

The Noun Phrase

Presentation by:
B. Senthil Kumar
Department of CSE

Overview

- The Noun phrase [*NP*]
- Coordination
- Agreement

Noun Phrase

- View the NP as revolving around a **head**, the central noun in the NP.
 - The syntax of English allows for both pre-nominal (pre-head) modifiers and post-nominal (post-head) modifiers.

Before the Head Noun

- NPs can begin with a determiner,
 - *a stop, the flights, that fare, this flight, those flights, any flights*
- Determiners can be optional
 - *Show me **flights** from San Francisco to Denver on weekdays.*
- **Mass nouns** don't require determination.
 - Substances, like *water* and *snow*
 - Abstract nouns, like *music*, *homework*
 - In the ATIS domain, *breakfast*, *lunch*, *dinner*
 - *Does this flight serve **dinner**?*

Before the Head Noun

- **Predeterminers:**

- Word classes appearing in the NP before the determiner
 - ***all** the flights, **all** flights*

- **Postdeterminers:**

- Word classes appearing between the *det* and the head noun
 - **Cardinal numbers:** *two friends, one stop*
 - **Ordinal numbers:** *the **first** one, the **next** day, the **second** leg, the **last** flight, the **other** American flight*
 - **Quantifiers:** ***many** fares, **few** flights* (with plural count nouns)

Before the Head Noun

- Adjectives occur after quantifiers but before nouns.
 - a **first-class** fare, a **nonstop** flight, the **longest** layover, the **earliest** lunch flight
- Adjectives can be grouped into a phrase called an **adjective phrase** or **AP**.
 - AP can have an adverb before the adjective
 - the **least** expensive fare
- Rule for the prenominal modifiers with optional constituents:
 $NP \rightarrow (Det) (Card) (Ord) (Quant) (AP) Nominal$

After the Head Noun

- A head noun can be followed by **postmodifiers**.
 - Prepositional phrases
 - *All flights **from Cleveland***
 - Non-finite clauses
 - *Any flights **arriving after eleven a.m.***
 - Relative clauses
 - *A flight **that serves breakfast***

After the Head Noun – PP Phrases

- PP postmodifiers
 - *any stopovers* [*for* Delta seven fifty one]
 - *all flights* [*from* Cleveland] [*to* Newark]
 - *arrival* [*in* San Jose] [*before* seven a.m.]
 - *a reservation* [*on* flight six oh six] [*from* Tampa] [*to* Montreal]
 - *Nominal* → *Nominal PP (PP) (PP)*

After the Head Noun – non-finite clause

- The three most common kinds of non-finite postmodifiers are the gerundive (*-ing*), *-ed*, and infinitive form.
 - A gerundive consists of a VP with (*-ing*) form of the verb
 - any of those [*leaving* on Thursday]
 - any flights [*arriving* after eleven a.m.]
 - flights [*arriving* within thirty minutes of each other]

Nominal → *Nominal GerundVP*

GerundVP → *GerundV NP* | *GerundV PP* | *GerundV* | *GerundV NP PP*

GerundV → *being* | *preferring* | *ariving* | *leaving* | ...

After the Head Noun – non-finite clause

- Examples of two other common kinds
 - Infinitives and -ed forms:
 - the last flight ***to arrive in Boston***
 - I need to have dinner ***served***
 - Which is the aircraft ***used by this flight?***

After the Head Noun – relative clause

- A postnominal relative clause (a **restrictive relative clause**)
 - is a clause that begins with a **relative pronoun** (*that*, *who*)
 - The relative pronoun functions as the subject of the embedded verb,
 - a flight *that serves breakfast*
 - flights *that leave in the morning*
 - the United flight *that arrives in San Jose around ten p.m.*
 - the one *that leaves at ten thirty five*

Nominal → *Nominal RelClause*
RelClause → (*who* | *that*) *VP*

After the Head Noun

- Various postnominal modifiers can be combined,
 - a flight [*from* Phoenix to Detroit] [*leaving* Monday evening]
 - I need a flight [*to* Seattle] [*leaving* from Baltimore] [*making* a stop in Minneapolis]
 - evening flights [*from* Nashville to Houston] [*that* serve dinner]

Nominal → *Nominal* (*ThreePP*) (*GerundVP*) (*RelClause*)

ThreePP → *PP* (*PP*) (*PP*)

GerundVP → *GerundV NP* | *GerundV PP* | *GerundV* | *GerundV NP PP*

GerundV → *being* | *preferring* | *ariving* | *leaving* | ...

RelClause → (*who* | *that*) *VP*

Coordination

- NPs and other units can be **conjoined** with **conjunctions** like **and**, **or**, and **but**.
 - Please repeat $[_{NP} [_{NP} \text{the flights}] \text{ and } [_{NP} \text{the costs}]]$
 - I need to know $[_{NP} [_{NP} \text{the aircraft}] \text{ and } [_{NP} \text{flight number}]]$
 - I would like to fly from Denver stopping in $[_{NP} [_{NP} \text{Pittsburgh}] \text{ and } [_{NP} \text{Atlanta}]]$
 - $NP \rightarrow NP \text{ and } NP$
 - What flights do you have $[_{VP} [_{VP} \text{leaving Denver}] \text{ and } [_{VP} \text{arriving in San Francisco}]]$
 - $VP \rightarrow VP \text{ and } VP$
 - $S \rightarrow S \text{ and } S$

Agreement

- Most verbs in English can appear in two forms in the present tense:
 - 3sg, or non-3sg
 - 3sg form has a final -s where the non-3sg form does not

Do [_{NP} any flights] stop in Chicago?

Do [_{NP} all of these flights] offer first class service?

Do [_{NP} I] get dinner on this flight?

Do [_{NP} you] have a flight from Boston to Fort Worth?

Does [_{NP} this flight] stop in Dallas?

Does [_{NP} that flight] serve dinner?

Does [_{NP} Delta] fly from Atlanta to San Francisco?

What flights *leave* in the morning?

What flight *leaves* from Pittsburgh?

*[What flight] *leave* in the morning?

*Does [_{NP} you] have a flight from Boston to Fort Worth?

*Do [_{NP} this flight] stop in Dallas?

Agreement

- The rule that handled these yes-no-questions: $S \rightarrow \text{Aux NP VP}$

Two rules:

$S \rightarrow 3\text{sgAux } 3\text{sgNP VP}$

$S \rightarrow \text{Non3sgAux Non3sgNP VP}$

Lexicon:

$3\text{sgAux} \rightarrow \text{does} \mid \text{has} \mid \text{can} \mid \dots$

$\text{Non3sgAux} \rightarrow \text{do} \mid \text{have} \mid \text{can} \mid \dots$

Rules for 3sgNP and Non3sgNP:

$3\text{sgNP} \rightarrow (\text{Det}) (\text{Card}) (\text{Ord}) (\text{Quant}) (\text{AP}) \text{SgNominal}$

$\text{Non3sgNP} \rightarrow (\text{Det}) (\text{Card}) (\text{Ord}) (\text{Quant}) (\text{AP}) \text{PlNominal}$

$\text{SgNominal} \rightarrow \text{SgNoun} \mid \text{SgNoun SgNoun}$

$\text{PlNominal} \rightarrow \text{PlNoun} \mid \text{SgNoun PlNoun}$

Lexicon:

$\text{SgNoun} \rightarrow \text{flight} \mid \text{fare} \mid \text{dollar} \mid \text{reservation} \mid \dots$

$\text{PlNoun} \rightarrow \text{flights} \mid \text{fares} \mid \text{dollars} \mid \text{reservation} \mid \dots$

Agreement

- Problem for dealing with number agreement:
 - it doubles the size of the grammar.
- The rule proliferation also happen for the noun's **case**:
 - English pronouns have **nominative** (*I, she, he, they*) and **accusative** (*me, her, him, them*) versions.
- A more significant problem occurs in languages like German / French
 - Not only N-V agreement, but also **gender agreement**.
- A way to deal with these agreement problems without exploding the size of the grammar:
 - By effectively **parameterizing** each non-terminal of the grammar with **feature-structures**.

References

- Speech and Language Processing, Daniel Jurafsky and James H. Martin
[Chapter 9. Context-Free Grammars for English]



<Thank You />

