70 Conspiracies

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1 Conspiracies: The essential argument

The paper "On the functional unity of phonological rules" (Kisseberth 1970; henceforth FUPR) made what in essence is a very simple argument. It claimed that in the phonologies of the world's languages, it is often the case that there are phonological structures that are either barred or required, and that (from a standard generative phonology point of view) multiple rules may be involved in guaranteeing that these structures are avoided or achieved. This observation seems to be undeniably accurate. FUPR, however, went further and suggested that it was not sufficient to simply recognize this truth about the world's phonologies, but that somehow (a) these barred/required structures should be an explicit part of the phonological system of a given language, and (b) grammars that utilize multiple means to achieve/avoid a certain structure are not to be viewed as more complex than grammars that use fewer rules for the same end. As we shall discuss below, these claims are not consistent with the prevailing notion in generative phonology that all significant linguistic generalizations are expressible in terms of simplifications in the formal system of rules and representations. FUPR suggested that there was instead a *functional* aspect to phonological rules that eluded the formal approach of early generative phonology. It should be emphasized that the use of the term "functional" in FUPR is distinct from later usage where functional refers to the idea that (a) phonological phenomena are motivated by, i.e. grounded in, phonetic considerations (summarized in Boersma 1997 as the "minimization of articulatory effort and maximization of perceptual contrast"), as well as the idea that (b) notions such as contrast, paradigmatic considerations and frequency may shape the phonological grammar. FUPR emphasized the existence of avoided/preferred structures, but not what factors make the structure in question good or bad nor what factors favor one repair over another.

The idea that phonological rules "conspire" to avoid/achieve a given phonological structure is one that had been suggested to me originally by Haj Ross and George Lakoff on the basis of their syntactic work (as well as that of David Perlmutter). A close reading of major pre-generative linguists (particularly Boas and Sapir) seemed to support this notion, as these linguists not infrequently linked a particular phonological phenomenon (e.g. so-called "inorganic" vowels)

to some claimed limitation on phonological structure. It was, however, Morris Halle who wisely suggested to me that I take a close look at the Yawelmani dialect of Yokuts if I wished to push this line of thought.

Yawelmani has, over the decades, been a point of reference for almost every approach to the essential problems of phonology. Newman (1944) provided the initial detailed description of Yawelmani (as well as three other dialects of the Yokuts language). His description of the language was in the tradition of Sapir. Harris (1944) and Hockett (1967, 1973) looked at the Yawelmani data from the point of view of American structuralism, and Kuroda (1967) reworked Newman's analysis in terms of standard generative phonology. Later, Archangeli (1984 and subsequent work) applied the principles of underspecification and non-linear phonology to Yawelmani. In the optimality-theoretic literature, Yawelmani has been critical to the analysis of opacity (cf. Cole and Kisseberth 1995; McCarthy 2007).

FUPR examined a number of the essential aspects of Yawelmani phonology, but while not differing radically from Kuroda's analysis, drew a conclusion that was out of the mainstream. What follows is a detailed summary of FUPR's account of Yawelmani.

Yawelmani words, in their surface form, consist of a sequence of syllables of the shape CV, CVV, CVC (where VV = long vowel). Thus all words begin with a single consonant and they may end either in a vowel or a single consonant. Internal to the word, vowels do not occur in succession: there is at least one and at most two consonants located between vowels. Vowels may be long or short, but when a vowel stands in the environment __ CC or __ C#, it can only be short. These observations lead to the conclusion that Yawelmani bans syllables with complex margins (i.e. consonant clusters in either onset or coda position) as well as trimoraic syllables.

In the timeframe of FUPR, syllables played no role in generative phonology (see CHAPTER 33: SYLLABLE-INTERNAL STRUCTURE). As a consequence, all of the statements about phonological structures and all the rules formulated referred only to sequences of consonants and vowels. The discussion below follows the presentation in FUPR, but also translates it into a syllable-based analysis.

Underlying representations in Yawelmani are shaped in part by the above limitations on surface structure (CHAPTER 1: UNDERLYING REPRESENTATIONS). There are no prefixes in Yawelmani, so stems always occupy word-initial position. All stems in Yawelmani have an initial consonant. Thus there is no need to have a rule to insert a consonant at the beginning of vowel-initial words. On the other hand, while no stem contains a sequence of three consonants, some stems do end in two consonants. When such stems are followed by a consonant-initial suffix, we have a situation where the ban on triconsonantal clusters (or complex margins) is endangered. An epenthetic vowel is introduced between the first two consonants in the three-consonant sequence (CHAPTER 67: VOWEL EPENTHESIS). This vowel epenthesis phenomenon is illustrated by the data in (1). (We have supplemented the data cited in FUPR for purposes of exposition.)

(1)   *Underlying form of stem*   *Stem + aorist* /hin/

ʔilk	ʔilik-hin	'sing'
ʔutj	ʔutuj-hun	'fall'
logw	logiw-hin	'pulverize'
ʔajj	ʔajij-hin	'pole a boat'

The stems in (1) appear in their underlying form when followed by a vowel-initial suffix (e.g. [ʔilk-al] 'might sing', [logw-ol] 'might pulverize', [ʔajj-al] 'might pole a boat', etc.), but with an epenthetic [i] when followed by a consonant-initial suffix like the aorist /-hin/. If these stems appear in word-final position (e.g. in the imperative), then a vowel is also epenthesized between the two consonants that stand in word-final position (due to the fact that a word can only end in a single consonant, as a consequence of the ban on complex codas). Thus the stem /ʔilk/ will appear as [ʔilik] if not followed by a suffix. The epenthetic vowel in Yawelmani is the high front unround vowel [i], though this vowel will appear as [u] when preceded by a high round vowel (cf. [ʔutuj-hun]).

In FUPR, the rule in (2) is postulated for Yawelmani:

(2) *Vowel Epenthesis*

$$\emptyset \rightarrow i \; / \; C \; \_\_ \; C \; \{\#, C\}$$

These epenthetic vowels are clearly a means to avoid complex syllable margins. But Vowel Epenthesis is not the sole method for avoiding complex margins in Yawelmani. Specifically, there are two morphologically restricted cases where one of the consonants is deleted. One case involves two suffixes that have an initial consonant cluster (in both cases, the first consonant in the cluster is a laryngeal), where the first of these consonants is deleted in position after a consonant-final stem. For example, the suffix /-hnil-/ elides its initial consonant after a consonant-final stem like /gitiin-/ 'to hold under the arm' (this morpheme sequence occurs in the noun 'armpit' and there is other morphology and irrelevant phonology involved in the final form of this noun, [giten-nel-a-w]). The available data are not sufficient to make it clear whether the two suffixes in question are at all productive. The rule given in (3), if ordered before Vowel Epenthesis, will correctly delete the initial consonant of /-hnil-/.

(3) $C \rightarrow \emptyset \; / \; C + \_\_ \; C$
(in fact, the only consonants that occur in the environment $C + \_\_ \; C$ are [ʔ h])

The second case of consonant deletion occurs as an aspect of the phonology of certain suffixes which trigger moraic reduction in a preceding stem (in Newman's terminology, these suffixes require the "zero" form of a stem). For instance, stems with three consonants (e.g. /halaal-/ 'lift up') are converted to the shape CVCC- (e.g. [hall-]) in front of a suffix such as /-hatin/. This suffix, in turn, will elide its initial consonant, due to the prohibition against three-consonant sequences (i.e. complex margins). Again, we are not aware of whether a suffix such as /-hatin/ is productive. The rule given in (4), if ordered before Vowel Epenthesis, will correctly delete the initial consonant of the specified suffixes.

(4) $C \rightarrow \emptyset \; / \; CC + \_\_$
(affects only suffixes such as /-hatin/ that trigger the so-called "zero stem")

It is clear that both of these restricted deletion rules are functionally related to the vowel epenthesis phenomenon: they guarantee that an input that potentially violates the ban on triliteral consonant clusters and word-final consonant clusters

(i.e. complex syllable margins) will in fact obey this constraint on the surface (CHAPTER 68: DELETION). Of course, all the potential violations of the ban on complex margins could be avoided by the single phenomenon of Vowel Epenthesis. The consonant deletion processes in (3) and (4) are not necessary in order to secure an outcome where there are no complex margins. However, what the existence of conspiracies tells us is that (in a rule-based approach to phonology) languages do not always opt to use the fewest number of rules possible to avoid an offending phonological structure.

Rules (2)–(4) constitute only one part of the Yawelmani conspiracy against complex margins. There is evidence to motivate the postulation of a rule in Yawelmani that elides a short vowel (either /i/ or /a/) in the environment VC __ CV. This rule can explain both cases where vowels in verb suffixes are elided, and also aspects of the nominal case system. Specifically, it deletes what Newman referred to as the "protective" vowel /a/ in a structure like /k'iliij + a + ni/ 'cloud (INDIRECT OBJEC-TIVE)' but not in a structure like /puulm + a + ni/ 'husband (INDIRECT OBJECTIVE)'. In an example like /k'iliij + a + ni/, deletion of /a/ yields an output where there is only one consonant in onset position and one consonant in coda position. On the other hand, there is no deletion of /a/ in /puulm + a + ni/, due to the fact that such a deletion would yield an output with three consonants in a row: [lmn], a sequence that would require either a complex onset or a complex coda.

The rule in (5) achieves the correct result.

(5) $V \rightarrow \emptyset$ / VC __ CV

Rule (5) does not bear any *formal* similarity to either the vowel epenthesis rule in (2) or the consonant deletion rules in (3) and (4). However, despite this lack of formal similarity, there is an obvious functional similarity: (5) deletes a vowel *unless* to do so would create violations of the ban on complex margins. Deleting a vowel is of course the opposite of inserting one from a formal point of view, but both actions, along with consonant deletion, reveal the overarching principle that complex margins are not permitted in Yawelmani.

There is yet one more aspect to the Yawelmani complex margin conspiracy. Word-final verbal suffixes of the shape -CV elide their vowel when preceded by a vowel-final stem but not a consonant-final stem. In other words, the vowel of these suffixes will elide unless its elision would produce a violation of the ban on complex margins. Thus the imperative suffix /-k'a/ loses its vowel after the stem /taxaa-/ 'take', yielding [taxa-k'], but no elision takes place after the stem /xat-/ 'eat', yielding [xat-k'a] rather than *[xat-k'], with a complex coda. This second vowel deletion rule is formulated in (6):

(6) $V \rightarrow \emptyset$ / V + C __ #

There is of course some formal similarity between (5) and (6), since both are vowel deletion rules and only apply in the event a VC structure precedes. However, since (6) is restricted to word-final vowels that are part of a CV suffix, there is not iden-tity even in terms of the preceding structure: i.e. VC __ in (5) but V + C in (6).

We have now discussed the *rules* in Yawelmani that implement the ban on complex margins: (2)–(6). These rules, however, do not tell the entire story. In the standard generative phonology that prevailed at the time FUPR was written, it was

proposed that *morpheme structure conditions* (CHAPTER 86: MORPHEME STRUCTURE CONSTRAINTS) served to restrict the shapes of morphemes in underlying representation. In Yawelmani, there are no morphemes that contain a sequence of three successive consonants. In other words, structures are avoided inside a morpheme if they could only be syllabified by creating a complex margin.

This aspect of conspiracies was developed at greater length in Kenstowicz and Kisseberth (1977), under the rubric of the "duplication problem." Specifically, it was noted that in theories where there are both "morpheme structure conditions" and also phonological rules, it is often necessary to repeat the same generalization both as a morpheme structure condition and also as a feature-changing rule. For example, underlying representations of morphemes may disallow a NC sequence where the nasal and the consonant are not of the same point of articulation, but a rule may still be required that converts a morpheme-final nasal to be homorganic with a consonant in initial position in the next morpheme (CHAPTER 81: LOCAL ASSIMILATION). As long as there is a morpheme structure component of the phonology that is distinct from the rules that account for alternations in the shapes of morphemes, then there will be conspiracies whereby structures that are banned in the underlying representations of morphemes will trigger morphophonemic alternations as well.

To summarize: in Yawelmani, a morpheme structure ban on trisyllabic consonant sequences prevents morphemes from having offensive segmental material to begin with. A rule of vowel epenthesis, as well as two minor rules of consonant deletion, prevents violations from occurring at the juncture of morphemes. Two vowel deletion phenomena are constrained in a fashion to prevent the creation of complex margins.

But having pointed out this conspiracy, what are we to make of it? FUPR suggested that although there is no way in which a *formal* unity can be found for these various rules, nevertheless the ban on triliteral and word-final consonant clusters (i.e. the ban on complex margins) should be part of the phonological grammar of Yawelmani. However, in standard generative phonology, a phonology is a set of representations and a set of ordered rules that derive a surface form from an input form. A ban on complex margins cannot be part of the phonology unless it participates in the derivation of surface forms from input forms; otherwise it is simply a useless appendage that has no basis for existence in a formal system. In an attempt to find some way to make the ban on complex margins a part of the phonology, FUPR suggested that bans of this sort might function as *derivational constraints*.

The idea of a derivational constraint is this. Suppose that we formulate rule (5) as (7):

(7)   A word-medial (short) vowel elides.

Say that the application of this rule fails if its immediate output would violate the ban on triliteral or word-final consonant clusters (i.e. complex margins). This derivational constraint would allow a word-medial vowel to delete only if deletion does not produce an illicit structure. Of course, this notion of derivational constraint would radically alter the way in which rules apply, but it would mean that a constraint like the ban on complex margins in Yawelmani would have an actual role to play in derivations.

The notion of derivational constraints, however, is only a very partial account of the Yawelmani complex margin conspiracy. It is not evident how the ban on complex margins would play any role in the derivation of words where offending structures arise across morpheme boundaries. Because the notion of a derivational constraint did not solve the conspiracy problem, it did not play a significant role in phonology until considerably later.

2   Conspiracies: An historical overview

In order to fully understand the argument made in FUPR, one must begin with perhaps the central concern of early generative phonology: specifically, the question of how a language learner deduces the correct grammar from the data to which the language learner is exposed. The rough answer to this question that was advanced was that the learner adopts the "simplest" grammar. Simplicity, at least in terms of phonology, was taken to be determined by reference to the counting (particularly) of feature specifications both in rules and in lexical representations. A critical part of this enterprise was to design grammars so that the phonological patterns most commonly found in languages could be expressed in a simple fashion, while patterns that were never found in languages could be expressed only under great duress. An essential element of this enterprise was the building of a system of notation that would allow what the linguist understood to be the "same" or "related" phenomena to be subsumed under a single rule (a rule that while covering the observed data would often go beyond those data to make predictions about data the learner may not have encountered). (See Chomsky and Halle 1968 (*SPE*) for an extended discussion of this point of view. These ideas can be found throughout the entire early generative phonology literature.)

What FUPR showed was that in synchronic grammars one could find cases where obviously related phenomena could not be given a unitary treatment from the point of view of any available formal notation because they were related not in terms of their actions (insertions, deletions, feature changes, etc.), but rather the structural configurations that they either avoided or strove to achieve. As long as phonology was viewed as a theory of rules which married phonological actions to specific phonological contexts, a solution to the problem of conspiracies was impossible. The one partial solution suggested – derivational constraints – was a tentative step in the direction of separating the action (vowel deletion, in the Yawelmani case) from the context in which it occurs. It was, of course, not until the development of Optimality Theory (cf. Prince and Smolensky 1993) that a total solution emerged.

Although the FUPR paper itself focused on conspiracies in the synchronic grammars of specific languages, the paper developed out of my (ultimately unsuccessful) attempt to extend the ideas of "Chapter Nine" of Chomsky and Halle (1968) by developing a notion of "universal rules." What Chapter Nine attempted to do was to make it formally simpler for a grammar to conform to what is "natural" than for it to go against what is most natural. In terms of phonological representations, it did this by creating a system where an unmarked feature value was cost-free, while a marked feature value rendered the representation a more costly one. The consequence was that whenever possible, an underlying representation would contain an unmarked value rather than a marked value

(since generative phonology claimed that the least costly grammar was always chosen over the more costly grammar if both grammars yielded the correct outputs). Chapter Nine went further, however, and attempted to extend the idea of making unmarked specifications cost-free when formulating phonological rules. However, it found only a very restricted way of achieving this goal. In particular, it proposed that if a phonological rule specifies a particular structural change, then markedness principles come into play to add other changes that follow naturally. For instance, Yawelmani has a vowel harmony rule whereby a vowel becomes round when preceded by a round vowel of the same height. This vowel harmony rule affects the vowel /i/ when it stands after the vowel /u/. However, when /i/ rounds, it also becomes back and surfaces as [u]. Chapter Nine suggested that in a case such as this, the vowel harmony rule simply specifies that a vowel acquires the feature [+round] and then markedness principles will automatically add the feature [+back].

In Chapter Nine, the only way that markedness considerations could play a role in "simplifying" the grammar was through this device of "linking" a natural structural change (e.g. the backing of a round vowel) to a language-specific rule (e.g. vowel harmony). As such, Chapter Nine had a proposal only for the case where a secondary structural change is natural given some primary structural change. It did not have an explanation for why the same primary changes occur under similar conditions in language after language (e.g. nasal assimilation, epenthesis of onsets, lenition).

In an earlier version of Kisseberth (1969), I attempted to develop (but later abandoned) the idea that grammars contain a set of universal rules (cost-free, so to speak). This proposal was motivated by the recognition that no matter how much tinkering one did with the system of notation, it would always be possible to state very simple rules that have linguistically implausible consequences. As a consequence, generative phonology's attempt to make more natural rules "easy" to formulate and less natural rules more difficult seemed fundamentally flawed.

The principal difficulties that the search for universal rules faced at the end of the 1960s included:

(i)   In a given language, a very natural phonological process accrues a significant number of language-specific restrictions that reduce the generality of the rule needed to account for the phenomenon; it was unclear how to separate the essence of a rule from all the baggage required to properly delimit its scope of application.

(ii) *The conspiracy problem.* Specifically, there are multiple distinct actions (insertions, deletions, feature changes, sequencing changes) that are triggered by essentially the same context. Since a given language may utilize several rules to avoid/achieve a certain structural configuration, the scope of application of each rule must be delimited, obscuring the universal nature of the rule.

(iii) If "universal" means "in every language," why are there languages where these (proposed) universal rules are not in fact implemented in all cases or indeed at all?

Optimality Theory (Prince and Smolensky 1993 and a myriad of subsequent references), of course, ultimately provided a solution to these problems by (a) separating the actions themselves from the "rules" (now expressed as constraints),

(b) allowing constraints to interact with one so that different actions are favored in certain situations over other actions, and (c) postulating a type of constraint (faithfulness) that could suppress the effects of other constraints by outranking them.

As the preceding discussion indicates, FUPR developed out of the problem of developing a notion "universal rule." It could not succeed in solving the problem of conspiracies, since it assumed the existence of (learned) rules. Between FUPR and the optimality-theoretic solution to conspiracies and universal rules, there were many significant phonological developments. Most of these developments have some bearing on the conspiracy problem. Perhaps it will be useful to begin with an observation in McCarthy (1993: 169):

> The idea that constraints on well-formedness play a role in determining phono-logical alternations, which dates back at least to Kisseberth's (1970) pioneering work, has by now achieved almost universal acceptance. A tacit assumption of this program, largely unquestioned even in recent research, is the notion that valid con-straints must state true generalizations about surface structure or some other level of phonological representation. Anything different would seem antithetical to the very idea of a well-formedness constraint.

McCarthy goes on to reject the point of view that the constraints that grammars conspire to enforce are necessarily true surface generalization. But it is important to understand the way in which the idea of conspiracies evolved and McCarthy here identifies a principal theme.

It is true that in the Yawelmani case the ban on complex onsets/codas is (largely) satisfied by the surface representations of the language. FUPR did not claim, however, that this was necessarily the case, but rather allowed for the possibility that a relevant constraint might be true of only a certain stage of the derivation. This conclusion was a necessary one, because FUPR did not propose to abandon the notion that phonological systems are systems where principles interact in a possibly complex way such that some principles may not be true of the surface but only of some other level of the representation. From that point of view, it could very easily be the case that a certain configuration is favored or disfavored through much of a derivation, only to have late, low-level rules derive surface forms where the principle in question is violated. It was well known, for instance, that commonly assumed laws of syllabification in English may be violated in fast speech. In other languages, violations may result from processes operative in careful speech as well.

Although FUPR was careful not to suggest that the phonological targets of conspiracies were surface targets, the discussion that evolved over the sub-sequent years generally emphasized the surface nature of the constraints that rules conspired to serve (e.g. Haiman 1972; Shibatani 1973; Sommerstein 1974). This emphasis is extremely significant, since it had the consequence that the essential point of FUPR was lost as phonological thinking veered in new direc-tions. The question raised by Kiparsky (1968), "How abstract is phonology?" led several influential phonologists to move in various interrelated directions. On the one hand, "Natural Generative Phonology" (cf. Vennemann 1971, 1974; Hooper 1973, 1979) attempted to limit phonology to surface-true generalizations. On the other hand, the "Natural Phonology" of Stampe (1973) attempted to re-focus

phonology away from the alternations observed in the shapes of morphemes (alternations which were often of restricted scope, were non-productive, and had exceptions, and which Stampe considered to be arbitrary and learned) towards processes that were "automatic," "exceptionless," and "innate," which could be observed in a variety of domains such as language acquisition, fast speech, unguarded speech, drunken speech, language games, etc. Both Natural Generative Phonology and Stampe's Natural Phonology did not survive, for a quite simple reason: both approaches essentially removed the many examples of very regular, productive morphophonemic processes from the scope of phonology, since they were usually not surface-true generalizations due to exceptions or interactions with independent phenomena, etc. However, Stampe's Natural Phonology did have a lasting impact, in that it eventually led to the so-called "Lexical Phonology" approach, which made a significant attempt to distinguish among principles that obtained in the lexicon and principles with a wider scope of application that were not dependent on the particulars of morphological structure (cf. Kiparsky 1982, 1985; Mohanan 1986, 1995). To this day this remains a critical issue in working out a comprehensive theory of phonology (CHAPTER 94: LEXICAL PHONOLOGY AND THE LEXICAL SYNDROME).

The debate with regard to the "abstractness" of phonology (i.e. the extent to which surface forms may differ from their underlying sources and what sorts of evidence are required in order to postulate a divergence between surface and underlying structure) had considerable implications for the concerns of FUPR, as well as the ultimately related notion of universal rules. If phonology has little abstractness, and if most of the rules that had been proposed during the early years of generative phonology were not really rules of phonology at all, then perhaps arguments such as the one presented in FUPR are irrelevant. If the various rules that we claimed conspire to avoid complex margins in Yawelmani are not in fact real rules of the language, then the argument in FUPR is no argument at all. And if the only phonological rules are ones that are directly represented by overt surface forms, then explaining how a phonological system is learned no longer seems so challenging, and appeal to universal considerations is less necessary.

The abstractness controversies of the early 1970s, however, were never really resolved, but instead phonologists turned to a new approach to phonological analysis and universals, namely an approach that emphasized the development of phonological representations from which outputs could be predicted with a minimal appeal to rules and rule interaction. The motto of phonology became "if the representations are right, then the rules will follow" (McCarthy 1988: 84). For our purposes, we will refer to this as *representational phonology* (cf. Goldsmith 1976, 1990; Clements and Goldsmith 1984; Clements 1985; and many other references). Although representational phonology had very considerable successes (e.g. the autosegmental approach provided substantial insights into the complicated tonal phenomena of Bantu languages and the vowel harmony patterns of a variety of languages; CHAPTER 114: BANTU TONE; CHAPTER 45: THE REPRESENTATION OF TONE; CHAPTER 91: VOWEL HARMONY: OPAQUE AND TRANSPARENT VOWELS; CHAPTER 118: TURKISH VOWEL HARMONY; CHAPTER 123: HUNGARIAN VOWEL HARMONY), it became apparent from several of its most significant contributions that an adequate account of phonological patterns requires appeal not just to representations and rules, but also to constraints. The introduction of constraints can be found in such papers as Itô's (1989) theory of epenthesis, the extensive literature on the

Obligatory Contour Principle or concepts such as word-minimality in the work on prosodic morphology (cf. McCarthy 1979, 1981; McCarthy and Prince 1986).

The return to a role for constraints in phonological thinking naturally also triggered a return to relevance of the notion of conspiracies and constraints on derivations. Papers such as Myers (1991) on the notion of "persistent rules," the Theory of Constraints and Repairs developed in Paradis (1988), and ultimately Optimality Theory all found the issue identified in FUPR to be a significant one that needed to be addressed in phonological theory. We shall discuss the optimality-theoretic analysis of the conspiracy phenomena later, but at this point we would like to turn to specific examples of conspiracies.

3 Conspiracies in various domains of phonological research

The argument in FUPR is limited to a single synchronic phonological system, but the notion is relevant to most, if not all of the domains of phonological exploration: universals, variation, and dialectology (CHAPTER 92: VARIABILITY), language change (CHAPTER 93: SOUND CHANGE), acquisition (CHAPTER 101: THE INTERPRETATION OF PHONOLOGICAL PATTERNS IN FIRST LANGUAGE ACQUISITION), loanword phonology (CHAPTER 95: LOANWORD PHONOLOGY), etc. Space limitations do not permit an extensive discussion of all the domains where the notion of conspiracies is relevant, but we present some brief discussion of several domains: synchronic grammars, universal rules, phonological acquisition, and loanword phonology.

3.1 *Conspiracies in synchronic grammars*

We have already discussed at length the conspiracy in Yawelmani that revolves around the avoidance of complex syllable margins. There is a great variety of other examples of conspiracies that have been discussed over the past few decades. Here we will illustrate just two: hiatus avoidance conspiracies and conspiracies banning sequences of a nasal consonant followed by a voiceless obstruent.

Many languages do not allow onsetless syllables, particularly in word-medial position (cf. Casali 1997; CHAPTER 61: HIATUS RESOLUTION; CHAPTER 55: ONSETS for discussion). Traditionally, such languages are said to avoid hiatus (a succession of two vowels with no intervening consonant). There are, of course, several ways in which a VV sequence (hiatus) may be avoided. The first or the second vowel may be deleted. The first or the second vowel may undergo glide formation. A consonant may be inserted between the vowels. While some languages may choose to avoid hiatus by invoking a single anti-hiatus action, it is not at all uncommon to find a language invoking multiple actions according to the specific VV sequence.

Chicano Spanish provides a relevant example (cf. Hutchinson 1974; Reyes 1976; Baković 2007). Consider the data in (8), taken from Baković (2007). We have used orthographic representation for the input and retained that representation for the output, except that we put the surface form resulting from the hiatus avoidance rules inside brackets to highlight how the hiatus is dealt with.

(8) a. *tu uniforme*   *t*[u]*niforme*   'your uniform'
         lo odio   *l*[o]*dio*   'hate (1SG him/it)'
         era asi   *er*[a]*si*   'it was like that'
         se escapó   *s*[e]*scapó*   'escaped (3SG)'
         mi hijo   *m*[i]*jo*   'my son'   (*h* is silent)
     b. *paga Evita*   *pag*[e]*vita*   'Evita pays'
         la iglesia   *l*[i]*glesia*   'the church'
         casa humilde   *cas*[u]*milde*   'humble home'   (*h* is silent)
         niña orgullosa   *niñ*[o]*rgullosa*   'proud girl'
     c. *mi obra*   *m*[jo]*bra*   'my deed'
         mi ultima   *m*[ju]*ltima*   'my last one (FEM)'
         mi hebra   *m*[je]*bra*   'my thread'
         mi arbol   *m*[ja]*rbol*   'my tree'
         tu epoca   *t*[we]*poca*   'your time'
         tu alma   *t*[wa]*lma*   'your soul'
         tu hijo   *t*[wi]*jo*   'your son'   (*h* is silent)
         su Homero   *s*[wo]*mero*   'your Homer'   (*h* is silent)
     d. *me urge*   *m*[ju]*rge*   'it is urgent to me'
         pague ocho   *pagu*[jo]*cho*   'that s/he pay eight'
         porque aveces   *porqu*[ja]*veces*   'because sometimes'
         como Eva   *com*[we]*va*   'like Eva'
         tengo hipo   *teng*[wi]*po*   'I have the hiccups'   (*h* is silent)
         lo habla   *l*[wa]*bla*   'speaks it'   (*h* is silent)
     e. *como uvitas*   *com*[u]*vitas*   'like grapes (DIM)'
         se hinca   *s*[i]*nca*   'kneels'   (*h* is silent)

The data in (8) show that when two vowels are juxtaposed in Chicano Spanish, these VV sequences are not resolved in a single way. (7a) shows that when two identical vowels are adjacent to one another, the sequence is reduced to a single vowel. Thus in *tu uniforme*, a single [u] vowel is found. It is of course not readily apparent whether one or the other vowel is deleted or whether one should just say the two vowels coalesce.

(8b) demonstrates that a word-final low vowel *a* deletes before any vowel. Thus in *paga Evita*, the *a* at the end of the verb is absent in pronunciation. But the first vowel of the VV does not always delete. (8c) shows that if the first vowel is high, then it becomes the corresponding glide, whatever the second vowel might be. Thus *mi obra* yields [mjo] and *tu epoca* yields [twe]. On the other hand, if the first vowel is mid, the results are a bit more complex. (8d) shows that if the second vowel differs from the first with respect to either [±low] or [±back], then the initial vowel glides: *me urge* surfaces with [mju], *como Eva* results in [mwe] and *lo habla* (the *h* of the orthography is silent) becomes [lwa]. However, if the vowel that follows the mid vowel differs from it only with respect to the feature [±high], then there is no glide formation. Rather, as shown in (8e), the two vowels coalesce in a form identical to the second vowel: *como uvitas* results in [mu]. What this example from Chicano Spanish illustrates is that although a single strategy might avoid hiatus, languages may choose multiple means (for example vowel coalescence, vowel deletion, glide formation) to eliminate the problematic structures.

Combinations of a nasal consonant and a following voiceless consonant are disfavored in many languages (cf. Hayes and Stivers 2000 for discussion of the

phonetic preference for voiced consonants following nasals; see also CHAPTER 8: SONORANTS). There are different ways in which these ill-formed consonant sequences could be avoided. The most common "repairs" are voicing the post-nasal consonant or deleting this consonant (while assimilating the nasal to the same point of articulation), or devoicing the nasal or even deleting it all together.

Pater (1999) points out that in various languages, nasal–voiceless stop sequences are avoided by the application of more than one rule (even though a single rule in principle could resolve the problem). For example, in Kwanyama, a Bantu language discussed in Steinbergs (1985), there is evidence to support a ban on nasal–voiceless consonant sequences. One piece of evidence for the ban is the absence of such sequences in morpheme-internal position. It is also the case that the sounds [k] and [g] are in complementary distribution. [k] occurs word-initially and intervocalically, and [g] appears only after nasals. This distributional pattern supports the proposition that there is a principle that voices a consonant after a nasal. Such a proposal is also supported by the treatment of English loanwords, as shown in (9) below.

(9)   *Post-nasal voicing in Kwanyama loanwords*

    [sitamba]   'stamp'
    [pelenda]   'print'
    [oinga]   'ink'

In these borrowings, English nasal–voiceless stop sequences are replaced by nasal–voiced stop sequences.

But voicing of the stop is not the only repair found in Kwanyama. A root-initial voiceless stop located after a nasal prefix requires assimilation of the nasal, but then elides from the representation.

(10)   *Root-initial nasal substitution in Kwanyama*

    /eːN + pati/   [eːmati]   'ribs'
    /oN + pote/   [omote]   'good-for-nothing'
    /oN + tana/   [onana]   'calf'

In two other Bantu languages, Umbundu and Luyana, the same ban on nasal–voiceless consonants can be found. In these languages we again find two different repairs. A nasal that comes to stand in front of a voiceless fricative elides, while a nasal in front of a stop will assimilate the stop's point of articulation, but the stop itself elides. Schadeberg (1982) illustrates from Umbundu that /N + tuma/ surfaces as [numa] 'I send', while /N + seva/ surfaces as [seva] 'I cook'. Givón (1970) shows that in Luyana /N + tabi/ surfaces as [nabi] 'prince', while /N + supa/ surfaces as [supa] 'soup'.

While Kwanyama, Umbundu, and Luyana use two distinct strategies to avoid a nasal–voiceless consonant sequence, other languages may opt for a uniform repair. According to Pater, in Indonesian a nasal assimilates the point of articulation of both a voiceless fricative and a voiceless stop, with the oral stop then eliding. In other languages, like Kelantan Malay, Venda, Swahili, and Maore, nasals delete before voiceless stops and fricatives alike. Although uniform avoidance strategies are possible, many languages are like Kwanyama, Umbundu, and

Luyana in that they opt for a (perhaps only superficially) more complex pattern of avoidance.

3.2   *Phonological conspiracies and universal grammar*

As mentioned earlier, the FUPR paper arose out of an attempt to make some sense out of the notion that there might be "universal" rules. The problem that confronted the researcher during the generative phonology period was that while one could easily find phenomena that seemed to reflect some universal principle, the rule-based descriptions were rarely uniform across languages in their details. Furthermore, just as in the case of conspiracies in synchronic grammars, sometimes formally unrelated rules in different languages could be involved in achieving the same outcome.

Let us take an example from Bantu tonal systems (CHAPTER 45: THE REPRESEN-TATION OF TONE; CHAPTER 114: BANTU TONE). Early on in the research on these systems, it was recognized that a *sequence* of H tones is not preferred in these languages. Meeussen (1963) observed that in Tonga, for example, a succession of two H tones is converted to HL. In Leben (1973) and Goldsmith (1976), this ban on successive H tones was seen as a natural consequence of the approach to phonology that came to be known as autosegmental phonology. Specifically, autosegmental models typically represent surface sequences of a feature value (e.g. H tone) as a single multiply linked autosegment. As a consequence, to the extent that this representation is maximized, sequences of the same autosegment will be unexpected. The proposed constraint against successive identical auto-segments became known as the Obligatory Contour Principle (OCP). Although some support for the idea that the OCP constrains all features emerged in the phonological literature, there is no question that its tonal instantiation is by far the most robust evidence for the principle.

The notion of a ban on successive H tones depends on the ability to distinguish between *true* and apparent sequences of H tones. This distinction is captured in autosegmental phonology as follows. A true H tone is one located on the tonal tier, regardless of whether it is associated with one or more than one tone-bearing unit. Successive H-toned moras are not sequences of H tones if they are all linked to a single H tone on the tonal tier.

There are a number of ways in which the *HH principle can be manifested in a language. But before looking at these manifestations, two quite separates matters must be mentioned, both of which dramatically expand the diversity of the manifestations of the OCP. First of all, in the analysis of Bantu languages, it has sometimes been argued that phonologically there is just a contrast between H tone and the absence of tone. However, even in analyses that utilize inputs that lack L tones, rules have been proposed that derive L tones that then contrast with toneless moras. Consequently, we have some analyses where a H tone that violates the OCP may be simply deleted, and other analyses where it is changed to L. Formally, the rules are quite distinct, but in both versions the ban on successive H tones is satisfied. A second complication has to do with what it means for two H tones to be adjacent and thus in violation of the *HH ban. In some languages, adjacency of H tones on the tonal tier is the defining characteristic; in other languages, what is significant is that the H tones may not be associated with successive syllables; in yet other languages, what is critical is that the H tones not

be linked to successive moras. Because of these differences in adjacency, there will be considerable variation from language to language with respect to which representations actually violate the ban on HH in those languages.

Let us now look at some of the different ways in which the *HH ban is implemented in different languages. One implementation has to do with the very nature of the underlying representations found in a given language (CHAPTER 1: UNDERLYING REPRESENTATIONS). For example, Cassimjee (1992) shows that in Venda (a Bantu language spoken in South Africa and adjacent parts of Zimbabwe) noun stems, there may be sequences of H-toned moras, but in every case there is evidence that these sequences consist of a single H tone on the tonal tier associated with multiple successive moras. There are no morphemes with successive true H tones. In other words, underlying representations are structured so as to avoid violations of the OCP. The evidence that these H-toned sequences are a single H tone comes from a morphophonemic phenomenon known as Meeussen's Rule (Goldsmith 1984), whereby a H tone that is immediately preceded by a H tone is changed to L. For example, a noun such as /góŋ´óŋ´ó/ 'bumblebee' will, when preceded by a verb ending in a H tone, change first of all to the intermediate form: */gòŋ´òŋ´ò/, due to Meeussen's Rule: i.e. all three syllables become L-toned (indicating that all three syllables started off linked to a single H tone that then changed to L). Subsequently, the preceding H tone spreads onto the first syllable forming a contour tone: */gô/. Falling tones in Venda, however, are only permitted on bimoraic vowels and bimoraic vowels occur only in the penultimate syllable of an Intonational Phrase. As a consequence, /gô/ surfaces simply as a H-toned syllable: [góŋ´òŋ´ò]. If /góŋ´óŋ´ó/ were analyzed as having a sequence of three H tones rather than having a single H-tone multiply linked, we would have to explain why Meeussen's Rule does not affect the underlying representation of this word (see Cassimjee 1992 for more detailed discussion).

Even if underlying representations are configured to avoid violations of the OCP (as in Venda), it still may happen that the juxtaposition of morphemes yields potential HH sequences. One very common reaction to this threat is the deletion/lowering of the rightmost of these adjacent H tones as shown above for Venda. Rules that target the rightmost H in a HH sequence are said to be instantiations of "Meeussen's Rule" (cf. Goldsmith 1984). In Venda it is necessary for Meeussen's Rule to change H to L in order to obtain the right results. In the Ikorovere dialect of Emakhuwa (spoken in southern Tanzania), Meeussen's Rule simply deletes the H tone. For example, an underlying form like /k-a-ho̱-ka̱viha/ 'I helped' (underlining indicates the location of input H tones) has a H-toned tense-aspect morpheme /ho/ followed by a stem /kaviha/, which has a H tone (predictably) associated with its first vowel. This morpheme sequence violates the OCP ban *HH. The second of these H tones deletes, but subsequently the first H tone doubles onto the second by a general High Tone Doubling rule that applies in a wide variety of circumstances in the language: [k-a-hó̱-ká̱viha]. Of course, one might ask: how do we know that the H tone on the stem-initial /ka/ has deleted if in fact this mora is pronounced on a H tone? The answer is simple. If the underlying H tone on /ka/ had not deleted, then it would have triggered doubling onto the next mora, resulting in the ill-formed *[k-a-hó̱-ká̱víha]. Notice that it is clear that the H tone on /ka/ is deleted and not the H tone on the preceding morpheme /ho/. If we had deleted the H tone from /ho/, then we would predict the incorrect output *[k-a-ho̱-ká̱víha], since the second H tone would

double to its right. (See Kenstowicz and Kisseberth 1979 for a more extended dis-
cussion of Emakhuwa tone, albeit in a pre-autosegmental framework.)

Although deletion of the rightmost H is particularly common in Bantu, other
responses to violations of the *HH constraint can be found. In some cases it is
the leftmost of the two H tones that deletes or changes to L. For instance, in the
Bantu language Rimi (Yukawa 1989), underlying H tones shift systematically
one vowel to the right. Thus [u-te̱ghéja] 'to understand' has a H-toned verb
stem, where the H tone is underlying on the stem-initial vowel (underlined) but
surfaces on the syllable [ghe]. In an example like [u-va̱-ríghitja] 'to speak to them',
the verb stem is toneless but the object prefix /va/ bears an underlying H tone
that shifts onto the first syllable of the verb stem. When a H-toned object prefix
precedes a H-toned verb stem, as in [u-va̱-te̱ghéya], we see that the object
prefix loses its H tone and the syllable [te] retains its H tone, although this H
tone does shift to the next vowel. Rimi thus differs from languages like Venda
and Emakhuwa in that a violation of the OCP is repaired by deleting the leftmost
H rather than the rightmost H.

In yet other cases, the two adjacent H tones are merged into a single H tone
that is still linked to all of the moras that the original H tones were linked to. We
can refer to this as H-tone fusion. The evidence for H-tone fusion is sometimes a
bit indirect. The Bantu language Shambaa (Odden 1982) provides an interest-
ing example, however, since in addition to the need for H-tone fusion, it also
illustrates an entirely different means of avoiding *HH violations.

In Shambaa, whenever a sequence of H tones would be created (either within
a word or across words), a downstep is inserted between the H tones. For
example, the second H tone in each of the following examples is downstepped
relative to the first (downstep is indicated by the downward arrow and an
underlying H tone is indicated by underlining; the data also illustrate H tone
spreading, but we do not discuss this aspect of the data): [ate̱-k↓ómá] 'he killed',
[angé-↓já] 'he should have cooked', [ázakómá nj↓óká] 'he killed a snake', and
[ní k↓úi] 'it is a dog'. These data suggest clearly that a sequence H!H does not
count as a violation of *HH. It should be noted that while in some languages
downstep may derive from a so-called "floating" L tone, this is not the case in
Shambaa. We do not address here the issue of how downstep is represented, nor
whether it is represented in the phonology or only in the phonetics.

The insertion of a downstep between successive H tones in Shambaa is a
very general phenomenon, but there are some cases where successive input
H tones are *not* separated by a downstep. For instance, there is no downstep
between a H-toned object prefix and a H-toned verb stem: /ku-wá-kómá/ 'to kill
them'. Odden explains the failure of a downstep to be inserted at this juncture
by proposing that the H tone of the object prefix and the H tone of the verb stem
fuse into a single multiply linked H tone. As a consequence, there is a single
H tone and insertion of downstep cannot occur (since downstep is used only
between H tones).

In all the preceding examples, we have dealt with situations where an input
would violate *HH and formally different rules operate to alter the representation
so that it no longer has a HH sequence. The OCP ban *HH is manifested in other
ways in the grammars of the world's languages. Recall from our discussion of
Yawelmani how the ban on complex margins may serve to restrict the application
of vowel deletion rules. The same thing can be observed in tonal systems: the ban

on *HH may restrict the application of other tone rules. The most commonly observed phenomenon where *HH plays a restrictive role on another tonological process is in H-tone spreading. The precise formulation of H-tone spreading differs from language to language (at least in a rule-based model of phonology), but one overarching pattern is that spreading may be prevented from going onto a mora that itself is adjacent to a H-toned mora. It should be observed that in some languages, it is not spreading but shifting (i.e. spreading of a H followed by a delinking from all but the last mora in the spreading structure) that is blocked.

For example, in Isixhosa (cf. Cassimjee and Kisseberth 1998) the H tone on the subject prefix /bá-/ shifts to the following toneless syllable in [ba-yá-lwa] but is unable to do so in [bá-ya-bóna] due to the fact that the prefix /ya/ is followed in this case by a H-toned syllable. (As in our earlier examples, a mora that bears an underlying H tone is underlined.) Sometimes the adjacency of the H tones may be obfuscated. In Isixhosa the H on /bá-/ does not shift in [bá-ya-bonísa], even though at first glance it does not seem that the /ya/ is adjacent to a H-toned syllable. The problem in this example is that there is a H tone on the syllable /bó/ in the input, but in the output this H tone has shifted to the following syllable. What we observe here is the much discussed problem of phonological opacity: the H-toned nature of /bo/ serves to block spreading onto the syllable in front of it, even though in fact /bo/ is toneless on the surface.

The preceding discussion shows that if we look at *HH (an instantiation of the OCP) across a diverse set of languages, we find that it is entirely parallel to the constraint against complex margins in the synchronic grammar of Yawelmani. There is a "functional" unity that unites all these diverse ways of avoiding HH sequences: they are working towards the same end, representations that lack HH sequences. Any theory (such as generative phonology) that sees rules as devices that marry a structural change to a structural description will fail to express the universal principle *HH.

3.3 *Phonological conspiracies in phonological acquisition*

Much of the work on the child's acquisition of the phonology of a language assumes that the child accurately perceives (for the most part) the data to which s/he is exposed, but that various markedness principles (e.g. preferences for open syllables, preferences for oral over nasal vowels, preferences for stops over fricatives) restrict the child's attempt to produce an output faithful to that perception (CHAPTER 101: THE INTERPRETATION OF PHONOLOGICAL PATTERNS IN FIRST LANGUAGE ACQUISITION). As early as the extremely important work of Smith (1973), it was recognized that the notion of conspiracies is as relevant to child phonology as it is to adult phonologies. Smith proposed various rules to account for the fact that the child Amahl simplified consonant clusters in adult speech, but just as in Yawelmani, the unity found in the child's output was not reflected in the diversity of the rules that achieved this unity. Smith recognized this as a failing of his rule-based, derivational approach. Naturally, constraint-based approaches such as OT have gained currency in the field of phonological acquisition, at least in part because of their ability to capture conspiracies better in child language acquisition. It should be clear from the discussion throughout this chapter that "conspiracies" are first and foremost attempts to achieve an unmarked structure

or avoid a marked structure. Since markedness principles serve to shape the child's outputs, it follows that we will expect conspiracies to be manifested.

Space considerations limit us to a single instance of a conspiracy in phonological acquisition. Pater (2002) and Pater and Barlow (2003) discuss the ban on fricatives, *Fricative, which can be observed in the data on phonological acquisition (see also CHAPTER 28: THE REPRESENTATION OF FRICATIVES). The common repair of this constraint is for a fricative to be converted to the corresponding stop. Pater discusses a child LP65, aged 3:8 with a phonological delay, who in acquiring English lacked fricatives entirely from her output. However, adult English forms were repaired in two different ways: the deletion of the fricative or the stopping of the fricative. The choice of the repair was dependent on the adult input. If the fricative was part of a cluster, it was deleted. If it was not part of a cluster, it was converted to the corresponding stop. Thus *sneeze* became [niːd], *three* became [wi], *drive* became [waɪb]. Two different repairs secure the absence of fricatives, one of the many examples of conspiracy in the acquisition literature.

3.4   Conspiracies in loanword phonology

When speakers of L1 adapt words from L2 for use in speaking their native language, some of these words may contain structures that violate a constraint operative in L1. If these words are fully nativized, then these structures will be altered so as to avoid violations of the constraint in question. If the notion of conspiracies is applicable to the phenomenon of loanword adaptation then we expect that there will be cases where a given constraint will be enforced by means of quite distinct adaptation strategies (see also CHAPTER 95: LOANWORD PHONOLOGY).

In the Australian Aboriginal language Gamilaraay, words must end either in a vowel or a coronal sonorant ([n j l rr]), according to McManus (2008). If Gamilaraay borrows an English word that ends in a consonant that is permitted word-finally, then that consonant will surface. Thus English *barrel* is realized as [baril], and *poison* as [baadjin]. When an English word ending in a labial or dorsal consonant is borrowed, an epenthetic vowel appears. This epenthetic vowel obviously functions to avoid a disallowed coda consonant. Some examples of epenthesis are given in (11).

(11) baaybuu   'pipe'   nhaayba   'knife'
      dhuubuu   'soap'   yurraamu   'rum'
      milgin   'milk'   yurrugu   'rope'

However, when the English word ends in one of the coronal obstruents, which are not allowed in a word-final coda, an epenthetic vowel is *not* inserted; rather, the coronal is converted to a sonorant.

(12) bulaang.giin ~ bulang.giin   'blanket'   burrgiyan   'pussy cat'
      marrgin   'musket'   yuruun ~ yurruun   'road'
      dhalbin   'tablet'
      garaarr   'grass'   nhiigiliirr   'necklace'
      dhindirr   'tin dish'   maadjirr   'matches'
      yarrarr   'rice'   gabirr   'cabbage'

Gamilaraay employs both vowel epenthesis and the sonorization of a consonant to achieve an output where every output ends in a vowel or a sonorant coronal. Two formally distinct alterations yield an output that conforms to the same regularity.

4   The optimality-theoretic analysis of conspiracies

In the preceding section we provided some illustration of the relevance of the notion "conspiracy" in various domains of phonology. An examination of the phonological literature over the four decades since the publication of FUPR is rife with examples of the phenomenon. Although FUPR identified a facet of phonological structure that is no doubt of critical importance to the theory of phonology, it failed to offer a comprehensive solution to the problem that conspiracies pose. In addition, it failed to raise a significant question: *why* do conspiracies exist? Why do languages not employ a single device to achieve a preferred structure or to avoid a structure that is not preferred?

Optimality Theory provides the essential ingredients of both a comprehensive account of conspiracies and an explanation for why universal "rules" may not be reflected in the outputs of particular languages. By separating the constraints from the actions that repair potential violations of these constraints, it allows a constraint to both trigger some actions while preventing others. Thus *ComplexMargins can both trigger the appearance of an epenthetic vowel and block the elision of a vowel if elision would violate *ComplexMargins. OT is not a theory of actions, but rather a theory of how constraint interactions account for the pattern of observed actions. At the same time, the existence of highly ranked faithfulness constraints may prevent a constraint violation from being repaired at all in some languages.

Optimality Theory also explains why conspiracies occur, and can perhaps even be expected. Given a constraint such as *ComplexMargins, there are several different repairs that might avoid complex margins. However, each of these actions necessarily violates some other constraint (at the same time that they avoid a violation of *ComplexMargins). The constraints that the repair violates may be a faithfulness constraint, a markedness constraint, or some sort of morphological constraint. Since these other constraints have a particular ranking, this ranking will determine which repair to *ComplexMargins is optimal in a given situation.

Almost any optimality-theoretic description of a language will offer clear evidence that it has provided an insightful account of conspiracies. There is, however, a significant problem with the OT analysis of conspiracies. Specifically, for any constraint C, there are many logical "actions" that might repair a representation so that C is not violated. OT seems to claim that any of these actions could occur in some language. But is this in fact true? Various linguists have suggested that it is not true that all "repairs" for the violation of a constraint are in fact possible. This has been labeled the "Too Many Solutions" problem (cf. Steriade 2001, 2009). For example, Steriade considers the constraint that disfavors voiced obstruents at the end of a word. She notes that there are a considerable variety of phonological actions that might result in outputs that do not violate this constraint. Taking an input with a final /b/ as an example, the following repairs could avoid a violation of the constraint: (a) the devoicing of the /b/ to [p], (b) the nasalization

of the /b/ to [m], (c) the lenition of /b/ to [w], (d) deletion of the /b/, (e) the insertion of an epenthetic vowel after /b/, and (f) the metathesis of the /b/ with a preceding consonant that does not violate the constraint, etc. Steriade argues, however, that in fact it is only devoicing that is utilized to repair violations of the ban on word-final voiced obstruent.

The "Too Many Solutions" problem is a critical issue for Optimality Theory, since it calls into question the foundation of the theory – i.e. the separation of phonological actions from the constraints on structure that trigger these actions. It was the need to find an account of conspiracies that led to an abandonment of "rules" in favor of a set of constraints whose ranking determines the optimal action. So it is natural that a challenge to its analysis of conspiracies is at the same time a challenge to its very foundations.

There have been various attempts to solve the "Too Many Solutions" problem in OT: the "P-map" proposal in Steriade (2001, 2009), the "targeted constraints" in Wilson (2001), and the appeal to procedural markedness principles ("implicational constraint principle") in Blumenfeld (2006) are examples. It is beyond the scope of this chapter to explore the adequacy of these different attempted solutions, but there is no question that the issue is a central one in the exploration of OT approaches to phonology. Despite the challenges to the OT account of conspiracies, there is no doubt that much of the motivation for Optimality Theory resides in the advances that it made in explaining conspiracies, and these advances have been considerable indeed.

5   Conclusion

In this chapter we have explained the notion "conspiracy" in phonology and have illustrated its relevance to several domains of phonological investigation: synchronic grammars, phonological universals, the acquisition of phonology, and loanword adaptation. We have attempted to explain the historical background out of which the notion emerged, specifically the attempt to find what is universal in systems of phonological rules, and the reasons why an adequate solution was not available. We concluded with the observation that while Optimality Theory goes a long way towards providing an insightful account of conspiracies, it must still deal with the Too Many Solutions problem.

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