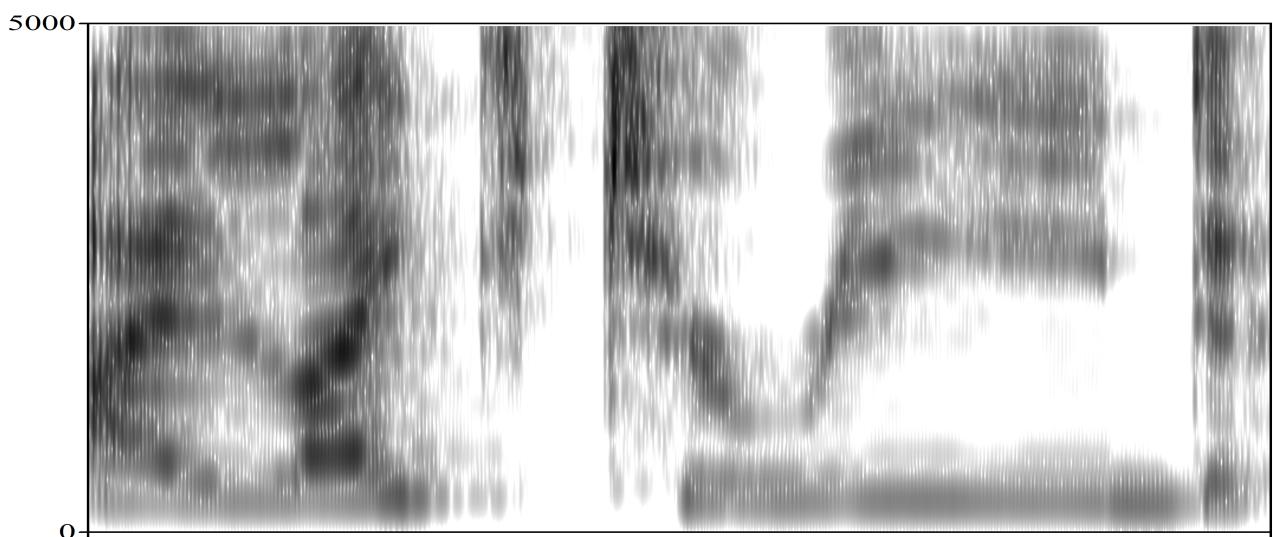


How to Read a Spectrogram

An Introduction for Beginners

1 What do you already know?

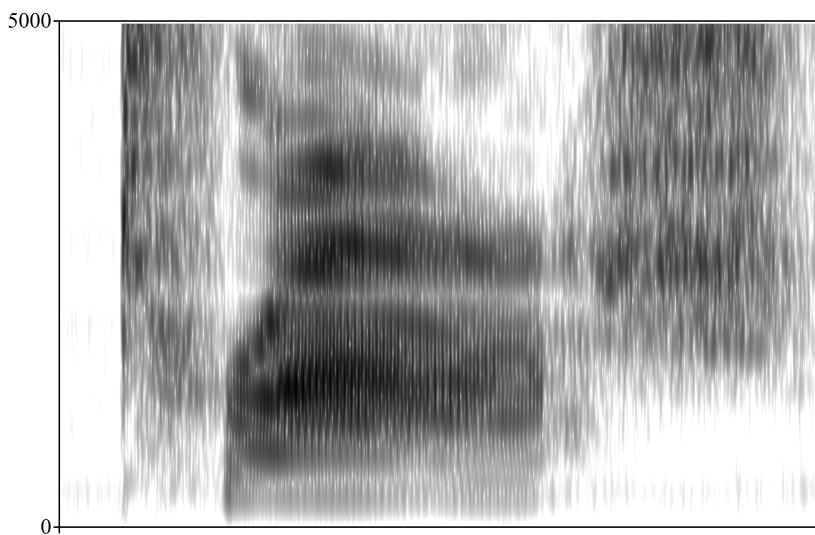
- Does the question tell you anything already? Read it carefully!
- Is this a sound, a word, or a sentence?
- Do you already know the words, and just have to match them to the right spectrogram?
- Do you need to answer exactly what the spectrogram is, or just figure out one thing about it?
- Are we looking at a particular language, or could they be made up words?
- Is there a waveform too, or just a spectrogram?



This spectrogram is a whole English sentence. That tells you it will have real words in (not nonsense words), and only English sounds, in an order that English allows. What happens to the “little words” in English when people speak normally? How would that look on a spectrogram?

2 Start dividing the spectrogram into parts, and look for clues about what kinds of sounds there are. What can you tell right away?

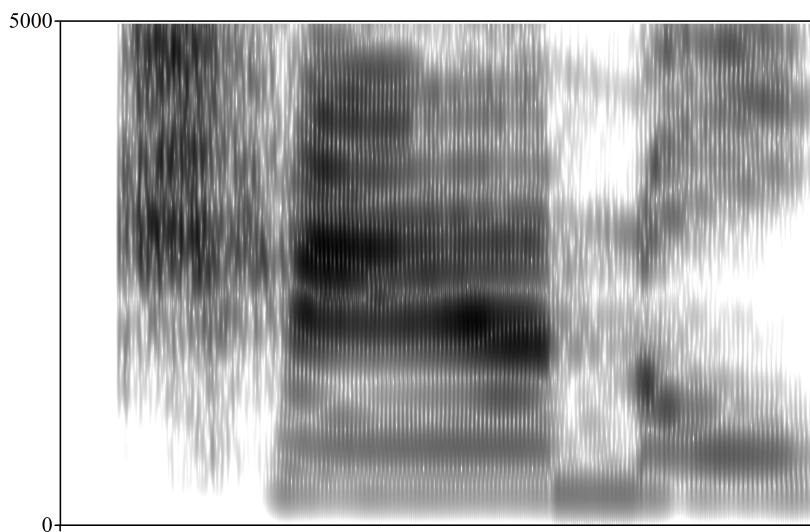
- Where do you see white noise/aperiodic sound? That could mean a fricative, or an affricate, or aspiration.
- Where do you see formants? That could mean vowels, or nasal stops.
- Where do you see release bursts? That could mean an oral stop (especially if you get a closure right before it).



That splotch of aperiodic noise at the end really stands out: fricative? – This part in the middle has really clear formants in it: vowel? – Does anything else jump out at you right away?

3 Use what you can tell easily to figure out the harder stuff

- If you have two sections of aperiodic noise, but one is more than twice as long as the other, it might be a fricative (long) and the second half of an affricate (short). Test it out: What would you expect to find right before the noise if it's part of an affricate?
- If there are two sections with formants, but one looks way paler than the other, the pale one might be a nasal, and the darker one a vowel. Test it out: What would you expect to find in a nasal, but not in a vowel?

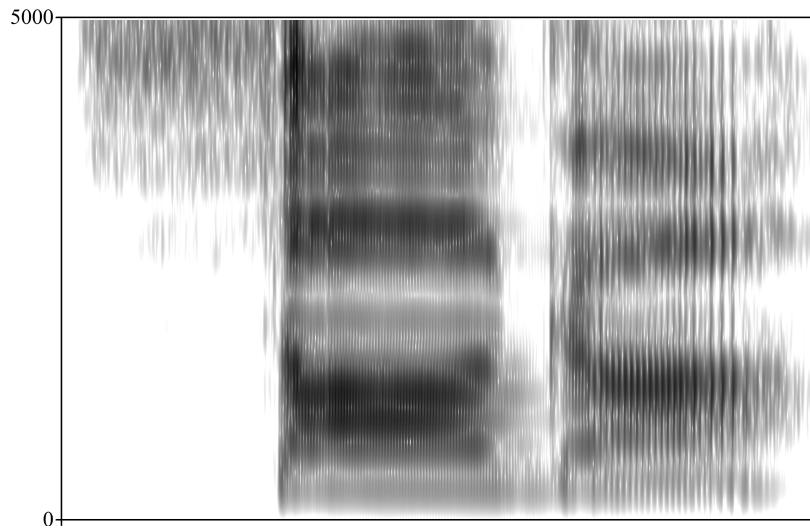


This spectrogram contains one vowel, one nasal, and one syllabic approximant... can you tell which is which?

4 Fill in the details (Again: start with what you can see most easily!)

- For the fricatives: What frequencies is the noise focused at? Is there a voice bar too?
- For the vowels: Where are the formants? Are they changing, or staying more static?
- For the nasal stops: Where are the antiformants?

- For the oral stops: Do you see a voice bar? How about aspiration afterwards? What's happening to the formants of the vowels beside them?



The release burst already tells us there's an oral stop in the middle of this word, but the voice bar and lack of aspiration says it's a voiced oral stop, and the F2 and F3 in the vowel right after tells us it's velar.

5 Remember to use what you know!

- All syllables have to have a nucleus, that means there's a vowel or syllabic consonant in there somewhere!
- If you know the language you're looking at, you know something about what's possible in it (For instance: English words can't start with [ŋ])
- If you've got a whole sentence, the words/sounds you've already figured out could give you clues about the ones you haven't.

Don't write down that your spectrogram says [spfktr] if it's supposed to be a real English word! – What if you've already figured out "The train leaves every _ at eight A.M.", Can you take a guess at what the blank is? What if I told you the first sound in the blank space looks like a nasal? (Always check your guesses against the spectrogram, but they can help if you get stumped)

6 Don't panic!

- Spectrograms are like little puzzles. You have to solve them one piece at a time. Even phoneticians don't just look at a whole spectrogram and instantly know exactly what it says!
- Start with what you do know, and come back to the stuff you're not sure about later. When you get to a sound you can't figure out, move on; don't let yourself get stuck on a tricky part!

Try to figure out all the spectrograms above for yourself, and then check your answers! What did you get right? What's still a struggle?

The answers (in order): I like to read; trash; channel; saga