

In homework 2, we discovered that of all the many ways of combining the stops of English with a fricative or stop, only the following make good codas.

- (1)
- | | |
|---------------|-----------------|
| [sp]: [kʌsp] | [ps]: [kʌps] |
| [mp]: [tɪæmp] | [pt]: [ɪæpt] |
| [st]: [mʌst] | [θt]: [pɛθt] |
| [ts]: [mʌts] | [tθ]: [eɪtθ] |
| [ft]: [fɪft] | [tʃ]: [bæʃ] |
| [nt]: [ɪænt] | [sk]: [mæsk] |
| [ks]: [meɪks] | [kt]: [lʌkt] |
| [ŋk]: [ɪŋk] | [zb]: [lɛzb]? |
| [bz]: [tʌbz] | [bd]: [ɪʌbd] |
| [zd]: [fɪzd] | [md]: [sʌmd] |
| [nd]: [bænd] | [ŋd]: [ɪʌŋd] |
| [gd]: [lægd] | [ðd]: [beɪðd] |
| [dz]: [ʌdz] | [vd]: [ɪʌlɪjvd] |
| [dʒ]: [ɛdʒ] | [gz]: [bʌgz] |
| ?[ŋg]: [ɪʌŋg] | [ft]: [gɪft] |
| [pθ]: [dɛpθ] | [mt]: [dɪɛmt] |

What is it about English that has this consequence? What is it about these particular combinations of sounds that makes them different from all those other combinations that don't make good codas? It turns out that there is a set of constraints on what codas can be that make reference to the feature composition of the sounds in those codas. We have a set of phonotactic constraints that allow only certain combinations of features in a coda, and it's those phonotactic constraints that block all other combinations of sounds and allow just those in the list above.

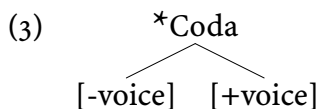
We won't look at all of those constraints, but we will look at two. To see what those phonotactic constraints are, and to discover what features are relevant, we should compare the codas that are good — those in the list above — to those which minimally differ from them but are bad. I will do that in a way that leads us to see what some of the patterns in the list above are.

We'll start by considering all those good codas whose first consonant is [-voice]. I've pulled those codas out of the list above and put them in (2), where I've also contrasted those codas with ones that are bad but very similar.¹

¹In the lists below, the “*” designates ungrammaticality. This is a common linguist's abbreviation. So “*[sb],” for instance, means that [sb] is an ungrammatical sequence of phones (for a coda).

(2) Good:	Bad:
[sp]: [kʌsp]	*[sb]: [kʌsb]
[ps]: [kʌps]	*[pʒ]: [kʌpʒ]
[pt]: [ɪæpt]	*[pd]: [ɪæpd]
[st]: [mʌst]	*[sd]: [mʌsd]
[θt]: [pɛθt]	*[θd]: [pɛθd]
[ts]: [mʌts]	*[tz]: [mʌtz]
[tθ]: [eɪtθ]	*[tð]: [eɪtð]
[ft]: [fɪft]	*[fd]: [fɪfd]
[sk]: [mæsk]	*[sg]: [mæsg]
[ks]: [meɪks]	*[kz]: [meɪkz]
[kt]: [lʌkt]	*[kd]: [lʌkd]

What we see is that in all the good codas, the second phone is also voiceless. By contrast, in all the ungrammatical codas, the second phone is voiced. So what we see here is that if the first consonant in a coda is voiceless, the second must be too. That's one of the phonotactic constraints on codas, then. One way to represent this constraint would be as in (3).



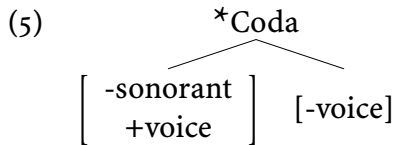
This says that a coda is ungrammatical if the first phone in it is unvoiced and the second is voiced.

In the next list, what I've done is pulled out all the good codas from the list in (1) which start with a voiced sound.

(4) Good:	Bad:
[zb]: [lɛzb]?	*[zp]: [lɛzp]
[bz]: [tʌbz]	*[bs]: [tʌbs]
[bd]: [ɪæbd]	*[bt]: [ɪæbt]
[zd]: [fɪzd]	*[zt]: [fɪzt]
[gd]: [lægd]	*[gt]: [lægt]
[ðd]: [beɪðd]	*[ðt]: [beɪðt]
[dz]: [ɑdz]	*[ds]: [ɑds]
[vd]: [ɪəliɪvd]	*[vt]: [ɪəliɪvt]
[gz]: [bʌgz]	*[gs]: [bʌgs]
[md]: [sʌmd]	
[nd]: [bænd]	
[ŋd]: [ɪæŋd]	
[mt]: [dɪɛmt]	
[mp]: [tɪæmp]	
[nt]: [ɪænt]	
[ŋk]: [iŋk]	

What we see here is more complex. For all those codas whose first sound is a [-sonorant] and voiced, the second sound must be voiced too. The [+sonorant] sounds are [m], [n] and [ŋ], and

these may be followed by [-voiced] sounds (as in [dɪɛmt], for example). But for every other [+voiced] sound, it looks like the sound that follows must also be voiced. In fact, if we make the second sound [-voiced], as I've done in the list of bad codas, the result is ungrammatical. So this is our second phonotactic constraint. If the first sound in a coda is [+voiced] and [-sonorant], then the second sound must be [+voiced] too. We could represent this constraint with something like (5).



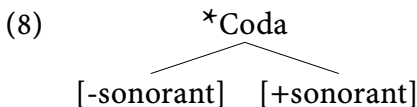
This says that any coda whose first member is voiced and not sonorant is ungrammatical if its second member isn't voiced. A way of stating these two constraints together is (6).

- (6) The first and second phone in a Coda must have the same value for [voice], unless the first is [+sonorant].

Finally, consider the comparative list of good and bad codas in (7).

(7)	Good:	Bad:
	[md]: [sʌmd]	*[dm]: [sʌdm]
	[nd]: [bænd]	*[dn]: [bændn]
	[ŋd]: [ɪɑŋd]	*[dŋ]: [ɪɑdŋ]

In each of the good codas, the first sound is [+sonorant], and the second sound is [-sonorant]. If we switch those sounds, the result is ungrammatical; that's what has happened in the list of bad codas. What we see here is a constraint that requires of codas that have just one sonorant sound in them that it be the first sound. We could express this constraint with (8).



Putting this together with (6), we could state what we've discovered with following two phonotactic constraints on codas in English.

- (9) a. The first and second phone of a Coda must have the same value for [voice], unless the first is [+sonorant].
 b. A [+sonorant] cannot follow a [-sonorant] sound in a Coda.