

# LING 20 Homework 4

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## Problem 1

The voiced oral stops are in complementary distribution with their voiceless oral stop counterparts, e.g. [p] and [b] are in complementary distribution.

a) State a generalization about when the voiced oral stops and the voiceless oral stops appear, respectively.

Voiced oral stops occur following nasals, while voiceless oral stops occur otherwise.

b) What are the phonemes that the voiceless and voiced oral stops are allophones of? That is, what are the underlying forms? (Hint: There are three.)

The underlying forms are /p/, /t/, and /k/.

c) State a phonotactic constraint that prohibits the underlying forms in the right environments. Write this constraint using IPA symbols.

A nasal sound cannot precede [p], [t], or [k].

d) Now state this constraint using articulatory features instead of IPA symbols. The constraint must be a single statement ("It is not possible to have ...") and must not involve disjunction ("X or Y").

\*[+nasal][~~-voice~~ +oral +stop]

e) Based on this constraint, provide a rule that changes the underlying forms in the right environments. Use IPA symbols in this rule.

/p/, /t/, and /k/ become [b], [d], and [g], respectively, when following a nasal.

f) Now formulate this rule using features instead of IPA symbols.

~~/-voice +oral +stop/~~ becomes [+voice] when it is preceded by [+nasal].

## Problem 2

In English, there are three forms that productively realize past tense. In what follows, we will ignore irregular past tense forms like go-went, make-made, fit-fit, etc.

The situation here is similar to what we saw for expressing the plural in class. First, consider only Group 1 and Group 2.

a) State a generalization about when the past tense element is realized as [d] and when it is realized as [t].

The past tense element is realized as [t] when the preceding element is voiceless, and as [d] otherwise.

b) The distribution of [d] and [t] is conditioned by a phonotactic constraint on English codas that we already saw in class. State this constraint.

\*[-voice][+voice] in a coda.

c) Given the constraint you stated in b), what is the underlying form of the past tense element? What is the rule that changes how the past tense element is realized when the phonotactic constraint is violated?

The underlying form is /d/.

The rule is that /d/ becomes [t] if preceded by a [-voice] consonant in the same coda.

Now consider Group 3.

d) It is a general fact about English that the sequences [tt], [td], [dt] and [dd] are all impossible within a coda. State a set of articulatory features that picks out [d] and [t] but no other sound.

[+alveolar -nasal +stop] = [t, d, ʔ] you also need [-tap]

e) Using these articulatory features, state a single phonotactic constraint that excludes the four combinations [tt], [td], [dt], and [dd] within a coda.

\*[+alveolar -nasal +stop][+alveolar -nasal +stop] in a coda.

f) Recall from c) above what the underlying form of the past tense element is. Given the constraint in d), state a rule that changes the underlying form to [ɪd] when the phonotactic constraint you gave in e) is violated.

/d/ becomes [ɪd] if preceded by a [+alveolar -nasal +stop] consonant in the same coda.

## Problem 3

The following data are from Xhosa, a Bantu language spoken in Africa. The first column gives the underlying forms of the words, and the second column shows how the words are actually pronounced.

There are two rules of Xhosa that play a role here:

- **Rule 1:** Change /u/ to [w] if it precedes [i].
- **Rule 2:** Delete a vowel if it follows another vowel.

a) Based on the underlying form /kuihashe/, what is the result that is produced if Rule 1 applies before Rule 2?

Underlying form:	/kuihashe/
Rule 1:	[kwihashe]
Rule 2:	-
Output:	[kwihashe]

b) What happens if the two rules apply in the opposite order?

Underlying form:	/kuihashe/
Rule 2:	[kuhashe]
Rule 1:	-
Output:	[kuhashe]

c) Which ordering produces the right result? What is the relationship between the rules (no interaction, feeding or bleeding)? Briefly explain why in 1–2 sentences.

Since [kwihashe] exists in the provided dataset and [kuhashe] doesn't, we can assume that applying Rule 1 before Rule 2 is the correct ordering. Since Rule 1 removes a context in which Rule 2 would have applied, we know the relationship between the rules is bleeding.