Introduction

Our focus in the preceding two chapters has been on learning how to pronounce consonants and vowels. Obviously, learning to do this is crucial if you want to sound like a native speaker of some other language. But sounds rarely occur by themselves. Instead, sounds combine to form words, and learning to speak another language also involves learning to pronounce new words. In many cases this requires learning how to combine sounds in unfamiliar ways.

As with any new activity that involves the coordination and sequencing of complex movements, learning to pronounce new words requires lots of practice. In this chapter we look at how the sequences of sounds in English differ from those in other languages. Perhaps not surprisingly, we will see that some languages have more complex systems than English, while others have simpler ones. Of course, knowing which sequences of sounds can and cannot occur in English is not going to make you a master of some other language. We believe, however, that it will help you to think analytically about the sound system of English, a system that you already have a lot of experience with. Equipped with this knowledge, you can then use it as a basis for comparison with any new language that you choose to learn. Being familiar with the sound sequences of English will also give you a glimpse into potential areas of difficulty that you might expect to encounter when learning a new language.

So how can you learn to combine unfamiliar sounds in unfamiliar ways to create new words? It may be helpful to break a difficult word down into smaller, more manageable sequences and practice pronouncing these shorter sequences very slowly. Practice the sequence over and over to give your vocal organs a chance to learn the new combination.
Slowly combine the smaller chunks together, practicing larger and larger chunks. The important point through all of this is to practice, practice, practice—slowly.

But what constitutes an unfamiliar sequence of sounds? To answer this question, we will start by describing which strings of sounds occur in English. Notice again that we say sounds, not spelling! Depending on the particular dialect, English has approximately 24 distinctive consonants—that is, the sounds that are used to distinguish the meanings of words, e.g. \([n, m]\), run vs. rum. A list of the consonants that occur in most dialects of American English is given in Table 5.1. Stops, fricatives, and affricates are grouped together under the cover term obstruents, while nasals, liquids, and glides form the group of sonorant consonants.

What combinations of consonants can begin a word in English? We know that \([b, t, p]\), \([st]\), and \([pl]\) are possible combinations because of words like brown, stop, and please. But are all combinations of two consonants possible at the beginning of a word? If they were, with about 24 consonants in the language we would expect \(24!/(24 – 2)!\) possible

<table>
<thead>
<tr>
<th>TABLE 5.1</th>
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<tbody>
<tr>
<td><strong>Consonants that occur in most English dialects.</strong></td>
</tr>
<tr>
<td><strong>OBSTRUENTS</strong></td>
</tr>
<tr>
<td><strong>Stops:</strong></td>
</tr>
<tr>
<td>[p] pill</td>
</tr>
<tr>
<td>[b] bill</td>
</tr>
<tr>
<td>[t] till</td>
</tr>
<tr>
<td>[d] dill</td>
</tr>
<tr>
<td>[k] kill</td>
</tr>
<tr>
<td>[g] gill</td>
</tr>
<tr>
<td><strong>Fricatives:</strong></td>
</tr>
<tr>
<td>[f] fan</td>
</tr>
<tr>
<td>[v] van</td>
</tr>
<tr>
<td>[θ] thin</td>
</tr>
<tr>
<td>[ð] this</td>
</tr>
<tr>
<td>[s] sue</td>
</tr>
<tr>
<td>[z] zoo</td>
</tr>
<tr>
<td>[ʃ] shack</td>
</tr>
<tr>
<td>[ʒ] Jacques</td>
</tr>
<tr>
<td>[h] hi</td>
</tr>
<tr>
<td><strong>Affricates:</strong></td>
</tr>
<tr>
<td>[tʃ] chunk</td>
</tr>
<tr>
<td>[dʒ] junk</td>
</tr>
</tbody>
</table>
combinations, that is, 552. In reality, there are fewer than 50 in the language. As a native speaker of English you already know this, even though you may not be consciously aware of the fact that you do. Yet, for a non-native speaker of English, these combinations have to be memorized. In the next section, we will look in more detail at what the possible sequences of English are. With this as a basis, we will then consider sequences in other languages and the challenges that an English speaker might encounter when learning them.

Sound Sequences in English and Other Languages

Knowing the sequences that occur at the beginning and at the end of a word will generally tell us the kinds of sequences that can occur within the word. Word-internal sequences are typically a combination of possible word-final sequences and word-initial sequences. For example, we know that [t] is a possible word-final sequence in English because it occurs after a vowel in words like cart, Burt, sort. We also know that [m] is a possible word-initial consonant in English because it occurs before a vowel in words like men, map, melon. Given this, it is not surprising to find the sequence [-tm-] occurring between vowels in an English word like apartment. So although we do not talk specifically about word-internal sequences in what follows, conclusions can be drawn from the other information provided.

ENGLISH SOUND SEQUENCES: WORD-INITIAL

Before looking at what occurs in other languages, let’s begin by thinking about possible sequences of sounds in English. The term phonotactics is used to refer to which sequences occur and do not occur in a language. We start by considering English phonotactics at the beginning of a word.

In English, words can begin with either a consonant or a vowel sound, e.g. big, supper, in, airplane. The number of consonants that can come before a vowel at the beginning of a word ranges from one to three. Any consonant can start a word, with two exceptions. First, there are no words in English that begin with the sound [ŋ] (the sound that occurs at the end of words like song [sɔŋ]). Second, the sound [ʒ] is very uncommon at the beginning of an English word, and those that do occur generally have a foreign flavor to them, e.g. Jacques, Zsa Zsa (Gabor).

As we increase the number of consonants at the beginning of a word, the number of restrictions also increases. In most English words that begin with two consonants, the first consonant is a stop or a fricative, and the second is a liquid ([l, ɾ]) or a glide ([j, w]). The only exception to this rule is that there are sequences of two consonants in which the first is the fricative [s] and the second is either a nasal consonant, e.g. snore, smoke, or an oral plosive, e.g. spot, stop, sky. Some examples of two-consonant sequences are given in (1). (An asterisk before a sequence indicates that the sequence does not actually occur.)
(1) **Two-consonant sequences**

- **p + consonant:**
  - [pl] please
  - [pə] price
  - [pj] pure
  - *[pw]* (except in foreign words like *pueblo*)

- **b + consonant:**
  - [bl] black
  - [bə] brother
  - [bj] beautiful
  - *[bw]*

- **t + consonant:**
  - [t̪] trim
  - [tw] twin
  - *[tl]*, *[tj]* (though [tj] is possible in some dialects as in *tune*)

- **d + consonant:**
  - [d̪] drug
  - [dw] dwell
  - *[dl]*, *[dj]* (though [dj] is possible in some dialects as in *dude*)

- **k + consonant:**
  - [k̪] crutch
  - [kl] clean
  - [kw] quick
  - [kj] cute

- **g + consonant:**
  - [g̪] grow
  - [gl] glad
  - [gw] Gwen
  - *[gj]*

- **θ + consonant:**
  - [θ] three
  - [θ̂] thwart
  - *[θl]*, *[θj]*

- **f + consonant:**
  - [f̪] fresh
  - [fl] flat
  - [fj] few, funeral
  - *[fw]*

- **v + consonant:**
  - [ṿ] view
  - *[v]* + consonant (except in foreign words, e.g. *Vladimir*)

- **s + consonant:**
  - [sp] spot
[st] stop
[sk] score
[sm] smile
[sn] snore
[sl] slimy
[sj] Sierra (for some speakers)
[sw] swim
*[^s]
ʃ + consonant:
[ʃi] shriek
*[ʃl], *[ʃj], *[ʃw] (except in foreign words, e.g. schlep, Schwinn)
*z + consonant, *ʒ + consonant, *ð + consonant

You will notice that the voiced fricatives generally do not occur before a consonant at the beginning of a word, so you do not get words like *znew or *vlop. An exception is found with the Russian name Vladimir, which when used in English provides a nice illustration of how the introduction of words from other languages can expand the inventory of sound sequences in one’s own language. Also missing are sequences made up of the consonants [t, d, θ] + [l], [θ] + [j], and [p, b, f] + [w]. None of these sequences occur at the beginning of words in English.

Word-initial sequences of three consonants are even more restricted. In fact, in English the first consonant in this kind of sequence has to be [s], the second consonant has to be a voiceless stop, [p, t, k], and the third consonant has to be an approximant, [ʃ, l, w, j], e.g. sprain [spɹeɪn], spleen [splin], spew [spju], strew [stɹu], scream [skɹim], sclerosis [sklərəsɪs], squall [skwɔl], skew [skju].¹ You will see in (2) that even within this restricted set, not all possible combinations are found (√ means that the sequence occurs, x means that it does not).

(2) Possible word-initial, three-consonant sequences in English

<table>
<thead>
<tr>
<th></th>
<th>j</th>
<th>w</th>
<th>l</th>
<th>j</th>
</tr>
</thead>
<tbody>
<tr>
<td>sp</td>
<td>√</td>
<td>x</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>st</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>sk</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

WORD-INITIAL SEQUENCES IN OTHER LANGUAGES

 Languages can differ from English in terms of word-initial sound sequences in a number of ways. A language may allow fewer consonants to occur at the beginning of a

¹. Note that in some dialects of American English, [ʃ] can occur in these three-consonant sequences, particularly before [tɹ], e.g. streer [ʃtɹɪt].
word, or it may allow more consonants. Or a language may permit a similar number of consonants as English but have different restrictions on which consonants can combine with each other. A language can also differ in the types of sounds that words can begin with.

Arabic is an example of this last point; it is more restrictive than English concerning the types of sounds that a word can start with. Recall that in English, words can begin with either a consonant or a vowel. In Arabic, however, all words must begin with a consonant. This means that, unlike English, there are no words like apple, inside, and eat that begin with a vowel. Interestingly, there are no languages where all words must begin with a vowel.

Other languages are more restrictive than English in terms of the number of consonants that can occur at the beginning of a word. Fijian (Boumaa), for example, allows only a single consonant to occur at the beginning of a word, though any consonant in the language can occur in this position (Dixon 1988). In Zulu, Swahili, Mandarin Chinese, and Korean, to name a few, no more than two consonants can begin a word, and the second consonant can only be a glide, e.g. [w, j]. Some examples of Korean words beginning with two consonants are [kwicok] ‘nobleman,’ [tjulip] ‘tulip,’ [pjemul] ‘jewelry.’ One consequence of this restriction was noted in Chapter 2, where we noted that when Korean speakers pronounce English words that begin with a sequence of consonants, they may insert a vowel between the consonants; for example, the word strike may be pronounced with a short vowel between each of three initial consonants.

Languages that allow fewer consonants at the beginning of the word, such as those just mentioned, often pose less of a challenge to an English speaker learning these languages than those that allow more consonants or a greater variety of consonant sequences. Polish, for example, exemplifies a language that allows more consonants in sequence at the beginning of a word, as discussed below, and thus may pose particular problems to the language learner. At the same time, problems may be encountered when the specific consonant sequences that are allowed in a given language are different from those of the native language, even if they are not more numerous. Greek provides a good example of a language with a similar number of permitted consonants as English but different phonotactics.

Greek is similar to English in that up to three consonants can occur at the beginning of a word (Joseph and Philippaki-Warburton 1987). A number of the clusters with three consonants will be familiar to English speakers, such as [spl], [splína] ‘spleen’; [spr], [spróxno] ‘push’; [str], [stratós] ‘army’; and [skr], [skrápas] ‘idiot.’ Two other possible sequences are not found in English: [skn], [sknípa] ‘kind of mosquito’; and [sfr], [sfrajíða] ‘stamp.’ Sequences of two consonants also present some patterns not encountered in English. These include sequences of fricative + fricative ([sf, sx]), fricative + stop ([ft, xt]), and stop + fricative ([ps, ts, ks]). Notice that a word of Greek origin like

2. Although some words in Arabic may appear to have a vowel at the beginning of a word, these are preceded by a glottal stop or another type of consonant when they are pronounced.
3. Some scholars have claimed that the glide actually forms a diphthong with the following vowel. If this is the case, Korean is even more restrictive since we would need to say that words can begin with no more than one consonant.
psychology with the non-English [ps] is pronounced in English with a single [s]. (See Chapter 6 for discussion.)

In Polish, between one and four consonants can begin a word. Words beginning with two consonants are most frequent, making up approximately 88% of words beginning with consonant clusters. Those with three consonants make up about 9%, and those with four consonants approximately 2%. It is impressive to note that there are over 230 different types of two-consonant sequences and close to 200 different three-consonant clusters (Bethin 1992).

Despite the large number of different consonant clusters in Polish, there are several generalizations about how strings of sounds combine that the language learner can use to learn the sequences, rather than memorizing each string of sounds individually. For example, not unlike English, most consonant clusters that come before a vowel are made up of an obstruent (stop, fricative, affricate) followed by a sonorant (nasal, liquid, glide), e.g. [sn, sm, śr], or a fricative followed by a stop, e.g. [sk, zb, st]. Unlike English, however, a sonorant consonant can also precede an obstruent at the beginning of a word, giving sequences such as [rv, rt, rd]. Another difference is that for some consonants, both orders are possible, e.g. [bz] bzu ‘lilac’, [zb] zbir ‘thug’.

ENGLISH SOUND SEQUENCES: WORD-FINAL

Now let’s consider possible sequences at the ends of words. Words in English can end with up to four consonant sounds, e.g. sick [sɪk] (one), six [sɪks] (two), sixth [sɪksθ] (three), sixths [sɪksθs] (four). Of course, words can also end in only a vowel, e.g. see [si]. The only consonant that is systematically excluded from occurring at the end of an English word is [h]. As we noted above, [h] occurs only before a vowel. (Remember, we are talking about sounds—the letter ‘h’ can come at the end of a word in English, but the sound [h] cannot.)

In some dialects of English, [l] has a similar distribution to [h] in that it does not occur after a vowel, only before one. This is the case, for example, in the variety of English spoken by the Queen of England (referred to as Received Pronunciation or RP English), as well as in the American variety of English spoken in the Boston area. Speakers of both dialects share similar pronunciations of words like car [ka] and park [pɑk] (though the quality of the vowels can differ).

When a vowel is followed by two consonants, the first may be a fricative, a stop, or a sonorant (nasal or liquid). If the first is a fricative or a stop, the second will also be a fricative or a stop, as in the words act [ækt], desk [desk], rest [rest], wisp [wisp], and fifth [fɪfθ]. If the first consonant is a sonorant, then the second will be a stop, a fricative, or an affricate, as in the words send [sɛnd], camp [kæmp], sink [sɪŋk], cinch [sɪŋʃ], art [ɑrt], help [help], twelve [twɛlv], Welsh [welʃ], and welch [welʃ].

There are, however, some further restrictions on word-final sequences. For one, when a nasal is followed by an oral stop consonant [p, b, t, d, k, g], both consonants must have the same place of articulation, e.g. rant [rænt], sink [sɪŋk], pump [pʌmp]. There are
no words like *ranp or *pimt. This restriction is relaxed if the final consonant is the past-
tense marker [t, d]; these consonants can follow any verb ending in a consonant whether
they have the same place of articulation or not, e.g. banged [bænd], rammed [ræmd].

An additional restriction holds between a vowel and the consonants that follow. If a
nasal + stop consonant sequence follows a diphthong, the nasal can only be [n] and the
stop can only be [t, d]. Note that for this restriction, [i] and [u] behave like diphthongs
and are written [ij] and [uw]. Examples are given in (3). There no words in English with
diphthongs followed by a velar or labial nasal and stop.

(3) **English diphthong + [nt] or [nd]**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[ai]</td>
<td>pint, find, mind</td>
</tr>
<tr>
<td>[au]</td>
<td>count, mount, mound, ground</td>
</tr>
<tr>
<td>[oi]</td>
<td>point, anoint</td>
</tr>
<tr>
<td>[ij]</td>
<td>fiend</td>
</tr>
<tr>
<td>[ei]</td>
<td>paint, faint</td>
</tr>
<tr>
<td>[uw]</td>
<td>wound</td>
</tr>
<tr>
<td>[ou]</td>
<td>won’t</td>
</tr>
</tbody>
</table>

But when the vowel is a monophthong, there is no such restriction: you can get a
velar or a labial nasal and stop, as illustrated by the examples in (4).

(4) **English monophthongs + nasal and stop sequences**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[æ]</td>
<td>land, lamp, bank</td>
</tr>
<tr>
<td>[i]</td>
<td>lint, limp, ink</td>
</tr>
<tr>
<td>[e]</td>
<td>tent, hemp</td>
</tr>
<tr>
<td>[ʌ]</td>
<td>hunt, hump, hunk</td>
</tr>
</tbody>
</table>

In sequences of three consonants at the end of a word, the first two consonants can
be any of the permissible two-consonant sequences noted above. However, the conso-
nant coming after these consonants can only be alveolar ([t, d, s, z]), e.g. acts [ækts],
wounds [wuwendz], lamps [læmps], inked [ɪŋkt], calmed [kæmd].

**WORD-FINAL SEQUENCES IN OTHER LANGUAGES**

As with word-initial sequences, languages can differ from English in a number of ways
when it comes to possible sequences at the ends of words. Some languages, like Fijian,
have no words at all that end in a consonant. Others, such as Japanese, permit only a
limited number of consonants. Although there are approximately 20 consonants in the
language, only one, [ŋ], can occur at the end of a Japanese word.

Greek is also interesting from the perspective of the consonants that occur at the end
of a word. There are only two consonants that can appear at the end of a word of Greek
origin: [s] and, less frequently, [n] (Joseph and Philippaki-Warburton 1987). Words of
foreign origin can end in other types of consonants, e.g. [kláb] ‘club’ and [rúz] ‘rouge.’ Final consonant clusters are also uncommon except in words of foreign origin, e.g. [fjórd] ‘fjord.’

Polish would appear to be at the other end of the spectrum since there can be up to five consonants at the end of a word. It should be noted, though, that four- and five-consonant sequences are not very common. The vast majority of final consonant sequences contain two consonants. Like English, many have a sonorant followed by another consonant, e.g. [rm, ln, mp, rtʃ, rf, lk]. Polish also has words with final obstruent-obstruent sequences such as [ʒb, ʒʃ, kʃ, ps, ptʃ]. The language differs most from English in allowing some words to end in an obstruent followed by a sonorant, e.g. [ʒm, kl, zn, dr, tr]. In English, a sonorant can precede an obstruent only at the end of a word, e.g. ramp, fault, art.

Summary

As we have seen, English seems to be situated in the middle of the continuum when it comes to phonotactics. There are many languages that have fewer possible sound sequences, but there are also many others that allow for more possibilities. As noted above, those with a subset of the combinations that English allows should pose less of a problem for the learner, assuming that the sounds are the same as well. For those with unfamiliar sounds or sequences, a useful strategy in learning them is to begin by breaking the word or sequence of sounds down into smaller parts. If possible, begin with what you know and build on that, as we did with individual sounds. Practice pronouncing the smaller parts slowly, and then slowly combine the sounds, getting feedback on your pronunciation from a native speaker if possible.

Exercises

1. Investigating word-initial consonant sequences

   Do some investigative work into the consonant sequences that occur at the beginning of words in a language that you are learning. Here is one method of doing this:

   • Start with a list of all the consonant sounds that occur in the language.

   (a) Sequences of two consonants:

   » Make a chart with a row for each consonant in the language. Put the IPA symbol for each consonant in the leftmost column of a single row. Each row should then be assigned to a particular consonant. It can be
useful for seeing patterns later to list the consonants in order of manner and place of articulation, e.g. p, b, t, d, k, g, s, z, m, n, l, r, y, w.

» Add a column for each consonant in the language, and label the top of the column with the IPA symbol for the sound in the same order as above.

» Beginning with the consonant in the first row, go across each column, checking each cell where the consonant can occur at the beginning of a word. Proceed with the consonants in each of the other rows until your chart is complete.

» What generalizations can you make about the place and/or manner of articulation of consonants that can begin a word? What generalizations can you make about consonants that can come second? How do these patterns compare to the sequences that can occur in English? Given the differences between English and your new language, where do you anticipate having difficulty? How might you deal with these challenges?

(b) Sequences of three consonants:

» If your language allows three consonants at the beginning of a word, create a chart similar to the one above with the following modification:

- Since three-consonant sequences will be composed of possible two-consonant sequences, label each row with one of the two-consonant sequences that you have identified above.

» Columns are identical to the ones in (a).

» Follow the same procedure as in (a), putting a check in each cell that corresponds to a possible three-consonant sequence.

(c) Sequences of more than three consonants:

» Follow the same procedure as above, delimiting the rows of the new chart to only those sequences that were possible in the preceding chart.

2. Investigating word-final consonant sequences

To discover what consonant sequences can occur at the end of a word, follow the same procedure as in Exercise 1 above for word-initial sequences, with the following modifications:

- The consonant that appears in each row will correspond to the consonant that comes immediately after a vowel.
- The consonant at the top of a column will be the consonant that potentially follows the consonant occurring in a row.
- Follow the same procedures as for word-initial sequences, putting a check in each cell that corresponds to a possible consonant sequence.
- Repeat with additional charts if more than two consonants can occur at the end of a word. Each sequence identified in the previous chart will appear in its own row in the new chart.
References

