LING001
Introduction to Linguistics

Lecture 16

Syntax II

04/01/2020

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Your goal this week

Practice your syntax skills

Specific skills to practice on practice problems:

1. Constituency tests
2. Phrase structure rules
3. Drawing trees
4. Identifying recursive structures
5. Identifying traces

Some reminders

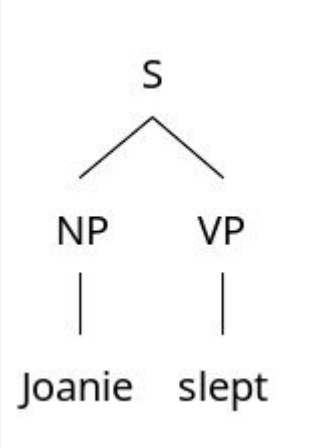
- Try the practice problems and attend recitation
- Ask to meet with us if you get to Friday and don’t feel you could do the practice on your own
- Solutions and study guide posted today
- Exam 3 posted on Friday - as always, it will be just like practice problems

Recap and what's next

- Last time, we talked about **simple phrases**
  - For example, **Noun Phrases** like *the dog*, *the big dog*
  - How to tell whether something is a **constituent**
- This time, we will look at how phrases and larger objects are derived by **rules**, and how they can be **moved**
  - How structure and meaning are mediated by syntax, particularly the 'hidden' structures we don't actually see but use
    - *John is easy to please* v *John is eager to please*
  - Some basic rules and two case studies of hidden structures that combine linguistics with psychology

Notation via the simple Sentence

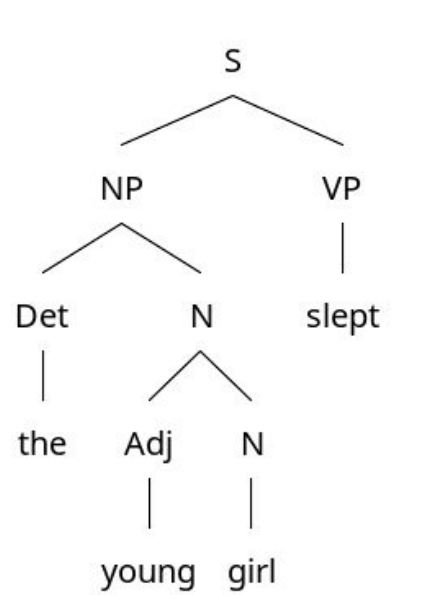
- We know that if we combine a **VP** with an **NP** to its left, we can create a sentence.
- A phrase structure rule that represents this fact about English can be written:
  - **S → NP VP**



https://yohasebe.com/rsyntaxtree/

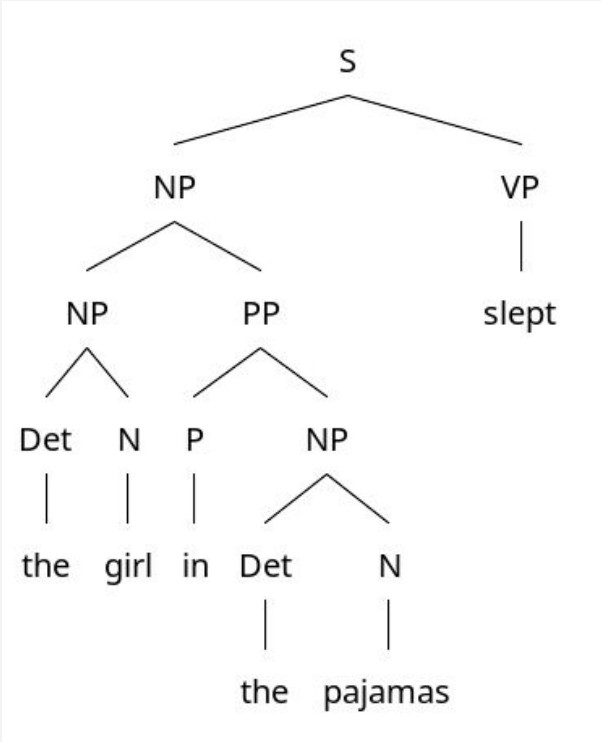
Noun Phrases

- But not all **NP**s and **VP**s are single words. We need to add other phrase structure rules to construct more complex sentences.
- Let's start by considering Noun Phrases. NPs can consist of a determiner followed by a noun (the girl slept), which we can represent:
  - **NP → Det N**
- And Nouns can be preceded by adjectives (The young girl slept), so let's capture that fact with another rule:
  - **N → Adj N**



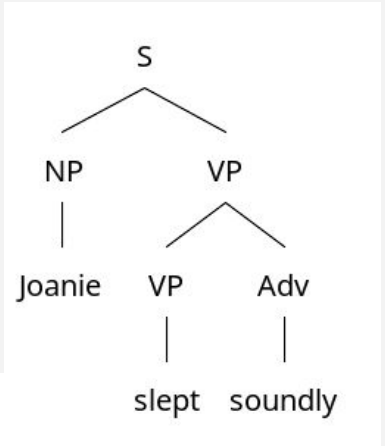
Adjuncts (are optional)

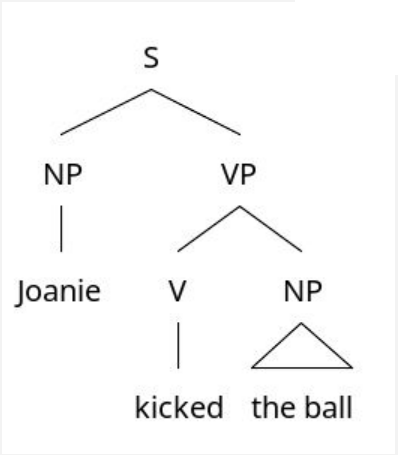
- We also need a way of adding adjoined phrases when we need to, like in:
  - [the girl [in the pajamas]]
- Here we have a **PP** that is *adjoined* to modify the meanings of the NP it is attached to.
- We can capture this fact with another NP rule:
  - **NP → NP PP**
- But we haven't articulated the structure of our PP, so we need to include one more rule:
  - **PP → P NP**



Verb Phrases

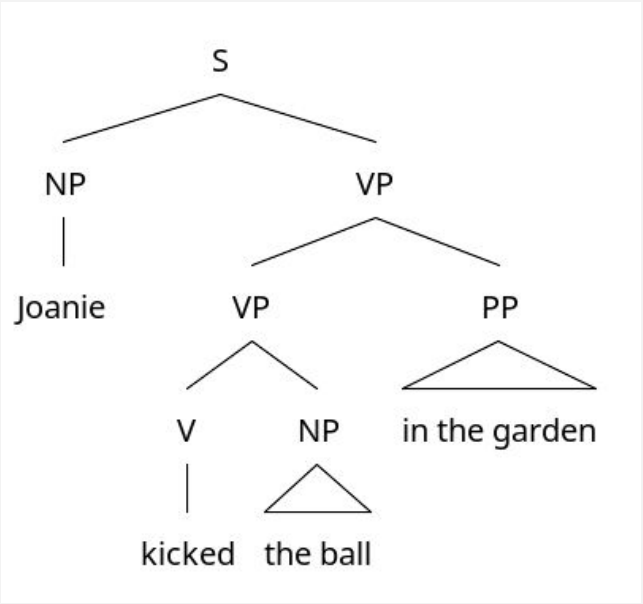
- So far we've focused on the left side of our tree; we still need rules to derive more complex VPs.
- What if the girl is sleeping soundly? We need a rule for VPs that contain adverbs:
  - **VP → VP Adv**
  - **VP → Adv VP**
- And we need to be able to express transitive verbs: those that have objects
  - **VP → V NP**





Adjuncts (are still optional)

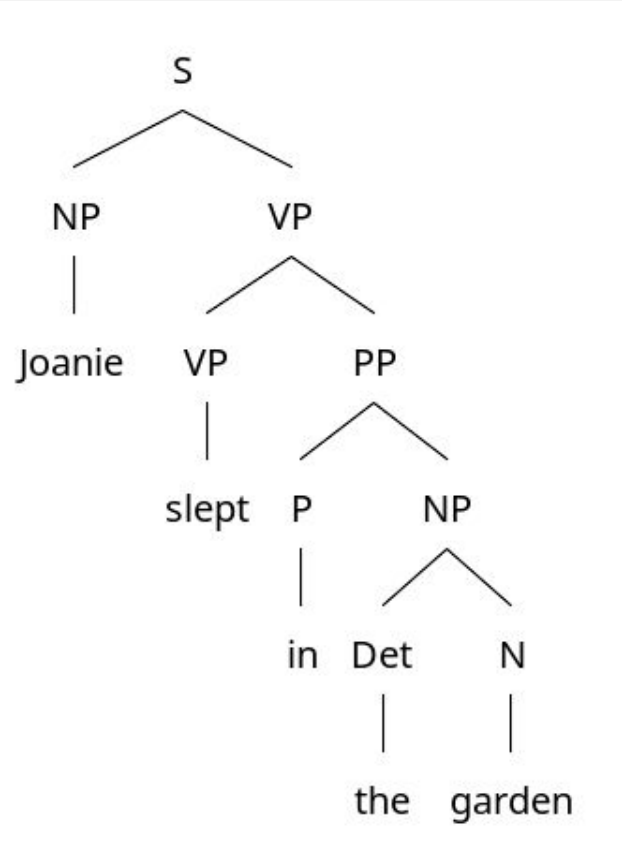
- We can also have PPs adjoined to VPs; often they specify *how* the action was performed
  - *Joanie kicked the ball in the garden*
- We can capture this fact with another VP rule, similar to our NP rule for PP adjuncts:
  - **VP → VP PP**
  - Our NP rule was: **NP → NP PP**



Joanie slept in the garden

https://yohasebe.com/rsyntaxtree/

(1) S → NP VP
(2) NP → Det N
(3) VP → VP PP
(4) PP → P NP



(Structural) Ambiguity

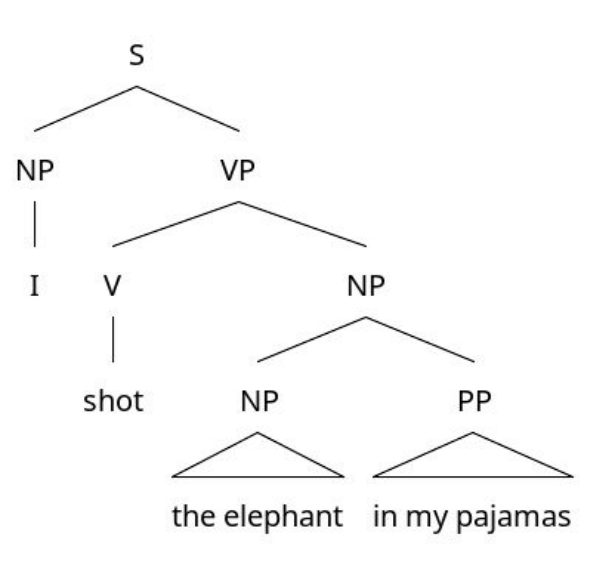
- You may have noticed that both NPs and VPs can have PPs attached to them.
  - **NP → NP PP** and **VP → VP PP**
- In some cases, this results in structure ambiguity: a single sentence has more than one possible structure (which results in more than one possible meaning)
- **Example:** *I shot an elephant in my pajamas*
  - Reading 1 - I shot an elephant while wearing my pajamas
  - Reading 2 - The elephant I shot wore my pajamas for some reason

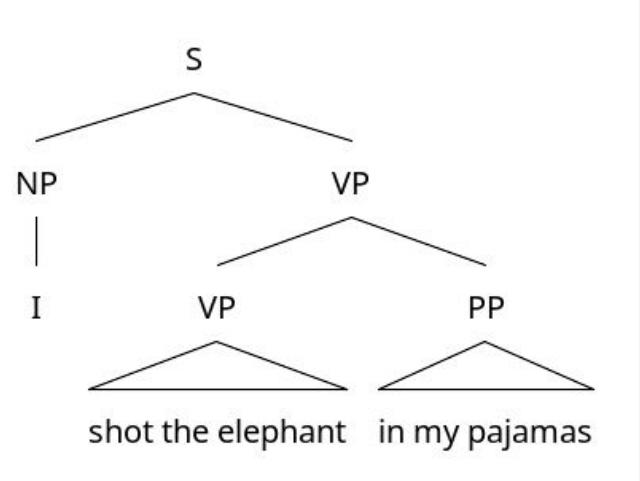
Many more examples

- Juvenile Court to Try Shooting Defendant
- Stolen Painting Found by Tree
- Kids Make Nutritious Snacks
- Red Tape Holds Up New Bridges
- Hospitals Sued by 7 Foot Doctors

Analysis

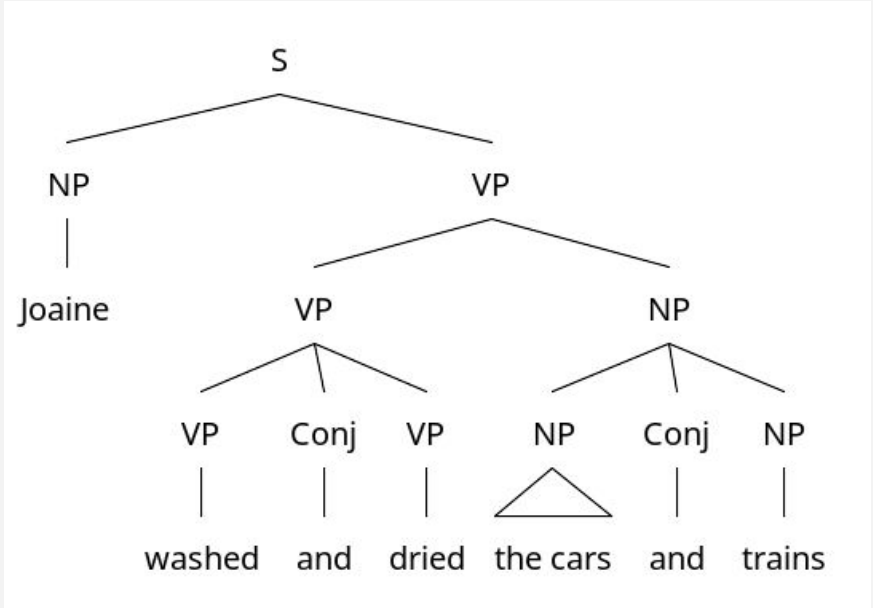
- The ambiguity depends on which thing the PP is modifying: the NP or the VP





Coordinate structures

- Sometimes we have two constituents of the same category that are joined with a conjunction (*and*, *or*)
- We'll add a special conjunction rule to account for these facts:
  - **XP → XP Conj XP**



VP → VP Conj VP **NP → NP Conj NP**

Arguments

- In some sense, many things that happen in a sentence depend on what the verb is
  - Transitive verbs like kick have two arguments
  - Intransitive verbs like sleep have one
- In order to be more precise about this, we need to distinguish grammatical (syntactic) position from semantic role

Roles and Positions

- Consider a transitive verb like kick. It has two arguments (with the following semantic roles):
  - The Agent - the kicker
  - The Patient - the thing kicked
- In active sentences in English, these correspond to the following grammatical positions:
  - The Agent is the Subject
  - The Patient is the Object

Verbs and arguments: Introducing Movement

- Verbs are looking for their arguments in particular positions. Remember our rule for transitive VPs?
  - **VP → V VP**
  - Patients appear in Object position (inside the VP)
- What about passives? Here is where the process of movement is important
  - We can start with the VP [kick [the ball]]
  - Then the object of the verb (kick) is moved to Subject position as part of the passive rule.
  - It’s still interpreted as the Patient, because that’s where it starts.

Traces

- In order to be interpreted as the Patient, the NPs has to have some relationship to the position it came from
- This is where the concept of **traces** can help
- In the passive sentence *the ball was kicked*, the NP *the ball* **leaves a trace** in Object position, allowing us to interpret it as the Patient.
    - [The ball] was kicked _____.

Other cases of movement

- The same principle applies in other areas as well: whenever an element appears in a position that is NOT where it is interpreted meaning-wise
  - **Questions** John ate the apples
What did John eat ___?
  - **Relative clauses** John was talking to the woman
The woman [who John was talking to _____].
  - **Topicalization** John likes these apples.
These apples John likes _____.

A brief look at some other languages

- English I *always* **do** my homework
  I **am** *always* late

- French Je **fais** *toujours* mes devoirs
  I **do** *always* my homework

Old(er) English

Here men **vndurstonden** *ofte* by this nyght the nyght of synne.
Here men **understood** *often* by this night the night of sin

Wepyng and teres **counforteth** *not* dissolute laghers.
Weeping and tears **comfort** *not* dissolute laughers.

...that is to seyn whil that they **lyven** *both*
that is to say while that they **live** *both*

Quene Ester **looked** *never* with swich an eye.
Queen Ester **looked** *never* with such an eye.

Shakespeare

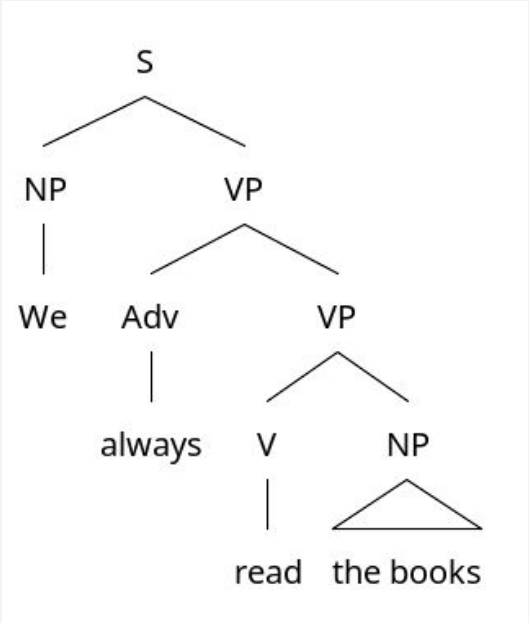
- **Saw** you my master?
  - *Speed, The Two Gentlemen of Verona, I.i*
- **Came** you from the church?
  - *Tranio, Taming of the Shrew, III.i*
- **Know** you not the cause?
  - *Tranio, Taming of the Shrew, IV.ii*
- **Heard** you this, Gonzalo?
  - *Alonso, The Tempest, II.i*

Basic Patterns to Notice

- In French and Old English, the finite verb appears before adverbs and negation.
- In Shakespeare and French, the verb also moves to the front when forming questions
- In Modern English only the auxiliary moves
  - ***Read** we always the books?
  - **Do** we always read the books?

Rules and transformations

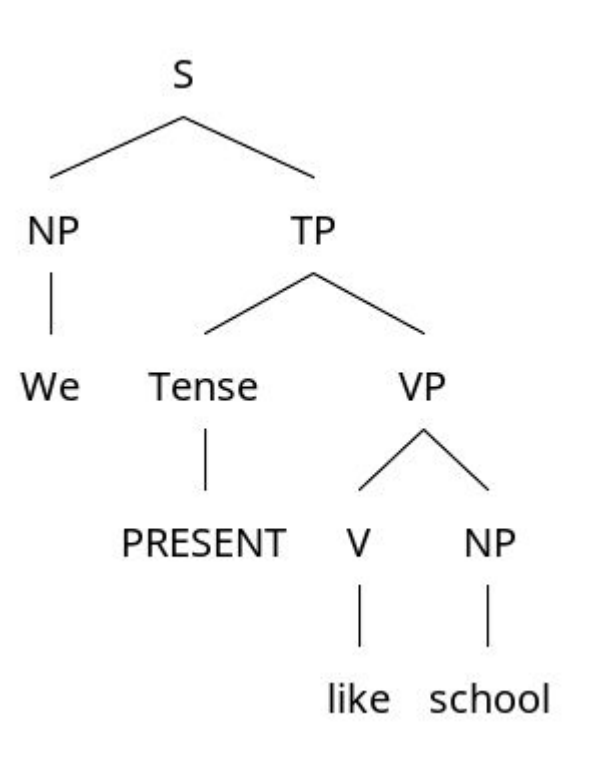
- Let's first build a tree for '*we always read the books*'. Here are your phrase structure rules:
  - **S → NP VP**
  - **VP → Adv VP**
  - **VP → V NP**

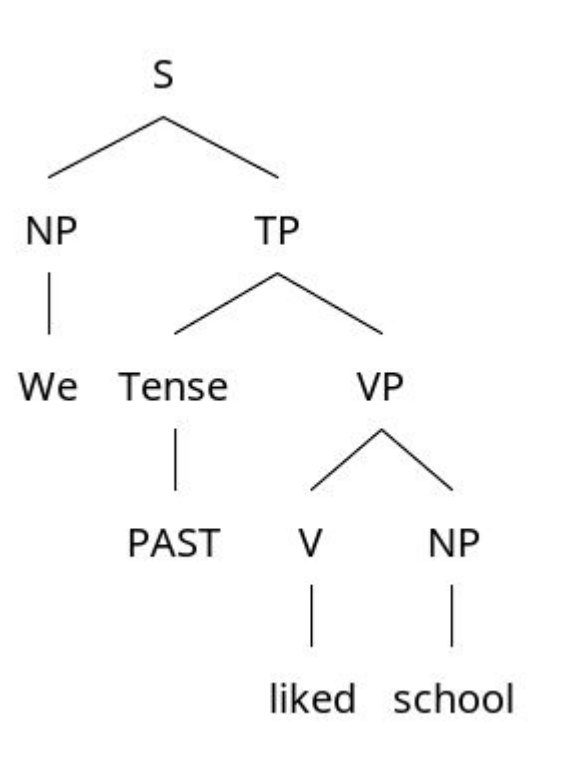


Tense Phrase

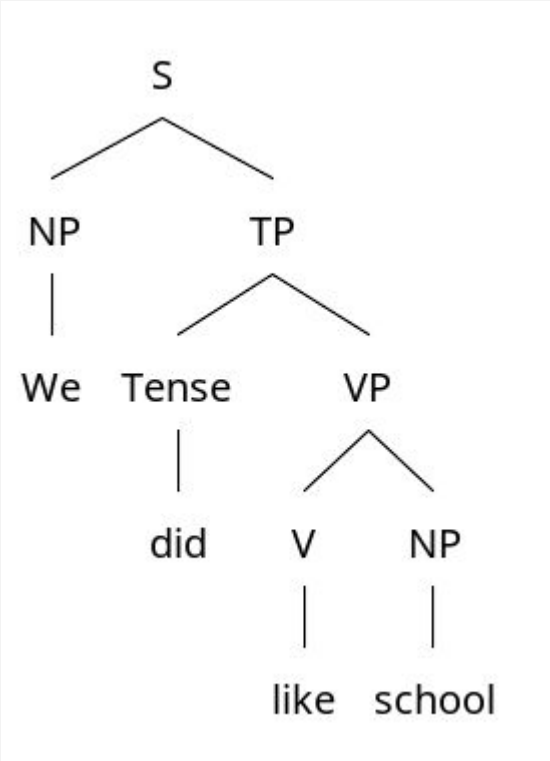
- We've said in French and Old English, the verb moves up. How can we account for this?
  - Je **fais** toujours mes devoirs
  - I **do** always my homework
- We need to move the verb before the adverb, but after the subject. Let's create a new position: TENSE
  - This is where tenses (like present/past) are represented. For example: We like exams. We **DO** like exams. We **DID** like exams.
- So let's revise our rules:
  - ~~**S → NP VP**~~ **S → NP TP**
  - **TP → Tense VP**

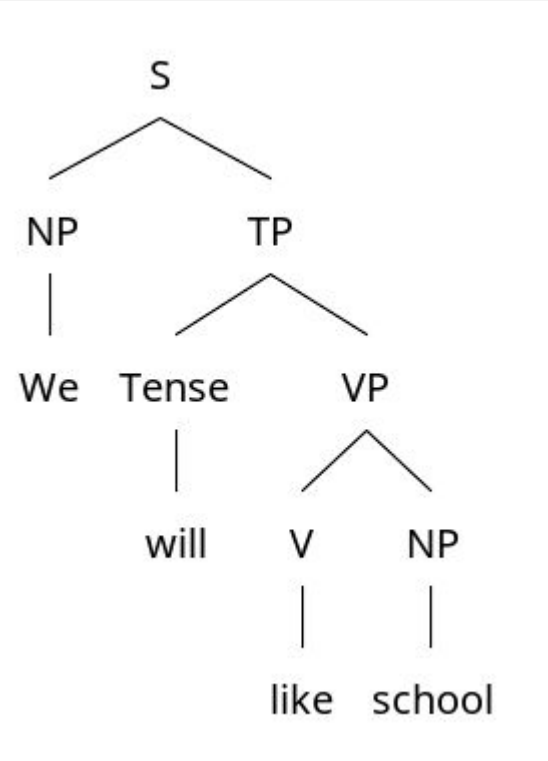
Our Tense Phrase in action





Our Tense Phrase in action





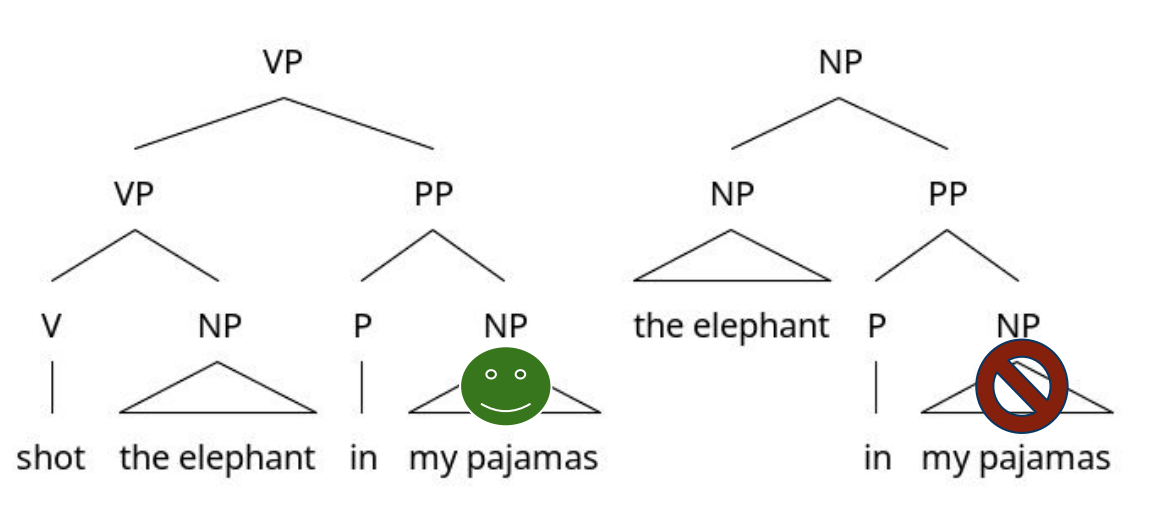
Transformations across languages

- In French and OE, main verb moves to tense position; In Modern English, it stays put. If it needs to be filled, we put an auxiliary there.
- In Shakespeare and French, the main verb moves to the beginning of a sentence to form questions. In Modern English, the main verb stays and the auxiliary verb moves to the beginning.

Constraints on Movements

- Much like syntactic rules — we don’t just combine anything with anything — movement is also restricted
  - Some of these “traffic” laws can feel really bizarre
- Recall the auxiliary movement rule (last lecture) for forming English Questions
- Also recall ‘I shot the elephant in my pajamas’. We have two readings, but what about the question:
  - What did I shoot an elephant in?

Constraints on Movement



- **What** did I shoot the elephant in _____?
- There are structures out of which movement is not possible. And this is quite general across sentences and languages.

Impossible movement, possible meanings

(1) Russell saw Zelda and whom?

***Whom** did Russell see Zelda and _____?

(2) You bought the house made out of what?

***What** did you buy the house made out of _____?

(3) I won't forget my trip to Africa.

***Africa,** I won't forget my trip to _____.

A-over-A Principle, or No Grandparent left behind

In general, we can't move a small NP out of a large one.

(1) Russell saw Zelda and whom?

***Whom** did Russell see Zelda and _____?

Whom did Russell see _____?

(2) You bought the house made out of what?

***What** did you buy the house made out of _____?

What did you buy _____?

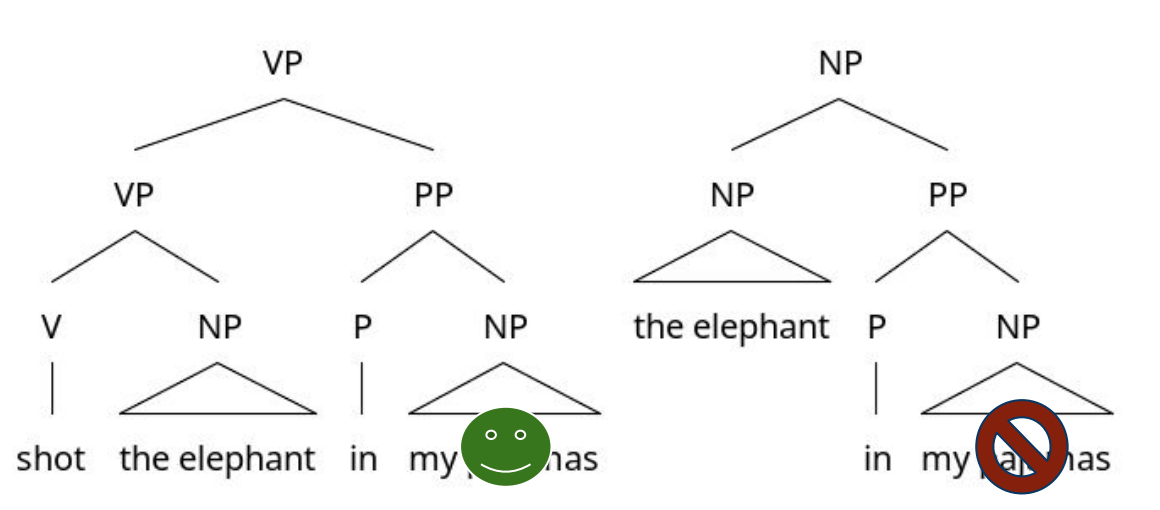
(3) I won't forget my trip to Africa.

***Africa,** I won't forget my trip to _____.

My trip to Africa, I won't forget _____.

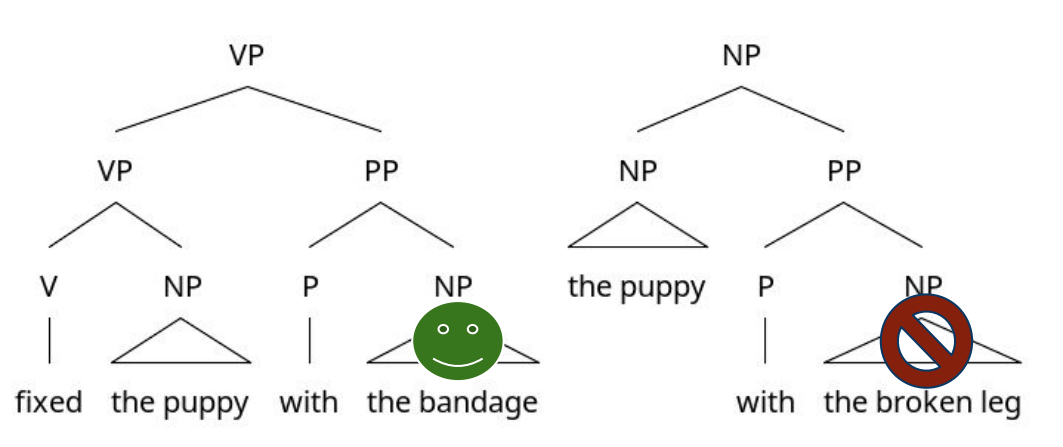
A-over-A Principle, or No Grandparent left behind

In general, a small NP cannot move out of a large NP



Even young children know this

- Children hear the story: *Three year olds saw a play. A dog broke a leg. A little girl fixed it up with a bandage."*
- And are asked: ***What*** *did she fix the puppy with ___?"*
- Reality gives two answers, but constraint on movement only makes one possible — and that's how kids answer!



Another psychological dimension

- We’ve motivated our discussion of traces by considering how verbs find their arguments.
- A substantial research program in linguistic theory asks further questions for other cases that look like movement
- Now, we’ll consider some psycholinguistic evidence for how traces are processed online by listeners.

Moved elements and their traces

- Sometimes also called ‘fillers and gaps’
- The idea is that the ‘who’ functions as a kind of placeholder:
  - The man **who** John was talking to ___ left.
- Here, ‘who’ which is associated with ‘the man’, must be understood as the object of *talking to*.
- One can investigate this hypothesis with a method known as priming.
  - Swinnery et. al 1988

Background: lexical access

- When we hear a word like cat (or see it spelled out) we activate that lexical item (word) - lexical access
- A number of factors determine how quickly lexical access will occur:
  - Length
  - Frequency
  - And more...

Priming

- We can influence lexical access via *priming*
- Priming is the facilitation of lexical access — under certain circumstances, accessing a word is faster
- **Example**: consider lexical access for word 2:

	word1	word2
Situation 1	cat	dog
Situation 2	hat	dog

- In situation 1, dog access is faster, because semantically-related cat came first. Cat primes dog.

Back to traces

- So what does priming have to do with traces? Consider the following example:

  The policeman saw the boy who the crowd accused ___ of the crime.

- In this example, the NP *the boy* is understood as the object of *accused*.
- This is because of movement in the relative clause, where who **moves to the front and leaves a trace**.

Experiment Predictions

- **Predictions**: if who has left a trace:
  - Meaning of boy should be active when first processed
  - This activation should decline over the reset of the sentence
  - But boy should be re-activated at the position of the trace, because that is where it is understood
  -

The policeman saw the **boy** who the crowd accused ___ of the crime.

Design

- Subjects are listening to sentences containing traces
- At the point of the trace, subjects are presented with a word visually, which they have to pronounce aloud
- Tests (the words presented at the trace):
  - Girl - semantically related to boy, which should be active at trace
  - Policeman, crowd - in the sentence, but not active at the trace

Results

- For **girl** (semantically related noun): lexical access is facilitated, suggesting that boy is activated at the trace
- For **policeman** and **crowd** (other nouns in the sentence): lexical access is not facilitated

Argued as evidence that **who** has left a trace in our minds!

Summary

- Movement is required when constituents appear in positions that they are not normally associated with
- Theory: movement leaves a trace in the original position, an object that relates to the moved element
- Important research asks what moves where and how far, etc. Some results suggest reactivation of moved elements at trace positions
- Syntax is the codebook that translates meanings into structures and then backwards.