Lab 2 – Linguistics I – Solutions

1. Learning Objectives
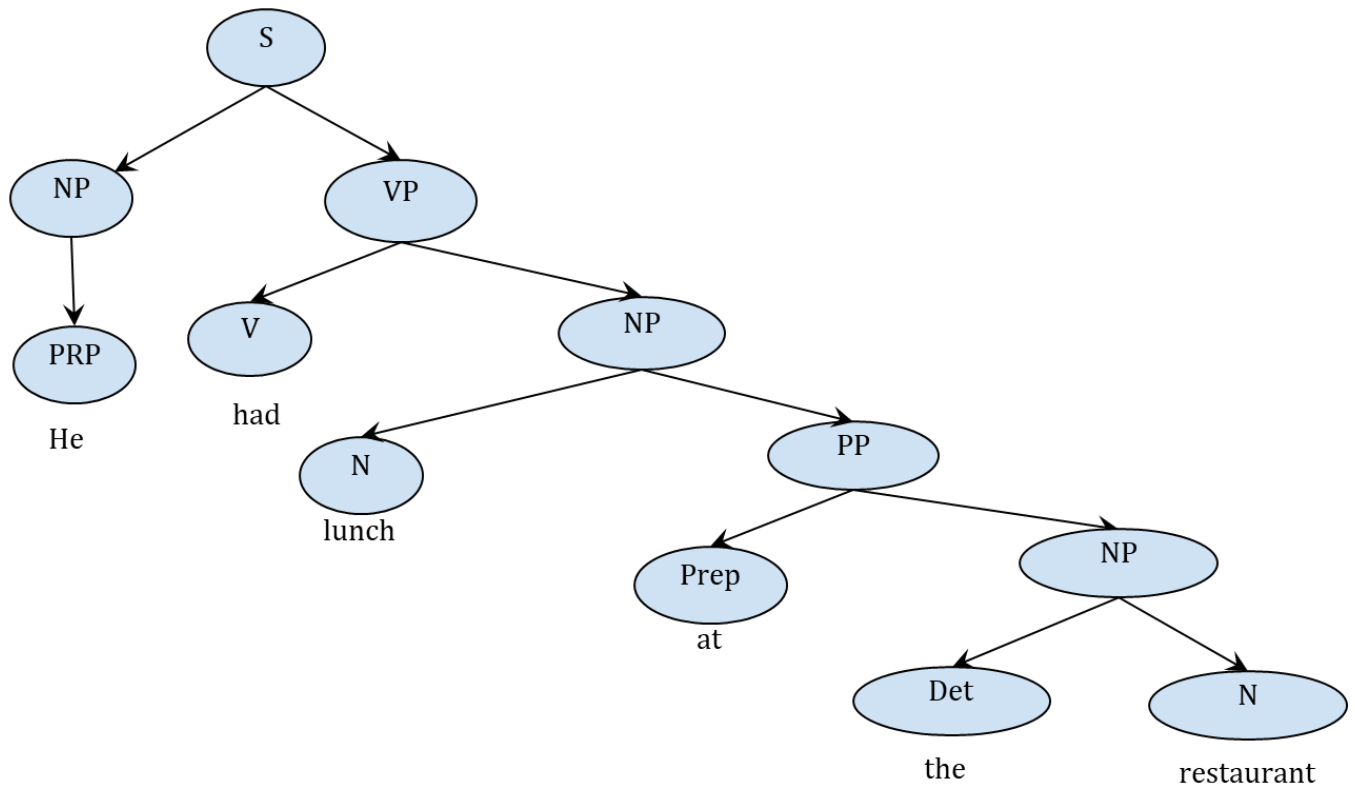
In this lab we are going to:

– Know more about linguistic structure, analysis and data

2. Formal Grammar

Define a formal grammar (grammar rules + lexicon) that can be used to analyse/generate the following sentence:

He had lunch at the restaurant.

Refer to slides 22 & 23

Grammar Rules

S -> NP, VP
NP -> PRP
VP-> V, NP
NP-> N, PP
PP-> P, NP
NP-> DT, N

Lexicon

Noun -> lunch, restaurant
Verb -> had ["to have ", 3rd, pres]
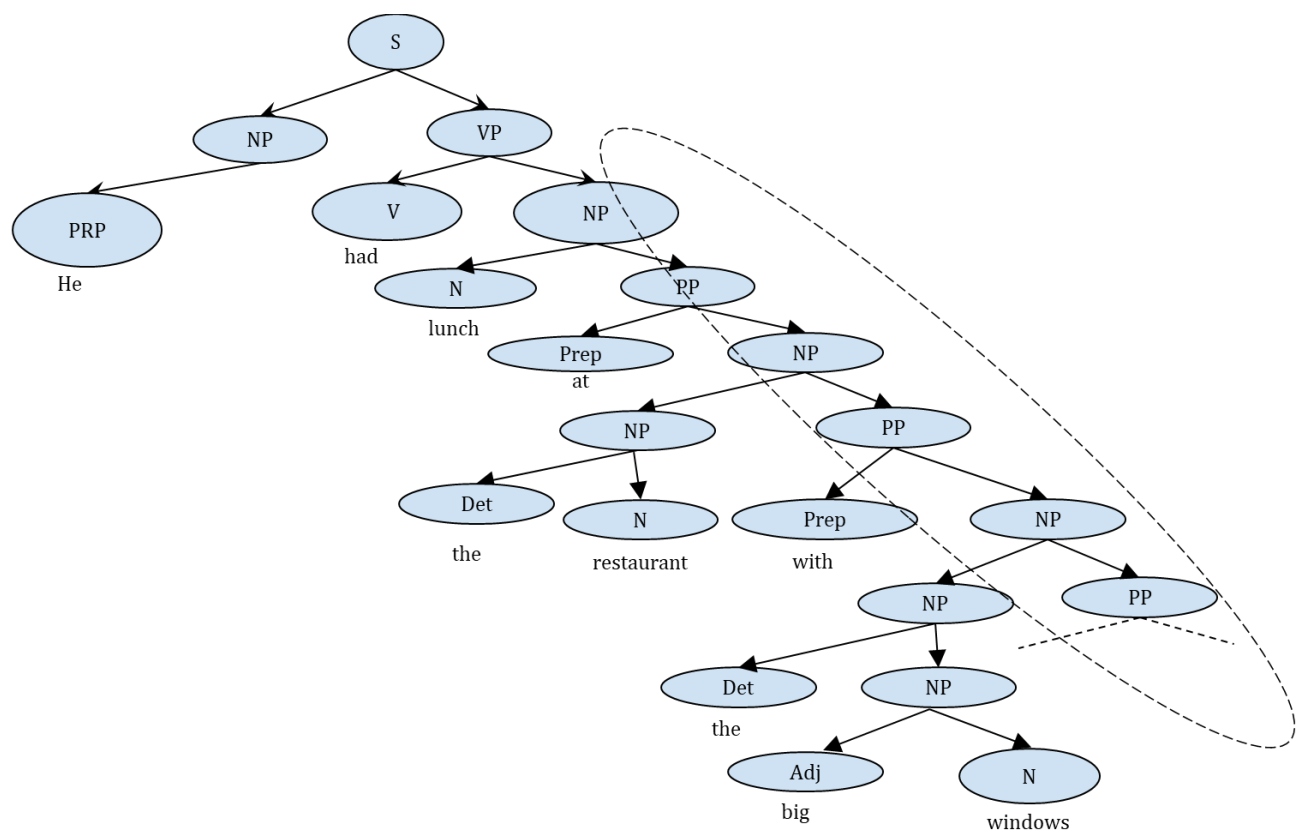Preposition -> at
Determiner -> the
Pronoun -> he

3. Formal Grammar (recursion)

Extend the grammar so that it can be used to analyse/generate the following sentence:

He had lunch at the restaurant with the big windows on the corner of the street.

Refer to slides 24 & 25

Additional Rules:

NP-> NP,PP
NP -> Det, NP
NP -> Adj, N

Recursive grammar rules:

PP-> P, NP
NP-> NP,PP

4. Part of Speech Tagging

Use the PoS tag set from the slides to annotate each word in the following sentence with the correct part of speech:

He had an expensive, but very good lunch at the Thai restaurant with the big windows that is opposite the church.

Refer to slides 16, 17 & 18

He(PRP) had(VBD) an(DT) expensive(JJ), but(CC) very(RB) good(JJ) lunch(NN) at(IN) the(DT) Thai(**JJ/NNP**) restaurant(NN) with(IN) the(DET) big(JJ) windows(NNS) that(Wh-Det) is(VBP) opposite(IN/RB) the(DET) church(NN).

6. Morphology

Refer to slide 14

6.1.   Can you find the stem the following words: amusing, amusement, and amused?

the stem would be **amus**.

6.2.   Can you get the lemma for the following words: amusement, amusing, and amused?

the lemma for each and all would be **amuse.**

Some languages have a complex morphology such as the Arabic language. Consider the word

وسيكتبونها

/wasayaktubuwnahA/

6.3.   Can you guess the PoS tag for this word?

و+س+يكتبون+ها
wa+sa+yashtari+h
and+will+(they)write+it
CC+RP+VBP+PRP

6.5.   Name some applications that might use these morphological processes?

Information Retrieval (query expansion in search engines), Feature Extraction, Information Extraction, Language modelling.
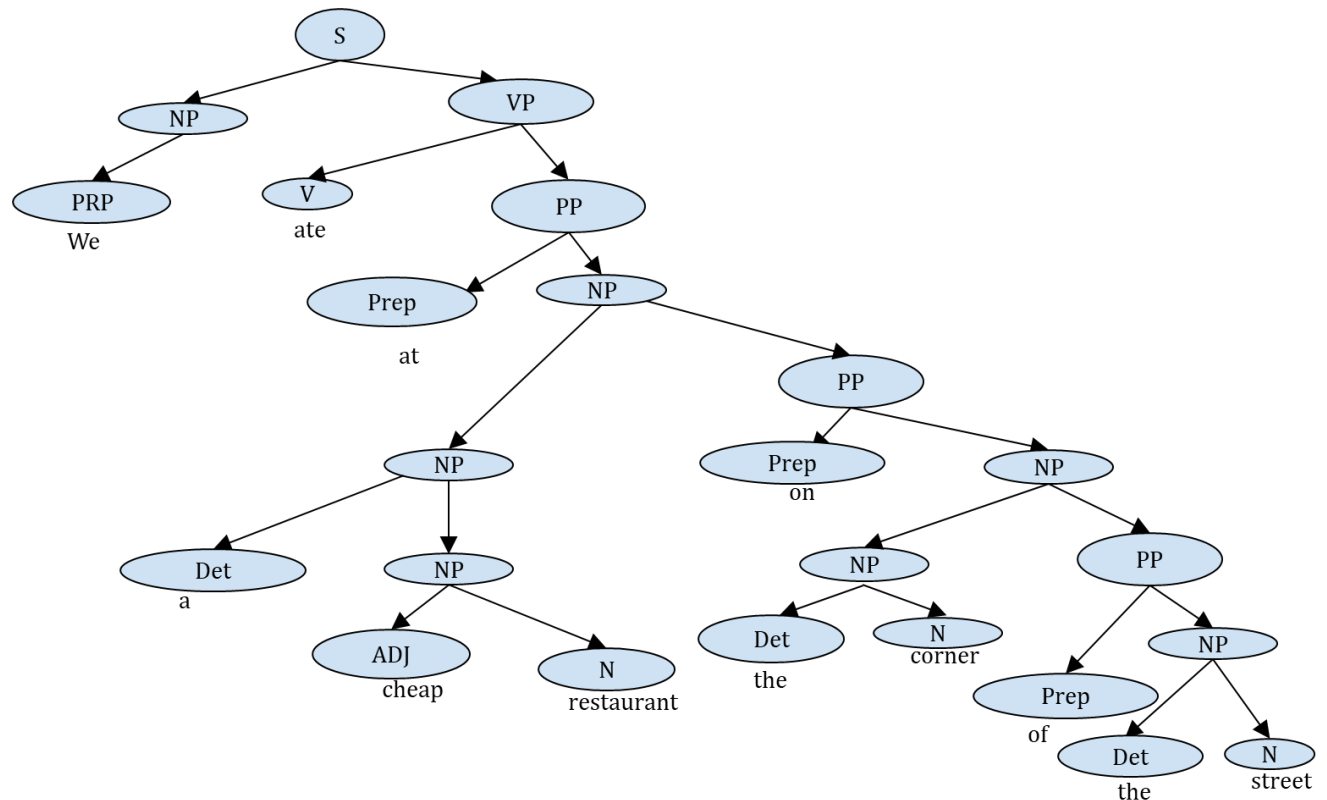
7. Phrase/Constituency Structure vs. Dependency Structure

Provide a phrase/constituency structure (tree) and dependency structure (tree) for the following sentence.

We ate at a cheap restaurant on the corner of the street.

Refer to slides 27 & 28

Phrase structure:

S
NP
VP
PRP
We
V
ate
PP
Prep
at
NP
NP
PP
Prep
on
NP
Det
a
NP
NP
PP
ADJ
cheap
N
restaurant
Det
the
N
corner
Prep
of
NP
Det
the
N
street

Dependency Structure: