Words

Morphology

Linguistics

What’s morphology?

Morphology is the study of the form of words.

Words may seem like atomic units of meaning; however, they can often be broken down into smaller atomic units of meaning called morphemes.

What’s a morpheme?

A morpheme is the smallest linguistic unit which has both sound and meaning.

There are two types of morpheme:

Roots/Stems (e.g., <swim>)

Affixes (e.g., <-ing> <pre->)

Roots

A root morpheme can stand by itself.

It does not have to be attached to other morphemes although other morphemes can attach to it.

Affixes

Affixes need to be attached to a root morpheme.

There two ways to classify affixes:

- By position
- By use

Affixes by Position

Prefix -- before the root (e.g., <pre->)

Suffix -- after the root (e.g., <-ed>)

Suprafix -- over the root (cf. produce (n) & (v))

Infix -- inside the root (e.g., abso-*freaking*-lutely)

Affixes by Use

Inflectional

- Does not change word class
- Serves grammatical functions

Derivational

- Changes either word meaning or word class

Inflectional Morphemes I

Attached to nouns:

<-s> as in *John***’s** *book* (Genitive Case)

<-s> as in *Cat***s** *are cute* (Plural)

Inflectional Morphemes II

Attached to adjectives:

<-er> as in *warm**er*** (Comparative)

<-est> as in *warm**est*** (Superlative)

Inflectional Morphemes III

Attached to verbs:

- <-s> as in *John swim**s*** (3SG-Present)
- <-ing> as in *John is think**ing*** (Gerund)
- <-ed> as in *John walk**ed*** (Past)
- <-en> as in John had chos**en** (Past Perfect)

Excursus: Allomorphs

Plural morpheme <-s> is one morpheme with three phonetic realizations.

boot-s -> /but -s/

bee-s -> /bi-z/

bush-es -> /bu∫ -əz/

Derivational Morpheme

Snoozeville

Builder

Predetermination

Relive

Inevitable

Field Exercise

PROLOG BREAK

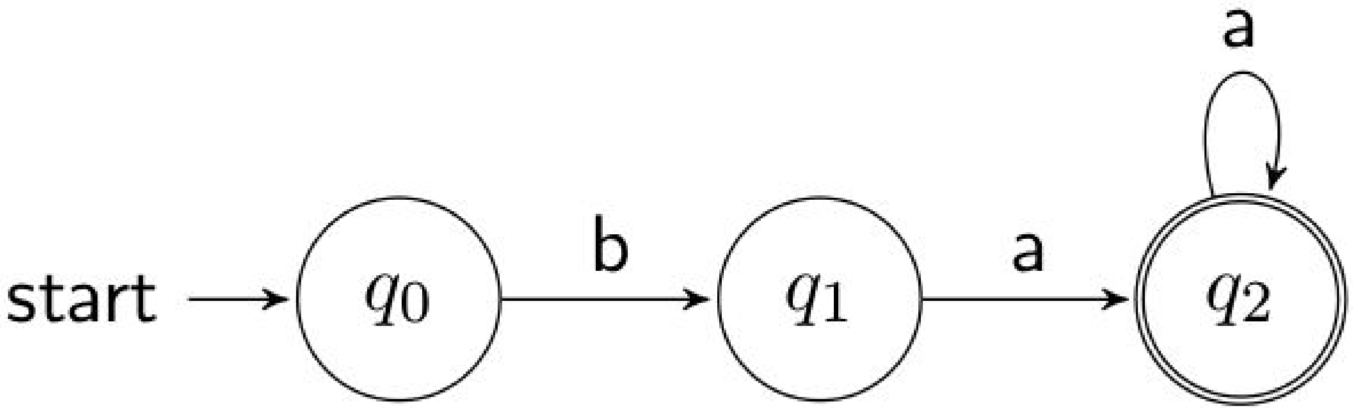
Finite State Automata

Computer Science

Five Components of FSA

1. A finite set of states (e.g., {*q0, q2, q3*})
2. A finite input set of symbols (e.g., {*a, b*})
3. A start state *q0*
4. A set of final states (e.g., {*q2*})
5. A set of transitions (e.g., {δ(q0,b,q1),δ(q1,a, q2),δ(q2,a,q2)})

FSA: Graphically



This FSA accepts the following strings:
ba, *baa*, *baaa*, *baaaa*, *baaaaaa*, *baaaaaaa*, etc..

FSA: Graphically: Example

- Try doing an example to see which strings get accepted by the FSA
- Try building your own FSA that accepts the strings that meet the requirements
- If you have time, try building the larger language-based FSA

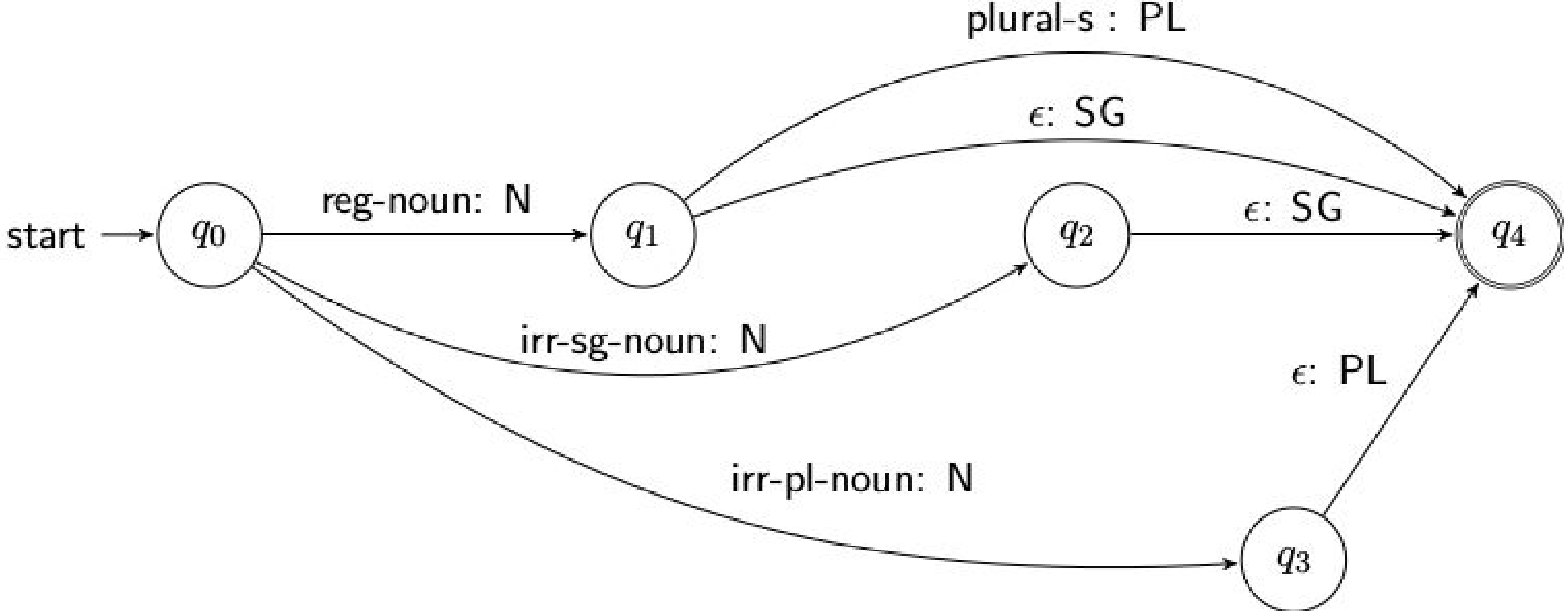
FSA (in Prolog)

```
q0([b|L]) :- q1(L).
q1([a|L]) :- q2(L).
q2([a|L]) :- q2(L).
q2([]).
---
> q0([baaaa]).
true
```

Finite State Transducer

An FSA with labeled output

FST Graphically



FST (in Prolog)

```
q0([X|L1],[n|L2]):- reg_noun(X), q1(L1,L2).
q1([X|L1], [pl|L2]):- plural_s(X), q4(L1,L2).
q1(L1, [sg|L2]):- q4(L1,L2).
q0([X|L1],[n|L2]):- irr_sg_noun(X), q2(L1,L2).
q2(L1,[sg|L2]):- q4(L1,L2).
q0([X|L1],[n|L2]):- irr_pl_noun(X), q3(L1,L2).
q3(L1,[pl|L2]):- q4(L1,L2).
q4([],[]).
```