is that no two privative primes are contradictory, hence incompatible with each other). In (21)–(24), I give some representations for [t] and [t͡s] that have been proposed using privative primes. (Underlining marks the head within the expressions.)

(21) *Representations of* [t] *and* [t͡s] *with privative features 1* (Harris 1994 : 131)

a.
```
        ×
        |
      ●
    / |  \
  ʔ   |   h
      ●
      |
      R
```
b.
```
        ×
       / \
     ●   ●
    / \ /  \
  ʔ    ●    h
       |
       R
```

(22) *Representations of* [t] *and* [t͡s] *with privative features 2* (Szigetvári 1997)

a.
```
      ×
     /|\
    ʔ |  \
     h   R
```
b.
```
      ×
     /|\
    ʔ |  \
     h   R
```

Harris claims that in (21b) ʔ and h are not fused, while each is independently fused with the place feature R. Even if it were clear how this is to be interpreted, it is hard to see why (21b) should be the result of the lenition of (21a), when it in fact contains one element – a root node – more. This fission analyses reminds one of vowel diphthongization, and – as a reviewer suggests – perhaps hints at an alternative solution: affrication is neither lenition nor fortition.

The head-changing analysis of stop affrication, (22a) > (22b), would also need an alternative, much less obvious definition in order to qualify as lenition.

The representations in (23) and (24) show more clear-cut changes in the number of phonological primes involved, but neither suits the definition of lenition as feature loss.

(23) *Representations of* [t] *and* [t͡s] *with privative features 3* (Scheer 1996 : 189, 241)

a.
```
      ×
      |
      v
      |
      h
      |
      ʔ
```
b.
```
      ×
     / \
    v   I
    |   |
    |   A
    |   |
    h   h
    |
    ʔ
```

(23a) > (23b) looks like even less of a lenition, if lenition is defined as delinking (cf. (9a)). Within Scheer's model, however, sonority is determined by three factors: (i) the host of the segment, Onset < Nucleus; (ii) the presence of obstruency (h) and stopness (ʔ), h+ʔ < h < ø; and (iii) the role of the aperture element (A), ø < operator A < head A. Accordingly, the structure in (23b) is more sonorous than that in (23a), hence stop affrication is lenition, if lenition is

taken to be any movement up the sonority scale. This model, however, is incompatible with the definition of lenition proposed in this chapter, because lenition is now the loss, now the gain of some melodic prime.

Dependency phonology is another framework applying privative features that, similarly to Scheer's model, predicts the affrication of a stop to be movement up the sonority scale, as Honeybone (2001 : 229) points out. In this model the structures in (24) are proposed.

(24) *Representations of* [t] *and* [t͡s] *with privative features 4*

(Anderson and Ewen 1987 : 266, 274)

a. ○   b. ○

{|C|}   {|C|}

{|V:C|}

{|I|}   {|I|}
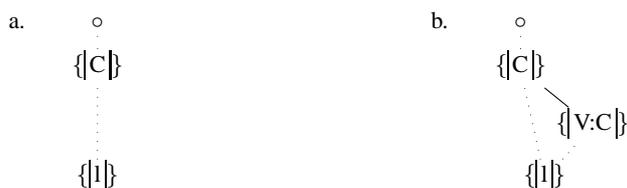
Here again affrication leads to a more complex structure, which is more sonorous, i.e., more vocalic, in that it includes a V component, which the stop counterpart does not. The problem with the interpretation of lenition in this model is the same as in any other making reference to sonority scales: the only possible terminus of a lenition trajectory is a vowel. This, however, is only one of the possibilities.

If sibilants are indeed stronger than plosives, an otherwise peculiar set of consonant clusters that occur before a syncope site can be captured. According to the data presented by Wells (1990), syncope in English occurs after a consonant cluster only if the cluster is of the falling-sonority type, e.g., [mp, nf, lt], but not otherwise.[38] Level-sonority clusters of the noncoronal stop+coronal stop type also pattern with falling-sonority clusters in this respect, e.g., *peremptǿry*, *trajectǿry*, etc. It may be put down to the well-known peculiarity of [s] that *s*+stop clusters may be followed by syncope (*prospǿrous*), crucially, however, stop+sibilant clusters – this time not only [s] – also allow syncope to follow them, e.g., *excellent* [-ksl-], *luxury* [-kʃr-/-gʒr-], *structural* [-ktʃr-], *scriptural* [-ptʃr-], *exceptional* [-pʃn-], etc. If sibilants are indeed stronger (i.e., less sonorous) than stops, these clusters all qualify as falling-sonority clusters, hence syncope is expected to occur after them.[39]

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[38] If this condition is met, syncope may or may not happen, but it is impossible if there is the wrong type of cluster preceding the syncope site.

[39] Note that the set of syncope-allowing clusters is not coextensive with the set of word-final clusters: [mb, zb, nf, kʃ, ptʃ] are some examples of syncope-allowing clusters (e.g.,

The fact that palatalization, like in *virtue* and *tuna* – which incidentally is accompanied by affrication (cf. footnote 33) – first occurs in unstressed syllables, and stressed syllables are affected only in a second go argues for treating (at least this kind of) affrication as lenition. While it is true that palatalization is assimilation, not lenition, it was also established that consonants are more prone to undergo assimilation when they are in a weak position. I prefer to remain agnostic on this issue.

Lass and Anderson say: "The least radical lenition of a voiceless stop involves timing: the closure is released, not at the moment of voice-onset on a following vowel, but before it" (1975 : 152). Accordingly, they treat both [t] > [t͡s] and [t] > [tʰ] as cases of lenition. One problem with the contention that a plain stop becoming aspirated should be lenition is that in systems where aspiration is fully functional, that is, where aspirated consonants systematically contrast with nonaspirated ones, neutralization, for example, word finally, yields a voiceless unaspirated stop. Such changes are almost exceptionlessly instances of lenition. It also raises doubts that in English aspirated stops occur in strong position: pretonically and word initially. Based on these arguments, [t] > [tʰ] can hardly be categorized as lenition.

The distribution of aspirated and unaspirated voiceless stops in English also suggests that the former are stronger: while aspirated stops occur word initially and pretonically, their nonaspirated couterparts occupy the typical weak positions, they are word final, preconsonantal, and not followed by stress. Furthermore, in English the distribution of aspirated stops is remarkably parallel to that of [h]. Accordingly, if aspiration should be lenition and deaspiration fortition, then the change [h] > ø would have to be classified as fortition, and hypothetical [h]-epenthesis as lenition. It is doubtful that anyone would subscribe to such a categorization.

We may conclude that aspiration of stops is fortition, or rather, deaspiration is lenition. The case of affrication is more dubious: there is reason to believe that this change, at least when it results in a sibilant, constitutes fortition. In fact, aspiration and affrication often go hand in hand: cf., for example, English *time* [tʰaɪm] or [t͡saɪm]. Collinge also cites Fourquet, who "requires an interim stage (e.g., $p > p^h > (p)f$)" in the High German consonant shift (1985 : 65), suggesting that an aspirated stop is part of the trajectory form a plain stop to an affricate. Nonetheless, there also is reason to treat affrication as lenition. I refrain from taking a stand in this issue.

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slumbẹrer, rasbẹry, confẹrence, as well as the examples above) that do not occur word finally.

8. Lenition and geminates

There are two issues that concern lenition and geminates to be discussed in this section. On the one hand, some analysts treat degemination as an instance of lenition, e.g., Hock, cf. (7), Kirchner.[40] Using the model of lenition sketched in this chapter, I will argue against this categorization. On the other, geminates typically resist lenition, both as a whole ([kk] > [xx]) and partially ([kk] > [xk]). One possible explanation for this resistance of geminates to lenition will be proposed here.

The source of the idea that degemination exemplifies lenition is well-known data like those in (25).

(25) *Some Latin–Portuguese correspondences*

	Latin	Portuguese	
a.	gutta	gota	'drop'
b.	rota	roda	'wheel'
c.	vadum	vau	'ford'

It is hard to miss the conclusion that in a lenition scale with the following step: 3: tt > 2: t > 1: d > 0: ø, for each Latin intervocalic consonant at stage *n*, Portuguese exhibits the counterpart at stage $n - 1$. As Carvalho (2002 : 54f, this volume) notes, there is an inherent problem with this trajectory, namely, a quantitative distinction ([tt] ∼ [t]) becomes a qualitative one ([t] ∼ [d]).[41] If, however, we also consider data like those in (26), an alternative analysis will also lend itself. The case of the geminate in (25a) can be parallelled by both that in (26f) and the obstruent cluster in (26a), that is, besides a degemination analysis, one of cluster simplification is also available. The data in (26) show that at a given period in the history of Portuguese the stop+stop clusters inherited from Latin were changed, such that only the unmarked nasal+plosive clusters remained. Thus if the degemination of (25a) is claimed to be a part of a lenition trajectory, one is left wondering why the change [pt] > [t] is not. This is not to deny that degemination might be analysed as lenition, but it is not obvious then why any cluster simplification should be analysed differently.[42]

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[40]   Kirchner writes: "The term [lenition] thus uncontroversially includes: degemination [. . .]" (1998 : 1). "Uncontroversially" is a false generalization.

[41]   Carvalho proposes that both changes are quantitative, i.e., not involving phonological primes, but prosodic elements and relations between them.

[42]   The Portuguese continuation of Latin [kt] is [jt] (e.g., L *octo* > P *oito* 'eight'). The fact that some Latin clusters continue as clusters weakens, but does not spoil the similarity of geminates to clusters, since other clusters – like geminates – continue as single consonants.

(26) *Some more Latin–Portuguese correspondences*

	Latin	Portuguese	
a.	septem	sete	'seven'
b.	ventus	vento	'wind'
c.	mundus	mundo	'world'
d.	porta	porta	'door'
e.	carduus	cardo	'thistle'
f.	penna	pena	'pen'
g.	luna	lua	'moon'

The cluster analysis and the autosegmental representation of geminates – according to which the first part is empty, cf. (12) – offer a simple explanation for their resistance to lenition. The second part of the geminate cannot undergo lenition because it is in a strong, postconsonantal environment, as witnessed by the fate of the words in (26b)–(26e) – in this historical change Portuguese sonorants patterned with obstruents in this respect, i.e., any postconsonantal consonant was in a strong position. The first part cannot undergo lenition because being empty it has nowhere to simplify, it cannot become less complex. Thus geminate inalterability does not have to make reference to the double linkage of melodic primes in such structures (cf. Honeybone 2005), a solution discredited by Inkelas and Cho (1993).

Failure to note the cluster status of geminates leads Lass and Anderson to treat "intervocalic" strengthenings like Latin *ma*[j]*or* > *ma*[jj]*or* ∼ Italian *ma*[ʤʤ]*ore* 'bigger', Sanskrit *dváyōs* ∼ Gothic *twaddjē*, Old Norse *tveggja* 'of two', etc., as violations of the "preferred" intervocalic change (i.e., lenition) (1975 : 160). The alleged exceptions cited are not convincing, since they exclusively include geminates. While we have no explanation for the gemination of the intervocalic glide, once it occurs the rest of the process is expected: the second part of the geminate is in a strong (postconsonantal) position, hence a good candidate for undergoing fortition. The first part of the geminate lenites to zero in weak position, yielding a strong (plosive) geminate.

This section had two aims. Firstly, to show that it is not evident that degemination must be treated as a case of lenition, since it shows similarity to cluster simplification, as well, a process that is not unanimously categorized as lenition. Secondly, to show that geminate integrity can also be explained by the melodic emptiness of the first part of a geminate. With such an explanation one does not encounter the problems that the double-linkage hypothesis entails: it is not only geminates that exhibit multiple linking of melodic material, yet other such clusters (homorganic, or sharing laryngeal properites) do not show the degree of resistence to lenition that geminates do.

9. Conclusion

The goals of a theory of lenition are clear: it must (i) provide a simple definition that enables the analyst to decide of any phonological phenomenon whether it falls within the domain of lenition, (ii) give a clearly defined set of contexts where what is categorized as lenition is "natural" to happen and (iii) correlate the change and the contexts, i.e., show that it would be "unnatural" if lenition occurred elsewhere (cf. Harris 1997 : 316). This chapter tries to achieve goals (i) and (ii). Lenition is defined as loss of a privative melodic prime. While many other definitions of lenition are also possible, under the present one lenition ceases to be a metaphorical term, which selects a group of phenomena within the class of phonological processes. Rather, the result of lenition is indeed a weaker segment, inasmuch as it contains less phonological material than the input. We have seen, however, that for such an approach sonorization is a problematic process, since it is not immediately obvious that it should involve the loss of melodic primes. Some researchers claim this to be the case (Harris 1990), others claim the opposite (Rice 1992). A fuller discussion was promised to follow in Szigetvári (this volume). As for goal (ii), two generalizations were made: consonants in postvocalic position are more prone to undergo lenition than those that are not preceded by a vowel (i.e., are preceded by another consonant or are word-initial); consonants in prevocalic position, on the other hand, are more immune to lenition than those that are not followed by a vowel (i.e., are preconsonantal or word-final). It was also noted that in this respect sonorant consonants pattern with vowels in some languages and with obstruents in others.

Achieving goal (iii), that is, showing that the changes and the contexts in which they occur are in a causal relationship, is a task for the rest of the book.

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