Grammar Rules for English

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Last lecture:
- context-free grammars
- syntactic trees
- ambiguity

Today’s lecture
- overview of some aspects of the phrase structure of English
Sentence-Level Construction

Among the large number of constructions for English sentences, four are particularly common:

- Declarative
  
  *I prefer a morning flight.*

- Imperative
  
  *Give me the newspaper.*

- yes-no question
  
  *Do any of these flights have stops?*

- wh-questions
  
  *What is your name?*
I want a flight from Ontario to Chicago.
The flight should be eleven a.m. tomorrow.
The return flight should leave at around seven.
I will be back tomorrow.
Imperative

Often begin with a VP and have no subject.

\[ S \rightarrow VP \]

Show the lowest fare.
Give me Sunday’s flights arriving in Las Vegas from New York City.
List all flights between five and seven.
Go home.
yes-no question

Often used to ask questions or requests.

\[ S \rightarrow \text{Aux NP VP} \]

*Do any of these flights have stops?*

*Does American’s flight eighteen twenty five serve dinner?*

*Can you give me the same information for United?*
**wh-subject-question**

Identical to the declarative structure, except that the first NP contains a *wh*-word.

\[ S \rightarrow Wh-NP \ VP \]

What airlines fly from Burbank to Denver?

Which flights depart Burbank after noon and arrive in Denver by six?

Whose flights serve breakfast?
**wh-non-subject-question**

Wh-phrase is not the subject of the sentence, and so the sentence includes another subject with the auxiliary before the subject NP

\[ S \rightarrow Wh-NP \text{ Aux } NP \text{ VP } \]

What flights do you have from Burbank to Tacoma?
Long-distance Dependencies

*Wh*-non-subject-questions contain *long-distance dependencies*:

*What flights do you have from Burbank to Tacoma?*

*Wh-NP* *what flights* is separated from the predicate that it is related to the *VP have*. Some models of parsing, a small marker called a *trace* or *empty category* is inserted after the verb to indicate long-distance dependency.
NP: the Determiner

\[ NP \rightarrow Det \ Nominal \]

NP can begin with simple determiners:

- a stop
- the flight
- this flight
- those flights
- any flights
- some flights

More complex expressions can act as determiners:

- United’s flight
- United’s pilot’s union
- Denver’s mayor’s mother’s cancelled flight

The determiner is a possessive expression: \[ Det \rightarrow NP’s \]

Determinant are not obligatory:

- I like water.
- I like apples.
NP: the Nominal

The *nominal* follows the *Det* and may contain other modifiers. In its simplest form:

Nominal $\rightarrow$ Noun

Numbers and other quantifiers:
- *two friends*
- *the second leg*
- *the last flight*
- *the next day*
- *many flights*
- *one stop*

Adjectives:
- *a first-class fare*
- *a non-stop flight*
- *the longest layover*
- *the earliest flight*

Adjectives can be grouped into *adjective phrase* (AP):
- *the least expensive fare*
NP: Nominal

The head noun can also be followed by postmodifiers:

Prepositional phrase (PP):

- all flights [from Cleveland]
- all flights [from Cleveland][to Newark]
- arrival [in San Jose][before seven]
- a reservation [on flight sixty two][from Tampa][to Montreal]

A rule to account for postnominal PPs:

Nominal → Nominal PP
NP: Nominal

Non-finite clauses:

1. **Gerundive (-ing) postmodifiers** – VP that begins with the gerundive (-ing) form of the verb:
   
   $\text{Nominal} \rightarrow \text{Nominal Gerund VP}$
   
   *any flights* [*arriving after eleven]*
   *flights* [*leaving on Thursday]*

2. **Infinitives:**
   
   *the last flight* [*to arrive in Boston]*

3. **–ed forms:**
   
   *I need to have dinner* [*served]*.
   *Which is the aircraft* [*used by this flight]*?
Relative clauses – a clause that begins with a relative pronoun (that or who). The relative pronoun functions as the subject of the embedded verb:

- a flight [that serves breakfast]
- flights [that leave in the morning]
- the man [who arrived late]

Nominal $\rightarrow$ Nominal RelClause
RelClause $\rightarrow$ (who|that) VP

Various postnominal modifiers can be combined:

A flight [from Phoenix to Detroit][leaving Monday evening]
Evening flights [from Nashville][that serve dinner]
Verb Phrase

The verb phrase consists of the verb and a number of other constituents:

- \( VP \rightarrow Verb \)  \( disappear \)
- \( VP \rightarrow Verb\ NP \)  \( prefer\ [a\ morning\ flight] \)
- \( VP \rightarrow Verb\ NP\ PP \)  \( leave\ [Boston]\ [in\ the\ morning] \)
- \( VP \rightarrow Verb\ PP \)  \( leaving\ [on\ Thursday] \)

More complex constituents are also possible:

Another VP:

\[ I\ want\ [VP\ to\ fly\ from\ Milwaukee\ to\ Orlando] \]

Sentential complement:

\[ I\ [VP\ [V\ think]\ [S\ I\ would\ like\ to\ take\ the\ early\ flight]] \]
Conjunction

Major phrase types can be combined with *conjunctions* like and, or, but:

\[
I \text{ need to know } [\text{NP } [\text{NP the aircraft}] \text{ and } [\text{NP the flight number}]]
\]

\[
\text{NP } \rightarrow \text{NP and NP}
\]

The ability to form coordinate phrases through conjunctions is used to test for constituency:

\[
I \text{ need to know the } [\text{Nom } [\text{Nom aircraft}] \text{ and } [\text{Nom flight number}]].
\]
Conjunction

VP conjunctions:

What flights do you have [VP [VP leaving Denver] and [VP arriving in San Francisco]]

S conjunctions:

[S[S I’m interested in a flight from Dallas to Chicago] and [S I’m also interested in going to Baltimore]]

\[ VP \rightarrow VP \text{ and } VP \quad S \rightarrow S \text{ and } S \]

Metarule: \[ X \rightarrow X \text{ and } X \]

Any non-terminal can be conjoined with the same non-terminal to yield a constituent of the same type.