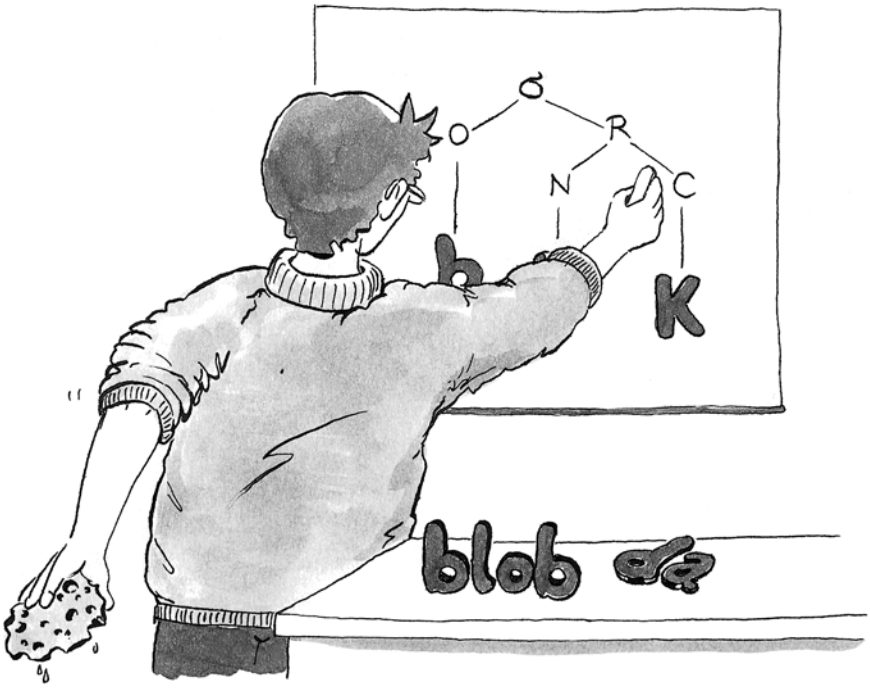
PART ONE

INTRODUCTION



I

Overview

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The syllable has (nearly) always played a central role in phonological theory, but with the recent advent of Optimality Theory (OT), its role has become crucial. The first papers on OT, as well as numerous papers written since, are based on the syllable. It is no exaggeration to say that syllabification has played a pivotal role in establishing OT and, in turn, that OT has contributed to our understanding of the role of the syllable, since many issues concerning this prosodic constituent have been reconsidered in the light of this theory (McCarthy and Prince 1993, Prince and Smolensky 1993). The present book provides insights into the syllable and into OT in three respects. First, it underlines the continuing interest in the syllable. Second, it shows that OT is capable of providing answers to old issues that have been problematic in procedural analyses, as well as shedding light on new issues and giving fresh perspectives. Third, the syllable helps reveal and solve problems within OT. Several aspects of syllabification have proved hard to solve within OT and have forced phonologists to come up with original solutions.

The first section of this introduction gives an overview of the three issues just mentioned. Since it is impossible to give a detailed account of all the numerous aspects of the syllable that phonologists are concerned with, we focus on the points that we consider as central in the volume. In the second section, we concentrate on the individual chapters and offer summaries of their contents.

1.1. The Central Role of the Syllable in Phonology

In the seventies, several phonologists, such as Vennemann (1974), Hooper (1976), and Kahn (1976), proposed including the syllable as a prosodic unit in generative phonological theory. The relevance of the syllable for linguistic theory has increased ever since. The syllable is connected with both segmental

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and suprasegmental levels. It allows a succinct formulation of many phonological generalizations (see Blevins 1995 for a summary of the role played by the syllable in phonological theory). Let us briefly illustrate these observations.

The connection with segments is apparent in various processes, such as the well-known glottalization of voiceless stops in the coda of English syllables or the aspiration of the same voiceless stops in the onset of (stressed) syllables. The first [t] in the English word *Atlanta* is glottalized; [p] in *applause* is aspirated. In both words stress is on the second syllable. Words may start with [pl], such as in *play*, but no word starts with [tl]. An intuitive way to describe the distribution of the glottalization and aspiration of stops is to say that syllable-initial stops are aspirated while syllable-final stops are glottalized. The consonant cluster [pl] in *applause* is syllable-initial, while [t] in *Atlanta* is syllable-final. It is much more difficult to formulate the distribution of aspiration and glottalization if no reference is made to the syllable. The distribution of aspiration must be expressed by a statement along the following lines: before stressed vowels voiceless stops are aspirated if they are word-initial or are part of a possible word-initial consonant cluster.

At higher prosodic levels, syllable shape determines which syllables are most likely to be stressed in many languages: heavy syllables are more prone to be stressed than light ones. In Latin, for example, stress is on the penultimate syllable if it contains a long vowel (*amíicus* 'friend') or a closed syllable (*agénda* 'things that have to be done'). If the penultimate syllable has a short vowel, stress is on the antepenultimate syllable (*Cícero* name). Both long vowels and closed syllables have a branching rhyme and differ in this respect from syllables with just a short vowel in their nuclei. Syllables with a branching rhyme are called heavy and those with a nonbranching rhyme are light. Thus, the stress distribution can be stated in the following terms: stress is on the penultimate syllable if it is heavy; otherwise it is on the antepenultimate syllable. Again, a formulation of the distribution of stress without the aid of the syllable would fail to point out the structural equality of syllables with long vowels and closed syllables in Latin.

To sum up, the syllable allows the formulation of generalizations both at the segmental level and at higher prosodic levels, which are awkward to express without referring to this constituent. Of primary concern for the goals of this book, however, is the way OT can be used to account for different aspects of syllabification and, conversely, how different aspects of syllabification tell us more about OT.

1.1.1 How OT Sheds Light on the Syllable

With the recent rise of OT, the theoretical emphasis has shifted away from representations and toward constraints and their interactions. One of the main

insights of OT is that markedness generalizations, as expressed in the form of constraints on surface forms, are part of phonological theory in the most direct way. These constraints are grounded in phonetics: they are justified by general considerations of acoustics or articulation. These constraints conflict with faithfulness constraints. An example is hiatus avoidance. Hiatus is the phonetic result of the immediate adjacency of vocalic syllable peaks. In languages that resolve hiatus, resolution can be attained by different means, such as insertion of a consonant between the two vowels, glide formation, deletion of one of the vowels with or without compensatory lengthening, and so on. OT assumes that a constraint against hiatus (*HIATUS) is part of Universal Grammar and thus that such a constraint is part of the grammar of every language. However, the way in which individual languages choose to resolve hiatus depends on the ranking of this markedness constraint with respect to faithfulness constraints. Languages that do not resolve hiatus have high-ranking faithfulness constraints on the vowels involved in the hiatus, whereas languages that eliminate hiatus rank the relevant faithfulness constraints lower than the constraint against hiatus. In other words, typological variation is the direct consequence of the interaction of constraints. The result of different interactions can be summed up with the help of (a simplified account of) three languages. In Hawaiian, hiatus is freely allowed; in German and French, it is not or at least not in all morphosyntactic and/or prosodic environments. In Hawaiian, the markedness constraint *HIATUS is ranked below all other constraints; in German and French, *HIATUS is high ranking. In German, hiatus is resolved by inserting a glottal stop as the onset of the second syllable (*Beamte* 'civil servant' is realized as [bəʔamtə]), whereas in French, the first vowel of a two-vowel sequence is deleted in a Det + N context (*le amour* 'the love' is [lamuʀ]). In terms of constraint interaction, the difference between the three languages is expressed in the following way. In Hawaiian, *HIATUS is ranked below constraints prohibiting consonant epenthesis (called DEP(C)) and vowel deletion (MAX(V)), as in (1a). In German, where a consonant is inserted to avoid hiatus, both MAX(V) and *HIATUS are higher ranking than DEP(C), as shown in (1b). Hiatus must be avoided, but vowels may not be deleted. In French, hiatus is avoided as well, but in this language it is better to delete a vowel than to epenthesize a consonant. This is expressed by ranking both DEP(C) and *HIATUS above MAX(V), as in (1c).

(1) a. Ranking in Hawaiian: hiatus is allowed.
MAX(V), DEP(C) >> *HIATUS
b. Ranking in German: hiatus is avoided by inserting a consonant.
MAX(V), *HIATUS >> DEP(C)
c. Ranking in French: hiatus is avoided by deleting a vowel.
DEP(C), *HIATUS >> MAX(V)

In the older derivational approach to phonology, hiatus resolution takes the form of (ordered) rules whose common purpose is not deducible from the rules themselves. This hidden common goal of different kinds of processes has been called "the conspiracy of the rules" by Kenstowicz and Kisseberth (1977). Compare the rules in (2), which have the effect that a glottal stop is inserted between two vowels (in German) or that a vowel is deleted (in French). From the format of the rules, it must be interpreted as a coincidence that vowel deletion in one language and consonant epenthesis in another both lead to the elimination of hiatus.

(2) Derivational rules
  a. Consonant epenthesis (German)
     Ø _ C / V _ V
  b. Vowel deletion (French)
     V _ Ø / _ V

Although both rules result in the avoidance of a sequence of two heterosyllabic vowels, this outcome is not immediately apparent from the rules themselves. The target, avoidance of hiatus, is not mentioned in the rules, whereas in OT it is a direct component of the constraints.

Syllable typology can also be elegantly accounted for in OT. It has been repeatedly observed that all languages have syllables of the form CV but not necessarily other forms (Jakobson 1962, Prince and Smolensky 1993, Blevins 1995), which follows from certain typological generalizations. First, if a language has syllables without onsets (V), it also has syllables with onsets (CV). Second, if a language has closed syllables (CVC), it also has open ones (CV). Furthermore, if a language has syllables with complex onsets (CCV), it also has CV syllables. And finally, if a language has syllables with complex codas (CVCC), it also has CVC syllables and therefore also CV ones. These generalizations can be accounted for by constraint interaction between markedness and faithfulness constraints. The markedness constraint ONSET requires that syllables have onsets, and NOCODA prohibits codas. Faithfulness constraints, such as the ones used for hiatus, state that underlying material must be parsed as such. As shown, there are at least two kinds of faithfulness constraints, one against epenthesis (DEP) and one against deletion (MAX). These two constraints are joined together here under the cover term FAITH. Consider several rankings standing for different types of languages in (3)–(5). In the first Tableau 1 in (3) the markedness constraints dominate the faithfulness constraints. Whatever the input, if the constraints are ranked as shown, the language allows only the most unmarked CV syllables to emerge as optimal.

(3) Tableau 1: ONSET, NOCODA >> FAITH (No epenthesis, no deletion)

/cv/	ONSET	NOCODA	FAITH
☞ cv			
cvc		*!	*
v	*!		*
/cvc/			
☞ cv			*
cvc		*!	
v	*!		*
/v/			
☞ cv			*
cvc		*!	*
v	*!		
/vc/			
☞ cv			*
cvc		*!	*
v	*!		*

If FAITH is ranked above NOCODA but below ONSET, as in (4), the language has the syllable types that win in this tableau. The ranking in (4) allows both CV and CVC syllables.

(4) Tableau 2: ONSET >> FAITH >> NOCODA

/cv/	ONSET	FAITH	NOCODA
☞ cv			
cvc		*!	*
v	*!	*	
/cvc/			
cv		*!	
☞ cvc			*
v	*!	*	
/v/			
☞ cv		*	
cvc		*	*!
v	*!		
/vc/			
cv		**!	
☞ cvc		*	
v	*!	*	

In (5) the consequences of the ranking FAITH >> ONSET >> NOCODA are illustrated. This ranking allows the syllable types CV, CVC, V, and VC.

(5) Tableau 3: FAITH >> ONSET >> NOCODA

/cv/	FAITH	ONSET	NOCODA
☞ cv			
cvc	*!		*
v	*!	*	
/cvc/			
cv	*!		
☞ cvc			*
v	*!*	*	
/v/			
cv	*!		
cvc	*!*		*
☞ v		*	
/vc/			
cv	*!*		
cvc	*!		*
v	*!	*	
☞ vc		*	*

The tableaux in (3)–(5) illustrate that all languages, irrespective of their constraint ranking, allow CV syllables. More complex types of syllables, in contrast, are only allowed in some constraint rankings.

The ability of OT to explain typological patterns as a result of the interaction of markedness and faithfulness constraints is the core of the theory, and it is to a great extent responsible for its success.

1.1.2 How the Syllable Sheds Light on OT

As mentioned in section 1.1, syllable structure has played a prominent role in the conception and development of OT, not only because it can neatly illustrate simple factorial typologies, but also because it involves different interacting modules, such as segments, sonority, moras, syllabification, edges, and stress.

There are, however, cases in which constraints on surface structure do not seem to make the right predictions. For example, certain types of alternations involving syllable structure are not recoverable from surface forms alone but seem to need an intermediate form between input and output to which both

are in some sense more faithful than they are to each other. Such cases have been called "opaque" by Kiparsky (1973). Opacity is illustrated here with palatalization of [s] in Swabian, an Alemannic Germanic dialect spoken in the southwest of Germany. In Swabian, [s] and [ʃ] are distinctive, as can be observed in the pair *vermi[ʃ]en* ~ *vermi[s]en* 'to mix ~ to miss'. However, when coronal [s] is followed by an obstruent, it is palatalized to [ʃ], as shown in (6), and thus becomes indistinguishable from underlying [ʃ].

(6) Palatalization in Swabian

			Standard German
Konstanz	Kon[ʃ]tanz	name of a city	Kon[s]tanz
Aspekt	A[ʃ]pekt	'aspect'	A[s]pekt

In addition to palatalization, Swabian has a process of word-final obstruent cluster simplification, illustrated in (7). In contrast, the standard Northern pronunciation involves a nonpalatalized [s] and complete realization of the cluster.

(7)

Swabian			Standard German
bist	biʃ	'are, 2 sg.'	bi[s]t

In the Swabian examples in (7), [s] is palatalized, although the reason for the palatalization is not present on the surface. The more transparent candidate *[bis] is expected, since in standard OT this candidate is always more faithful to the input [bist] than [biʃ]. [biʃ] incurs a violation of a faithfulness constraint called IDENT(anterior), requiring featural identity between input and [bɪs] output that does not have.

Opaque interactions such as these have proved difficult to express in OT. Certain generalizations are not statable in terms of the usual surface constraints, simply because these generalizations are not surface true. The success of OT in other areas, however, forces phonologists to find a solution to this problem. To make a definition of opacity possible, it needs to be established whether all known cases of opacity are due to the same kind of effects. Another important question is whether opacity always necessitates the assumption of a so-called sympathetic candidate that is neither the input nor the output (see the different proposals by McCarthy [this volume] and Ito and Mester [this volume]). Thus the opacity problem is an example of how the syllable can shed light on issues pertaining to OT, or, viewed less parochially, pertaining to the phonological system.

1.2. Overview of the Content

This volume is further organized into the following parts: part two deals with syllable structure and prosodic structure, part three concerns semisyllables and edges of syllables, part four focuses on segmental alternations, and part

five considers the interface between phonetics and phonology. Even though most of the chapters touch upon several of these issues and thus could justifiably be included in several parts of the book, we have assigned every chapter to a part based on its main focus.

1.2.1 Syllable Structure and Prosodic Structure

Part two groups together the chapters dealing with syllabic and prosodic structure. Several issues are raised in this section: the relation between the structure of the syllable and its position in the foot, the role of syllable weight in morphology, the role of syllables in a language that has traditionally been described as a mora language, and the relation between sonority and weight at various levels of the *prosodic hierarchy*.

In his chapter "Sympathy, Cumulativity, and the Duke-of-York Gambit," John McCarthy deals with syllables, phonological opacity, and the intersection of these two topics. He focuses on a problem in the syllabic and metrical phonology of Bedouin Arabic. According to traditional analyses, a stressed vowel deletes, its stress shifts to a following vowel, and then the deleted vowel is replaced: *ʔákalat* → *ʔkálat* → *ʔakálat*. This is a Duke-of-York derivation in the sense of Pullum (1976), because it contains an A → B → A mapping. McCarthy presents a reanalysis of Bedouin Arabic in OT terms, eliminating the Duke-of-York derivation by making crucial use of the *semi-syllable*, a concept also used by many other contributors to this book.

One part of the analysis of Bedouin Arabic involves an opaque alternation, which McCarthy proposes to treat using Sympathy Theory (McCarthy 1998). In Sympathy Theory, a particular failed output candidate exercises an indirect influence over the actual output form. Sympathy can accommodate the opaque alternation in Bedouin Arabic, but it raises a broader typological question: is it possible to eliminate Duke-of-York derivations entirely? McCarthy suggests that it is, if the indirect influence of the sympathetic candidate over the output is reckoned in terms of shared unfaithful mappings, which he calls "cumulativity." At the conclusion of his chapter, McCarthy returns once again to the topic of the syllable, showing that, if cumulativity is correct, there cannot be constraints demanding faithfulness to syllable affiliation. This, he argues, is how OT must construe the familiar observation that syllable structure is never contrastive.

Stuart Davis's "The Controversy over Geminates and Syllable Weight" focuses on the relation between geminates and weight and gives a positive answer to the recurrent question as to whether geminates are underlyingly moraic (see the chapters by van Oostendorp and by van de Vijver in this volume, which also come to the conclusion that consonant length can be specified underlyingly). Davis's chapter illustrates how OT allows new analyses of

old problems by giving an elegant analysis of the formation of the inanimate plural in Sinhala. Davis shows that, although much discussed in the phonological literature, it is a moot question whether the singular of the Sinhala inanimate noun is derived from the plural or the plural is derived from the singular. The difference between the singular and the plural is determined by the constraint hierarchy of the language. Moreover, he shows that constraint ranking can provide answers to questions about representations, in particular, whether geminates are represented moraically or nonmoraically. He also explains that Leti and Ngalakan, which have been used in the literature to argue against the moraicity of geminates, do not, in fact, present serious counterevidence: the patterning of word-initial clusters in Leti motivates the view that word-initial geminates can be partly extraprosodic, and the Ngalakan stress data do not really bear on the issue of the underlying moraicity of geminates.

Haruo Kubozono's "The Syllable as a Unit of Prosodic Organization in Japanese" shows that even in a so-called moraic language like Japanese, the syllable is an indispensable prosodic constituent. His argument for the syllable is based on preferred foot structures. In a whole series of word formations, there is a tendency toward the trochaic feet HL and HH, and an avoidance of LH and LL forms. The word formations that Kubozono discusses are based on the syllable and not on the mora. Evidence for his analysis comes from phenomena like word accent, babies' language or motherese, loanword truncation, *zuzya-go* (a secret language used by Japanese jazz musicians), and chanting phrases used by Japanese baseball fans when cheering for their favorite players.

The last chapter in part two, Draga Zec's "Prosodic Weight," proposes that weight is a property of prosodic constituents in general. The syllable, the foot, and possibly the prosodic word all impose their own minimal sonority thresholds. She proposes that SONORITY is a family of constraints that govern the sonority relations within the prosodic hierarchy. SONORITY interacts with the family of FAITHFULNESS constraints. Three case studies provide evidence for positing a sonority threshold constraint external to the syllable. To give one example here, in English, syllables with *l* or a nasal in the nucleus (CL(C)) exhibit a highly restricted distribution: CL and CLC syllables are never stressed, nor are there any monosyllabic CLC words or disyllabic CLCL words. In contrast, [r] in the nucleus (CR(C)) has the same distribution as a full vowel. Thus, English prohibits syllabic liquids and nasals as heads of feet.

An interesting conclusion of this chapter is that prosodic heads have their own phonotactic requirements, and it can be hypothesized that nonheads may have different phonotactic requirements. In this way, Zec's contribution can be linked to several other chapters in this volume, namely, those of Cho and King, Féry, Green, Kiparsky, and Wiltshire, which all deal with segments that