

# Syntax in Universal Dependencies

Daniel Zeman

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Charles University  
Faculty of Mathematics and Physics  
Institute of Formal and Applied Linguistics



unless otherwise stated

- 1 Same Annotation
- 2 Syntax Tour
- 3 Copula
- 4 Prague Dependency Trees vs. Universal Dependencies
- 5 Core vs. Oblique

**Same Annotation**

# Universal Dependencies

- Same things annotated same way across languages...
- ... while highlighting different **coding strategies**

# Manning's Law

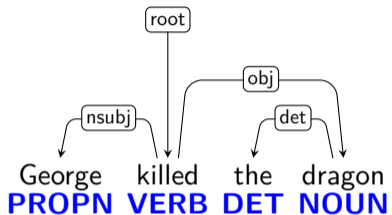


*The secret to understanding UD is to realize that the design is a very subtle compromise between approximately 6 things:*

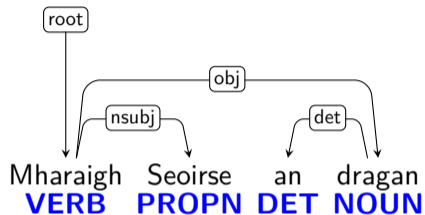
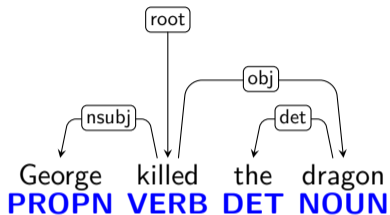
- 1 UD must be satisfactory on linguistic analysis grounds for **individual languages**.
- 2 UD must be good for linguistic **typology**, i.e., providing a suitable basis for bringing out cross-linguistic parallelism across languages and language families.
- 3 UD must be suitable for **rapid, consistent annotation** by a human annotator.
- 4 UD must be easily comprehended and used by a **non-linguist**, whether a language learner or an engineer with prosaic needs for language processing. ... it leads us to favor **traditional grammar** notions and terminology.
- 5 UD must be suitable for **computer parsing** with high accuracy.
- 6 UD must support well **downstream language understanding tasks** (relation extraction, reading comprehension, machine translation, ...)

*It's easy to come up with a proposal that improves UD on one of these dimensions. The interesting and difficult part is to improve UD while remaining sensitive to all these dimensions.*

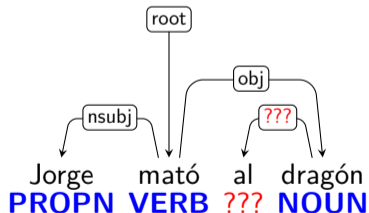
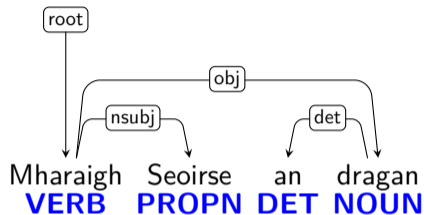
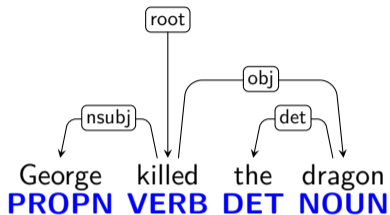
# Same Thing Same Way



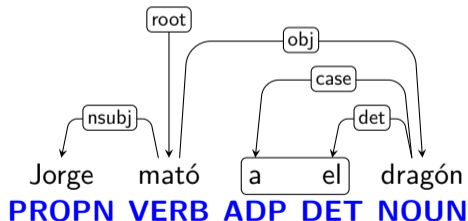
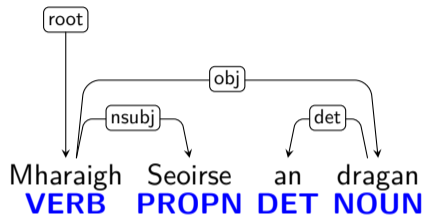
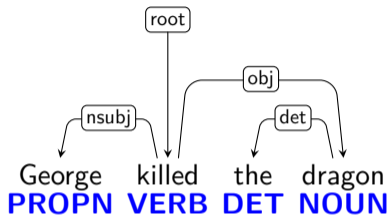
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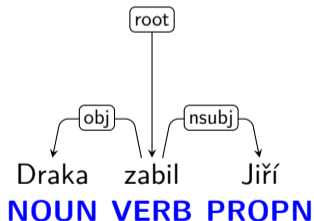
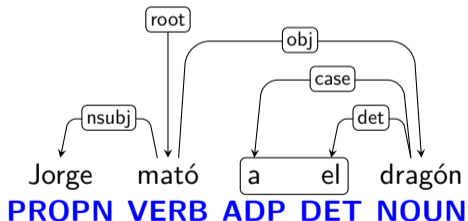
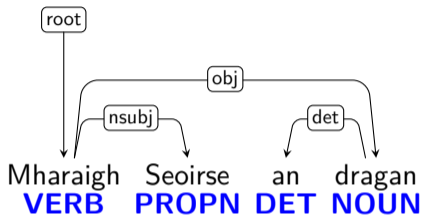
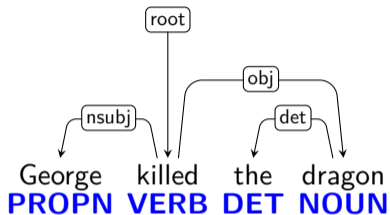
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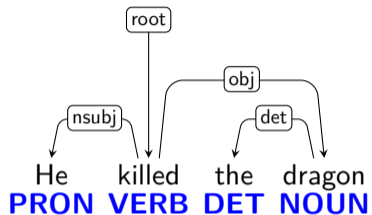
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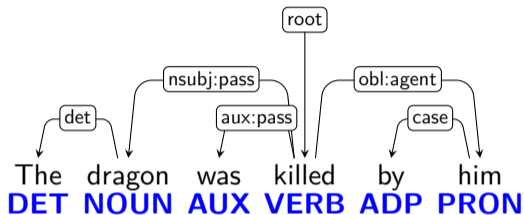
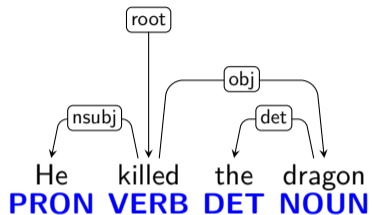
# Same Thing Same Way



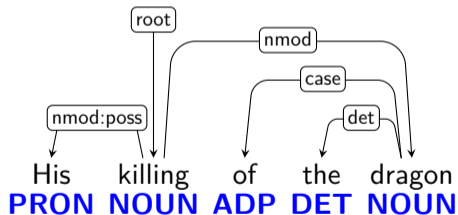
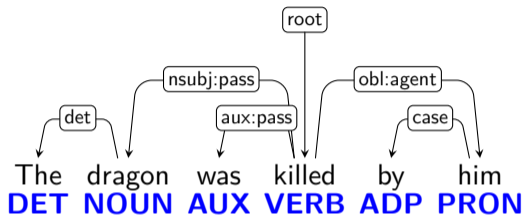
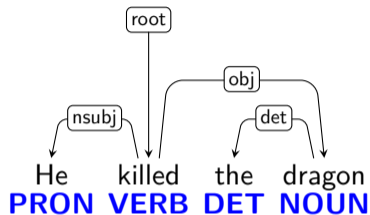
# Same Meaning $\neq$ Same Construction!



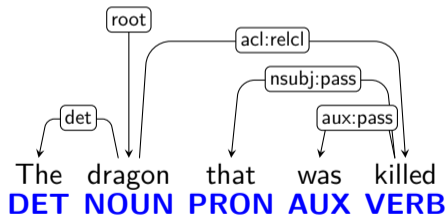
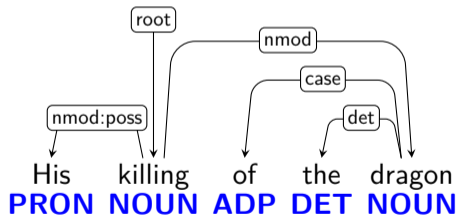
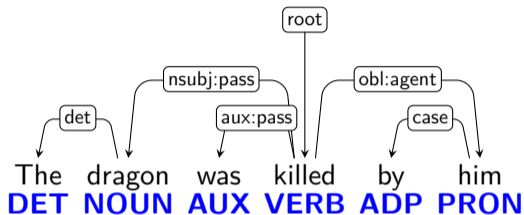
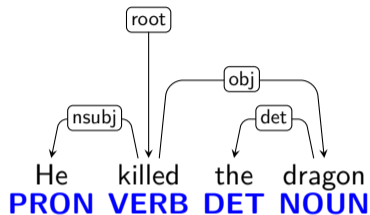
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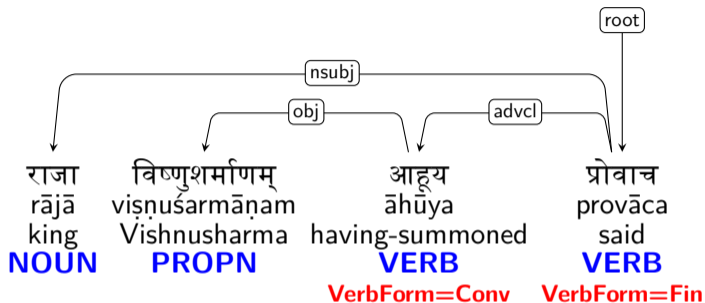
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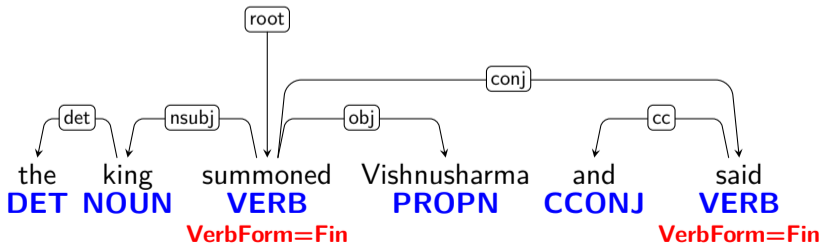
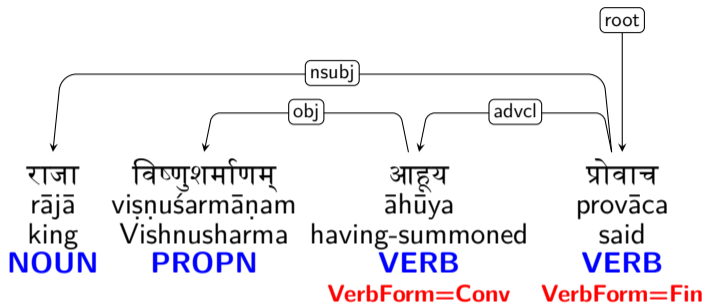
# Same Meaning $\neq$ Same Construction!



# Language-specific Preferences



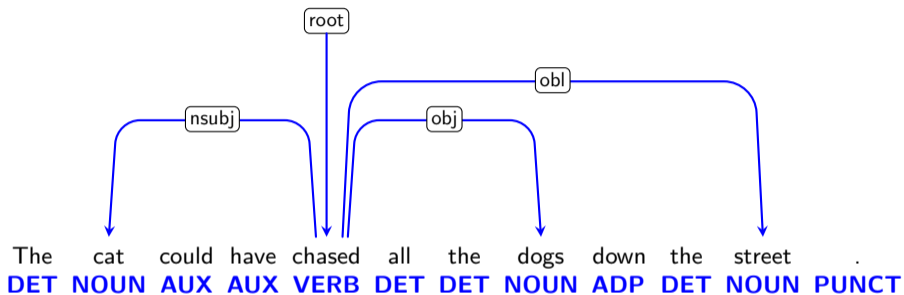
# Language-specific Preferences



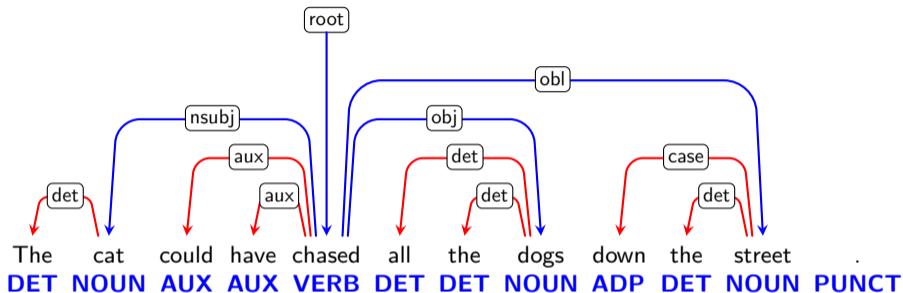
# Syntax Tour

- 1 Same Annotation
- 2 Syntax Tour**
- 3 Copula
- 4 Prague Dependency Trees vs. Universal Dependencies
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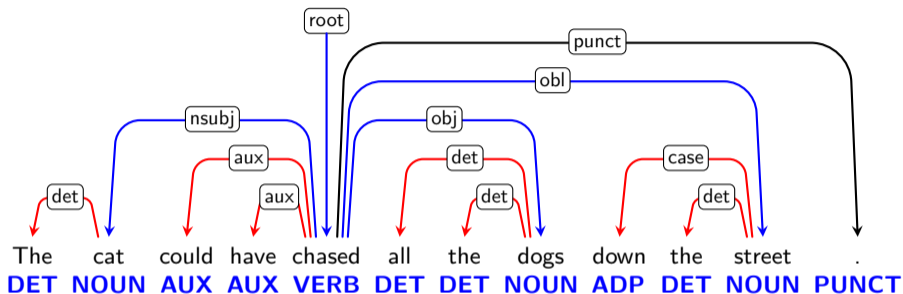
The cat could have chased all the dogs down the street .  
DET NOUN AUX AUX VERB DET DET NOUN ADP DET NOUN PUNCT



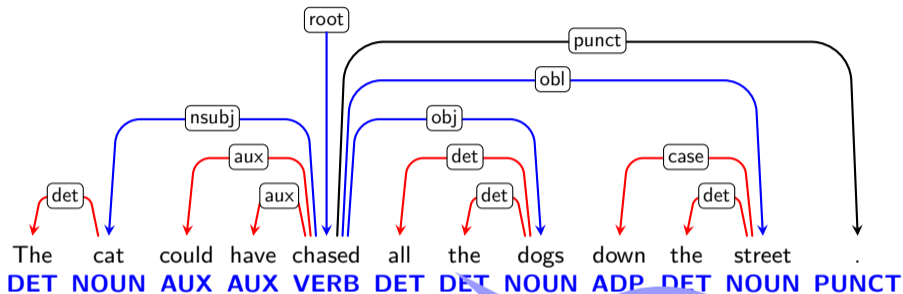
- Content words are related by dependency relations



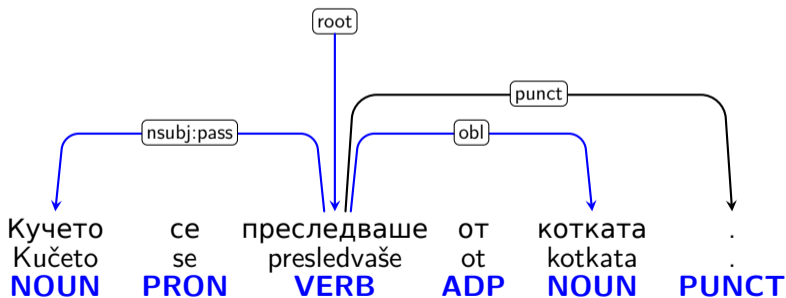
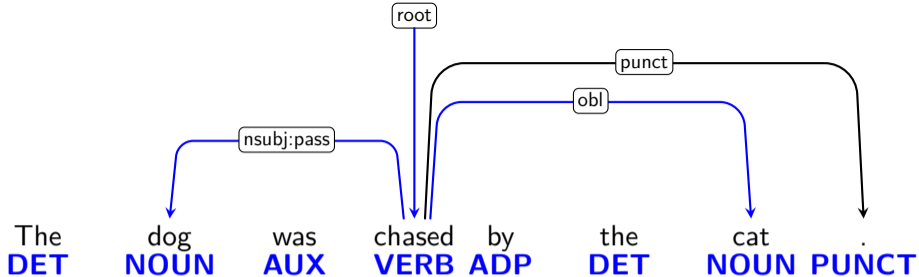
- Content words are related by dependency relations
- Function words attach to closest content words

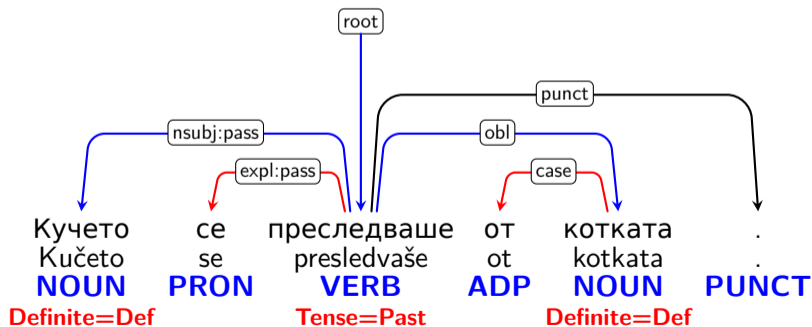
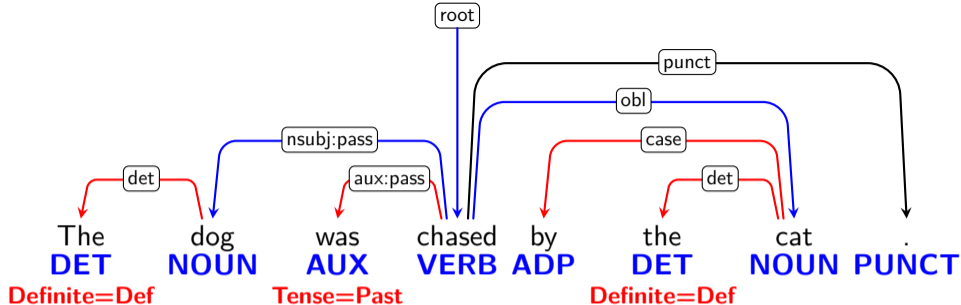


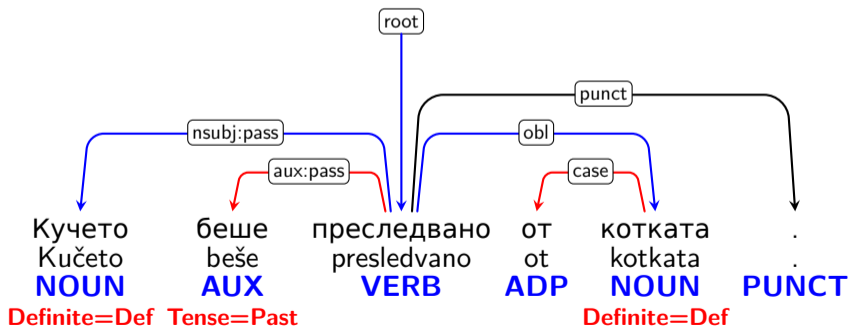
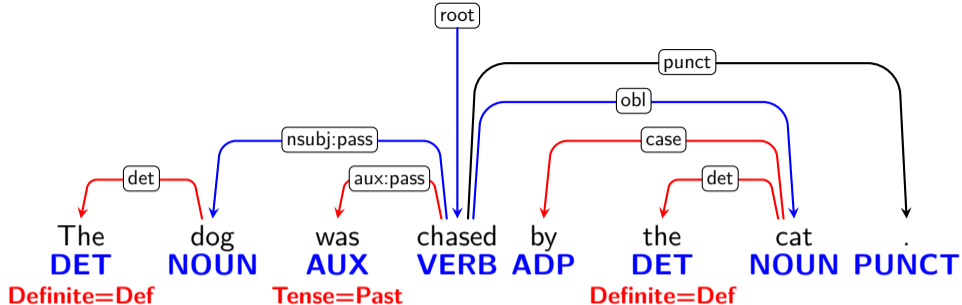
- Content words are related by dependency relations
- Function words attach to closest content words
- Punctuation attach to head of phrase or clause

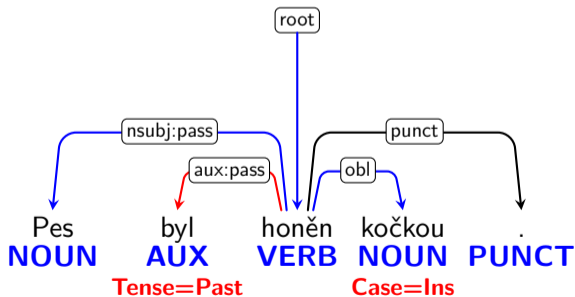
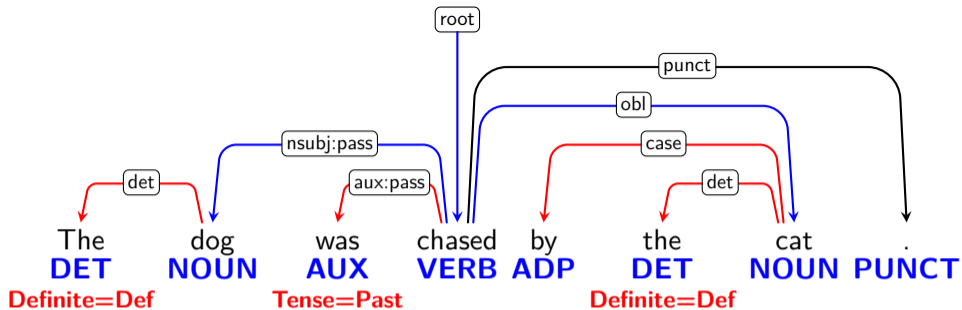


Not  
"dependency"  
in the strictly  
syntactic  
sense!









## Dependents of Clauses (Verbal or Not)

	Nominal	Clausal	Modifier	Function
Core	<b>nsubj</b>	csubj		
Non-Core	<b>obl</b> vocative dislocated expl	advcl	advmod discourse	aux cop mark

## Dependents of Verbs, Adjectives and Adverbs

	Nominal	Clausal	Modifier
Core	<b>obj</b> <b>iobj</b>	ccomp xcomp	
Non-Core	<b>obl</b> expl	advcl	advmod

## Dependents of Nominals

	Nominal	Clausal	Modifier	Function
	nmod appos	acl	amod nummod	det case

## Dependents of Nominals

### Nominal

nmod

appos

compound

flat

### Clausal

acl

### Modifier

amod

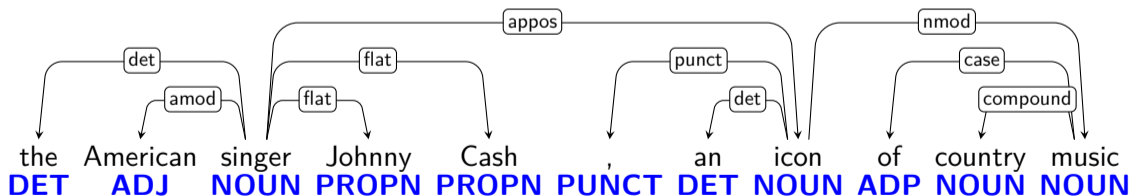
nummod

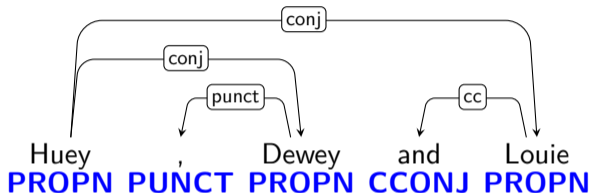
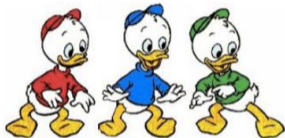
### Function

det

case

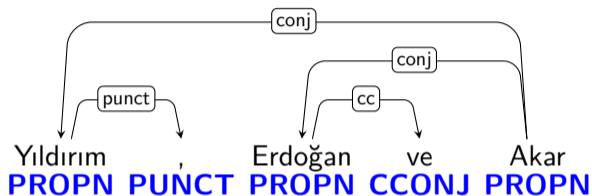
clf





- Coordinate structures are headed by the first conjunct
  - Subsequent conjuncts depend on it via the **conj** relation
  - Conjunctions depend on the next conjunct via the **cc** relation
  - Punctuation marks depend on the next conjunct via the **punct** relation

# But Some Languages Might Prefer the Opposite



- Coordinate structures would be headed by the last conjunct
  - Preceding conjuncts would depend on it via the **conj** relation
  - Conjunctions would depend on the preceding conjunct
  - Punctuation marks would depend on the preceding conjunct

## Multiword Expressions

Relation	Examples
fixed	<i>as well, by and large, according to, more than</i>
flat	<i>president Havel, New York, four thousand</i>
compound	<i>phone book, dress up</i>
goeswith	<i>notwith standing, with out</i>

- UD annotation **almost** does not permit “words with spaces”
  - Multiword expressions are analyzed using special relations
  - The **fixed**, **flat** and **goeswith** relations are always head-initial
  - The **compound** relation reflects the internal structure
- Words with spaces allowed in exceptional cases:
  - Vietnamese (spaces delimit syllables, not words)
  - Numbers (“1 000 000”)
  - Possibly other approved cases, e.g. multi-word abbreviations

## Other Relations

<b>Relation</b>	<b>Explanation</b>
parataxis	Loosely linked clauses of same rank
list	Lists without syntactic structure
orphan	Orphans in ellipsis linked together
reparandum	Disfluency linked to (speech) repair
dep	Unspecified dependency
root	The single syntactically independent element of the sentence

# Language-specific Relation Subtypes

- Language-specific relations are **subtypes** of universal relations added to capture important phenomena
- Subtyping permits us to “back off” to universal relations

## Language-specific Relation Subtypes

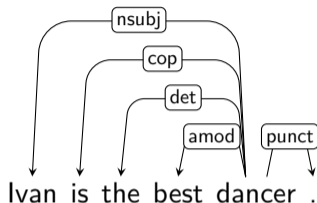
<b>Relation</b>	<b>Explanation</b>
acl:relcl	Relative clause (the boy <b>who lived</b> )
compound:prt	Verb particle (dress <b>up</b> )
nmod:poss	Possessive nominal ( <b>Mary 's</b> book)
obl:agent	Agent in passive (saved <b>by the bell</b> )
cc:preconj	Preconjunction ( <b>both</b> ... and)
det:predet	Predeterminer ( <b>all</b> those ...)

Copula

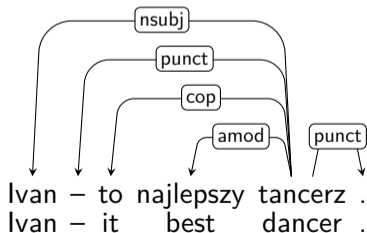
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# Nonverbal Predicate and Copula

- Some languages use a copula verb:

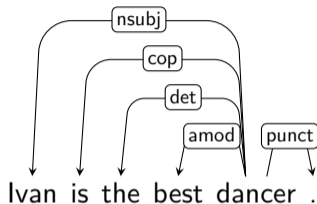


- Some languages use a copula **pronoun**:

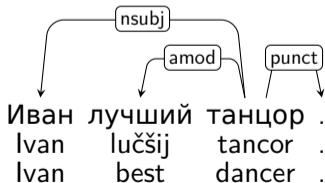


# Nonverbal Predicate and Copula

- Some languages use a copula verb:

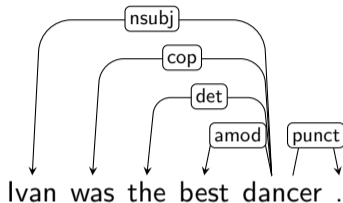


- Some languages **omit the copula**:

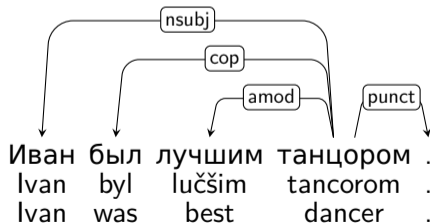


# Nonverbal Predicate and Copula

- Some languages use a copula verb:



- Some languages use it **only in some tenses**:

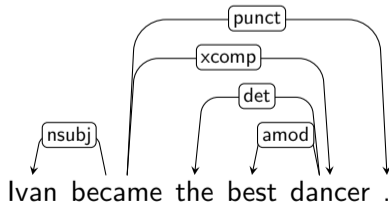


# Copula Verbs: We Are Restrictive!

- *To be* is copula:

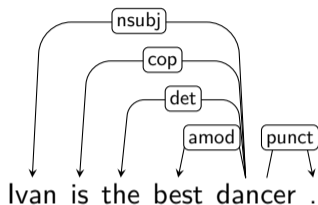


- *To become* is not copula:

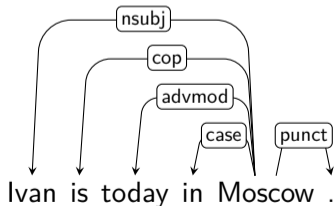


# Once Copula, Always Copula!

- This is parallel with Russian:

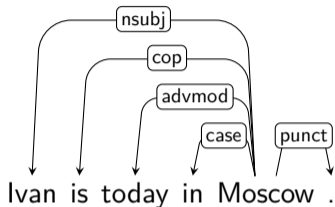


- This is also parallel with Russian:

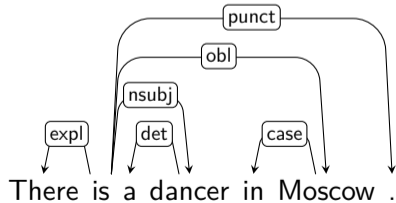


# Well, Almost...

- This is parallel with Russian:

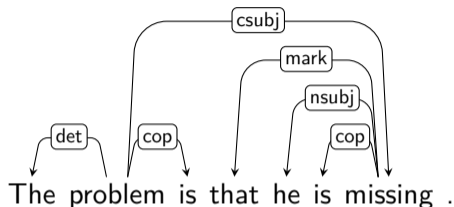


- But not with this in English:

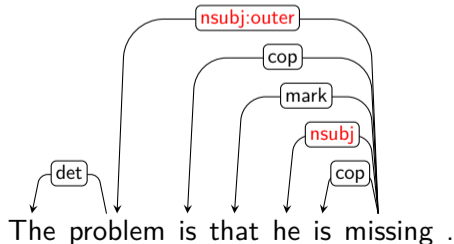


# Clauses and Copula

- A clause can be the subject:

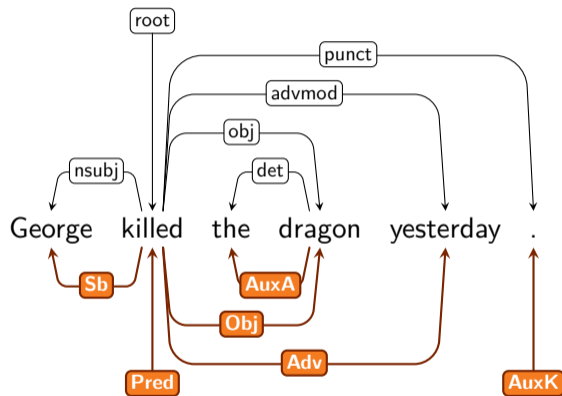


- A clause can be the nonverbal predicate:

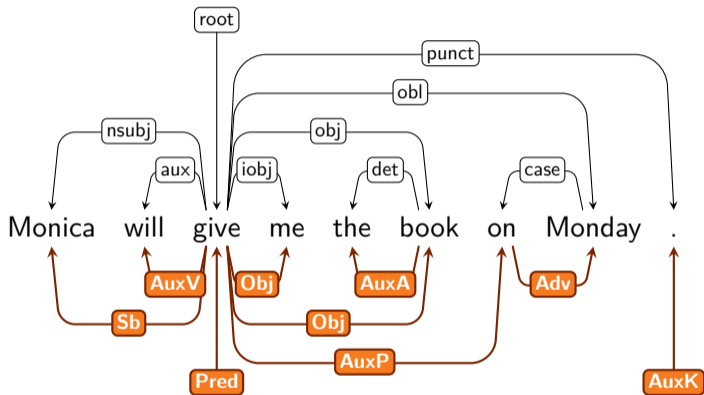


# Prague Dependency Trees vs. Universal Dependencies

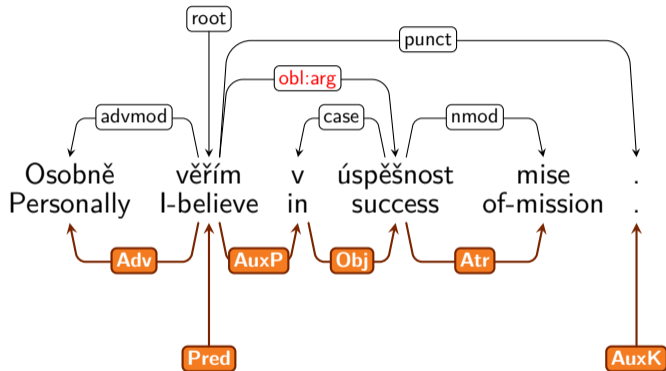
# Simple Clauses



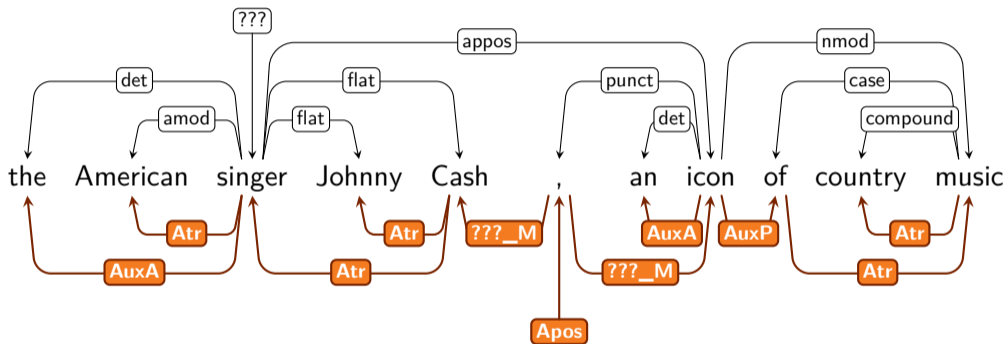
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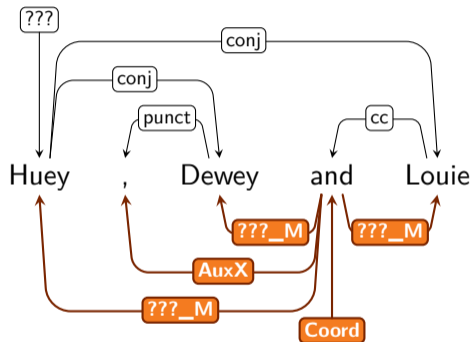
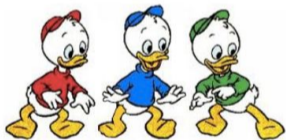
# Simple Clauses



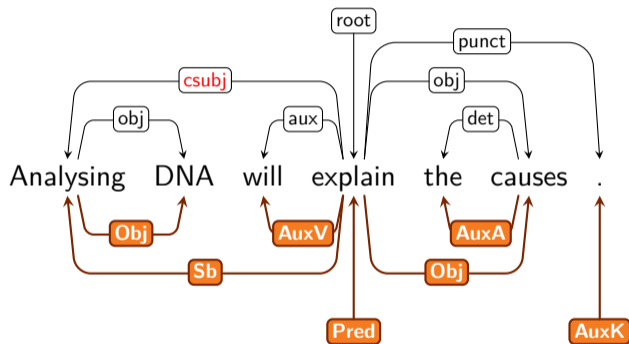
# Nominals



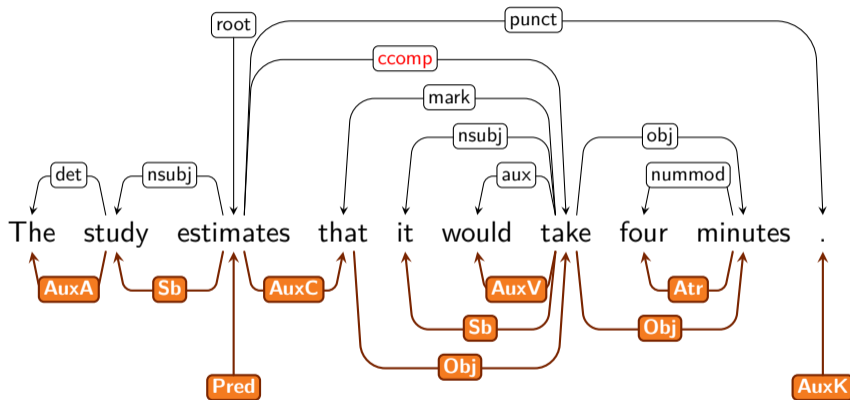
# Coordination



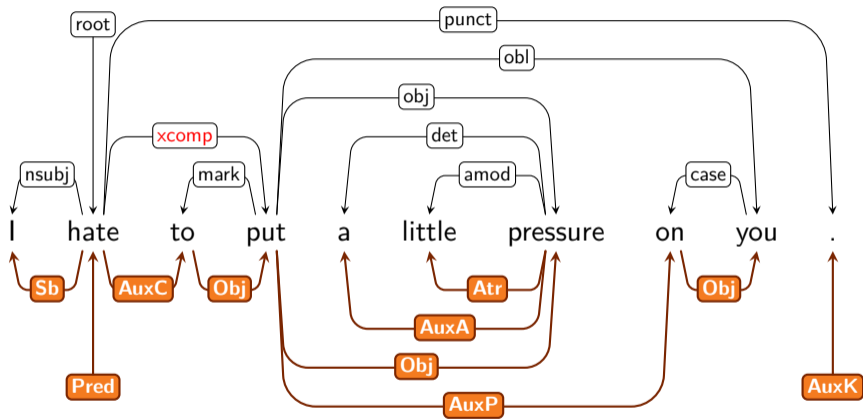
# Subject Clauses



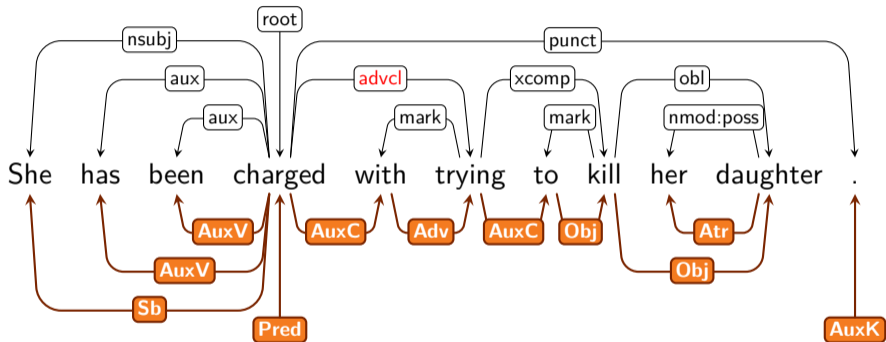
# Complement (Object) Clauses



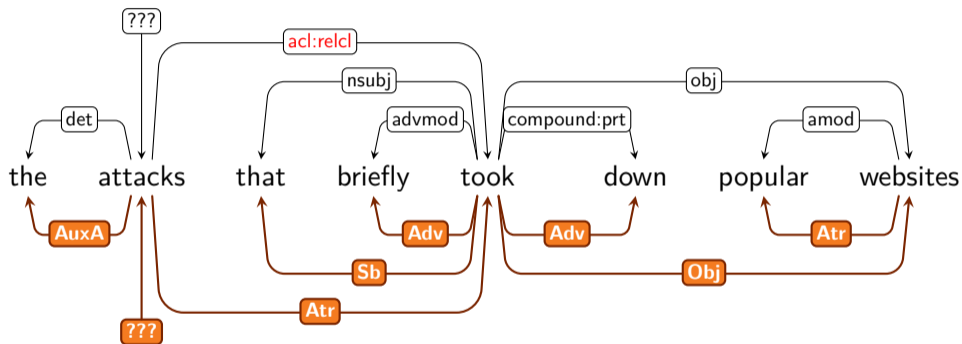
# Open Clausal Complements



# Adverbial Clauses

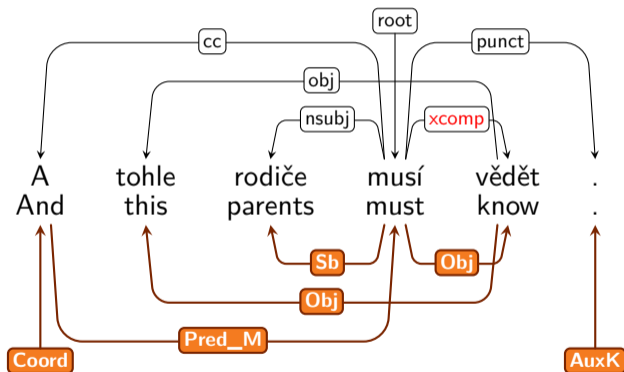


# Adnominal Clauses



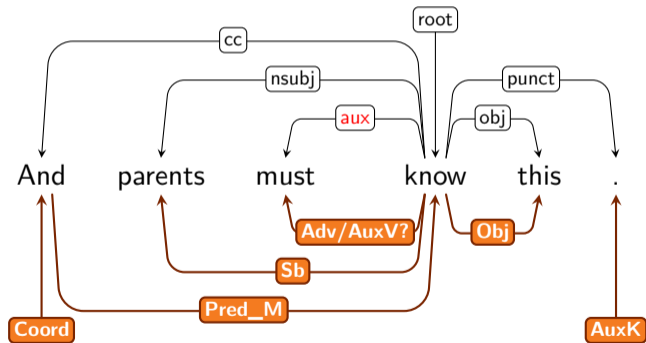
# Modal Verbs

- In Czech, modal verbs are not considered auxiliary  
⇒ modal verb + infinitive = 2 clauses!

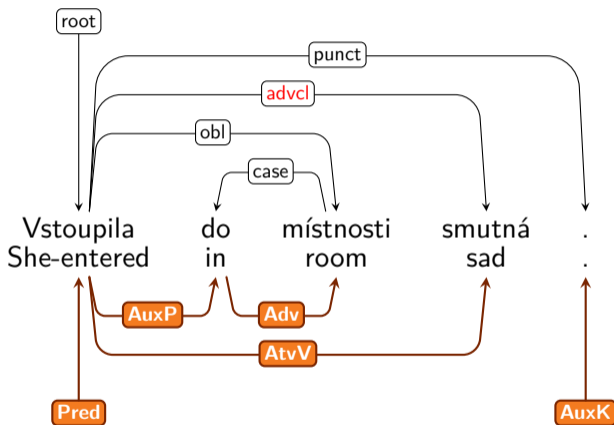


# Modal Verbs

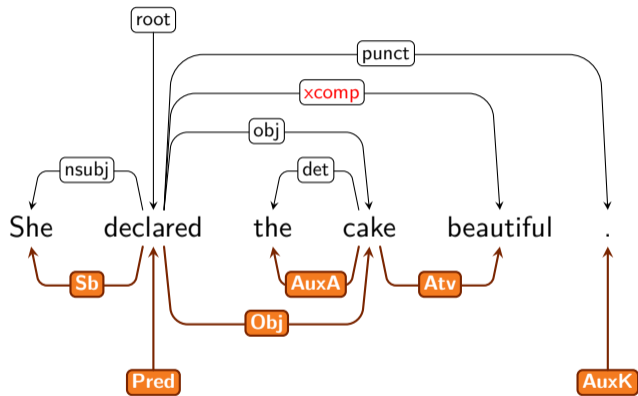
- In English UD, modal verbs are considered auxiliary  
⇒ modal verb + infinitive = 1 clause!
- Analytical layer in PCEDT is estimated automatically from the tectogrammatical layer  
⇒ modals come out as adverbial modifiers there.



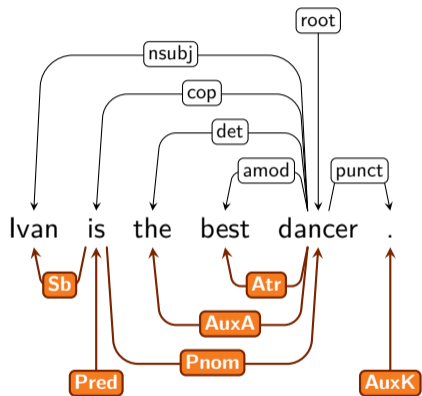
# Secondary Predication (“Doplněk” in Czech Grammar)



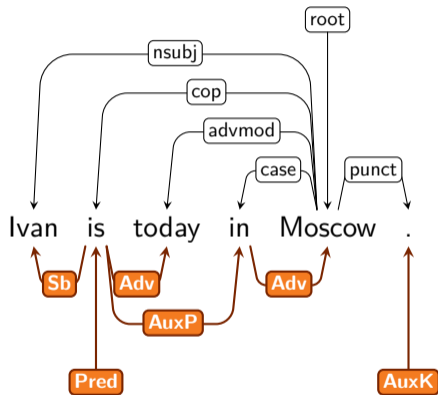
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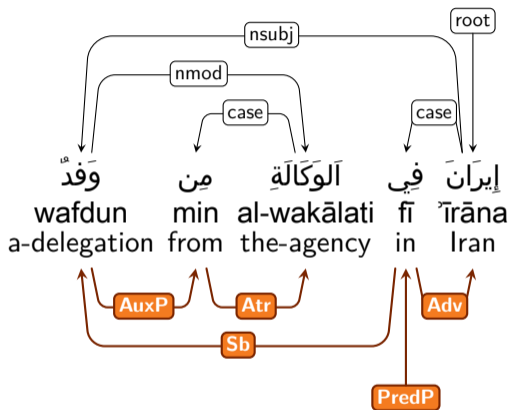
# Nonverbal Predicates with Copulas



# Locative Predicates with Copulas

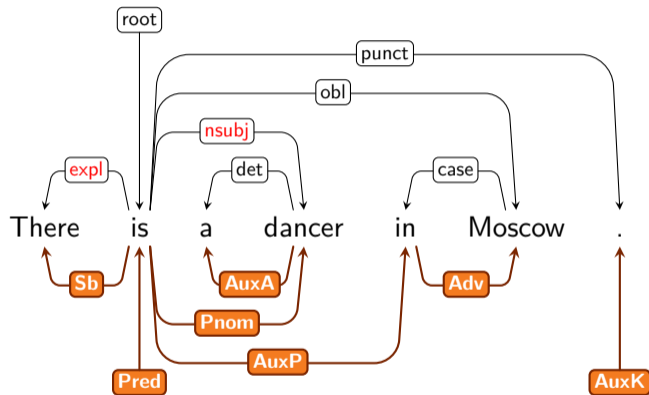


# Nonverbal Predicates without Copula

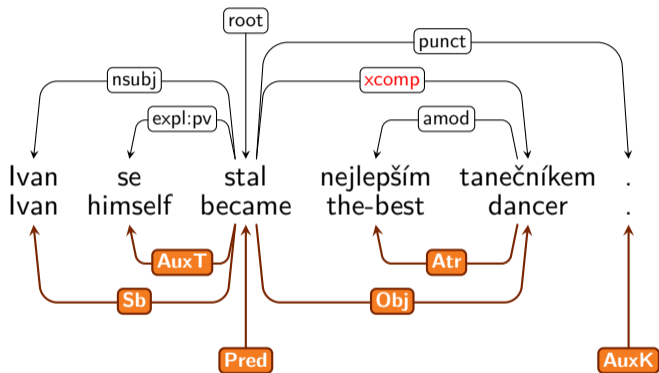


“A delegation from the Agency is in Iran.”

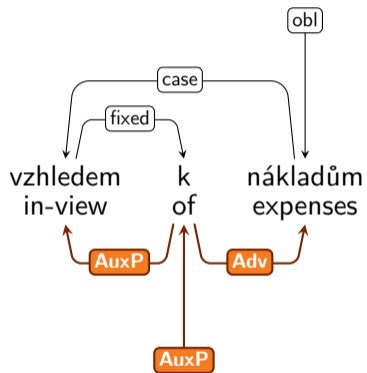
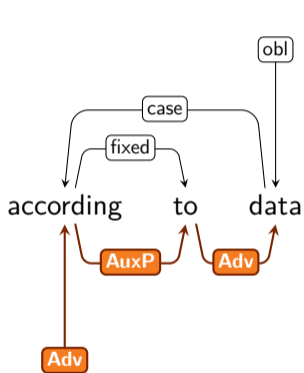
# English Existential Clauses



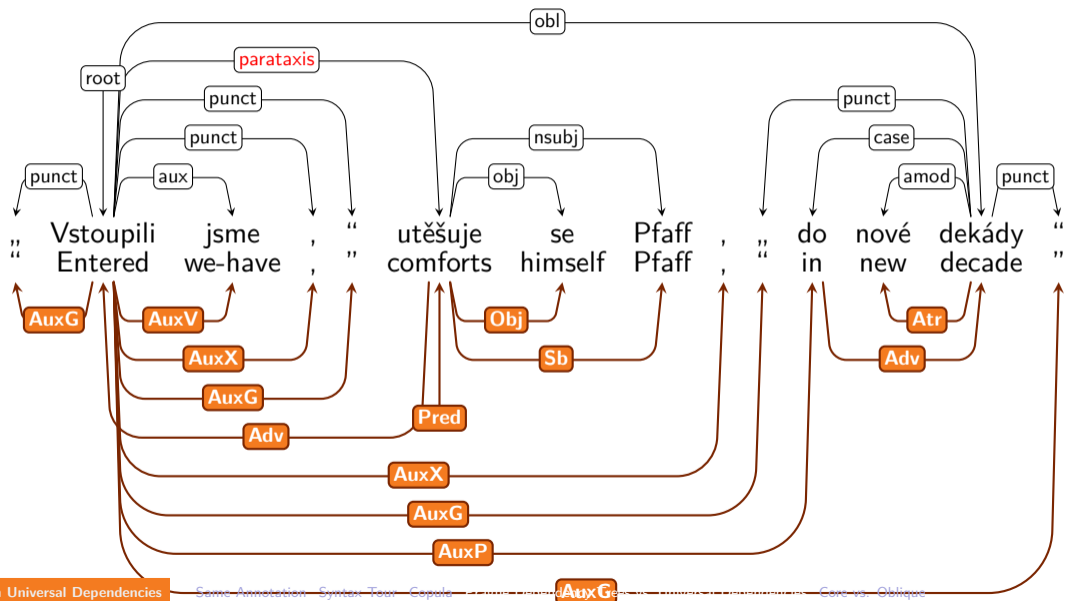
# Pseudo-Copulas

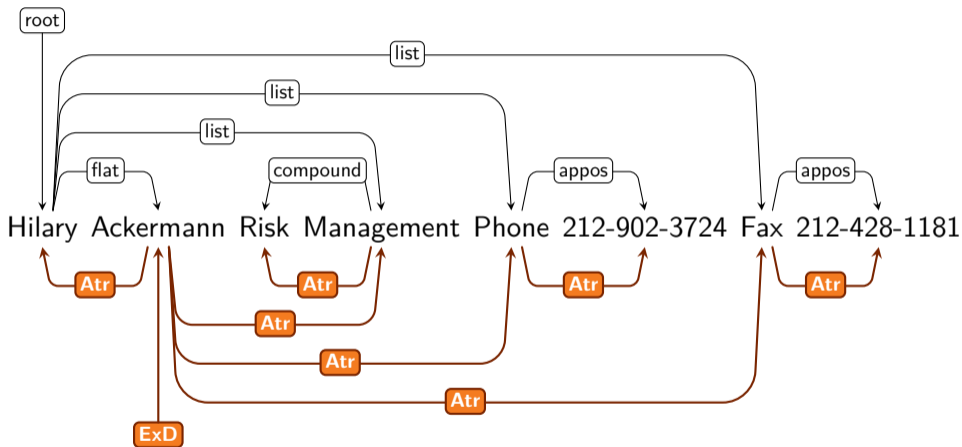


# Fixed Multiword Expressions



# Direct Speech Interspersed with Reporting Clause





## Core vs. Oblique

- 1 Same Annotation
- 2 Syntax Tour
- 3 Copula
- 4 Prague Dependency Trees vs. Universal Dependencies
- 5 Core vs. Oblique**

## Dependents of Clauses (Verbal or Not)

	Nominal	Clausal	Modifier	Function
Core	<b>nsubj</b>	csubj		
Non-Core	<b>obl</b> vocative dislocated expl	advcl	advmod discourse	aux cop mark

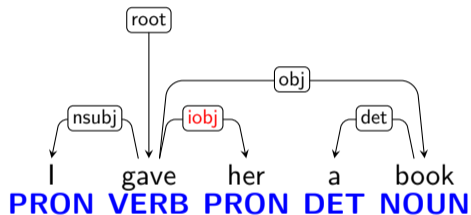
## Dependents of Verbs, Adjectives and Adverbs

	Nominal	Clausal	Modifier
Core	<b>obj</b> <b>iobj</b>	ccomp xcomp	
Non-Core	<b>obl</b> expl	advcl	advmod

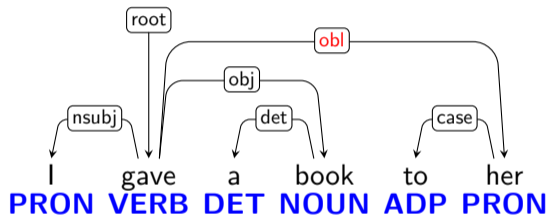
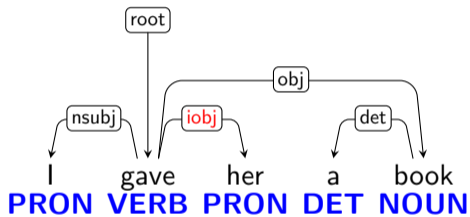
## Dependents of Nominals

Nominal	Clausal	Modifier	Function
nmod appos	acl	amod nummod	det case

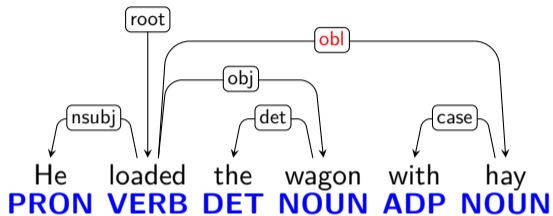
# Information Packaging



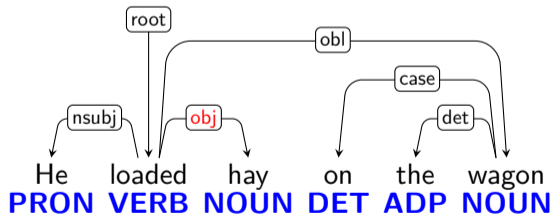
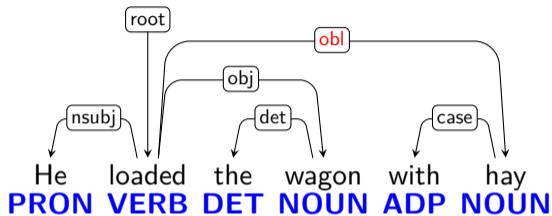
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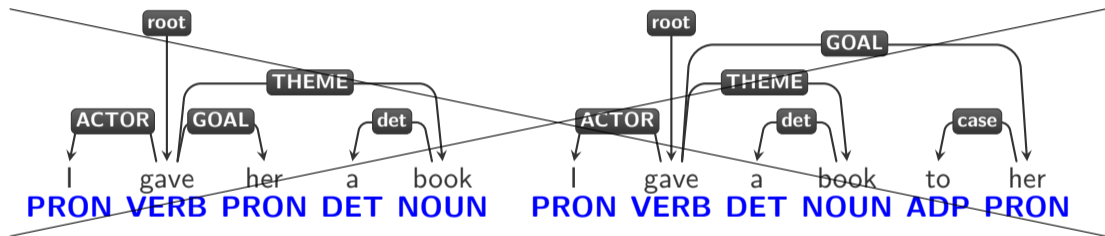
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# Information Packaging



# UD is NOT about Semantic Roles!



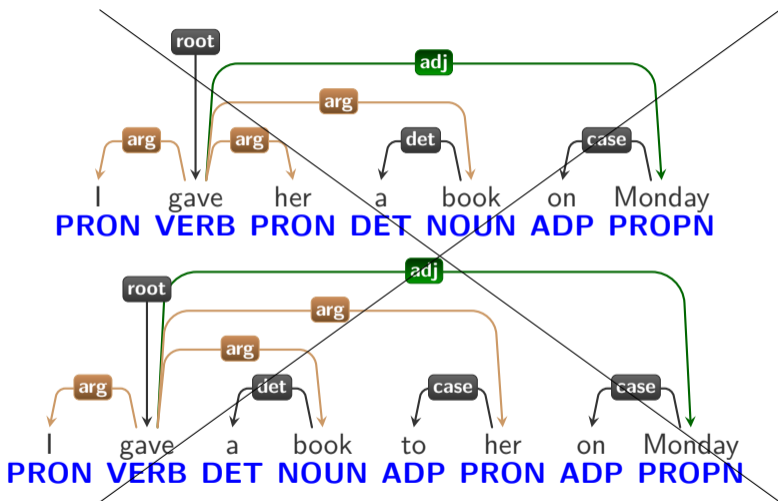
# Manning's Law – What If We Do Semantic Roles?

*The secret to understanding the design and current success of UD is to realize that the design is a very subtle compromise between approximately 6 things:*

- 1 UD must be satisfactory on linguistic analysis grounds for **individual languages**.
- 2 UD must be good for linguistic **typology**, i.e., providing a suitable basis for bringing out cross-linguistic parallelism across languages and language families.
- 3 UD must be suitable for **rapid, consistent annotation** by a human annotator.
- 4 UD must be easily comprehended and used by a **non-linguist**, whether a language learner or an engineer with prosaic needs for language processing. ... it leads us to favor traditional grammar notions and terminology.
- 5 UD must be suitable for **computer parsing** with high accuracy.
- 6 UD must support well **downstream language understanding tasks** (relation extraction, reading comprehension, machine translation, ...)

*It's easy to come up with a proposal that improves UD on one of these dimensions. The interesting and difficult part is to improve UD while remaining sensitive to all these dimensions.*

# UD Avoids Argument-Adjunct Distinction!



# Avoiding an Argument-Adjunct Distinction

- From the guidelines:
  - Subtle, unclear, and frequently argued over
  - Questionable as a categorical distinction
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  - $\Rightarrow$  there is now a relation subtype `obl:arg`
- **AND** I will argue that
  - Core-oblique distinction is unclear and argued over too
  - (Though I will **not** propose to discard it.)

# So What Is Core and Why?



THE CORE

- UD v1 guidelines took core-oblique for granted
- English (simplified):
  - Bare noun phrase  $\Rightarrow$  core argument (nsubj, obj, iobj)
  - Prepositional phrase  $\Rightarrow$  oblique argument or adjunct (obl)

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- Clash with traditional terminology
  - Grammars of German, Czech etc. define **prepositional objects**
  - But these are not necessarily core...
  - Yet some people took their national definition of object...

# Language-specific Coding Strategy

- Idea:
  - **Oblique** arguments are marked **similarly to adjuncts** (prepositions, certain morphological cases...)
  - Core arguments are marked differently
    - $\Rightarrow$  easy for annotators and non-linguists!
- Why are core arguments special?
  - They tend to be **targeted by grammatical rules**
    - Passivization
    - Control verbs
    - Reflexives
    - ...

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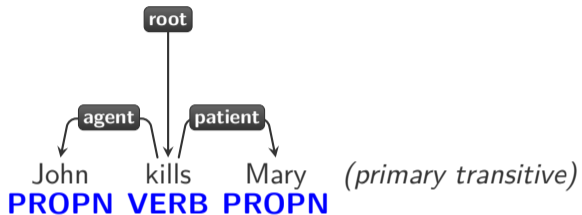
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  - Note the way they are coded
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  - Generalize to other predicates with same coding and rules
- Then define:
  - function A  $\Rightarrow$  **nsubj**
  - function P  $\Rightarrow$  **obj**

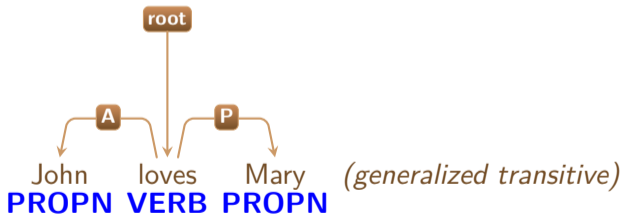
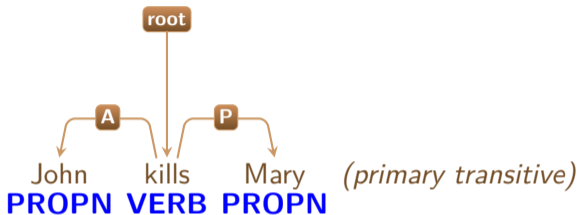


# Transitive Predicates in English



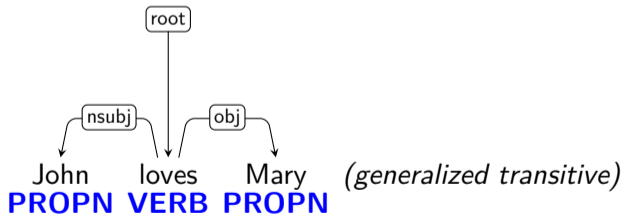
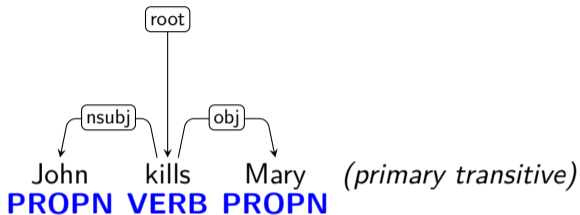


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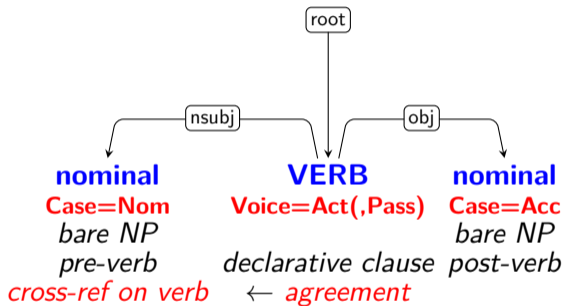


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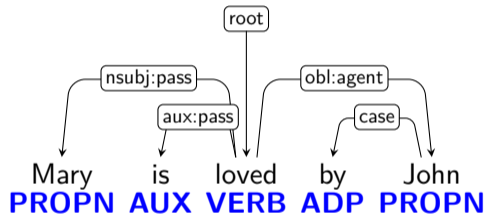
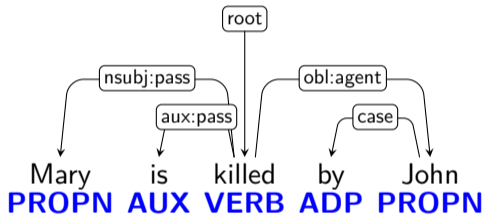


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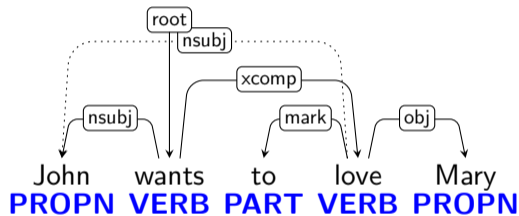
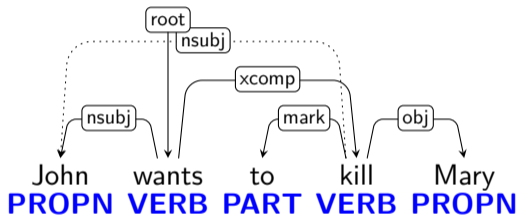


# Passivization in English



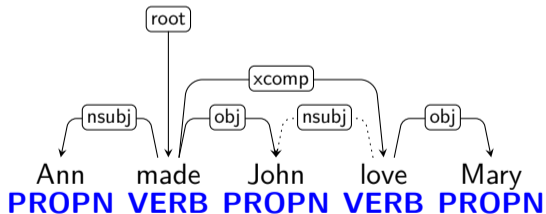
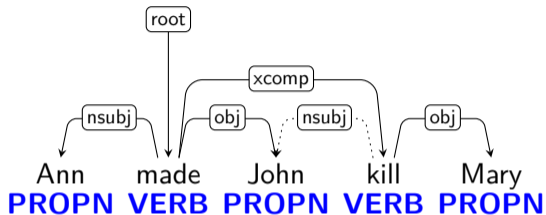


# Subject Control in English





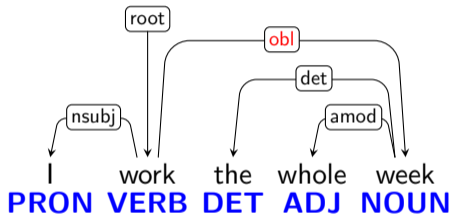
# Object Control in English





## Some Problems

- Some temporal adjuncts are bare noun phrases
  - *I work the whole week.*
  - *I work every Friday.*



- At least it cannot passivize:
  - *\*The whole week is worked by me.*
  - *\*Every Friday is worked by me.*
- But...



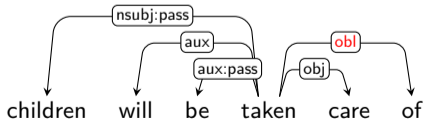
## Some Problems

- Some transitive verbs cannot passivize
  - *John **has** a new car.*
    - *\*A new car is had by John.*
  - *Friday does not **suit** me.*
    - *\*I am not suited by Friday.*



## Some Problems

- Some transitive verbs cannot passivize
  - John *has* a new car.
    - \*A new car is had by John.
  - Friday does not *suit* me.
    - \*I am not suited by Friday.
- Some prepositional verbs can passivize
  - You can *rely* on Ben.
    - Ben can be relied on.
  - They will *take* care of your children.
    - Your children will be taken care of.





## Bare Temporal Adjuncts: Any Other Criteria?

- *I work **the whole week**.*
- *I work **every Friday**.*
- English has a fixed word order; adjuncts are less fixed than objects:
  - *I work every Friday in Paris.*
  - *I work in Paris every Friday.*
  - *I spend every Friday in Paris.*
  - *\*I spend in Paris every Friday.*
- Unlike objects, adjuncts cannot be replaced by pronouns:
  - *Where do you spend this Friday? I spend it in Paris.*
  - *Where do you work this Friday? \*I work it in Paris.*

# Tentative Summary?

- The borderline is inherently fuzzy
- No universally applicable and exact algorithm
- Better described in terms of probability



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- The borderline is inherently fuzzy
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- Better described in terms of probability
  
- Core coding **not favored by adjuncts**
- Oblique coding **similar to most adjuncts**
- Passivization etc. may help...
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- The borderline is inherently fuzzy
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- Core coding **not favored by adjuncts**
- Oblique coding **similar to most adjuncts**
- Passivization etc. may help...
- ... but does **not** work as **strict criterion**
  
- Semantic roles needed when starting a new language
- Argument-adjunct might help with exceptions
  - Although we managed to explain *the whole week* without it



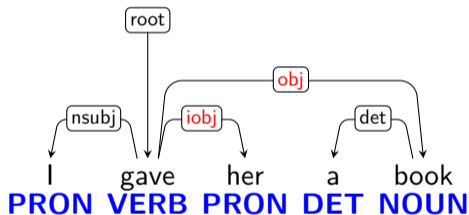
# Intransitive Predicates

- Just one core argument
  - We already “know” how to find out if there are two
- $\Rightarrow$  function **S**
  - Regardless of semantic role:
    - *John runs.*
    - *John sleeps.*
    - *John falls.*
    - *John relies on me.* ... intransitive because *on me* is not a core argument!
- Then define:
  - function **S**  $\Rightarrow$  **nsubj**



## Ditransitive Predicates

- Three core arguments: nsubj, obj, and **iobj**
- Which one is iobj? Language-specific rules. English: the one closer to the verb (i.e., the GOAL semantic role).
- **NEW in 2023:** iobj can be used **even if obj is not present**

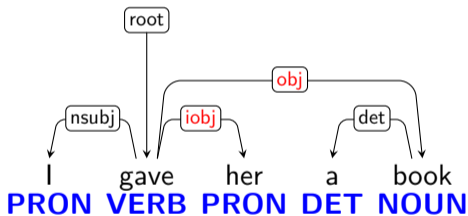


- Passivization:
  - *She* was given a book by me.
  - *?A book* was given her by me.



## Ditransitive Predicates

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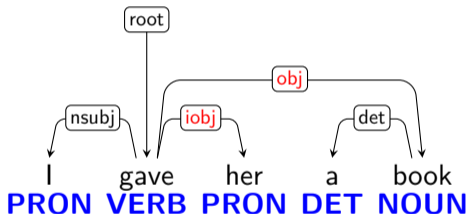


- Fronting in questions:
  - *What did I give her?*
  - *\*Who did I give a book?*



## Ditransitive Predicates

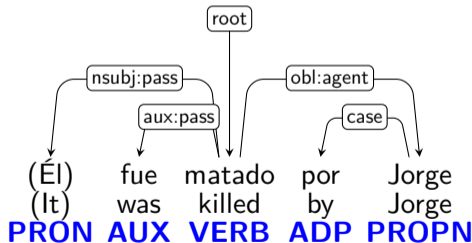
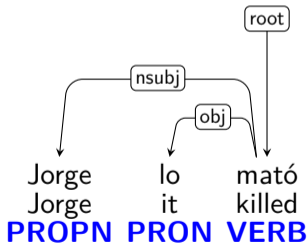
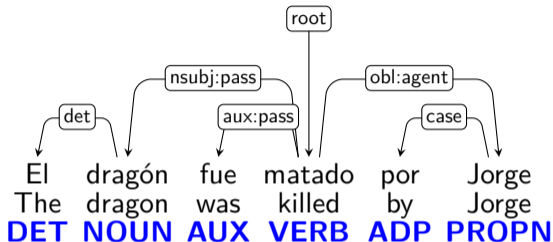
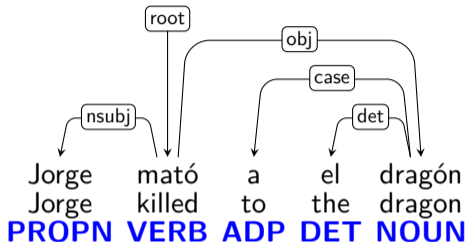
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- Andrews (2007): *the status of the notion of 'indirect object' is problematic and difficult to sort out. The top priority is to work out what properties recipients and themes do and do not share with P arguments of primary transitive verbs.*

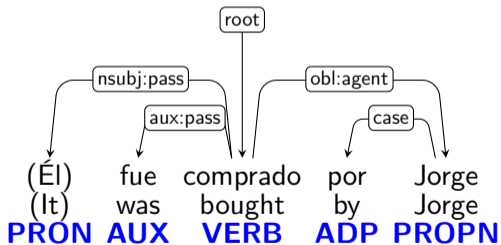
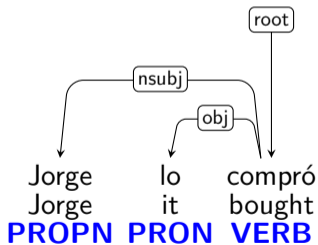
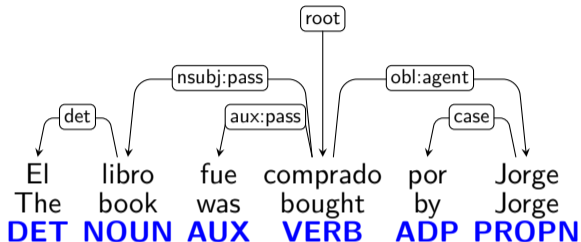
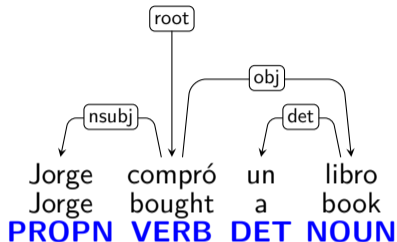


# Spanish



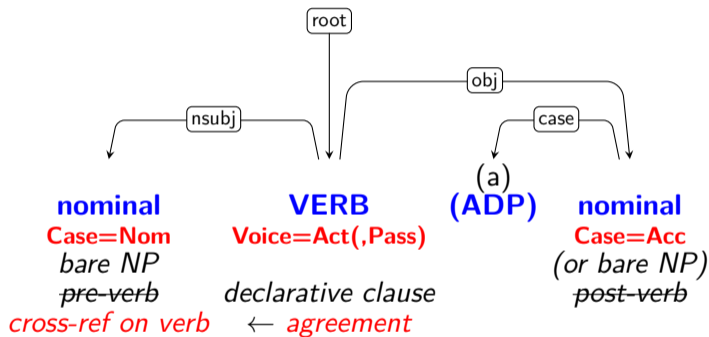


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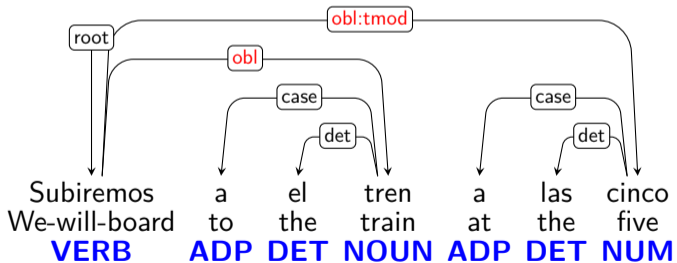
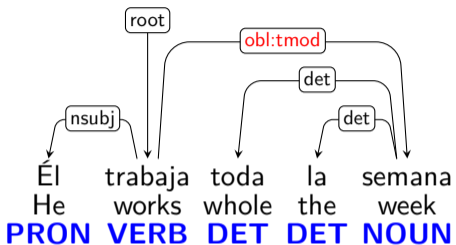


# Spanish Transitive Clauses



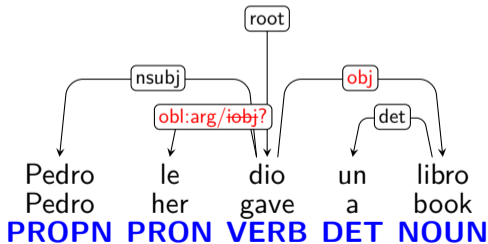
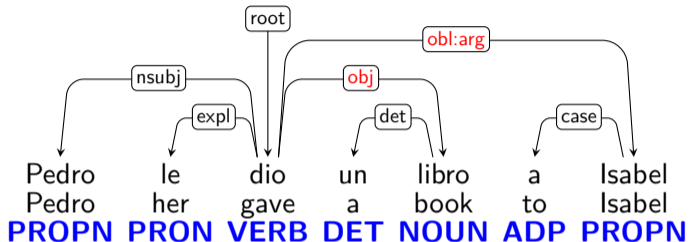


# Spanish Adjunct Exceptions



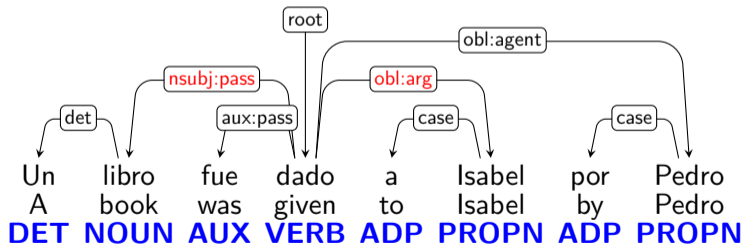
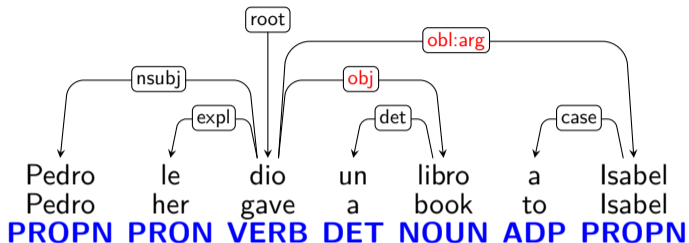


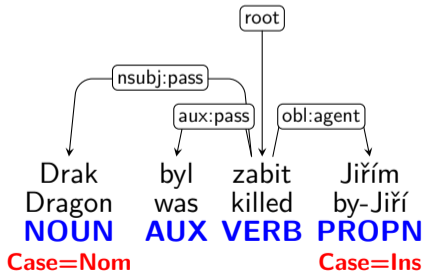
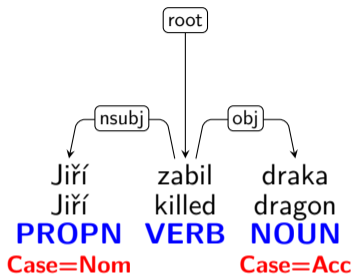
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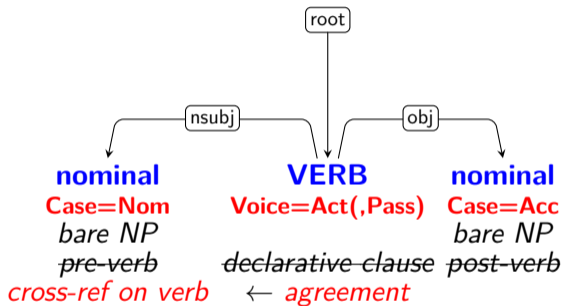
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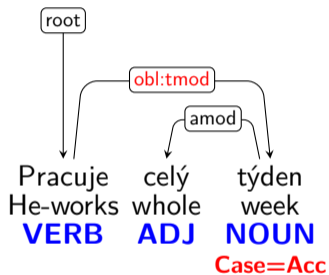


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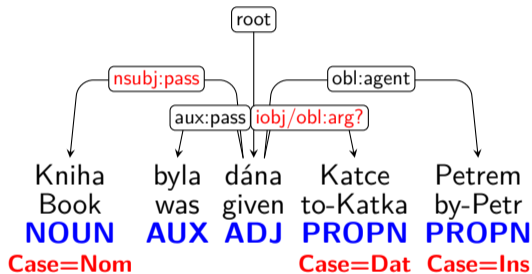
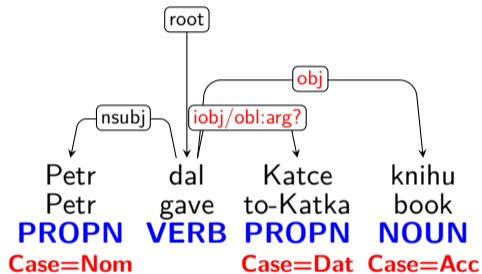


# Czech Adjunct Exceptions

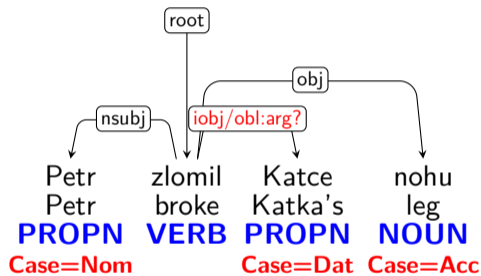
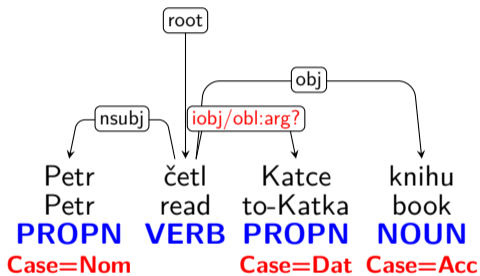




# Czech Ditransitive Clauses



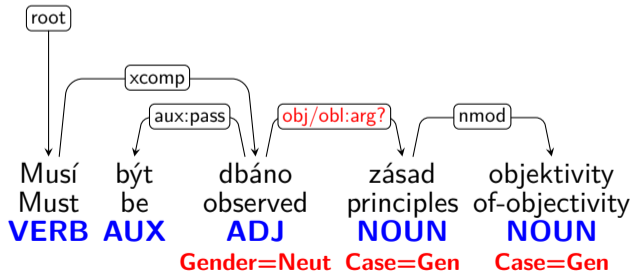
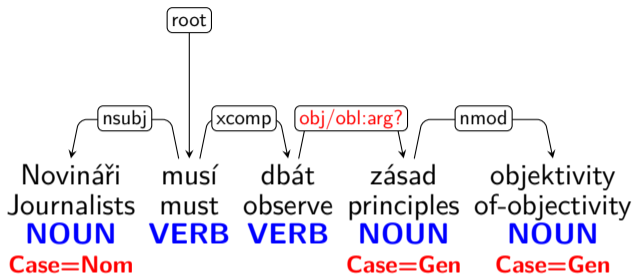
# Dative: Recipient vs. Beneficiary





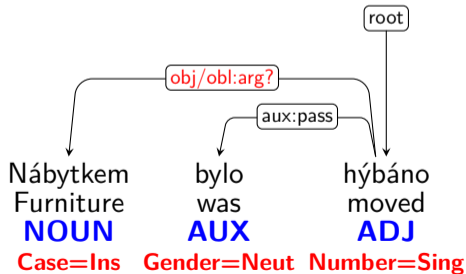
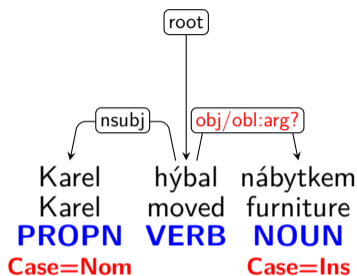


# Monotransitive with Genitive?



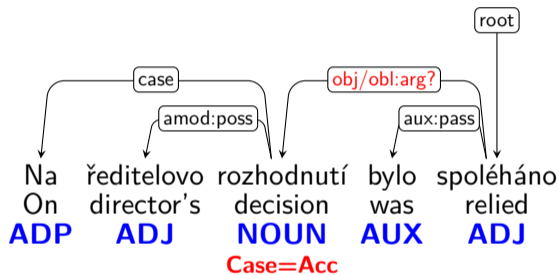
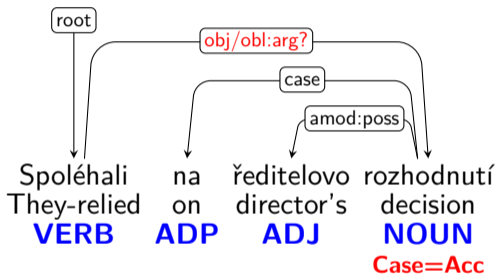


# Monotransitive with Instrumental?





# Monotransitive with Preposition?





## Tentative Summary 2

- There is a core-oblique scale:
- **Nom** > **Acc** > **Gen,Dat** > **Ins** > **preposition**
- Where is the borderline?





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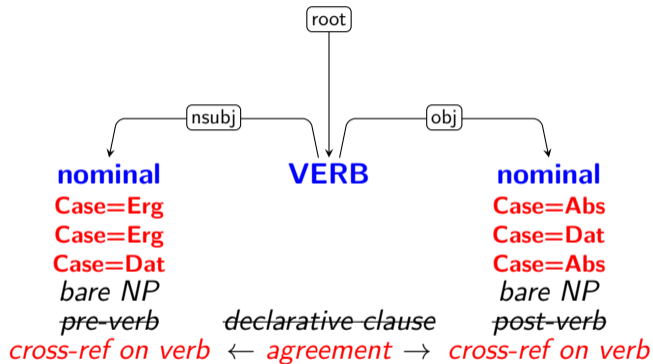
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- UD Czech 2.6 (May 2020):
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  - $\Rightarrow$  No ditransitives in Czech!
  - (Exception: *učit* “to teach” takes two Acc.)

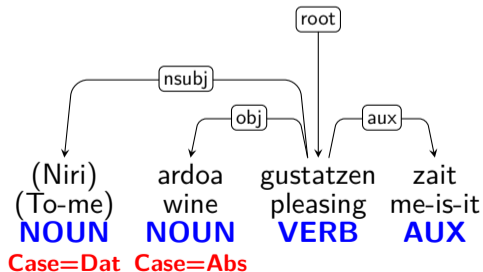
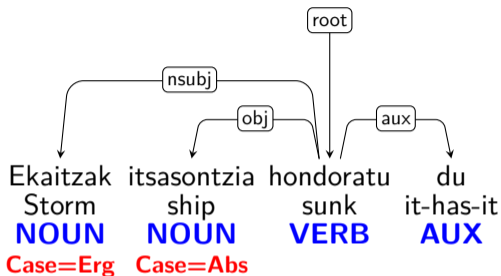


# Basque Transitive Clauses



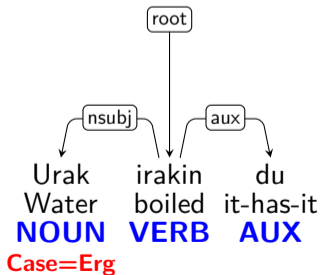
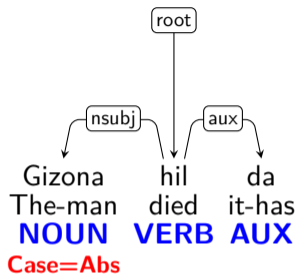


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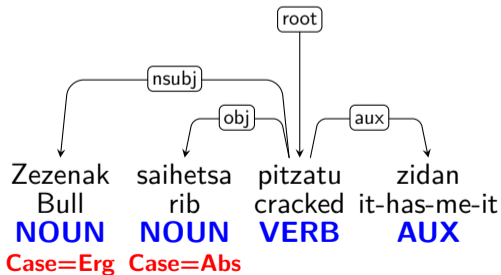
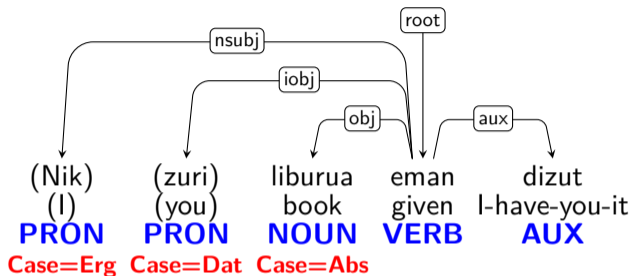


# Basque Intransitive Clauses



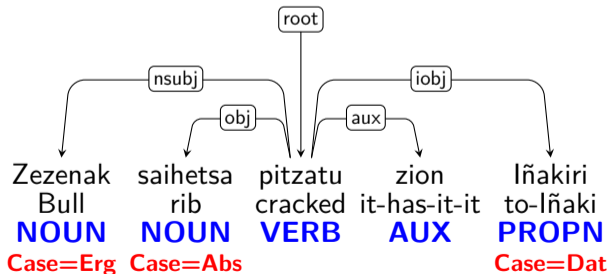
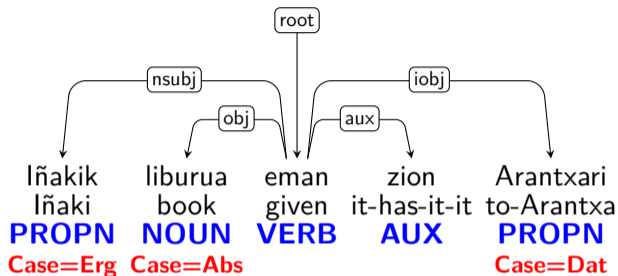


# Basque Ditransitive Clauses



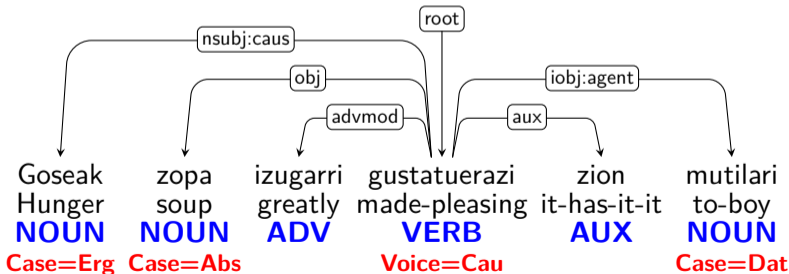
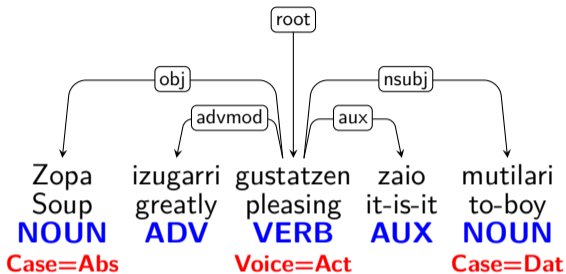


# Basque Ditransitive Clauses



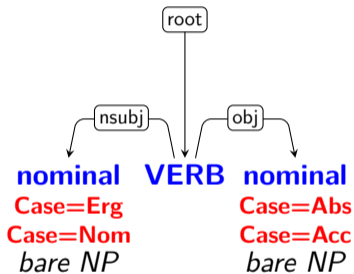


# Basque Causative Applied to Dative Subject



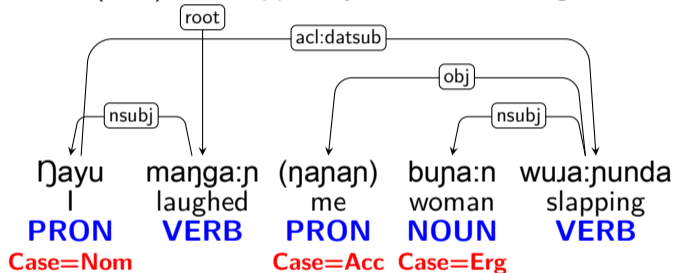


# Yidj Transitive Clauses



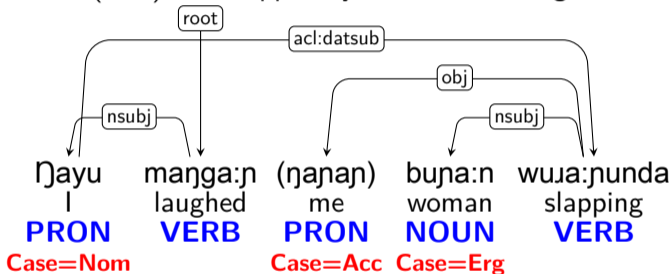
# Yidinj “Dative” Adnominal Clauses

“I, (who) was slapped by the woman, laughed”



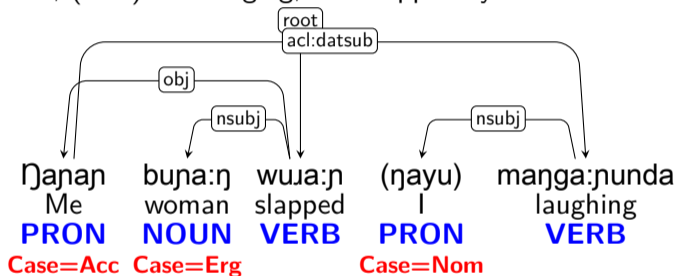
# Yidj "Dative" Adnominal Clauses

"I, (who) was slapped by the woman, laughed"



The coreferential (and elidable) NP must have **S** or **P** function.

“I, (who) was laughing, was slapped by the woman”

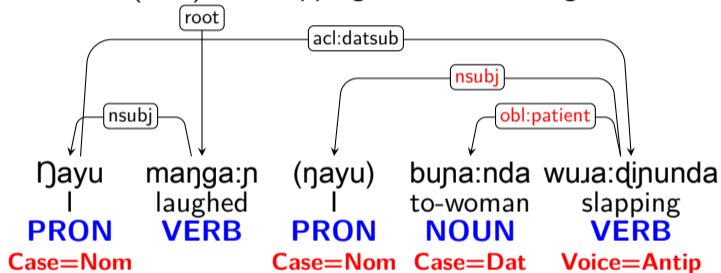


The coreferential (and elidable) NP must have **S** or **P** function.



# Yidj Antipassive

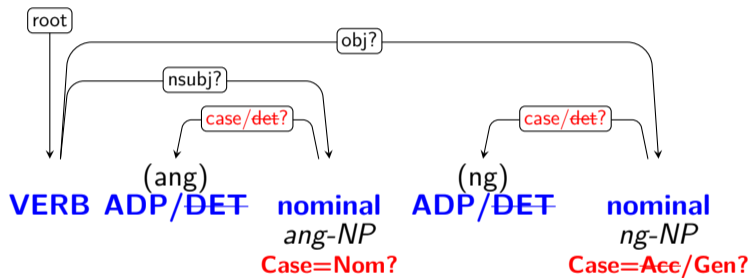
“I, (who) was slapping the woman, laughed”

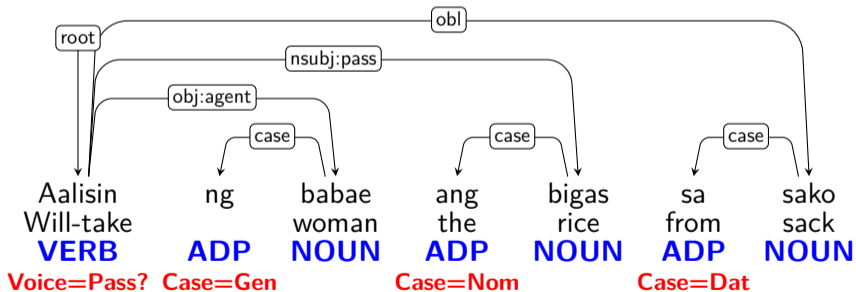
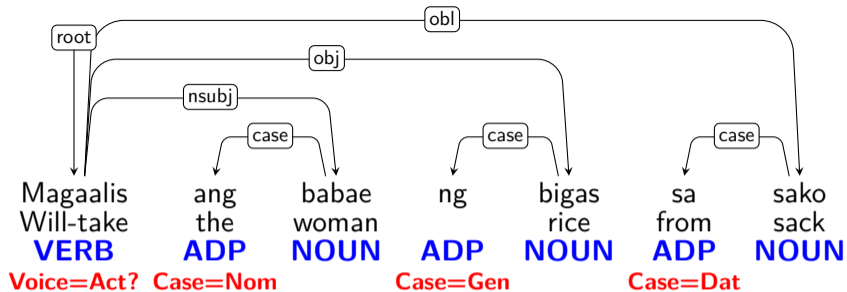


Original P is now oblique and original A is now S.



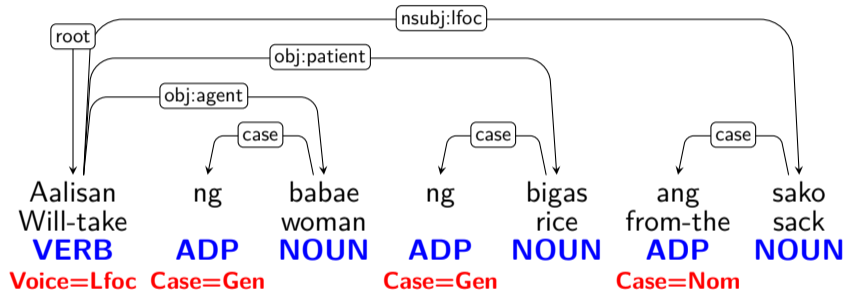
# Tagalog Transitive Clauses





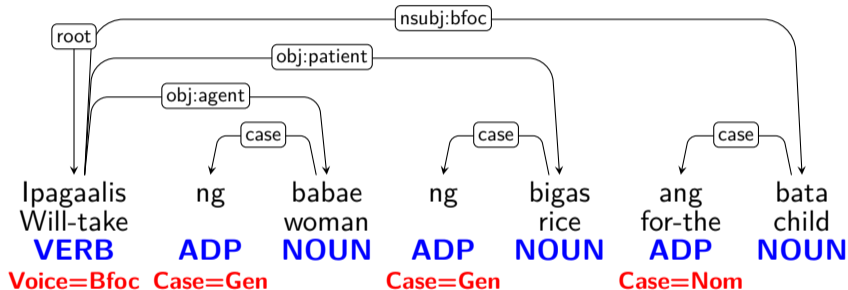


# Tagalog Locative Voice $\Rightarrow$ Ditransitive!



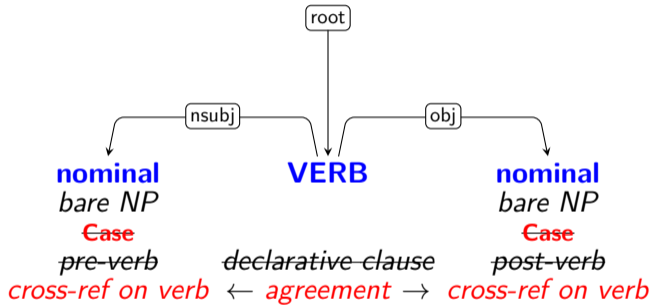


# Tagalog Benefactive Voice $\Rightarrow$ Ditransitive!



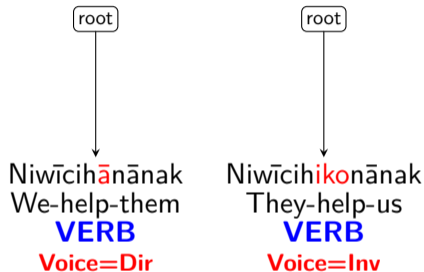


# Plains Cree Transitive Clauses





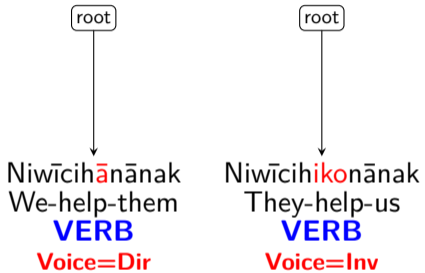
## Direct-Inverse Voice in Plains Cree



Animacy hierarchy: 1st person > 3rd person



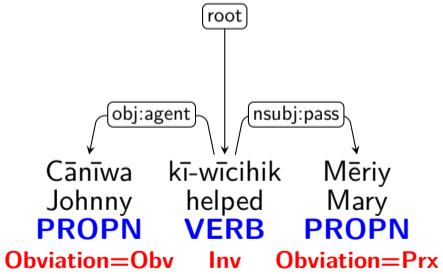
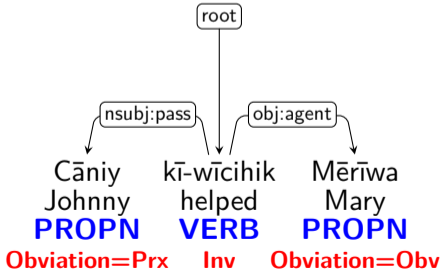
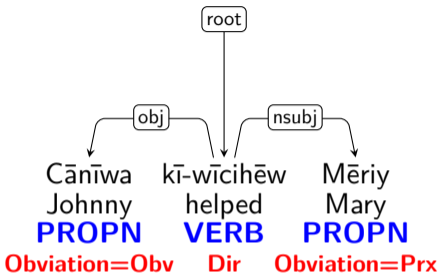
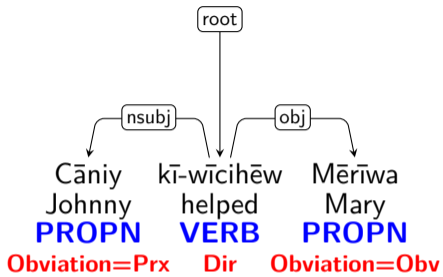
# Direct-Inverse Voice in Plains Cree



Animacy hierarchy: 1st person > 3rd person  
 Should we set **nsubj** > **obj**?

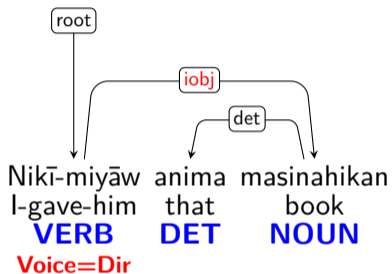


# Direct-Inverse Voice in Plains Cree





## Plains Cree Ditransitive Clauses



The **theme** (not the recipient) is indirect object because it is not cross-referenced on the verb (it is **inanimate**, while the verb references an animate object).

## Summary

- Universal Dependencies
  - Unified annotation for all languages
    - Language-specific extensions
  - Content words higher than function words ... better parallelism
  - Clauses – nominals – modifier words
  - Core arguments vs. oblique dependents

<https://ufal.cz/courses/npfl075>