

HW 4: More Foul Logic

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Due May 16 by 11:59pm **Points** 100 **Submitting** a file upload

PART 1: The Art of More Foul Logical Analysis

In class we discussed a specific case of allomorphy in English: the plural. We saw that although we consider -s to be a single morpheme, it is pronounced in different ways depending on the last phoneme of the stem it attaches to. For example, we saw that the pluralization of "cat" (in ARPAbet) is:

K AE T \implies K AE T S

But that the pluralization for "dog" is:

D AA G \implies D AA G Z

And furthermore that the pluralization for "horse" is:

HH AO R S \implies HH AO R S AH Z

In each of these cases, the form of the allomorph depends on some feature or features of the final phoneme of the stem. (For now, don't worry about irregulars, i.e. sheep \Rightarrow sheep.)

It turns out that there is a similar rule for the regular past tense in English. Just as in the example above, the form of the allomorph depends on a feature (or features) of the preceding phoneme. Below is a small dataset with words that contain all of the different allomorphs of the English past tense (note that there are no irregular verbs -- what we are interested in here is the regular morphological process):

banned

waded

bowed

napped

tricked

freed

lifted

puffed

pounded

maxed

behaved

misted

Draw a table like the one we saw in class that shows which of the above words have each allomorph of the past tense. Once you have made the table, write the rule that governs variation between the past tense allomorphs in English. Your rule can be written in plain English.

PART 2: Impossible Allomorphs

Now consider the following pair of words: "incomprehensible", "impossible". Both have a derivational prefix (in- in the first, im- in the second) which adds a meaning of negation to the stem. (For the sake of simplicity, ignore other negative prefixes like un- in "unavoidable".) In- and im- are allomorphs of the same morpheme. Your task is to demonstrate that this is the case by thinking of four other words that use each of the morphemes (i.e., four words that start with in- and four that start with im-, where the prefix always has the same meaning regardless of the form). Once you have compiled this dataset, make a table like the one for Part 1 and determine the rule which describes which allomorph will be selected when attached to any new stem.

For this part, turn in the list of words you've thought of, the table that organizes them, and the rule you've developed. The rule can be written in plain English.

PART 3: More-foul-logical sounds

Now consider the allomorphs of the plural morpheme in English discussed in class: [z] (as in dogs), [s] (as in cats), [əz] (as in foxes). Let's represent them with the arpabet symbols Z, S and AH Z.

Create an FST that takes as input the pronunciation of a noun (represented using arpabet symbols as in the CMU pronunciation dictionary), a "^" to indicate concatenation, a representation of the inflectional plural morpheme, and a "#" to indicate the end of the word. The output should be the pronunciation of the plural form of the noun, followed by the symbol #.

For example, given the input:

```
d aa g ^ s #
```

(which corresponds to the word dog, the arbitrary symbol ^, the plural morpheme s, and the end of word symbol #) will produce as output

```
d aa g z #
```

(which is the pronunciation of the plural form *dogs*).

Other examples:

Input 1

```
k ae t ^ s #
```

Output 1

```
k ae t s #
```

Input 2

```
d ih sh ^ s #
```

Output 2

```
d ih sh ah z #
```

Turn in a drawing of your FST and a prolog file named allomorph.pl that contains your FST as prolog statements.

AVAILABLE RESOURCES

Be sure to check out the subset.pl file in the code folder under the Files menu. This have the template for subsetting that I demoed in class.

WHAT TO SUBMIT:

- One pdf named allomorph.pdf that contains your answers to parts 1, 2, and 3 (see above).
- One prolog file named allomorph.pl for part 3 (see above).