Little Handy Guide to Solving Pesky Phonology Problems

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Some Homework Comments

- When approaching a phonology problem, you are trying to figure out whether the certain segments that you are comparing belong to the same or separate phonemes in the language.
- This must be figured out based on data, **not on whether you personally find them to be contrastive in your own mind.** This is because every language divides the potential sound system differently. Two sounds can be completely contrastive in one language and sound the same to speakers of another language.
  - For example, in English, we use both unaspirated and aspirated stops interchangeably –we don't recognize a difference between [t] and [t^h]. However, in Hindi, those are considered to be two completely different sounds, causing differences in what word you are saying.

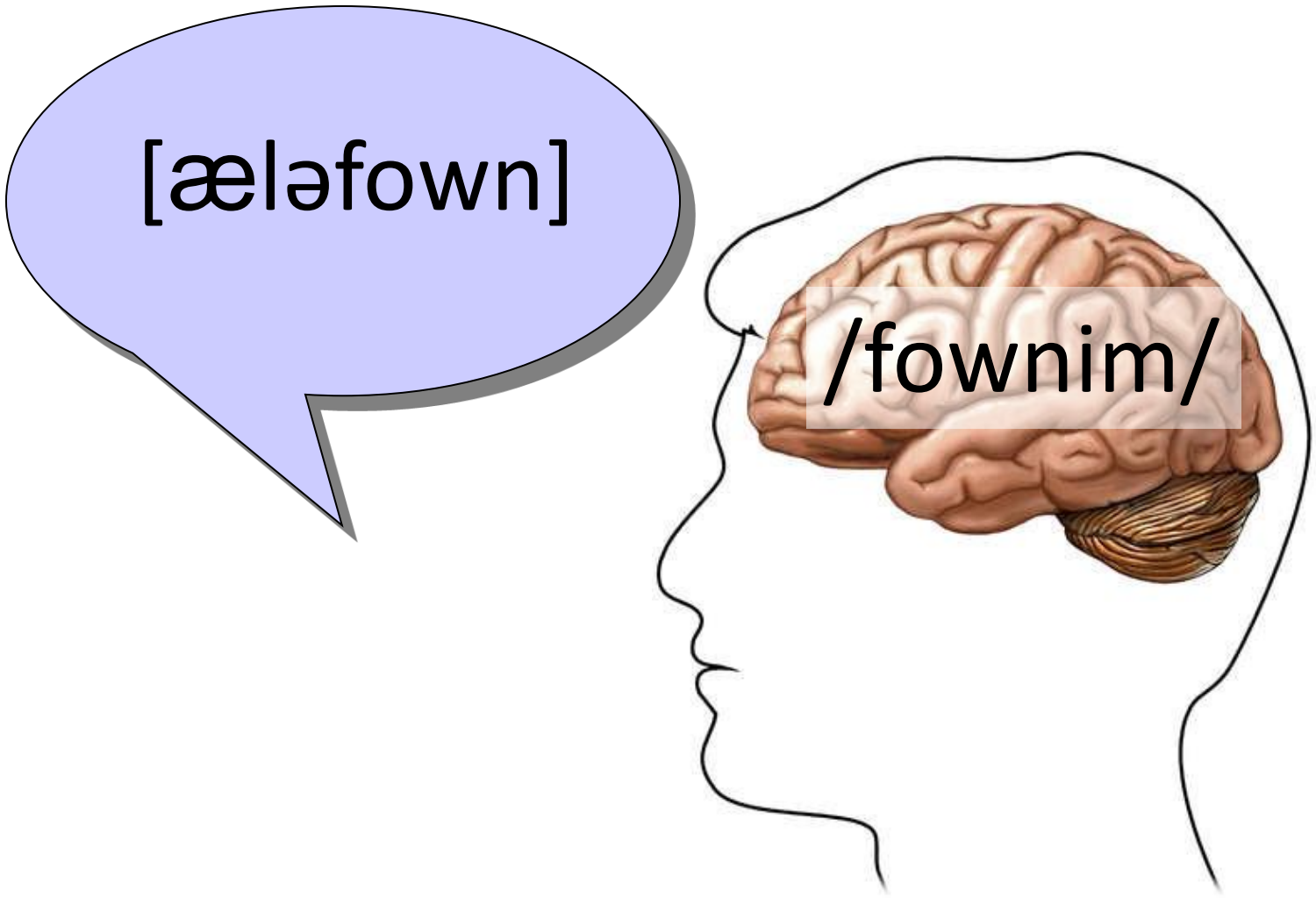
Some Homework Comments

- This powerpoint is meant to help you solve phonology problems.
  - First, a bit of explanation about the terms and concepts in phonology.
  - Then, a step-by-step presentation guiding you through solving a dataset. There is a practice dataset included in this powerpoint. As you go through each slide, try to answer the questions and check them with my responses on the following slide.

Why phonology?

- In the previous lessons, we learned about the phonetic system, which categorizes the different sounds in use within the language.
- However, just because a language has an inventory of certain sounds, doesn't necessarily mean that all of those sounds correspond to a mental representation that is identical to the surface form. Instead, we see that some of those surface forms (allophones) only occur in specific phonetic environments.
- This leads us to consider that some allophones in a language can belong to a mental representation (phoneme) shared with other allophones.

Allophone and Phonemes



Allophone and Phonemes

- Phonemes are the underlying mental representations of the sounds we make. (think ‘the **phone** in **me**’). Allophones are the actual utterances (think of saying “ **‘Allo**, **phone**!”).
- Every allophone belongs to a phoneme. However, in phonology datasets, we are trying to figure out whether two allophones belong to the same or different phonemes.

Allophone and Phonemes

- If they belong to the same phoneme, we expect the allophones to follow **complementary distribution** patterns. This is where there are separate, **distinct environments** where each allophone appears in the data.
- If instead we find that the two allophones in question share an environment (i.e. **non-distinct**), then we say that they are in **contrastive distribution** (the same environment shows the contrast) and are allophones of two different phonemes.

Determining Distributions

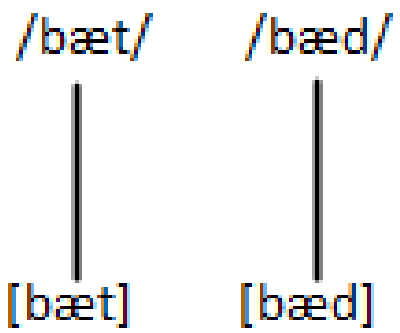
- **Contrastive Distribution**
  - This is when two segments share the same environment. When two segments share the same environment, it allows us to see how the two contrast.
  - Helpful way to remember:
    - Think of diamonds. When comparing the quality of two diamonds, they are typically compared with a black surface behind them. This is because the black surface provides a neutral background to highlight the contrast of the diamonds. In the same way, shared environments in words allow us to see more clearly that the two segments in question contrast with each other.
  - When the two segments share the same environment, you cannot write a rule describing when one segment should show up instead of the other. You can't predict it.

Determining Distributions

- **Complementary Distribution**
  - This is when two segments occur in different environments.
  - Helpful way to remember:
    - Think of superheroes (my favorite is Spiderman). Underlyingly, Spiderman and Peter Parker are the same person. However, depending on the environment, you're going to see only one representation of Peter Parker. You'll never see Spiderman and Peter Parker hanging out in the same place at once.
    - Thinking of superheroes also helps you think of the name, because superheroes often get compliments. Granted, that's a homophone of the actual word, but it tends to do the trick.
  - When the two segments share the same phoneme, you should be able to write a rule describing when one segment should show up instead of the other. The environment determines which representation you'll see.

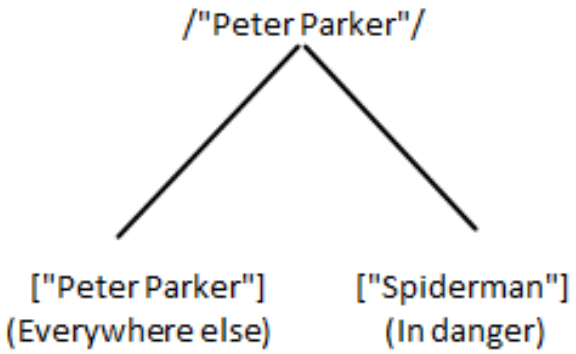
Distributions (again)

- Contrastive Distribution
  - Share the same environments. Minimal or near-minimal pairs. It is impossible to find a rule to tell you to when one should appear to the exclusion of the other.

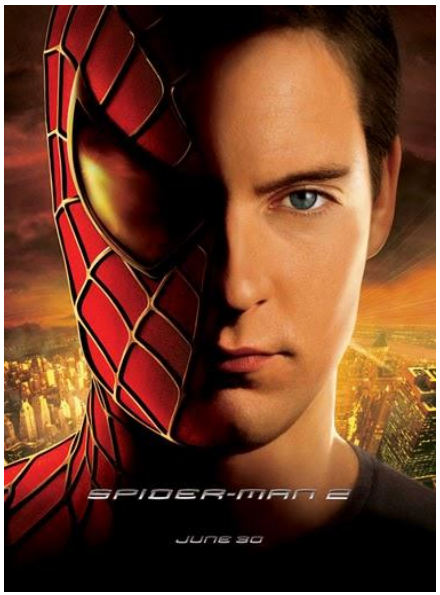


Distributions (again)

- Complementary Distribution
  - Do not share the same environment. One environment can be distinguished from the other.
  - You want to be able to look for a rule to define when the underlying phoneme changes to that particular allophone
  - E.g.



/"Peter Parker"/ --> ["Spiderman"]/ In dangerous situations



Natural Classes

- All of those terms that you learned in phonetics weren't for nothing! Manner, voicing, and place of articulation are all factors that tend to affect what segments alternate within a language.
- There are some other terms that can describe classes of sounds that aren't based purely on phonetics. For example, obstruents, sonorants, and stridents all describe sounds that have been shown to group together in some languages. These groups have been formed through the study of phonology, so be sure to know them!

So you have a phonology problem.

- This powerpoint will guide you step by step on how to solve a phonology problem --
- Step 1: Don’t panic! It is not the end of the world. You have data and are just trying to look for patterns. Plus, you have a handy guide for solving phonology problems!

Step 2: Know what two segments you are trying to compare.

- Consider the following dataset from German. You are going to compare the segments [x] and [ç]. Look up what these two segments are (voicing, manner, and place of articulation) and write them down on your paper. How do they differ? How are they similar?

1.	ɑxt	'eight'	7.	ʃpʀeːçə	's/he/it would speak'
2.	ɛçt	'real'	8.	lɛçəln	'to smile'
3.	ɪç	'I'	9.	flʊxt	'flight'
4.	buːx	'book'	10.	ʀiːçən	'to smell'
5.	lɔx	'hole'	11.	lɑxən	'to laugh'
6.	hoːx	'high'	12.	fɛçtən	'to fence'

Step 3: Make a list of where the segments appear.

- It is helpful to do this by making what we call “T-diagrams”, where you have a space which represents where the segment occurs in the word.
  - e.g.: Isolating the [x] in the word [lɑxən] would look like this in t-diagram form:

	x	
lɑ	___	ən

    - Note: You want to write down every environment that a segment occurs in. This means that if a segment appears twice in a word, you should repeat that word twice on the t-diagram – once for each place that the segment is appearing.
  - Do this with the other words in the dataset and compare them to the t-diagrams on the next slide.

T-diagramming

- Now we have the following t-diagrams.
  - (# stands for a word boundary)

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		T
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		Əln
ʀi:		ən
fɛ		tən

Step 4: Try to classify the environment

- Look at the segments directly to the left and directly to the right of the segments listed. Can you classify them in groups?

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		t
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		əln
ʀi:		ən
fɛ		tən

Step 4: Try to classify the environment

- Looking to the right for both segments, we can see that segments are shared. ([t], [ə], #, etc.). Does this mean that this environment is distinct or non-distinct for each segment we're comparing?

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		t
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		əln
ʀi:		ən
fɛ		tən

Step 4: Try to classify the environment

- This means that this particular environment is non-distinct for the segments in question. However, don't draw conclusions yet – we still need to compare the segments on the other side.

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		t
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		əln
ʀi:		ən
fɛ		tən

Step 4: Try to classify the environment

- Now look at the left for both segments. Both appear after vowels, but do those vowels form specific classes?

Note: Natural classes are meant to describe characteristics of a group of segments to the exclusion of others. When trying to define a natural class, be sure that you are being general enough to describe all the segments you want to, but also specific enough to exclude those segments you don't want .

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		t
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		Əln
ʀi:		ən
fɛ		tən

Step 4: Try to classify the environment

- Yes! [ɛ], [ɪ], [e:], and [i:] are all front vowels, while those vowels appearing before [x] are all back vowels. Does this mean that the environments are distinct or non-distinct for each segment? What kind of distribution do [x] and [ç] have, then? Do these two segments belong to the same or separate phonemes?

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		t
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		əln
ʀi:		ən
fɛ		tən

Step 4: Try to classify the environment.

- This means that they have **distinct environments** which describe where [x] and [ç] occur, meaning that they are in **complementary** distribution and hence are **allophones of the same phoneme**.

	x	
ɑ		t
bu:		#
lɔ		#
ho:		#
flʊ		t
lɑ		ən

	ç	
ɛ		t
ɪ		#
ʃpre:		ə
lɛ		əln
ʀi:		ən
fɛ		tən

Step 5: Write a rule or note (near) minimal pairs.

- If the segments occur under distinct environments (i.e. are in **complementary distribution**), then you should be able to describe that with a rule.
- With the data that we just encountered, we saw that [x] occurs after back vowels and [ç] occurs after front vowels. For this particular dataset, that means that there are two rule options here, depending on which segment you choose to be the underlying phoneme:

  voiceless palatal fricative (i.e [ç]) → velar/back vowels__

  or

  voiceless velar fricative (i.e. [x]) → palatal/front vowels__

Note that we write rules by describing the sounds in question and highlighting what changes between the two. This is why it was important to not the voicing, manner, and place of articulation of these segments at the beginning.

Hypothetical

- Consider if each segment didn't occur after easily grouped vowels. What if there were a central vowel [ə] that appeared before [x] as well?
- If it appeared only before [x], then the group of vowels that appear before [x] (now [ə o: u: ɑ ʊ ɔ])could no longer be simply classified as back vowels.
- This would mean that we could more easily describe the group of sounds which occur before [ç] (i.e. front vowels) than before [x]. It would then be easier to describe a rule for where [ç] occurs, meaning that we would assume that /x/ is the underlying phoneme. The rule would then look like this:
  - Voiceless velar fricative → palatal /front vowels __
    - (This reads as "A voiceless velar fricative changes to a (voiceless) palatal (fricative) when it occurs in the environment after back vowels.")
    - Note that we don't have to rewrite the features that don't undergo change (we didn't have to say "voiceless velar fricative → voiceless palatal fricative") because it would be redundant to do so
  - We wouldn't need to write a rule for when the underlying /x/ changes to an [x], because it is assumed that it would do that in every environment that is not after a front vowel.

Step 5: Write a rule or note (near) minimal pairs.

- If the segments share environments (i.e. are in **contrastive distribution**), then you should be able to find a minimal/near minimal pair.
- A near minimal pair is when two words (which have two different meanings) have the exact same segments except for the segments in question.
  - For instance, in English, [bæd] ‘bad’ and [pæd] ‘pad’ are minimal pairs, since a change in one segment causes a difference in meaning.
- Near minimal pairs are when the entire word may not be the same, but the environments directly to the left and right are the same.
    - For instance, in English, [miʃən] ‘mission’ and [viʒən] ‘vision’ are near minimal pairs, showing that [ʃ] and [ʒ] belong to separate phonemes

Step 6: Check your work!

- If you have just written a rule, describing environments based on natural classes, be sure to check and make sure that there are no words in the dataset which would make the wrong prediction.
- For example, if we had said that [x] occurred after round vowels instead of back vowels, our rule would not work because it would not predict [x] occuring after [ɑ].
- This is a very important step! Don't forget it!

Summary

- Step 1: Don't Panic! (Hooray for Hitchhiker's Guide to the Galaxy references!)
- Step 2: Know the segments you are comparing
  - Write down the voicing, manner, and place of articulation for the segments you are comparing.
- Step 3: Write out the T-diagrams.
- Step 4: Try to classify the environments.
  - Compare the environments occurring to the left, right, and both sides. Are there any natural classes you can see?
- Step 5: Write a rule or list (near) minimal pairs.
- Step 6: Check your work!

Summary

- Terms to know:
  - Complementary distribution
  - Contrastive distribution
  - Phoneme
  - Allophone
  - Minimal pairs
  - Natural Class