Synchronic Lenition

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Key Points

- Introduces and illustrates several common types of lenition patterns
- Motivates a division between intervocalic and non-intervocalic lenition
- Discusses the interaction of lenition with word-accent systems
- Outlines several classes of lenition theories that posit different fundamental representations and processes

Abstract

Lenition is the weakening of speech sounds. What exactly it means for a sound to be weakened in a particular theory depends on what types of representations, features, and processes exist in that theory. Many common lenition patterns, such as approximantization and debuccalization, can be thought of as weakening in terms of articulation, acoustics, and possibly phonological features. While there is a fair amount of agreement on such "core" lenition patterns, there is less agreement on what causes lenition. This article briefly outlines approaches in terms of articulation, acoustics, and information dynamics.

Introduction

The term *lenition* is used to refer to the weakening of speech sounds. In diachronic linguistics, it refers to a situation where a stronger (or more *fortis*) sound at an earlier stage of a language becomes a weaker (*lenis*) sound at a later stage. Lenition patterns also occur in synchronic grammar in many languages, generally when lexically identical consonants surface as fortis phones in some environments but as lenis phones in other environments. Because it is sometimes difficult to say which phone is underlying and which is derived, synchronic lenition is inherently tied up with *fortition*, the strengthening that is the inverse of lenition. There are a variety of definitions and explanations of lenition and fortition, and a corresponding variety of theoretical approaches, but some core cases and facts are widely agreed upon.

What Are "Weakening" and "Strengthening"?

Modern phonetic and phonological theories differ quite a bit in their *ontology*: the elementary building blocks, structural representations, and processes that go into the computation of sound patterns and underlie linguistic behavior. Because different theories posit fundamentally different entities that might undergo lenition or fortition, it is not always clear what kind of strengthening or weakening the terms refer to. However, most theories share some fundamental empirical predictions about how lenition and fortition are manifested in physical terms.

In theories where articulatory gestures or features are the fundamental building blocks of phonology, lenition can be thought of as a reduction in articulatory effort or movement. Kirchner's (1998) influential approach, for instance, defines lenition as any sound pattern resulting from constraints that call for a reduction in physical effort when producing sounds. On this view, a stop between two vowels might not achieve closure because articulators would need to move relatively far to and from the flanking open vocal-tract configurations for vowels.

In theories where acoustic/auditory features are the fundamental building blocks, lenition can be conceived of as weakening the degree to which consonants are saliently consonantal or distinct from vowels. For instance, Harris and Urua (2001) define lenition as a sound pattern that reduces information in the speech signal by making consonants less distinct from a schwa-like "carrier" signal; Katz (2016) formalizes lenition constraints as calling for less acoustic change ("disruption") from vowels and shorter durations of such change in some positions than in others. In these approaches, a stop between two vowels internal to a word or phrase might be realized as an approximant because this renders it less distinct from or disruptive to a surrounding stream of more sonorous sounds such as vowels.

In theories where abstract features encoding contrast (i.e., information) are the fundamental building blocks, lenition is any pattern that reduces segmental information in less salient contexts or vice versa, i.e., a form of correspondence between abstract informativity and perceptual salience or positional prominence (Cohen Priva, 2017; Harris & Hyman, 2022). In this approach, a stop between two vowels internal to a phonological stem might be realized as an approximant because preserving the contrast between stops and approximants (or the "element" encoding stop-hood) in this medial context is not as important as it would be at the beginning of a stem. Conversely, the approximant realization might make the stop perceptually less salient in the lower-information stem-medial environment.

While these theories posit radically different forces driving lenition, the choice of intervocalic stop approximantization (traditionally referred to as "spirantization") as an illustration is meant to demonstrate that they all share broad *extensional* similarities as to what lenition sounds like. In all of these theories, more lenited consonants will be less distinct from sonorous sounds like vowels and approximants and plausibly shorter. In acoustic terms, this translates minimally to higher intensity, higher-amplitude voicing and formants, and shorter duration.

In sound change, lenition can occur in specific positions or "across the board" to all instances of a segment. In synchronic lenition, almost by definition, lenition will involve positional effects where the same underlying sounds are realized as more lenis in certain positions than in others. There is no single set of positions that is shared across all phenomena referred to as *lenition*. And there is a growing (but not universal) consensus that synchronic lenition processes in different positions behave differently with respect to both phonetic and phonological properties. For this reason, common lenition patterns are introduced in two separate sections below, depending on their characteristic positions. Many of the typological generalizations come from cross-linguistic surveys by Kirchner (1998), Lavoie (2001), and Gurevich (2003).

Intervocalic Lenition

The most common type of lenition pattern cross-linguistically is one where consonants are realized as weaker when they appear in between two vowels internal to a word or phrase than when they appear at the beginning of a word or phrase. Some but not all of these languages also lenite consonants in positions other than in between two vowels, such as in consonant clusters or at the end of a phrase.

For instance, Campidanese Sardinian (Indo-European) displays variable voicing and approximantization of obstruents within a phonological phrase, as illustrated in (1). As is common in this literature, the IPA fricative symbols [β], [ð], and [ɣ] are used here to transcribe sounds that are more often noiseless approximants. The lenited sounds are weaker in the sense that they have less constricted vocal tracts than the fortis ones, have more acoustic energy and higher-amplitude formants, and are shorter.

(1) Campidanese Sardinian obstruent lenition (Katz, 2021)

	##_V	**V#_V**	**Gloss**
Stop [-voi]	[tera]	[sa#ðera]	"earth" / "the earth"
	[pizu]	[su#βizu]	"seed" / "the seed"
	[kãĩ]	[su#ɣãĩ]	"dog" / "the dog"
Stop [+voi]	[donaj]	[apu#d∼ðonau]	"give" / "have given"
	[bendi]	[olu#b∼βendi]	"sell" / "want to sell"
	[gwiðaj]	[apu#g∼ɣwiðau]	"drive" / "have driven"
Affricate [-voi]	[tʃeu]	[su#ʒeu]	"sky" / "the sky"
Fricative [-voi]	[seraj]	[olu#zeraj]	"shut" / "want to shut"
	[filu]	[su#vilu]	"son" / "the son"

In Campidanese, voicing and approximantization extend variably to some obstruents in some clusters: "door", for instance, is pronounced by various speakers as [poʁda], [poʁta], or [potːa]. Other clusters, notably /s/+stop, rarely or never display lenition of either consonant.

Voicing and approximantization are the two most common types of intervocalic lenition in the surveys mentioned above. Tapping or flapping, where a coronal sound shortens and becomes a tap or flap, is also common. Benton (1971) describes tapping in Pangasinan (Austronesian) as changing intervocalic /d/ to [ɾ] in native words (other instances of [d] and [ɾ] have been introduced in Spanish loans). Tapping does not apply in clusters. Taps are weaker than stops because they do not achieve sustained closure, may not entirely attenuate formants and low-frequency acoustic energy, and are typically very short.

(2)	Pangasinan tapping (Benton, 1971)			
	[d̲abók]	“dust”	[ma-ɾ̲abók]	“dusty”
	[d̲agém]	“wind”	[ma-ɾ̲agém]	“windy”
	[d̲ásal]	“pray”	[manda-ɾ̲ásal]	“is praying”
	[itd̲án]	“will be given for”	[ted̲tér]	“chop up”

Beyond the general phonetic properties of common intervocalic lenition patterns, the examples above also illustrate several other characteristics of such patterns. Both processes involve fortis phones in complementary distribution with lenis ones: in other words, the lenited forms of intervocalic consonants are not segments that are independently found in other positions, nor vice versa. This appears to be very common cross-linguistically (Katz, 2016), although there is a systematic class of exceptions, discussed in the section below on initial accent.

Campidanese also illustrates *pseudo-* or *incomplete* neutralization: segments realized as voiced and voiceless stops in initial positions can both appear as approximants intervocalically, but the rate of approximantization is different for the two classes (indicated here with the variability tilde), and approximants from the voiced stop series are slightly longer and less intense on average than those from the voiceless series. This type of situation, where two sets of more fortis consonants both lenite to phonetically overlapping but slightly distinct lenis realizations, is also attested in American English tapping (Fox & Terbeek, 1977), Canarian Spanish (Broś et al., 2021), and Rome Italian (Hualde & Nadeu, 2011).

Non-Intervocalic Lenition

Many types of lenition occur in characteristic positions other than between vowels. Some of the most common positions for lenition are final in a word or syllable. A classic example is *debuccalization*, where consonants lose some or all of their supralaryngeal features. For instance, in Tiriyó (Cariban), [h] is present only in word-final and pre-consonantal positions, while other obstruents are absent in these positions (Parker, 2001). A few alternations show that consonants realized as [p], [t], [k], and [s] before vowels become the glottal fricative [h] before obstruents.

(3)	Debuccalization in Tiriyó (Parker, 2001)		
[mi-ponop̲ɨ]	[mi-ponoh̲-ta-e]	[mi-ponoh̲-po]	[mi-ponoh̲-kə]
2p-tell	2p-tell-fut-assert	2p-tell-caus	2p-tell-imp

These consonants weakened because they have lost some or all of their supralaryngeal articulations (the question of whether and how their laryngeal gestures are adjusted to yield [h] is more complex), and because the change eliminates place-of-articulation cues that make consonants distinct from one another and from adjacent sounds such as vowels. In this case, debuccalization is described as neutralizing the contrasts between obstruents found elsewhere in the language to a single category. Debuccalization is common in word- and syllable-final positions, but lenition surveys also contain examples of debuccalization in intervocalic position or word-initially.

Another fairly common domain-final lenition is liquid gliding. In Cibaeño Spanish (Indo-European), for instance, underlying /l/ and /ɾ/ are both optionally realized as a front vocoid (notated [j] here) when they occur at the end of a word or before another consonant (Nuñez-Cedeño, 1997). They can also delete in these contexts.

(4)	Cibaeño liquid gliding (Nuñez-Cedeño, 1997)		
	_# (singular)	**_V (plural)**	**Gloss**
	[animaj̲]	[animal̲es]	“animal”
	[papej̲]	[papel̲es]	“paper”
	[tɾaβaxaðoj̲]	[tɾaβaxaðoɾ̲es]	“worker”
	[muxej̲]	[muxeɾ̲es]	“woman”

Gliding also optionally occurs for coda liquids word-medially. It can be considered weakening because it ostensibly results in a less constricted vocal tract, more intense and/or vowel-like formant structures, and the loss of information distinguishing the liquids from one another and from glides.

Degemination can also be considered a form of lenition: it makes consonants shorter, and may reduce the maximum constriction they achieve, as well as the acoustic consequences thereof. Degemination typically affects consonants in *non*-intervocalic position, that is, the exact opposite of the lenition processes discussed in the previous section. Polish (Indo-European), for instance, allows singletons and geminates to contrast in intervocalic position and marginally in word-initial position, but neutralizes to

singletons word-finally (5a) and adjacent to consonants (5b). Other languages neutralize length contrasts in word-initial but not word-final position, or in both positions.

(5) Polish geminates and degemination (Pajak, 2009; Rubach & Booij, 1990)

(a)	*Nominative*	*Genitive*	*Gloss*
	fontan͡ːi̯	fontan͡	"fountains"
	las͡ːa	las͡	"lassoes"
	flotɨ̯l͡ːɛ	flotɨ̯l͡	"fleets"
(b)	/sɛn-nɨ̯/ → [sɛn͡ːi̯]		"sleepy"
	/pʲɛ̃kn-nɨ̯/ → [pʲɛ̃kn̩͡i̯]		"beautiful"
	/frant͡sus-ski/ → [frant͡suski]		"French"

There are many other sound patterns with various positional profiles that some linguists consider to be lenition, but generally with less consensus than the patterns illustrated so far. For instance, some researchers refer to neutralizing domain-final patterns such as obstruent devoicing and non-assimilatory place neutralization (of which debuccalization is a sub-case) as lenition, others do not. This is unsurprising because, as noted in the introduction, linguists differ in how they define lenition and in hypotheses about segmental representations. If you believe that voiced obstruents have a voicing gesture or prime and that lenition is gestural reduction or loss of primes, then devoicing probably is an instance of lenition. Under different definitions such as similarity to vowels, it probably is not lenition.

Initial Accent and the Modulated Carrier Signal

A considerable amount of recent literature on synchronic lenition has focused on what it is *for*: what are the broader forces driving lenition and fortition patterns? Harris and colleagues propose that lenition reduces the amount of phonological *information* in positions that are less important for identifying phonological domains (Harris & Hyman, 2022; Harris & Urua, 2001). Much of this work is based upon a major counterexample to the claim that intervocalic lenition doesn't neutralize contrasts: word-accent systems in a genetically diverse group of sub-Saharan African languages.

In these languages, phonological *stems* contain a privileged initial position, and other positions are weak. Non-initial intervocalic positions are subject to characteristic intervocalic lenition patterns such as voicing, tapping, and spirantization; final positions are subject to characteristic domain-final patterns such as glottalization and devoicing. In the examples in previous sections, intervocalic lenition patterns result in complementary distribution, while other lenition patterns freely neutralize contrasts. But in word-accent languages, *both* types of non-stem-initial lenition neutralize contrasts. For instance, in Ibibio (Niger-Congo), some obstruents contrast for voicing or continuancy at the beginning of a phonological stem (Harris & Urua, 2001). But in non-initial intervocalic positions, only approximants and taps occur, and in final positions, only voiceless (frequently unreleased) stops occur.

(6) Ibibio contrasts by position (Harris & Urua, 2001)

Stem-initial	**Intervocalic**	**Final**
[fʌ́k] "cover"	[dé͡ːβé] "not scratching"	[dé͡ːp] "scratch"
[b̄ʌ̀kːɔ́] "uproot"	[tóβó] "tie oneself"	[tóp] "tie"
[t̄èm] "cook"	[bè͡ːé] "be shut"	[bèt̄] "shut"
[d̄é͡ːp] "scratch"	[kó͡ːɾó] "not calling"	[kó͡ːt̄] "call"

The alternations in the right two columns show that final voiceless stops correspond to medial approximants and taps, and this supports an analysis where the obstruents available initially also lenite medially, neutralizing underlying contrasts. In this approach, non-initial positions in Ibibio carry less information phonologically, because there are fewer contrasts, and phonetically, because lenited consonants lose some of the acoustic properties that make them distinct from vowels. Harris and Hyman (2022) illustrate such inventory restrictions in a wide range of African languages, some of which have more elaborate domains and hierarchies of contrastiveness than the disyllabic stem of Ibibio.

Initial-accent languages have at least three intersecting positional patterns: stem-initial syllables are prosodically prominent relative to non-initial ones; stem-initial consonants are fortis relative to non-initial ones; and more contrasts are available stem-initially than non-initially. This is consistent with a theory where lenition neutralizes contrasts in non-initial positions, as Harris and colleagues suggest. It is also consistent with a theory where prosodically prominent syllables host more contrasts than non-prominent ones, and lenition-fortition patterns are orthogonal to this dynamic. Indeed, many of these initial-accent languages restrict not only consonantal contrasts in non-stem-initial positions, but also contrasts for vowel quality, tone, and quantity. Franich (2021) shows that in one such language, Med mba, stem-initial syllables bear some of the temporal properties associated with stress in languages like English. While Harris & Hyman stress the fact that their analysis deals in a unified way with domain-final and

domain-medial lenition, it is worth noting that outside this group of languages, the two types of lenition tend to work very differently (Katz, 2016; Ségéral & Scheer, 2008). Unlike stress, which shows pervasive interactions with phonological contrast across languages (Beckman, 1998), intervocalic lenition rarely interacts with phonological contrast outside the initial-accent languages.

Boundary-Marking and Duration-Dependence

If the generalization that synchronic intervocalic lenition rarely drives phonological neutralization is correct, it calls for an explanation. The non-intervocalic lenition types illustrated above exist in both neutralizing and allophonic forms, like any "normal" phonological process. But intervocalic lenition would have to be different in some way to explain the rarity of straightforward neutralization patterns.

One proposal is that intervocalic lenition is special in the sense that its functional purpose is to demarcate prosodic constituents (Kingston, 2008). On this view, the relatively vowel-like lenis phones found constituent-medially preserve the continuity of acoustic features within a stream of vowels, while the relatively non-vowel-like fortis phones found at constituent edges tend to disrupt the continuity of acoustic features. Aligning these acoustic-auditory disruption points with structural boundaries in the speech stream could plausibly aid listeners in detecting such boundaries. This approach characterizes lenition essentially as a linguistic implementation of domain-general Gestalt grouping principles, which are active in other auditory domains and even in other modalities (Katz, 2023).

A second proposed explanation for what makes intervocalic lenition unusual is that it is not rooted in phonological features at all, but follows directly from sub-phonemic adjustments to the duration of a consonant (Cohen Priva & Gleason, 2020). Phonetic studies in a number of languages suggest that the extent of consonantal lenition, whether measured in terms of static or dynamic intensity metrics or qualitative phonetic features such as burst presence, is strongly negatively correlated with a consonant's duration. Several of these studies go further and argue that, given the effect of duration on consonantal strength and weakness, there is little left for phonological features or rules to explain once shortening and lengthening are taken into account. On this view, the relatively salient fortition-lenition patterns that tend to be transcribed for obstruents are simply one end of the continuum of phonetic initial lengthening and strengthening effects attested for many types of consonants in many languages (Cho, 2016). This approach also captures the generalization that beyond prosodic boosts to segment duration, other factors that affect duration, such as stress and speech rate, can also condition lenition.

Katz (2021) implements a feed-forward phonetic model of this type to account for the Campidanese Sardinian lenition patterns illustrated in (1). The model doesn't use phonological lenition constraints or rules at all; the suggestion is that reducing all synchronic intervocalic lenition to such a model would explain why these patterns show such limited interaction with systems of phonological contrast, why they tend to be conditioned in a scalar way by prosodic boundary strength, and why the phonetic correlates of lenition-fortition patterns tend to be more widely present amongst all sounds in a language. That said, there are some intervocalic patterns, such as Catalan stop lenition (Hualde & Zhang, 2022), that cannot be wholly reduced to changes in duration.

Conclusion

Synchronic lenition and fortition are important for a number of reasons. Several types of lenition and fortition are amongst the most widely attested sound patterns cross-linguistically. These patterns serve as a kind of "testing ground" for theories of phonetics and phonology more generally, because they involve an intricate interplay between prosodic and segmental factors. And intervocalic lenition, in particular, may have unusual typological properties that set it apart from other putative phonological processes. While there are still significant disagreements about what constitutes lenition, and even more so about what causes it, the last decade has produced many empirically detailed and innovative studies that have advanced our understanding of how lenition processes work.

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