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CHAPTER 1

THEMES IN VOWEL HARMONY

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1.1 Introduction

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In this chapter, we give an overview of the general issues and phenomena that arise in the study of vowel harmony. We intend to review the major questions, possible answers, and unresolved problems that this phonological phenomenon continues to raise, with reference to discussions in chapters in this volume, albeit not with the intention of being complete. First and foremost, the purpose of this introduction is to raise questions and possibilities, which we hope will whet the reader's appetite for searching and finding answers in the chapters contained in this handbook. We restrict our references to chapters in this volume.

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1.2 The scope of vowel harmony

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1.2.1 How do we define vowel harmony?

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The first question that arises is whether there actually is a natural class of vowel harmony (VH) systems—that is, a class of phenomena with specific defining properties. Archangeli and Pulleyblank (2007) are skeptical when they write that the term VH is "a descriptor of a class of similar phenomena rather than a technical term referring to phenomena with a clearly defined set of properties." Although they are probably right, it is nevertheless the case that over the years many articles and books have been written that bear the term *vowel harmony* in their titles.

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It would seem that, in practice, the term has often been used as follows:

(1) VH involves a vowel-to-vowel (V-to-V) *feature agreement* which applies across intervening consonants and, in many (some would say prototypical) cases, is *unbounded* within a certain domain, often the *word*.

C1P4 The description in (2) states some characteristic properties of VH that have frequently been mentioned in the literature:

(2) a. VH creates likeness rather than unlikeness, which sets it apart from all forms of dissimilation.

b. The trigger and target are vowels (this does not exclude consonantal participation).

c. Unboundedness: The targets include all vowels in some domain.

C1P5 While one could maintain that all VH systems have the first two properties, it would seem that property (2c) is the most controversial. We should first note that unboundedness is certainly not an exclusive property of VH, since consonant harmony can also be unbounded (see Chapter 2), not to mention prosodic factors like stress, accent, and tone. More crucial to our discussion here is that VH can be quite limited in scope when it involves an agreement relation between a stem-final vowel and only the vowel in the first following suffix; cases of this kind are described in several chapters in this volume (see Chapters 23, 53, 54, 55, 71, 74, and 75). A relevant factor here is also that harmony can be less rigid (somewhat gradient) as the domain becomes longer. In other words, enlarging the domain may affect the strength of the harmony.

C1P6 With that said, and apart from the issue of unboundedness, a wide variety of VH types occur that deviate in one way or another from this prototypical description, as will be clear from the chapters in the present volume. Here we mention some of the considerations that occur. There is the question of whether *all* vowels in the relevant domain must participate; many cases of VH exclude certain vowels from participating. Of course, as always, this is dependent on certain theoretical assumptions involving how we define *participation*: Does a so-called *neutral* front vowel that is often called *transparent* because it can harmlessly interrupt a string of back vowels, as is the case in Finnish and Hungarian (Chapters 28 and 67), participate in harmony when it occurs in a word that only has front vowels? Here we should also take into account how these alleged transparent vowels behave when they are the only type of vowel in a root, in which case they often select a front vowel in a following suffix.

C1P7 Another dimension of variation concerns a difference between the regularity of VH within roots/stems (internal harmony) and across morpheme boundaries (external harmony); see Chapter 36. Other questions arise as well. Firstly, must VH be *productive*? Secondly, must it occur in *all* word classes? Thirdly, must VH include a pattern of vowel co-occurrence within word *roots/stems*, as well as a productive pattern of vowel alternations in suffixes, in order to be termed vowel harmony? For example, partial harmony occurs where VH affects are found only in a few suffixes. This is reported for South American languages (Chapter 55). We also note that in Greek dialects only a fraction of the vocabulary displays some form of VH (Chapter 71).

C1P8 Some additional properties of VH are also often mentioned:

(3) a. VH applies obligatorily.

b. VH is neutralizing (structure preserving, non-allophonic).

c. VH tolerates lexical exceptions.

C1P9 These three criteria are properties of *lexical* rules in a stratal model (see Chapter 18). However, there is no a priori reason for believing that V-to-V processes (even when unbounded) could not apply at the post-lexical, phrasal level, although one would expect these to have properties opposite to those in (3). Examples of post-lexical, phrasal VH are discussed in Chapters 17 and 20.

C1P10 Finally, we can ask whether *phonetic motivation* is a necessary trait of VH and whether the relevant constraints need to be *phonetically grounded*, or whether harmony is the phonological manifestation of the extension of some articulatory gesture across a certain domain (Chapters 40 and 41). A demand for phonetic motivation, in whatever form, may not necessarily apply if one makes a principled distinction between *phonemics* and *phonetics* (or *phonology* and *phonetic implementation*), claiming that phonology is substance-free (see Chapter 33). That said, almost all cases of VH *can* be expressed in terms of natural classes involving features or elements that are, by definition, phonetically grounded, unless we would adopt the viewpoint that language users can invent ad hoc features for classes of phonemes that behave similarly. In some cases, due to mergers and other historical processes, relations between harmonic partners may not be natural, involving so-called *skewed relations*: see Chapters 43, 44, and 45.

C1P11 Another angle one can use when coming to grips with what we generally mean by VH is to situate it within the broader context of harmony or assimilatory patterns. Logically, we can distinguish four types of interactions between vowels and consonants:

(4) a. V-to-V (vowel harmony)
b. C-to-C (consonant harmony)
c. V-to-C
d. C-to-V

C1P12 We place prototypical VH under the type in (4a), which involves patterns of feature agreement between vowels in which intervening consonants are ignored (except at a more gradient phonetic level due to *co-articulation*). However, many cases of VH involve some consonantal involvement: Consonants can block the process (see Chapters 2, 16, and 53) and even trigger it, as in Turkish, where some words ending in palatal(ized) consonants can, even when preceded by a back vowel, cause suffix vowels to be front (see Chapter 59), or in Tigre, where pharyngeal and ejective consonants lower a preceding central vowel (Chapter 25). Also, in some palatal harmony systems, velar consonants have different allophones in front and back words, beyond the level of co-articulation (see Chapters 59 and 67). The class of consonant harmony systems, (4b), has received considerable attention (see Chapter 2). It would seem that consonant harmony targets properties that are not relevant for vowels. This specifically concerns harmony among coronal consonants with respect to finer distinctions such as laminality (*sibilant harmony*) and retroflexion (although retroflex harmony among vowels is also attested; see Chapter 10). But consonant harmony is not limited to coronals, as is apparent from cases of *nasal harmony* (Chapter 3) and *emphasis harmony* (also called *post-velar harmony*; see Chapter 47). As for the consonant–vowel interaction in (4c) and (4d), such phenomena usually involve *local assimilation* for properties that are relevant to both vowels and consonants, including lip rounding in particular.

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1.2.2 What is the domain in which harmony operates?

C1P13 An important dimension of harmony typology concerns the nature of the domain that delimits the harmony. A number of questions come to mind:

(5) Domains of VH

a. Is the domain the word, the phonological phrase, or a sub-word such as a bisyllabic domain that crosses the stem and the first affix?

b. Is the domain morphological in nature or prosodic, such as, perhaps, a foot (as in *umlaut* and *metaphony*; see Chapters 8, 19, 68, and 69)?

c. If morphological, is it bounded by certain morpheme types, such as the root/stem, or a specific class of affixes (e.g., inflectional affixes); it is also possible that suffixes undergo harmony while prefixes may not. Furthermore, enclitics may be included or excluded from the harmony domain. See Chapters 23 and 28.

d. Does the edge of the harmonic domain necessarily align with the edge of a word or sub-word structure?

e. Can the domain be just roots/stems with no active harmony for derived/inflected words, or the opposite, when roots do not display harmony while affixes harmonize with root vowels? See Chapters 28 and 36.

f. When VH applies to a sub-domain of the grammatical word, can such domains be independently characterized as morphological strata (Chapters 18, 23, and 28)?

g. What about compound words? It is common to find that adjacent root morphemes in compound words fail to harmonize, although a bounded agreement between the final vowel of the first stem and the first vowel of the second stem is reported; see Chapter 15.

h. Can domains be characterized in terms of specific spans, as in Optimal Domains Theory? See Chapter 31.

C1P14 A striking fact is that VH often applies more regularly and productively when inflectional affixes are added to stems, with exceptional affixes being more common in derivational morphology. This is likely related to the higher productivity of inflection when compared with derivational morphology.

C1P15 While harmonic patterns can be observed both within morphemes (specifically roots) and in alternations of affix vowels, cases are reported that only have root-internal harmony, such as in some non-Bantu Niger-Congo languages (Chapter 51). On the other hand, to find only external harmony (i.e., in complex words) in the absence of internal harmony (within root morphemes) is rare and, to the extent that it occurs, it can usually be attributed to root-internal harmony having deteriorated due to the massive influx of loanwords, when many roots are disharmonic (Chapters 28, 42, 43, 44, and 45). What this shows is that affix harmony is often more stable than root-internal harmony is, perhaps because the former serves the function of creating coherence within morphologically complex words.

C1P16 The rarity of the harmonizing domain comprising compounds is noteworthy and is likely due to the greater prosodic independence of the compound parts, which underlines the relevance of prosodic domains (such as prosodic words) in addition to morphological domains. Nevertheless, VH does sometimes extend to compound structures and even to larger domains, like phrases, however these are defined (Chapters 15, 17, 20, and 22).

C1P17 Another prosodic domain that is relevant is the foot. Harmony that is limited to a foot-like domain likely involves the sound patterns that are referred to as umlaut or metaphony processes (Chapters 68 and 69). This prompts a question about the relation between a stress domain and a word domain in languages that have initial stress and left-to-right harmony (due to the absence of prefixes), such as Finnish and Hungarian (Chapter 67).

C1P18 Even if a certain type of domain can be reasonably identified, harmony across this domain can be limited due to a number of factors, the first two of which have already been mentioned:

(6) Limitations on unboundedness
   a. There are blockers (usually opaque vowels, sometimes consonants or consonant clusters)
   b. Unidirectionality (see Section 1.2.3).

C1P19 Blocking effects of consonants are discussed in Chapters 16 and 53, whereas different types of opaque vowels are central in Chapters 67 and 21.

C1P20 Chapter 67 refers to a shrinking of the VH domain, whereby it applies on a syllable-by-syllable basis that depends on the quality of the vowels in those syllables, as occurs in Veps, Estonian dialects, Southern Khanty, and some Udmurt dialects.

C1P21 As for VH petering out across a larger domain, this is perhaps most typical of post-lexical, phrasal cases (Chapter 20). We will return to blocking vowels in Section 1.3.2. The question of directionality is addressed in the next section.

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1.2.3 The directionality question

C1P22 While prototypical harmony may have no direction, being *bidirectional* (i.e., when moving outward from the root/stem to affixes), there are also cases in which the agreement relation only goes in one direction. A number of factors have been suggested as possible determinants for harmony that is unidirectional. For example, VH may appear to be left-to-right because of the exclusion of prefix vowels as targets. This can often be handled by excluding them from the harmonic domain. But there are cases in which a direction must be stipulated (see Chapter 24). Sometimes, direction can be said to follow because targets must meet certain criteria (see Chapter 23), such as being stressed (as in umlaut and metaphony; see Chapter 8), or perhaps there is a default right-to-left direction (see Chapter 24 for discussion). Chapter 36 suggests that direction is an artifact of representations, and this need not be stipulated as part of the harmony rule.

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1.2.4 Root control versus dominant/recessive systems

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In so-called *root-controlled* VH, harmonic alternations can be found only in affixes. Roots, which are typically internally harmonic, do not alternate. It can be said that in such systems, the harmony starts with the first affix that attaches to a root such that the affix harmonizes with the root vowel that it is closest to. Subsequent affixes will harmonize with what is then the closest vowel, which could be a vowel in an adjacent affix. So, it is not the case that every affix harmonizes with a *root* vowel directly. Root control can be seen as a reflection of a general tendency for affixes to adapt to stems rather than vice versa. In Optimality Theory this phenomenon is captured by ranking constraints that demand *faithfulness* to roots more highly than constraints that demand faithfulness to affixes (Chapters 23 and 30). In Emergent Phonology (Chapter 36) the pattern of root or affix dominance is determined by lexical representations.

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In contrast with root-controlled VH, we also find cases in which roots alternate due to the influence of affixes, most often suffixes. This type of harmony system has been called *dominant/recessive*, which is typical of certain kinds of advanced tongue root (ATR) systems in which the presence of a morpheme with [±ATR] will cause all vowels in the word to be advanced or retracted (see Chapters 7, 15, 49, and 65). This needs to be qualified by the fact that a few morphemes with /a/ refuse to alternate and always show up as non-advanced. Those morphemes will block the propagation of ATR. The fact that VH seems to be triggered by the presence of a [+ATR] vowel suggests that this value is dominant over the recessive [–ATR] value.

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The distinction between root control and dominant/recessive VH systems can perhaps by captured by saying that in the former the trigger of harmony is *morphologically determined* (the first/last vowel in the root), whereas in the latter it is *phonologically determined* (the dominant value). It may be possible to connect this idea to another idea, which is that root-control VH is lexical and cyclic (which would prevent inward spreading), whereas dominant/recessive VH is ~~post-lexical (and~~ non-cyclic~~).~~

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We should also ask whether there are VH systems that are strictly *affix-controlled*. This possibility brings us back to Romance metaphony and Germanic umlaut, which also display affix-controlled VH, bearing in mind that in these cases stress plays a role as an attractor of the harmonic value (see Chapters 8 and 23).

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1.3 The roles that vowels play

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1.3.1 Triggers and targets of vowel harmony

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VH involves an agreement relation between a *causer* and a *causee*, often called the trigger and the target, respectively. When VH is iterative, targets become triggers. A number of claims have been made about triggers:

(7) Triggers of VH
   a. Triggers occur in a position of privilege (Chapter 23).
   b. Triggers must bear the harmonic feature contrastively (Chapter 14).
   c. Sometimes a potential trigger simply fails to induce VH (Chapter 21).

C1P28 It does not often happen that a potential trigger refuses to spread, although this is one way to interpret a situation in which a root vowel appears to occur with a feature specification in the suffix that is opposite to its own. A notorious case occurs in Hungarian, where a small class of roots containing a front neutral vowel occurs with back vowels in a following suffix, as in *híd-nak* 'bridge-DAT'; see Chapters 25, 28, and 67.

C1P29 Similarly, a number of claims have been made about targets:

(8) Targets of VH
   a. Targets occur in privileged positions (Chapter 23).
   b. Often not all vowels qualify as targets; those that do can be required to belong to a certain natural class, such as low vowels or high vowels (see Chapters 59 and 61).
   c. Some vowels cannot be targets since their feature make-up is not compatible with the spreading feature, either because the vowel system contains gaps or because a contrast cannot exist in a certain position. Such vowels function as *blockers* (or opaque vowels) which impose their value on subsequent vowels (see Chapters 28, 29, and 36).
   D. A specific class of vowels *can* undergo harmony but not pass it on (called absorbing vowels or icy targets; see Chapter 21).
   e. A common proposal is that targets must be unspecified for the harmonic feature (see Chapter 22).
   f. Some vowels may simply be exceptions to VH when occurring in specific affixes (so-called disharmonic affixes; see Chapter 21).

C1P30 Case (8b) relates to the notion of *parasitic* VH, which occurs when there is a specific requirement for both the trigger and target to belong to a subset of the class of vowels, such as when both must be high or low (see Chapters 18 and 61). A specific type of parasitic behavior is often found in Turkic languages, where rounding harmony only occurs in words that have front vowels (see Chapters 5 and 59). In Tungusic languages, on the other hand, rounding harmony is restricted to non-high vowels (see Chapter 61). Parasitic effects reflect a general tendency for vowels that are already alike to harmonize more easily in terms of other properties too.

C1P31 The notion of underspecification has long played a pivotal role in analyses of VH that appeal to binary features. Requiring underspecification for targets would prevent VH from being feature changing, while also causing these vowels to either *search* for a value specification (see Chapter 22) or adopt a default specification (see Chapter 14). Chapter 36 argues for an alternative to underspecification.

C1S9 ### 1.3.2 What is a neutral vowel and how does it behave?

C1P32 We have just seen that certain vowels can refuse to participate in the harmonic process, either refusing to be a trigger or, more often, refusing to be a target. Such behaviors can be idiosyncratic, requiring a lexical stipulation of some sort, but often refusal to participate,

especially refusal to be a target, is due to vowels lacking a harmonic counterpart in the vowel systems. While the term *neutral vowel* is often used interchangeably with *transparent vowel*, we could call all vowels that lack a harmonic counterpart (generally or in some context) *neutral* because a potential contrast has de facto been neutralized. We can then ask whether the way in which such vowels will behave is dependent on whether they are compatible with the active harmonic value (such as front neutral vowels which act transparently in palatal systems, assuming that frontness is the active feature) or are instead incompatible, such as neutral [–ATR] /a/, which acts opaquely in many ATR systems, assuming that we see those as having [+ATR] as the active feature. Some have argued that such predictability obtains in a significant number of cases (see Chapters 28 and 29). However, for other researchers there are enough cases where this prediction is not substantiated to warrant the position that the behavior of neutral vowels as either transparent or opaque is not predictable.

C1P33 It has been argued that sonority plays a role in which vowels act as transparent or opaque, the idea being that high-sonority vowels are more prone to block harmony, while low-sonority vowels are more prone to being transparent (see Chapter 22).

C1P34 Finally, also relevant here is that sometimes neutral vowels do in fact undergo harmony, which produces allophonic effects (see Chapters 20 and 56).

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1.4 Mechanisms of vowel harmony

C1P35 As the reader will experience, there are a wide range of models that have been developed to account for VH patterns and for how these patterns are to be formally represented. The variety of approaches testifies to the important role that VH has played in developing phonological theories:

(9) a. Iterative linear (assimilation) rules
b. Copy rules
c. Autosegmental spreading rules
d. Harmonic features (or *prosodies*) as properties of domains
e. Constraint-and-repair approaches
f. Selection of optimal patterns through a ranked constraint system
g. Licensing mechanisms
h. Emergent and exemplar-based approaches
i. Computational approaches.

C1P36 In early versions of Generative Phonology, assimilation rules cause a change in the feature specification on a target in some environment using the format A → B / X __ Y (see Chapter 26). In this approach there is no necessary formal requirement that the change and the environment are in any way related. However, a relationship between trigger and target

can be formalized in terms of a requirement that demands the feature value in the structural change of the rule to be a *copy* of a value in the environment, as in the search-and-copy approaches that have been proposed in recent years using segmental feature-filling rules (see Chapter 21).

C1P37 Another approach would be to formalize harmony as the extension of the scope of a feature. This brings us to the autosegmental spreading model in (9c) (see Chapter 27). The idea of feature spreading is inspired by the study of tone. The autosegmental approach was anticipated by the so-called prosodic school of J. R. Firth (see Chapter 25). Chapter 31 also identifies specific domains, called *spans*, within which a harmonic feature spreads.

C1P38 The fourth approach, (9d), represents the specification of the harmonic property as a property of a domain which then calls for a procedure to transfer this morphemic property to the vowels. In early generative work the relevant domain was the morpheme (see Chapter 26). We can also place the autosegmental treatment, which also assigns the harmonic feature to a morpheme domain, within this fourth approach. Additionally, we should also place the so-called metrical approach to VH, in which the harmonic feature percolates down the branches of a metrical structure (Chapter 27), within this type of approach.

C1P39 The use of output constraints takes center stage in constraint-and-repair approaches (9e) (see Chapter 19) and, of course, in Optimality Theory (see Chapter 30) as well as in Optimal Domains Theory (see Chapter 31). In Government Phonology (Chapter 28) and Radical CV Phonology (Chapter 29) harmony is formalized in terms of a linear *licensing* relationship (9g) between elements in adjacent syllable head positions, although the term 'licensing' has been used more generally in other approaches as well (see Chapter 23).

C1P40 In emergent and exemplar-based approaches (9h), the emphasis is on how VH comes to be learned and represented by systematically accounting for observable, surface patterns. In the Emergent Phonology (Chapter 36) approach the emphasis is on explaining the variety of phenomena classed as VH by systematically accounting for observable, surface patterns, without appealing to innate universals.

C1P41 A final approach (9i), falls under the heading of computational approaches. Despite appearances, most formal treatments of VH (and other phonological processes) are quite informal, often using notational devices that are well intended, but not precisely defined. While this does not necessarily mean that such approaches have no value (which would dismiss most work in Generative Phonology to date) or cannot be coherently formalized, some phonologists focus precisely on stating the relevant generalizations in a formal language that is precise and well defined, which can function as a *lingua franca* that mediates between the other approaches discussed in this section (see Chapter 34).

C1S11

1.5 Harmonic features and their phonetic correlates

C1P42 In principle, one might expect to find cases of harmony (as a lexical process) for every property that vowels can have distinctively (see Chapter 28). While this seems true overall,

tonal *harmony*, meaning that a tonal feature spreads to all vowels in a domain, has never been reported. We refer to Chapter 13, where Hyman lists some important differences between vowel harmony and tonal phonology, making a case for the claim that VH and tonal spreading cannot simply be subsumed under one label. This strengthens the argument that some have made against extending the autosegmental model (which was initially developed for tone) to VH.

C1P43 Even though it has been claimed that phonation properties can be distinctive for vowels, no case has been made for phonation harmony. In systems based on pharyngeal width, advanced vowels can be breathy, while non-advanced vowels can be creaky, but, that being the case, one could argue that phonation is a (non-exclusive) phonetic exponent or enhancement of the ATR element (see Chapters 7 and 15).

C1P44 As for types of VH, *palatal* and *labial* VH occur frequently (see Chapters 4 and 5). We also find VH that is based on *height* (high/low; Chapter 6) or on *pharyngeal width* (ATR/RTR; Chapter 7). Perhaps closely related is tense/lax harmony (see Chapter 9). Other types of harmony involve nasality, emphasis, and retroflexion (see Chapters 3, 10, and 47). Also see Chapter 46 for a review of VH types, as well as various maps that show the distribution of VH types on the various continents.

C1P45 When harmony involves all the properties of vowels, we speak of complete or *total harmony*. Total harmony is often observed with epenthetic vowels which echo or copy all features of a preceding or following vowel (see Chapter 11, and various cases in Chapters 23, 53, 54, 55, 56, 74, and 76). This type of VH is often facilitated only across intervening laryngeal or guttural consonants. In languages with very small vowel inventories, VH, while involving a single element, may appear as total. We will see examples of such cases in Australian languages in Chapter 74.

C1P46 As already mentioned, phonological features are not phonetic entities. They are cognitive symbolic units. In this sense, phonology is substance-free (Chapter 33). However, by viewing features (and phonological representations in general) as *symbolic*, we are committed to the idea that features have a content part in addition to their formal identity in the grammar. The content part of features/elements is their *phonetic correlate*. The most likely candidates for providing the content side are (a) articulatory aspects (see Chapters 32 and 20) or (b) acoustic aspects (see Chapter 28). There is a long-standing question as to whether we need both and, if we do, which of those two factors is primary. A trait of approaches that embrace the motor theory of speech perception, such as gesture-based approaches, is to focus on articulatory correlates (see Chapters 40 and 41). However, within each of those domains, we should not expect there to be one single phonetic correlate.

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1.6 Remaining topics

C1P47 For the remainder of this introductory chapter, we will very briefly mention a number of topics, pointing the reader toward the relevant later chapters in which they receive ample treatment.

C1S13

1.6.1 Phonetic and functional explanations and the synchronic grammar

C1P48 Why do some languages have VH while others don't, and what explains the specific properties of VH processes? We refer to Chapter 41 for a detailed discussion of views on the emergence of VH, taking into account phonetic and functional-perceptual factors, to Chapter 40 for phonetic, articulatory mechanisms that underlie (the emergence of) such processes, and to Chapter 38 for an acquisitional perspective on emergence of VH.

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1.6.2 Historical change and skewed systems

C1P49 When considering diachronic change, we can focus on the emergence of harmony as well as on its decline. Paradoxically, perhaps, the first step toward the decline of a phonetically motivated process is phonologization which raises a phonetic process of co-articulation to the level of phonological rules that need to be learned. Once phonologized, phonetic motivation and indeed the automatic, compelling nature of the process fades into the background, opening the door to exceptions and irregularities. The further decline of VH is usually precipitated by the influx of loanwords from languages that do not have vowel harmony. Usually, these steps in the life cycle of VH cause the process to be tied up with the lexicon and the morphology.

C1P50 Another interesting case of change can be seen in Mongolian, which, in the analysis of Svantesson (1985), developed an ATR system out of a palatal system (see Chapter 60). Such a development naturally follows from the recognition that ATR and palatality draw on the same articulatory resources, namely tongue root advancement.

C1P51 In addition to language interference involving disharmonic loan words entering a language, another significant factor in the decay or decline of VH is the *merger*. Here we must distinguish between mergers of various sorts. Assuming that in Hungarian neutral /i/ resulted from a merger between /i/ and /ɯ/, the resulting neutral /i/ is ambiguous with respect to its membership in both harmonic classes. When in Tangale (Chadic; see Chapter 48) the advanced low vowel /ɐ/ merged with non-advanced /a/, the latter vowel also became ambiguous between two classes. A crucial issue in the matter of mergers is to determine whether a merger has led to the collapse of two phonemically distinct entities (such as /i/ and /ɯ/ in the Hungarian case) or whether the merger is only phonetic. This issue arises in the case of complete (absolute) mergers, but also in the case of contextual merger, and it directly relates to the issue of abstractness (see Chapters 26 and 29).

C1S15

1.6.3 Data and methods

C1P52 As one will see in various chapters in this handbook, more and more studies are being carried out in which the phonetic details are instrumentally measured with sometimes unexpected results (see Chapters 32, 40, and 41). Another line of experimental work utilizes questionnaires, digital databases, and Google searches, which involve computer programs

that analyze patterns in data from the vocabulary of languages to detect whether there are systematic co-occurrence patterns (see Chapters 35 and 43).

C1S16

1.6.4 What are vowel harmony analyses about?

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Since the rise of mentalism in linguistics, due to the influence of Noam Chomsky, it has been common to claim that the phonological theory encodes sound patterns in the brain. In other words, the theory is claimed to aspire to psychological (ultimately neurological) reality. To directly test the psychological reality of analyses of VH in the human brain, and how they get to be there, we must turn to psycholinguistic and neurolinguistic methods; we refer to Chapter 39 for reviews of these respective areas of research. Insights and proposals regarding how learners acquire VH are reported in Chapters 36 and, with experimental data, 38.

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1.7 Structure of the volume

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The Oxford Handbook of Vowel Harmony contains, in addition to this introductory chapter, 75 original chapters, written by a total of 94 authors. In line with the plan that we had when we started this project, this handbook consists of five parts:

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1.7.1 Part I: Types of vowel harmony (Chapters 1–13)

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Starting with a chapter on the role of consonants in VH, this part contains nine short chapters on types of VH and some special cases, a chapter on VH that does not apply throughout the whole word and a chapter on why tonal features do not harmonize. (Maps that plot VH types is part of Chapter 46.)

C1S19

1.7.2 Part II: Structural issues in vowel harmony (Chapters 14–24)

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These 11 chapters address a wide variety of factors that directly interact with VH, such as distinctive features, vowel inventories, non-alternating vowels and syllable (or moraic) structure, domains of VH, and interaction with morphological structure. Three chapters deal with the application of VH in terms of locality, privileged positions, and directionality.

C1S20

1.7.3 Part III: Approaches to vowel harmony (Chapters 25–39)

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VH has been central in the development of phonological theories. The 15 chapters in this section provide an overview of different theoretical accounts, starting with the pregenerative

and classical generative periods and spanning 11 contemporary approaches. Two further chapters discuss the study of VH from the viewpoint of acquisition and psycholinguistics.

C1S21

1.7.4 Part IV: Genesis, evolution, and decay of vowel harmony (Chapters 40–45)

C1P58 The six chapters in this part focus on the historical life cycle of VH. Four chapters deal with phonetic factors (precursors), language contact, and gradual emergence, while two chapters focus on the decline of VH.

C1S22

1.7.5 Part V: Vowel harmony across languages (Chapters 46–76)

C1P59 The final and most extensive part of this volume offers 31 chapters that present data and analyses of VH from a large sample of the world's languages. All major language families receive extensive treatment, as do a number of isolates. While not *every* language (whether extinct or extant) is covered, this part of the volume provides the widest survey of VH ever published. Based on the chapters in this part, Chapter 46 presents the geographical distribution of the VH cases in these chapters.

C1S23

1.8 Conclusion

C1P60 It is our hope (and, frankly, expectation) that the present handbook will serve to contribute to the study of one of the most widely discussed topics in phonology, which will undoubtedly continue to play a major role in the development of theoretical approaches and stimulate further reporting on data from both better- and lesser-known languages.

C1S24

Acknowledgments

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C1S25

In memoriam

C1P62

The plans for this volume were formed in 2017. Given its appearance in 2024, a lot has happened during the intervening seven years; many of us have experienced hurdles of various kinds, not to mention the Covid epidemic that affected all of us. Sadly, after having completed a first version of the chapter on non-Bantu Niger-Congo languages, Ọlanikẹ Ọla Orie, an outstanding scholar and passionate human being, passed away on September 14, 2021. Before her passing, she trusted Nicholas Rolle with finishing the chapter that she had started. We dedicate this volume to her memory.