Phonological Acquisition and Phonological Theory

Edited by

John Archibald

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Publisher's Note
The publisher has gone to great lengths to ensure the quality of this reprint but points out that some imperfections in the original may be apparent.

For Samantha and Jessica,
who made the acquisition of phonology
interesting and entertaining

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Preface

Much of the current work on language learnability has focused on the acquisition of syntax. There has been much less on the acquisition of phonology within this theoretical framework. Most research on the acquisition of sound systems could practically be viewed as developmental phonetics, not phonology.

As someone who is interested in both language learnability and phonology, I thought it was time to put together a collection that showed the range of work going on that utilizes a sophisticated phonological framework. Most of us in this field have spent our share of time in the small rooms of the phonology sessions of acquisition conferences, dreaming of the auditorium. One conference organizer confessed to me, "We scheduled the phonology session just before the party, so people would stay."

I would like to thank all of the contributors to this volume for doing their bit to get us out of conference basements by showing a wider audience what it is we do. Maybe one day we'll even run out of handouts.

John Archibald

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Introduction: Phonological Competence

John Archibald
University of Calgary

What do we know when we know phonology? That is the question that I would like to address in opening this volume. This is, in fact, an acquisition question, as can be seen when we look at Chomsky's familiar goals for linguistic theory:

1. To account for the knowledge of a native speaker.
2. To account for the acquisition of that knowledge.
3. To account for the implementation of that knowledge.

The approach to language acquisition that has come to be known as *language learnability* is concerned with the first two goals. I begin by determining an adequate description of the final-state grammar and then try to determine how the learner could have arrived at such a system of knowledge. Although I do not deny that language learners move through developmental stages, the end of the journey is always kept in mind. In order to be able to describe the developmental stages that the learner moves through, we must refer to the kinds of linguistic structures that the learner is trying to represent. Thus, the study of acquisition cannot be divorced from considerations of the final state (see Dresher & van der Hulst, this volume, chap. 1).

Although there may be differences between child and adult learners (see Scovel, this volume, chap. 9), I maintain that this is a useful paradigm for

discussing both first (child) and second (adult) language acquisition. Both varieties of acquisition are addressed in this collection. Whether the learner is a child or an adult, the goal is the same: to acquire the final-state grammar. Therefore I take the term *learner* to refer to either the first- or the second-language learner.

The first step is to consider what the final state of phonological knowledge is. What does phonological competence look like? In this overview, I do not provide exhaustive (or, at times, any) arguments for the existence of particular structures. The purpose of this chapter is to lay the groundwork for the consideration of the acquisition studies that follow. As is traditional in an overview of phonology, I begin somewhere in the middle.

1. THE SEGMENT

Probably the most salient level of phonological structure is the segment. We assume that a word like *dog* can somehow be represented as a sequence of segments that looks something like [dɑg]. And although this may be a convenient phonetic shorthand, the segment plays a part in phonological representation. The learner has to acquire the segments of the language being learned (see Rice & Avery, this volume, chap. 2).

But a question that has often arisen in the history of phonology is whether there is a level of structure beneath the segment. I outline the proposal regarding a unit known as a *feature*.

2. THE FEATURE

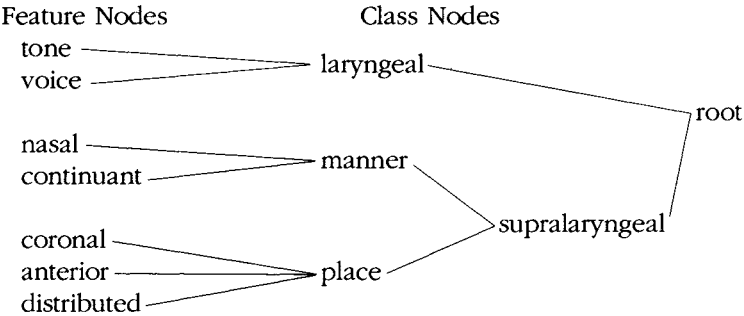
In many models of phonology, the segment is taken not as a primitive of phonological structure but rather as a convenient shorthand to represent a collection of features. Probably best known are the features proposed by Chomsky and Halle (1968) in *The Sound Pattern of English* (henceforth SPE). Using this kind of feature system, it was assumed that a segment was composed from a set of primitive features. So the sequence [dɑg] could also be represented as in (1):

(1)

[d]	[ɑ]	[g]
+consonantal	−consonantal	+consonantal
−syllabic	+syllabic	−syllabic
−sonorant	+sonorant	−sonorant
+anterior	−high	−anterior
+coronal	−round	−coronal
+voice	+back	−coronal
		+voice

The segments were represented as *bundles* of features. Later proposals (Clements, 1985; Sagey, 1986; etc.) have suggested that the features are not grouped into unordered matrices but, in fact, have an internal hierarchical structure. Clements proposed the kind of internal segment structure shown in (2):

(2)



I assume, then, that the final state includes some kind of representation of segment structure. The learner has to acquire the features of the language being learned (see Dinnsen & Chin, this volume, chap. 7; Rice & Avery, this volume, chap. 2).

Related to the issue of feature values is the notion of underspecification. Underspecification theory assumes that redundant information is not represented in the lexical entry. For example, radical underspecification proposes that most phonological features are redundant and can be specified by a set of universal redundancy rules or markedness conditions. As Ingram (this volume, chap. 4) points out, some redundancies are absolutes; for instance, a vowel that is [+high] will be redundantly [–low]. Others are determined by markedness; for instance, liquids and nasals are redundantly [+voice]. Underlying representations are specified only for the marked features, and the redundant features are specified by redundancy rules. For children, we must ask how they acquire this underspecified representation.

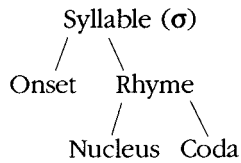
Now, let us consider units larger than the segment.

3. THE SYLLABLE

Current phonological theory also includes a unit of structure that groups segments together into a larger constituent known as a *syllable.* Intuitively, we know quite a bit about the syllables of our native language. For example, we are pretty good at deciding how many syllables are in a word like *Samantha.* And we are pretty good at knowing whether something is a well-formed syllable in our language (we probably would not argue that

the last syllable of *Samantha* is *-ntha*). So we know something about the internal structure of syllables, too. And if we have a system of knowledge in this domain, we need some way of representing it. Again, I do not argue for a particular model of the syllable but merely present a widely used model. Selkirk (1982) proposed the syllable structure shown in (3):

(3)



In the word [dɑg], the [d] would be in the *onset*, the [ɑ] would be in the *nucleus*, and the [g] would be in the *coda*.

Now, languages vary as to the degree of complexity allowed in each of these syllabic positions. When describing a language we need to ask whether the onset, nucleus, and coda can branch. As an example, consider languages that allow only CV syllables and not CCV syllables (i.e., no consonant clusters in the onset). We could say that the language that allows only CV syllables does not allow a branching onset, whereas the language that allows CCV syllables does. Cross-linguistically, we find that variation can be described with reference to the branching allowed in each position:

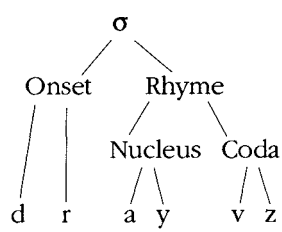
Can the onset branch? (yes/no)

Can the nucleus branch? (yes/no)

Can the coda branch? (yes/no)

If the onset or coda branches, we have consonant clusters. If the nucleus branches, we have long vowels or diphthongs. If we syllabified the word *drives* we would produce the structure shown in (4):

(4)



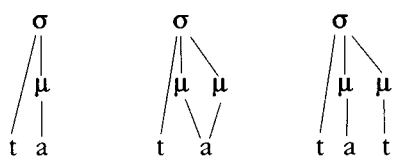
Note that all of the nodes branch. The learner must acquire the syllable structure of the language being learned (see Fee, this volume, chap. 3).

A concern with syllable structure also leads us to the question whether a branching nucleus or rhyme has a different theoretical status, or behaves differently in any way, from a nonbranching structure. Often it is claimed that branching and nonbranching structures do behave differently. This has led to the suggestion that there is an intermediate level of structure between the segment and the syllable known as the *mora.*

4. THE MORA

The mora is proposed to account for phenomena related to syllable *weight.* In many languages, difference in syllable type may affect phenomena like stress assignment. For example, in a quantity-sensitive language, a heavy syllable would attract stress but a light syllable would not. Heavy syllables are syllables that have either a branching nucleus (long vowel: CVV) or a branching rhyme (closed syllable: CVC). Light syllables are generally CV (open syllables). Languages vary as to which syllable types count as heavy or light. For example, in Latin CVC is considered heavy, whereas in Lardil CVC is treated as a light syllable. As always, if we see that certain forms are behaving differently, we would like to assign some structural difference to them. Hayes (1989) represented such structures as in (5) (where μ stands for mora):

(5)



[ta] [ta:] [tat]

Thus, we can maintain the generalization that, in quantity-sensitive systems, bimoraic syllables attract stress and monomoraic syllables do not. The learner would have to discover the moraic structure of the language being learned (see Broselow & Park, this volume, chap. 8).

5. OTHER PHONOLOGICAL PLANES

I have already mentioned that syllable (or moraic) structure can influence phenomena like stress assignment, where heavy syllables attract stress in some languages. Let us now look at some issues in stress assignment. It is widely assumed that the metrical structure of a word is projected from the

syllable structure. In Idsardi's (1992) terms, a grid mark is projected for each element that can bear stress. So in English a word would project a grid mark for each syllabic nucleus. The words *edit* and *collapse* would be represented as in (6):[1]

(6) x x x x

édit collápse

They have two syllables and project two elements onto the metrical grid. If we recast this in terms of moraic phonology we can account for the phenomenon of quantity sensitivity. Consider the moraic structure of these words:

(7) σ σ σ σ
| | | /\
μ μ μ μ μ

é d i t c o ll á p se

These elements are then grouped into a larger constituent called a *foot.* The foot may be strong on either the left (a trochee) or the right (an iamb). If the foot is strong on the left then additional prominence is added to the element on the left. The bimoraic syllable is labeled strong and forms a foot of its own. If there are no bimoraic syllables, a trochaic foot is built. The following structures are produced:

(8) F F F
/ \ | |
s w . s

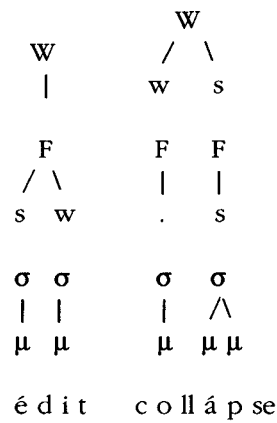
σ σ σ σ
| | | /\
μ μ μ μ μ

é d i t c o ll á p se

Then the feet are gathered into a constituent known as the *word tree,* which can be strong on either the left or the right. In English the word tree is strong on the right. This final step would produce the structures in (9):

[1]I use standard orthography, which, I trust, will not be confusing.

(9)



Learners will have to acquire the relations between syllabic phonology and the metrical grid, as well as the principles governing stress placement for the language being learned. That is to say, they will have to learn, for instance, whether the feet are trochaic or iambic, and whether bimoraic syllables receive added prominence (see Archibald, this volume, chap. 5).

The notion that there is another phonological plane for metrical structures leads us to the last element of phonological competence that I want to discuss.

6. AUTOSEGMENTAL PHONOLOGY

Just as a consideration of metrical phenomena has led us to a nonlinear model of phonological representation, so, too, does a consideration of tone. In fact, the analysis of tone was probably the driving force behind the proposal of autosegmental phonology. In languages where the pitch contour on a word can influence the meaning of the word, it emerged that the tones and the segments were best viewed independently. Goldsmith (1976) proposed that a word with tones assigned to it was best construed not with tone as an integral part of the vowel (e.g., *búlù*)[2] but rather as a nonlinear representation along the following lines:

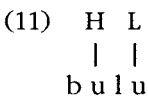
(10) Tonal Tier H L[3]

Segmental Tier b u l u

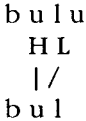
[2]ú stands for a high tone, and ù stands for a low tone

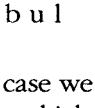
[3]H stands for a high tone, and L stands for a low tone.

Certain association (or linking) conventions connect the two tiers to produce a representation like (11):

(11)


In this way, tones would be assigned to vowels (or other tone-bearing elements). The first vowel would have a high tone associated with it, and the second vowel would have a low tone associated with it. This model of representation implies that phonological processes should be able to apply independently to the different tiers, and they do. Note the following hypothetical examples of what might happen if either tone were deleted (as in (12a)) or a vowel were deleted (as in (12b)):

(12) a.


b.


In the first case we note that the remaining tone spreads to existing vowels, resulting in a high tone on both vowels. In the second case, we note that there is only one vowel for both tones to associate with. As a result, the sole vowel bears a falling tone.

The learner must acquire the linking and spreading conventions of the language being learned (see Demuth, this volume, chap. 6).

7. SUMMARY

These, then, are some of the aspects of phonological competence that must be acquired. We can view phonological structure as a system of interconnected levels of representation: the feature, the segment, the mora, the syllable, the foot, the word, the metrical system, and the tonal system. Phonological competence also includes the processes that map one type of representation onto another. Traditionally, generative phonology has made use of the notion of *derivation* to link linguistic levels. A phonological rule would apply to an underlying (or intermediate) form. The learner must reconstruct the underlying form from the input (see Dresher & van der Hulst, this volume, chap. 1).

The goal for the language learner is to acquire phonological competence. This competence is a system of knowledge that includes both representations and processes.

Let us now consider the acquisition of this competence.

ACKNOWLEDGMENTS

I would like to thank E.-D. Cook for his comments on an earlier draft of this chapter.

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