

## Homework #4: Features

Due in class Tues., 10/20

### 1. Noncomputer feature exercise

What feature or features differentiates the sound in each of the following pairs? For each feature, state which member of the pair has the + value. Symbols are IPA. You can use the feature chart in your textbook, the Excel spreadsheet at <http://www.linguistics.ucla.edu/people/hayes/120a/index.htm#features>, or Feature Pad, discussed below.

Examples: p b; b is [+voiced]  
i o; i is [+high], o is [+LABIAL, +round, +back]

- |          |            |           |
|----------|------------|-----------|
| a. [ʍ ɣ] | i. [h ʔ]   | q. [χ x]  |
| b. [ɑ ɒ] | j. [p t]r. | r. [ɾ ʕ]  |
| c. [j ɥ] | k. [ts tʃ] | s. [k kʷ] |
| d. [u y] | l. [kʰ k]  | t. [w pʷ] |
| e. [i ɨ] | m. [u w]   |           |
| f. [i ɪ] | n. [tʰ ts] |           |
| g. [ð z] | o. [v β]   |           |
| h. [l ɭ] | p. [m b]   |           |

### 2. Noncomputer Exercise II

For each segment, if you change the value of the feature(s) indicated, what new segment will be derived?

	Old segment	Feature(s) to be changed
a.	[j]	[syllabic]
b.	[o]	[high]
c.	[dʒ]	[voice]
d.	[s]	[strident], [distributed]
e.	[e]	[front], [back]
f.	[o]	[front], [back]
f.	[u]	[round], [LABIAL]
g.	[x]	Change [0back, 0front] to [-back, +front]
h.	[i]	[front]

### 3. Feature Pad Tutorial

We will demo FeaturePad on Thursday in class.

To use FeaturePad in the CLICC lab:<sup>1,2</sup>

My Computer  
Humanities  
Linguistics  
Feature Pad

- To use FeaturePad on your computer at home (sorry, Windows only): visit

<http://www.linguistics.ucla.edu/people/hayes/120a/FeaturePad.htm>

and follow the instructions there.

- If you installed FeaturePad in the usual way, you will find the program at c:\\Program Files\\FeaturePad\\FeaturePad.exe. Click on this to start the program.
- You will first see a choice of languages. Pick “English.inv” (Inventory for Englishpseudolanguage), then Open. It will look like this:

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<sup>1</sup> Note: in addition to the CLICC, the third floor classrooms in Powell Library (west side of building) often have computers you can use.

<sup>2</sup> CLICC hours are posted at: <http://www.clicc.ucla.edu/tiki-index.php?page=Hours+and+Help>.



- Single out /ɪ/ on the left side of the arrow using [-syllabic, -consonantal, +coronal].
- In the **Perform a feature change** window, click on the obvious choice: [+lateral]. You'll find that this turns /ɪ/ into some combination of features for which there isn't an IPA symbol.
- Click on this symbol-less thing, and look at the lower right hand of the screen to see its features. Then click on /l/ and look at its features. If you keep doing this, it will become apparent that the additional features you have to change are [-consonantal, +anterior, -distributed]. If you change all of them, you will get an [l].
- You may find, as I did, that in the pairs of (1) above, more features are changing than you may have thought.

#### 4. Using features to express natural classes and changes

Use the English inventory in FeaturePad. Express the following rules in features. Note that FeaturePad may light up in red if you use more features than necessary. Experiment with removing them until you've solved the problem.

Hint: note that to change voiced fricatives to voiceless fricatives, you *don't have to say that the input must be voiced*. The reason is that you can simply use the features to say "fricatives become voiceless". The fricatives that are already voiceless will harmlessly undergo the rule and remain voiceless.<sup>3</sup> FeaturePad is a real stickler for this point...

1.  $l \rightarrow \emptyset / [\text{word } [t, d, \theta, \delta] \text{ \_\_\_\_\_\_}]$  (expresses a true fact about English)
2.  $[v, \delta, z, ʒ] \rightarrow [f, \theta, s, ʃ] / \text{word initially before a liquid}$  (expresses a true fact about English)
3.  $[b, g] \rightarrow \emptyset / [m, n, \eta] \text{ \_\_\_\_\_\_ } ]_{\text{word}}$  (English *bombard ~ bomb, prolongation ~ prolong*)
4.  $[i, ɪ, e, \varepsilon] \rightarrow [u, \upsilon, o, \text{ɔ}] / [w, \text{ʌ}] \text{ \_\_\_\_\_\_}$  (modeled on Yana)
5.  $[n, t, d] \rightarrow [n̥, t̥, d̥] / \text{ \_\_\_\_\_\_ } [\theta, \delta]$  (English *ten ~ tenth*)
6.  $[i, e, o, u] \rightarrow [ɪ, \varepsilon, \text{ɔ}, \upsilon] / \text{ \_\_\_\_\_\_ } \text{CC}$  (modeled on Hausa and many other languages)
7.  $[b, d, \widehat{d}_3, g, v, \delta, z, ʒ] \rightarrow [p, t, \widehat{t}_3, k, f, \theta, s, ʃ] / \text{ \_\_\_\_\_\_ } [p, t, \widehat{t}_3, k, f, \theta, s, ʃ, \text{ʌ}, h]$  ("Regressive Voicing Assimilation; Russian, Polish, French, etc.)
8. [l] becomes a copy of the following consonant, where following consonant is [t, d,  $\widehat{t}_3$ ,  $\widehat{d}_3$ ,  $\theta$ ,  $\delta$ , s, z, ʃ, z, n, l, r] (modeled on Arabic)<sup>4</sup>
9.  $[t, d] \rightarrow [\widehat{t}_3, \widehat{d}_3] / \text{ \_\_\_\_\_\_ } [i, j]$  (Alveolar Palatalization, Eng. *gotcha*)
10.  $[k, g] \rightarrow [\widehat{t}_3, \widehat{d}_3] / \text{ \_\_\_\_\_\_ } [i, ɪ]$  (Velar Palatalization: Hausa, Slavic)

<sup>3</sup> I believe I mentioned in class the metaphor for this that was invented by the ancient Sanskrit grammarians: rules apply like water, wetting that which is already wet; and not like fire, which burns only that which is not burnt. Keep your rules simple by applying them like water.

<sup>4</sup> Don't worry about how to express the change here; you can use words just like your model rule. We'll cover this soon.