LING 100 **Homework #4: Phonological Rules** **Fall 2008**
due Monday, October 6th

Problem 1: Writing rules. Assume language $\mathscr{L}$ has the same phonemes as in English. Using formal rules with phonological features, rewrite the following prose descriptions of $\mathscr{L}$'s phonology, following the format $A \rightarrow B / C \_\_ D$, where:

- A is the minimal and sufficient set of features needed to describe the natural class of phonemes in $\mathscr{L}$ that undergo the rule
- B is the minimal and sufficient set of features needed to describe the changes made by the rule
- C and D are the minimal and sufficient sets of features needed to describe the environment that triggers the rule

Remember to make use of special symbols like ∅, σ, and # where appropriate.

a. Fricatives are voiced between sonorant sounds (nasals, liquids, glides, vowels).
b. Voiced stops are deleted at the end of a syllable if preceded by a nasal.
c. Mid vowels are tense in open syllables (syllables that have no coda).
d. A high vowel turns into a glide before non-high vowels.
e. A glottal stop is inserted into the onset of an onsetless syllable.

Problem 2: Tohono O'odham stops and affricates. Consider the following data from Tohono O'odham (a.k.a. Papago), a Sonoran language of the Uto-Aztecan family, spoken in Arizona. Note that [ɨ] is a high central unrounded vowel. It has the exact same features as [i], except that [ɨ] is [+back] while [i] is [−back]. You can assume that this data is representative of the distribution of allophones in Tohono O'odham as a whole.

[tatai]	'tendon'	[t͡ʃuagia]	'net bag'	[d͡ʒuni]	'dried cactus fruit'
[tamʃ]	'gums'	[t͡ʃut͡ʃul]	'chicken'	[d͡ʒusukal]	'(lizard species)'
[tohnto]	'degenerate'	[t͡ʃukma]	'dark'	[d͡ʒuhki]	'rain'
[tokih]	'cotton'	[t͡ʃɨposid]	'to brand'	[d͡ʒɨgos]	'storm'
[todsid]	'to frighten'	[t͡ʃɨlwin]	'to rub'	[d͡ʒɨwikon]	'to scrape'
[daswua]	'to pile'	[t͡ʃɨgɨtog]	'to think'	[d͡ʒiwhiadag]	'arrival'
[dakpon]	'to slip'	[t͡ʃinig]	'to move the lips'		
[doad͡ʒida]	'healing'	[t͡ʃikpan]	'work'		
[doʔag]	'mountain'			(Kenstowicz and Kisseberth 1979)	

a. Based on the data above, you can reasonably conclude that Tohono O'odham has a phoneme (temporarily symbolized as /𝕋/) with allophones [t] and [t͡ʃ], and a second phoneme /𝔻/ with allophones [d] and [d͡ʒ]. In full, coherent prose, explain carefully why you can conclude this from the data.

b. What are the best choices for /𝕋/ (either /t/ or /t͡ʃ/) and /𝔻/ (either /d/ or /d͡ʒ/)? Justify your choices with full, coherent prose.

c. Using phonetic terminology, describe the environments for the allophones of each phoneme. It is okay to use 'elsewhere' for one allophone of each phoneme. Then, write a single formal rule using phonological features (using the guidelines in Problem 1) to describe the distribution of all four of the Tohono O'odham allophones. Be sure to make your rule minimal and sufficient. (If you can do it in a single rule, write as many as you need. But this problem can be done with one rule!)

d. Give full derivations for the Tohono O'odham words for 'tendon', 'healing', 'chicken', and 'storm', being sure to use the correct underlying representations, correct application of your rule in (c), and correct output forms.