Morphology

Morphology

- The Analyze Syntax method returns details about the linguistic structure of the given text.
- The Natural language API Provides information about its internal structure (morphology) and its role in the sentences.
- Morphology is the internal Structure of words.
- Morphology Focuses on how the components within a word(stems, root word, prefixes, suffixes etc.)
- In English, For example often adds “s” or “es” to the end of count nouns to indicate plurality and the word “d” or “ed” to a verb indicate past tense.

Morphology

- English, for example, often adds "-s" or "-es" to the end of count nouns to indicate plurality, and a "-d" or "-ed" to a verb to indicate past tense. The suffix “-ly” is added to adjectives to create adverbs (for example, “happy” [adjective] and “happily” [adverb]).
- The Natural Language API uses morphological analysis to infer grammatical information about words.

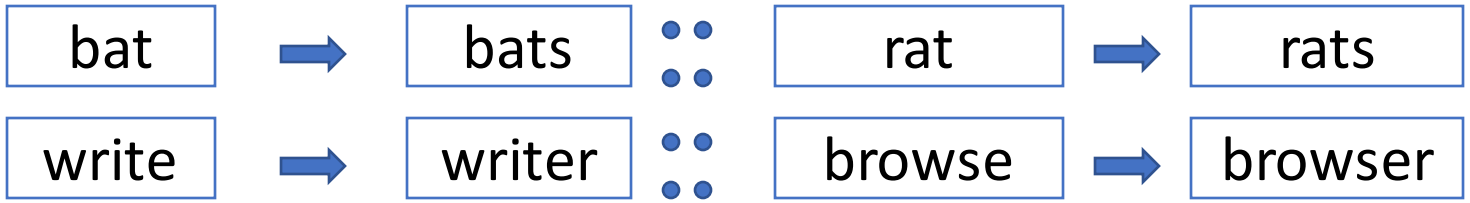
Morphology

- In Morphology we Studies how words are constructed from sub-word units.
- Morphological parsing is the process of finding the constituent morphemes in a word
- » foxes -> fox + es » foxes -> fox-N + es-PL
- » killer -> kill + er » killer -> kill-V + er-N

Morphology

- Study of Words
  - Their **internal structure**

  - How they are **formed**?



- Morphology tries to formulate rules

Needs for Morphological Analysis

- Information retrieval: search
- Systems benefit from being able to search for singular and plural forms of search terms –Generally fairly easy in English
- **Complications**

Irregular plurals handled via morphological rules

- goose -> geese
- Fish -> Fish
- Ox -> oxen

Needs for Morphological Analysis

Spelling rules needed

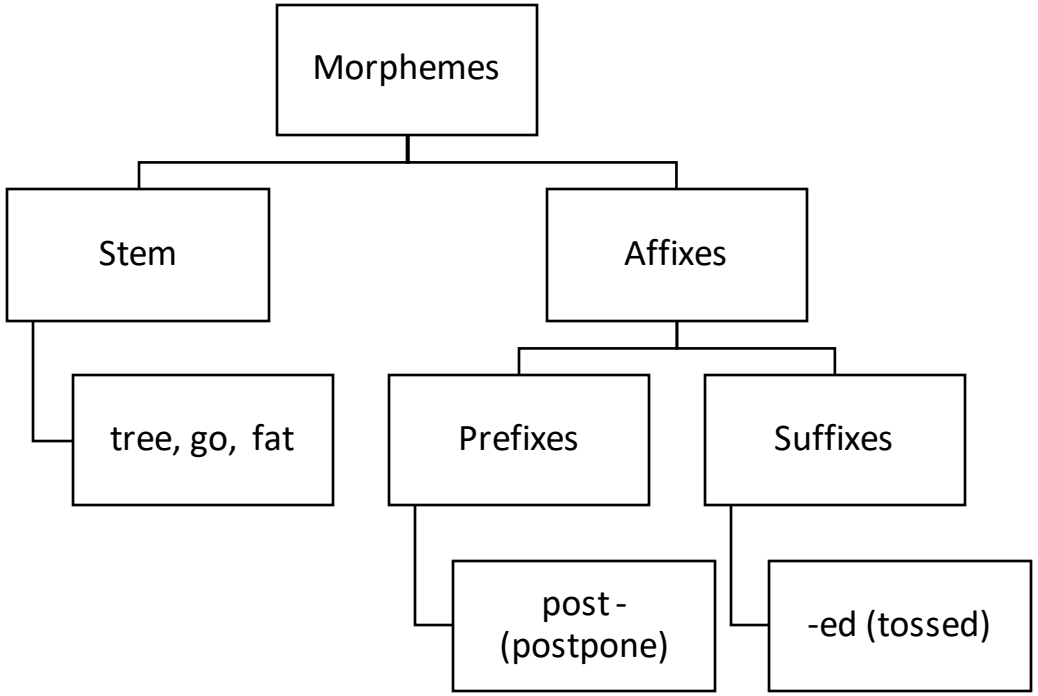
- Fox + pl -> Foxes
- Fly + Pl -> Flies

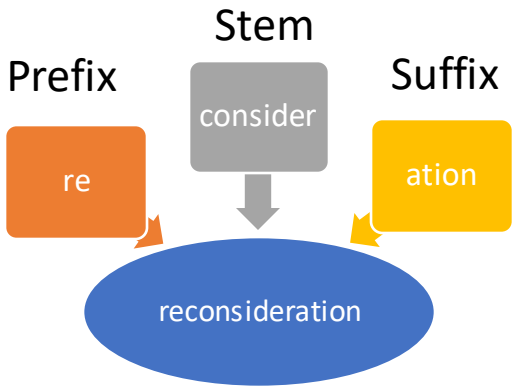
Morphology : word Form, Morphemes

- **Word Form** : A concrete word as it occurs in real speech or text. For our purposes, word is a string of characters separated by spaces in writing.
- **Morphemes** are the smallest meaningful constituents of words; Words are composed of morphemes (one or more).
- For Example sing-er-s, home-work, un-kind-ly, flipp-ed, de-nation-al-iz-ation

Morphemes

- Smallest meaning bearing units constituting a word





Classes of Morphology

- Inflection
- Derivation

Inflection

- Indicates some grammatical function like

Case	लड़का (D)	लड़के (O)
Number	लड़का (Sg)	लड़के (Pl)
Person	जाऊँगा (1st)	जाओगे (2nd)
Gender	जाऊँगा(Masc)	जाऊँगी (Fem)
Tense	गया(Pas)	जाऊँगी (Fem)

- Results in a word of the same class
- Productivity

Verbal Inflection

Morphological Form Classes	Regularly Inflected Verbs				Irregularly Inflected Verbs		
Stem	Jump	Parse	Fry	Sob	Eat	Bring	Cut
-s form	Jumps	Parses	Fries	Sobs	Eats	Brings	Cuts
-ing participle	Jumping	Parsing	Frying	Sobbing	Eating	Bringing	Cutting
Past form	Jumped	Parsed	Fried	Sobbed	Ate	Brought	Cut
–ed participle	Jumped	Parsed	Fried	Sobbed	Eaten	Brought	Cut

Forms governed by spelling rules
Idiosyncratic forms

Derivation

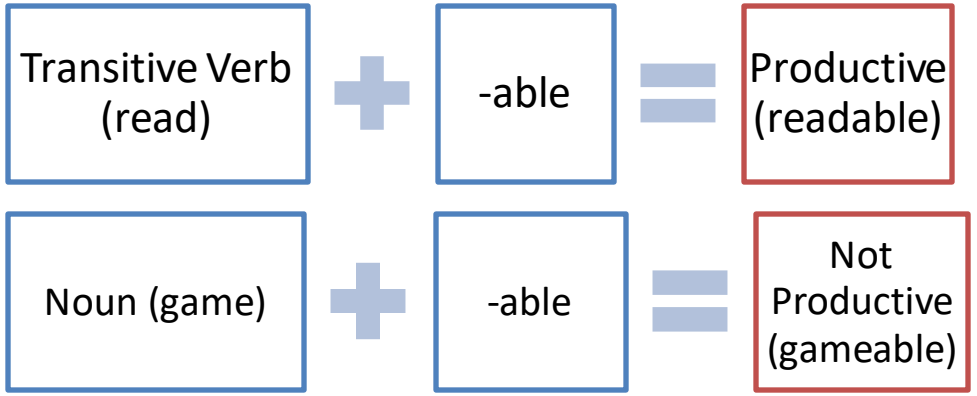
- Usually, results in a word of a different class
  - -able when attached to a verb gives an adjective
  - read (V) + -able = readable (Adj)
- Often meaning of the derived word is difficult to predict exactly
  - writer :: writer (one who writes)
  - paint :: painter (one who paints)
  - cut :: cutter? (an instrument used to cut)
- Less productive
  - eatable :: readable :: runnable?

Problems in Morphological Analysis

- Productivity
- False Analysis
- Bound Base Morphemes

Productivity

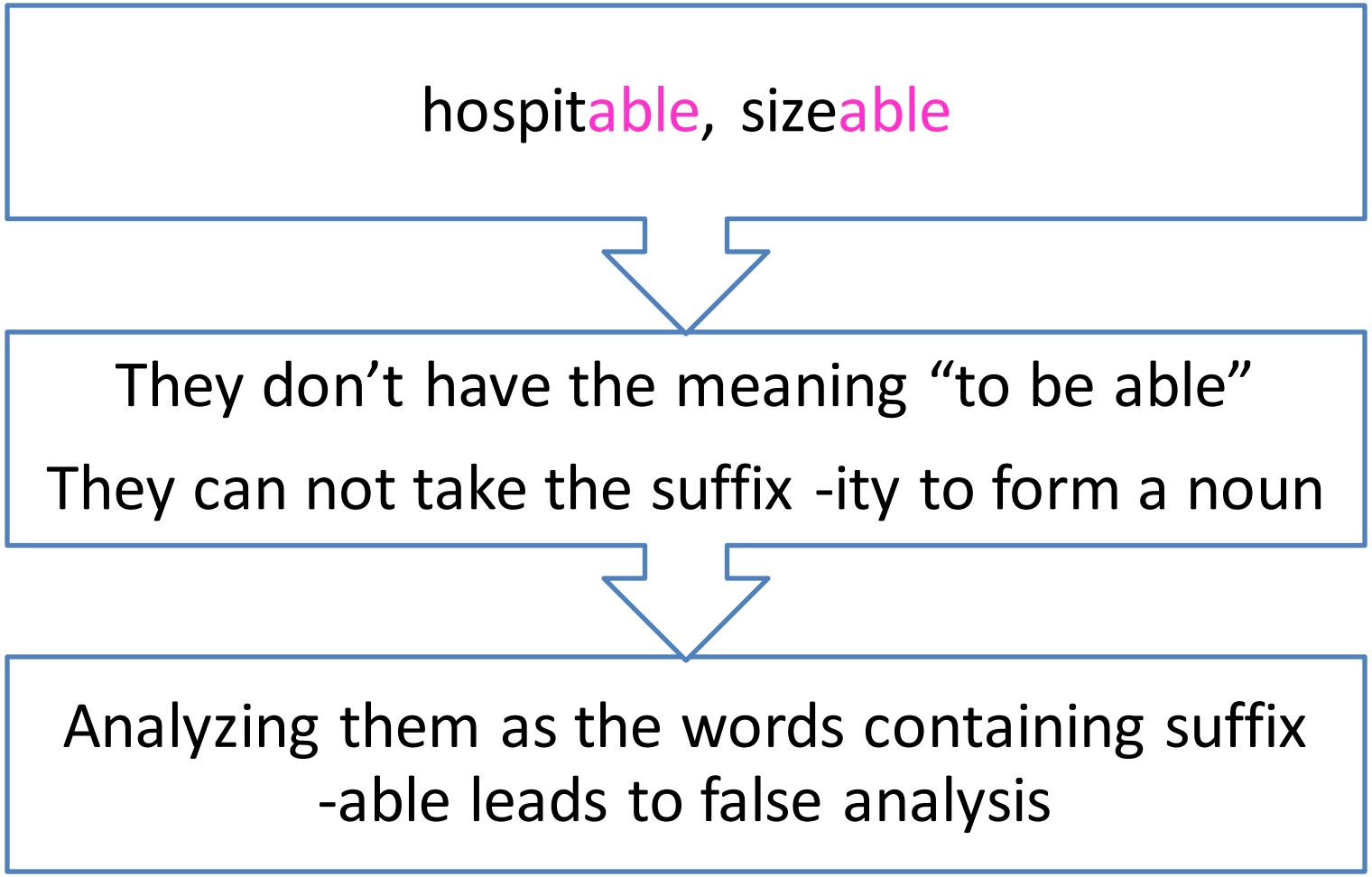
- Property of a morphological process to give rise to new formations on a systematic basis



- Exceptions

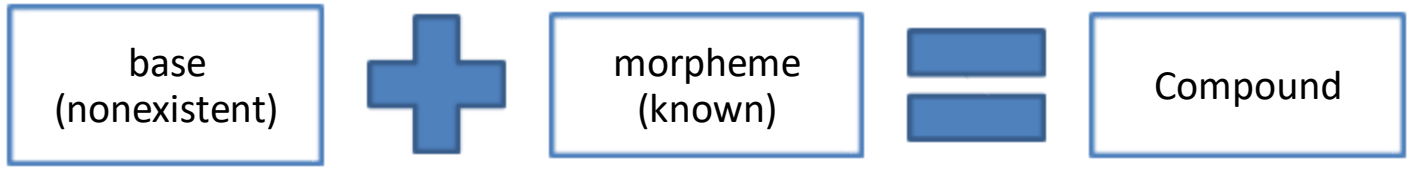
Peaceable	Actionable	Companionable
Saleable	Marriageable	Reasonable
Impressionable	Fashionable	knowledgeable

False analysis



Bound Base Morphemes

- Occur only in a particular complex word
- Do not have independent existence



malleable

feasible
(fease+ible)

- -able has the regular meaning "be able"
- -ity form is possible
- Base words don't exit independently

Morphological Parsing

- Finding
  - Constituent morphemes
  - Features

Input	**Morphological Parsed Output**
cats	cat +N +PL
geese	goose +N +PL
goose	(goose +N +SG) or (goose +V)
gooses	goose +V +3G
caught	(catch +V +PAST-PART) or (catch +V +PAST)

Resources

Lexicon	List of stems and suffixes along with basic information about them
Morphotactics	A model of morpheme ordering that explains which classes of morphemes can follow other classes of morphemes
Orthographic Rules	Spelling rules used to model the changes that occur in the work usually when two morphemes combine

Morphological Recognition

Lexicon

reg-noun	irregular-sg-noun	irregular-pl-noun	plural
flower	goose	geese	-s
cat	sheep	sheep	
dog	mouse	mice	

Morphological Recognition: Nouns

Lexicon

reg-noun	irregular-sg-noun	irregular-pl-noun	plural
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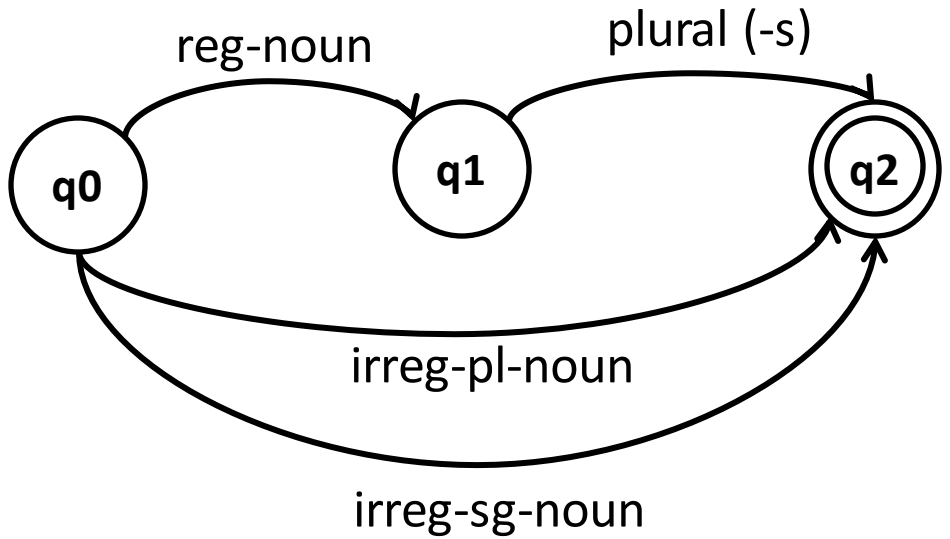
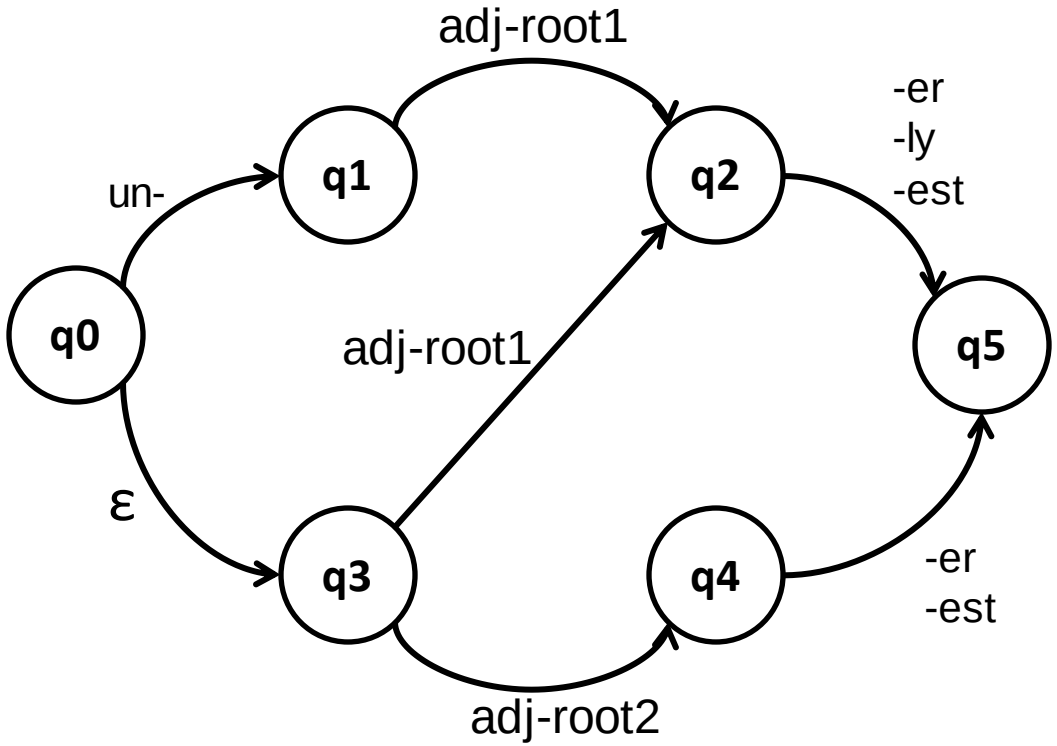
FSA



Note: Here, we are ignoring the nouns which take the suffix –es for pluralization

Adjectives

Type	Properties	Examples
adj-root1	Occur with un- and -ly	happy, real
Adj-root2	Can't occur with un- and -ly	big, red



Thankyou