

Syntax in Universal Dependencies

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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

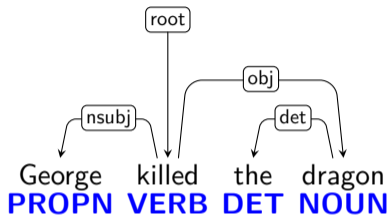


The secret to understanding UD is to realize that the design is a very subtle compromise between approximately 6 things:

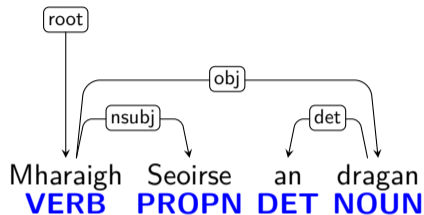
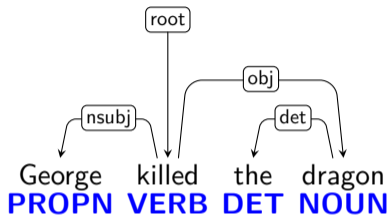
- 1 UD must be satisfactory on linguistic analysis grounds for **individual languages**.
- 2 UD must be good for linguistic **typology**, i.e., providing a suitable basis for bringing out cross-linguistic parallelism across languages and language families.
- 3 UD must be suitable for **rapid, consistent 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.

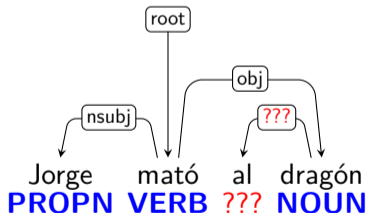
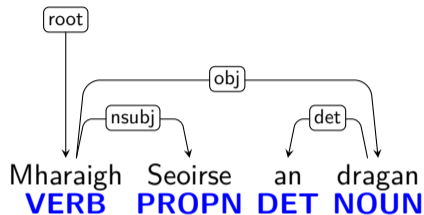
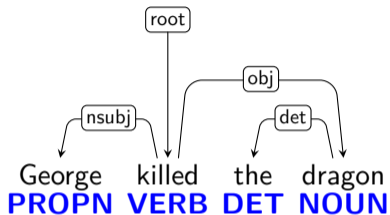
Same Thing Same Way



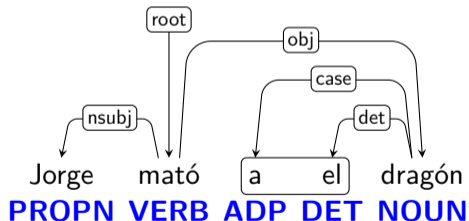
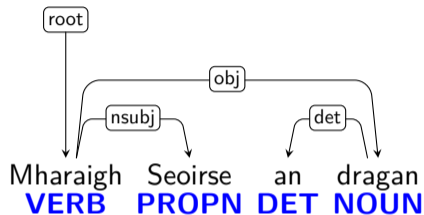
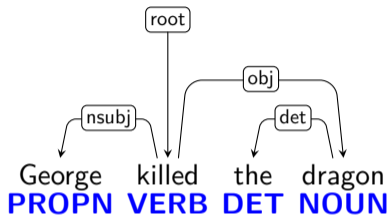
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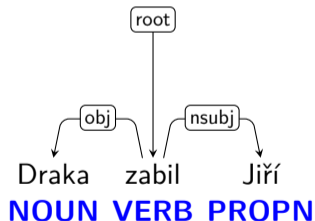
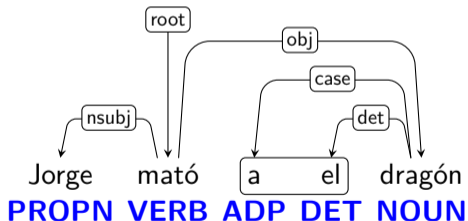
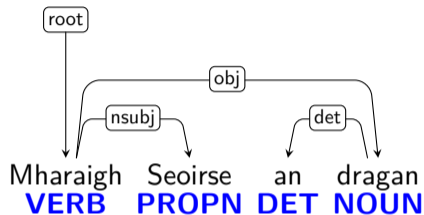
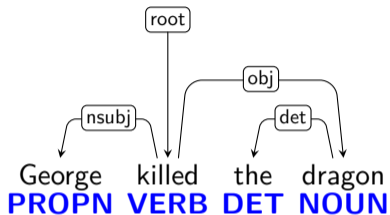
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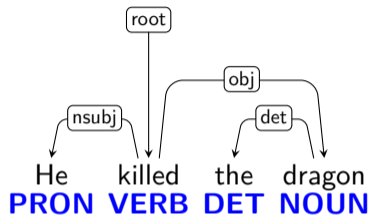
Same Thing Same Way



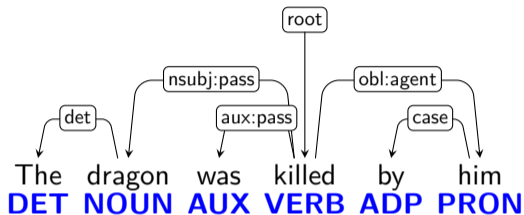
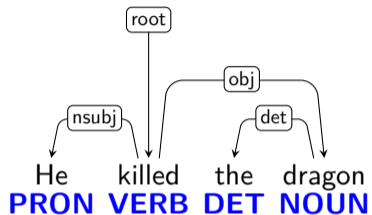
Same Thing Same Way



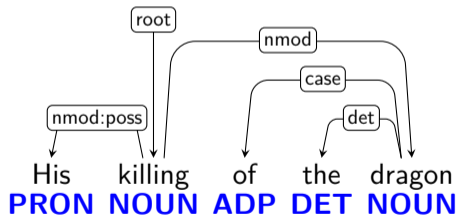
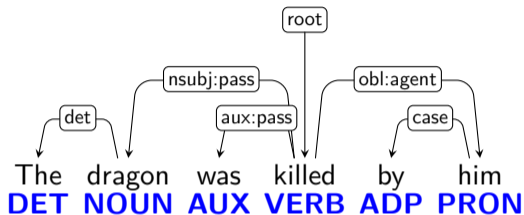
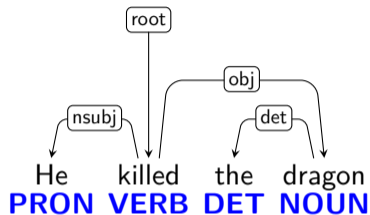
Same Meaning \neq Same Construction!



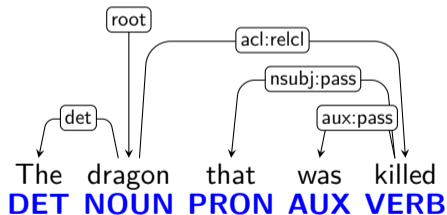
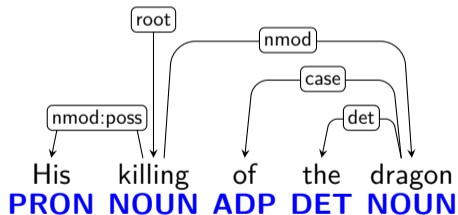
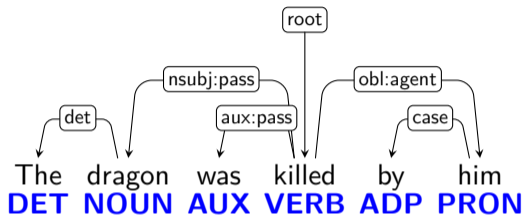
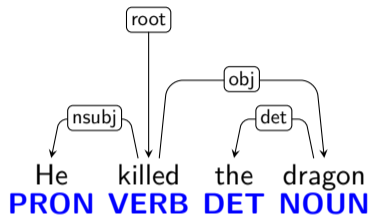
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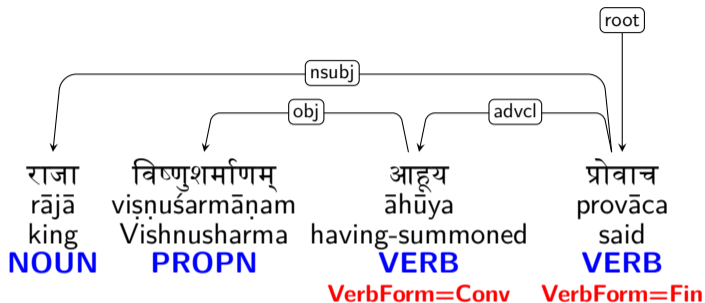
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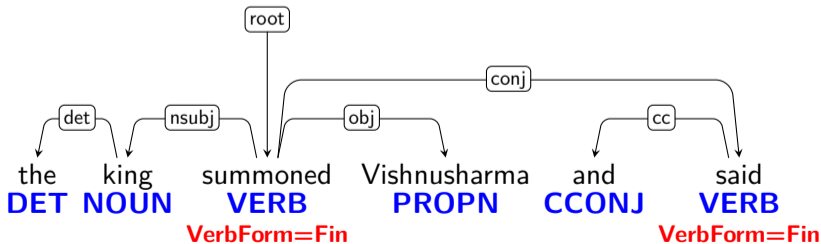
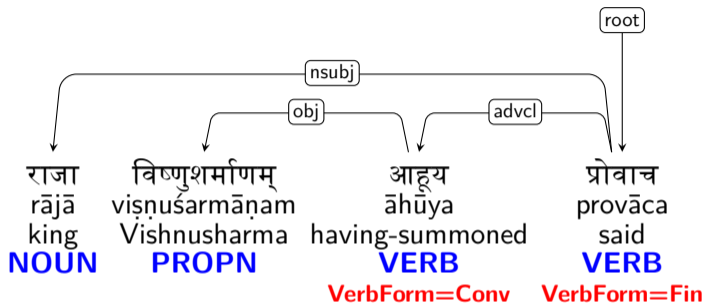
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Language-specific Preferences



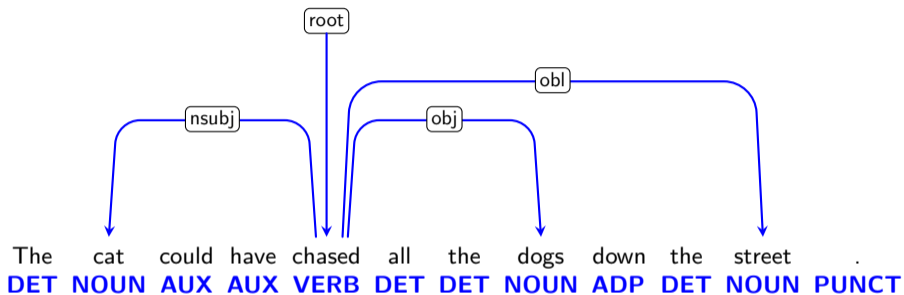
Language-specific Preferences



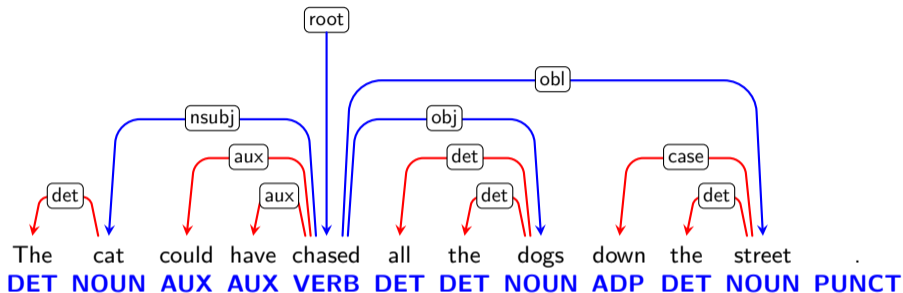
Syntax Tour

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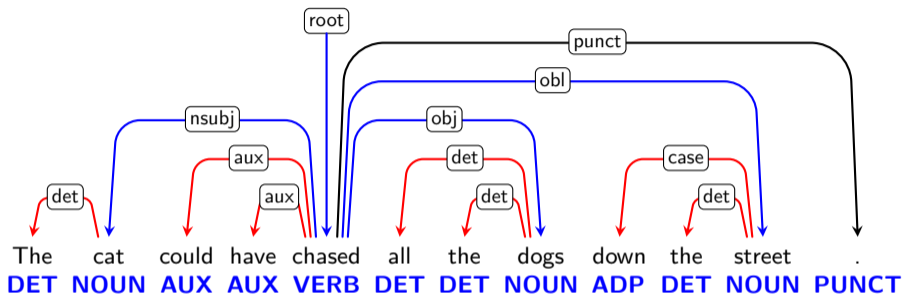
The cat could have chased all the dogs down the street .
DET NOUN AUX AUX VERB DET DET NOUN ADP DET NOUN PUNCT



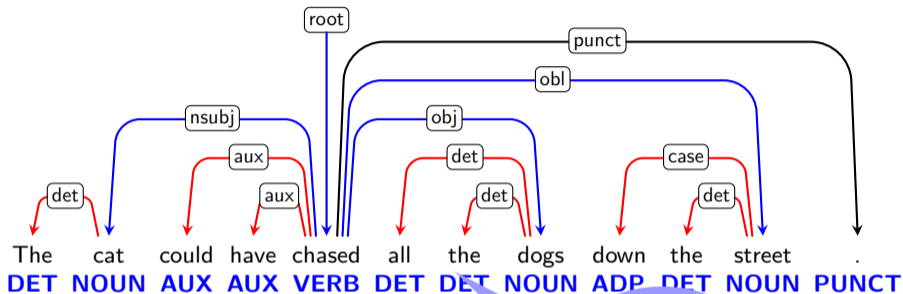
- Content words are related by dependency relations



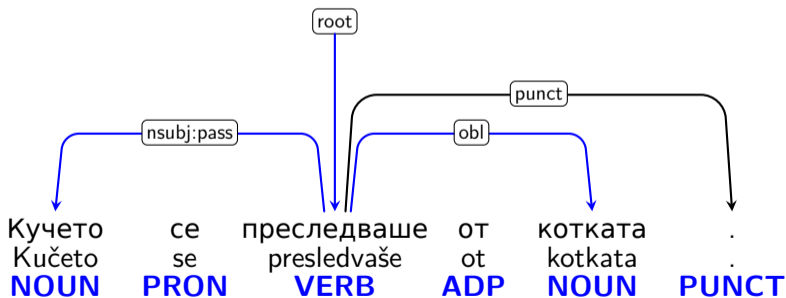
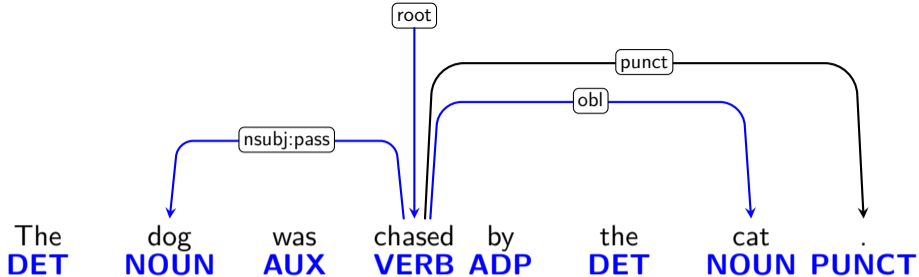
- Content words are related by dependency relations
- Function words attach to closest content words

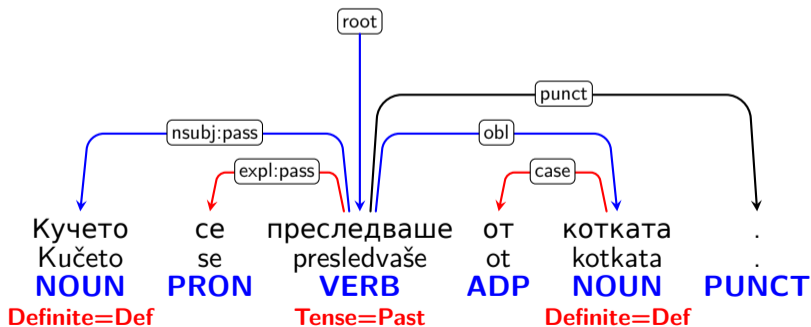
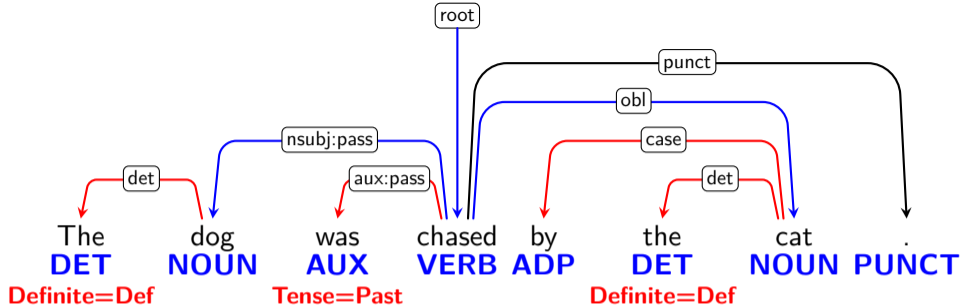


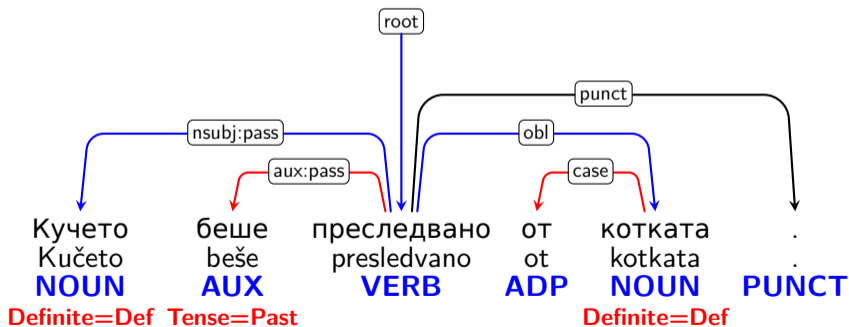
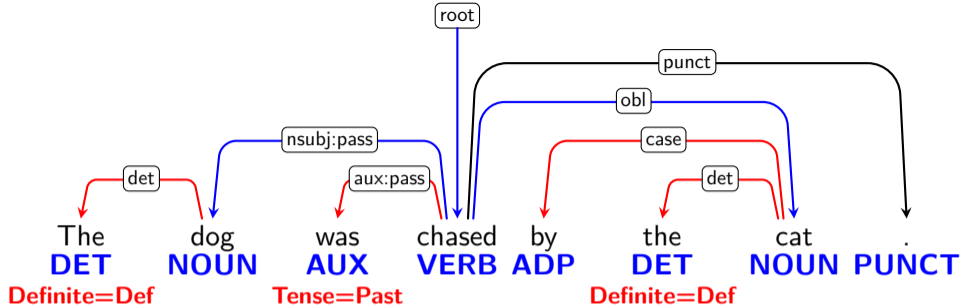
- Content words are related by dependency relations
- Function words attach to closest content words
- Punctuation attach to head of phrase or clause

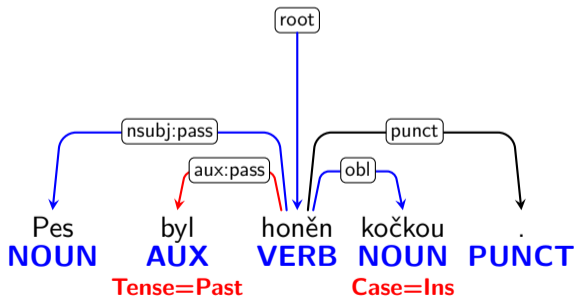
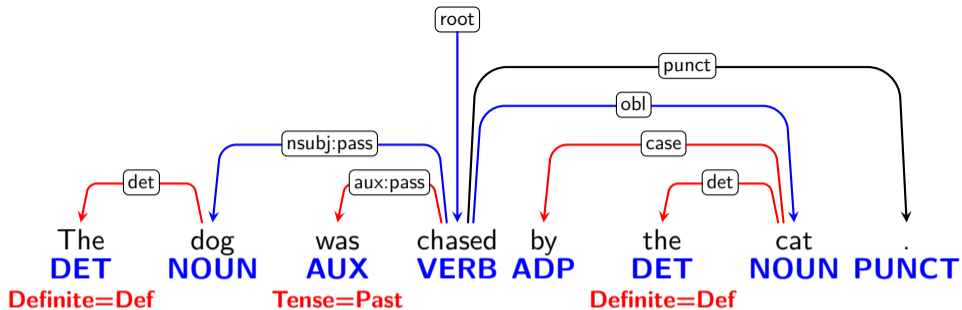


Not
"dependency"
in the strictly
syntactic
sense!









Dependents of Clauses (Verbal or Not)

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

Dependents of Verbs, Adjectives and Adverbs

	Nominal	Clausal	Modifier
Core	obj iobj	ccomp xcomp	
Non-Core	obl 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

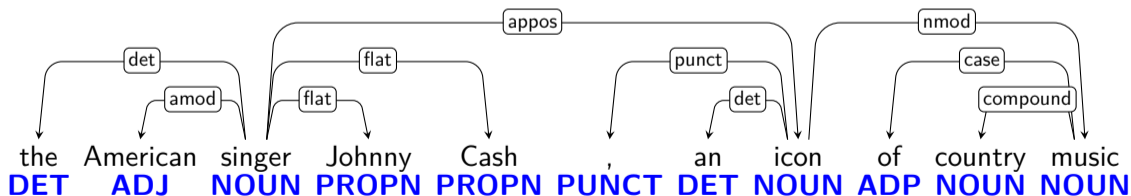
nummod

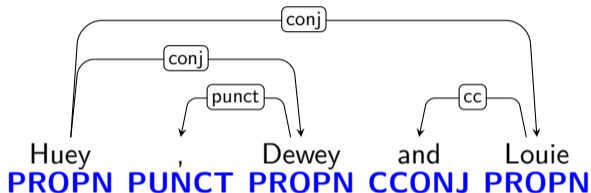
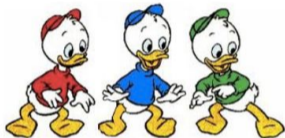
Function

det

case

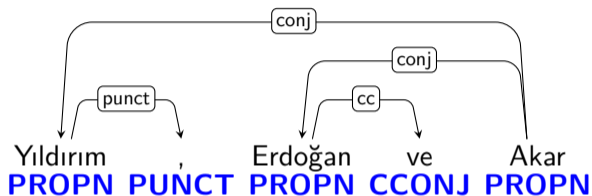
clf





- 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

Relation	Explanation
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

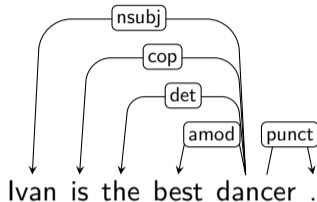
Relation	Explanation
acl:relcl	Relative clause (the boy who lived)
compound:prt	Verb particle (dress up)
nmod:poss	Possessive nominal (Mary 's book)
obl:agent	Agent in passive (saved by the bell)
cc:preconj	Preconjunction (both ... and)
det:predet	Predeterminer (all those ...)

Copula

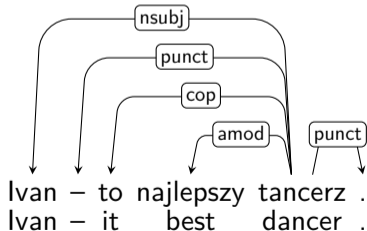
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Nonverbal Predicate and Copula

- Some languages use a copula verb:

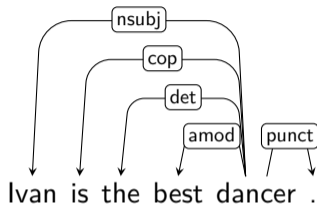


- Some languages use a copula **pronoun**:

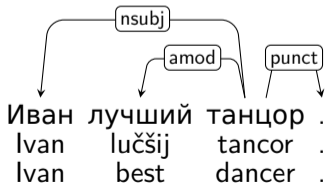


Nonverbal Predicate and Copula

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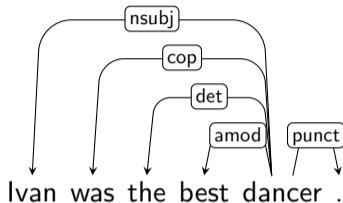


- Some languages **omit the copula**:

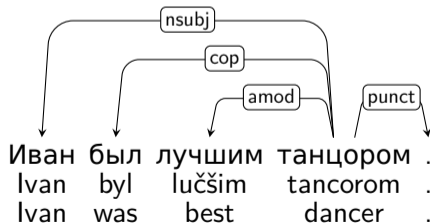


Nonverbal Predicate and Copula

- Some languages use a copula verb:



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

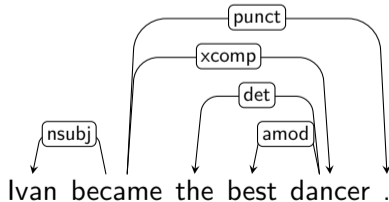


Copula Verbs: We Are Restrictive!

- *To be* is copula:

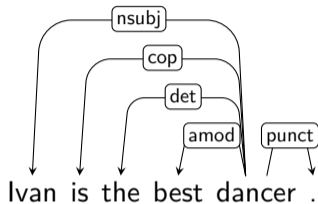


- *To become* is not copula:

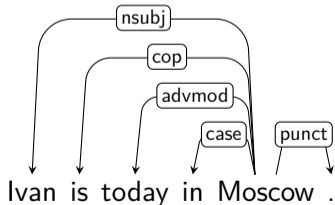


Once Copula, Always Copula!

- This is parallel with Russian:

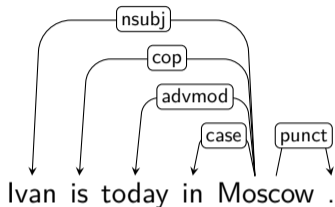


- This is also parallel with Russian:

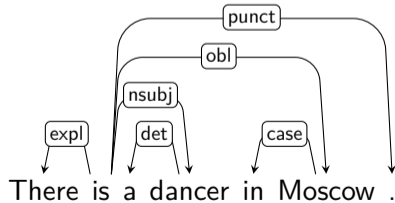


Well, Almost...

- This is parallel with Russian:

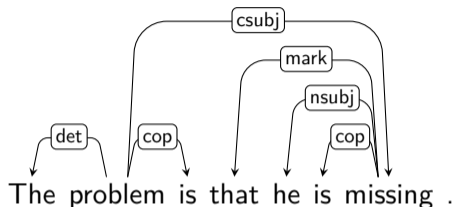


- But not with this in English:

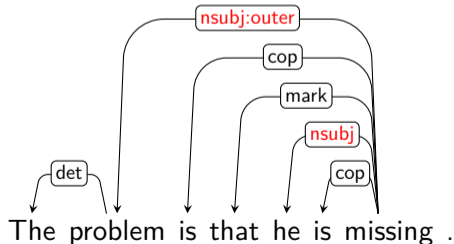


Clauses and Copula

- A clause can be the subject:

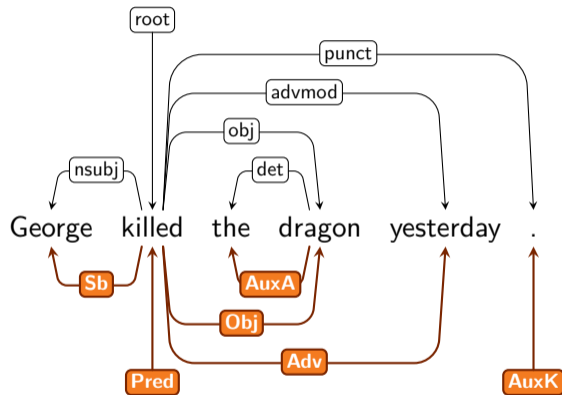


- A clause can be the nonverbal predicate:

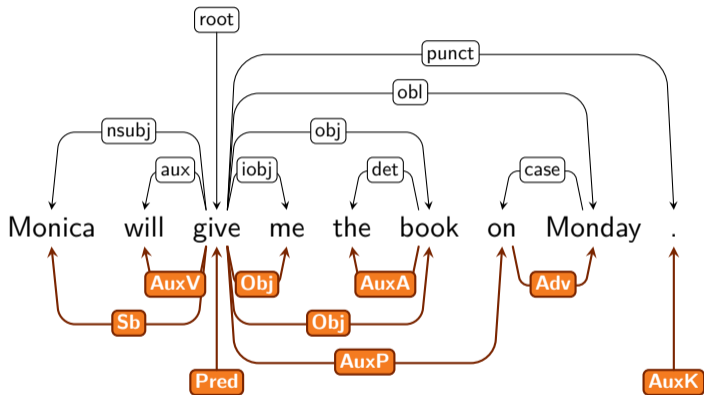


Prague Dependency Trees vs. Universal Dependencies

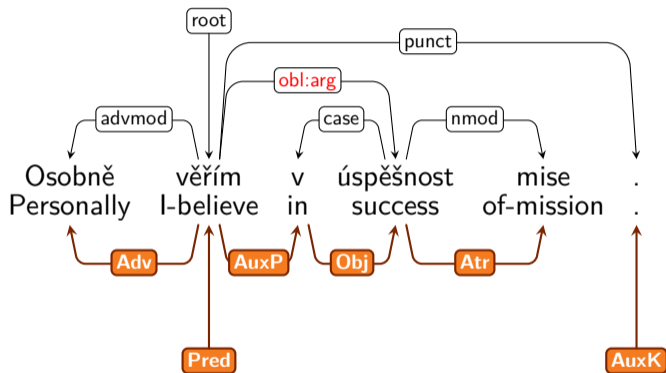
Simple Clauses



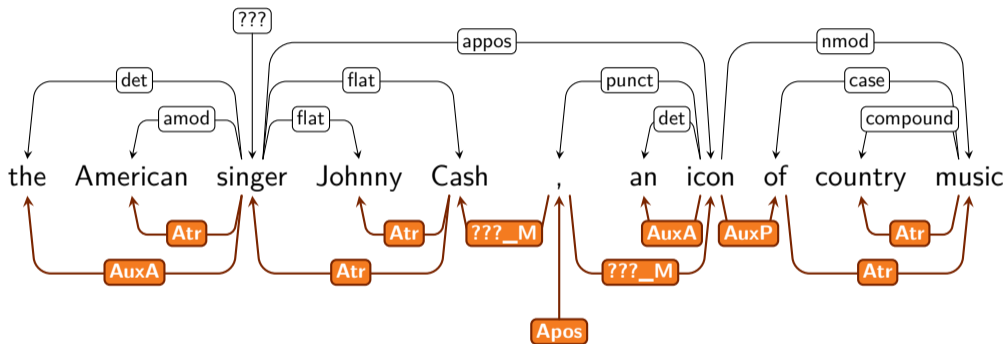
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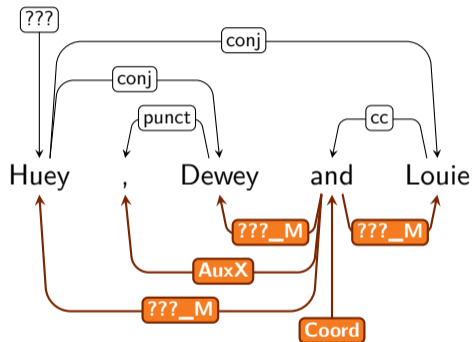
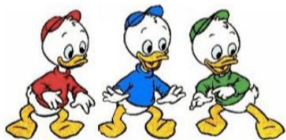
Simple Clauses



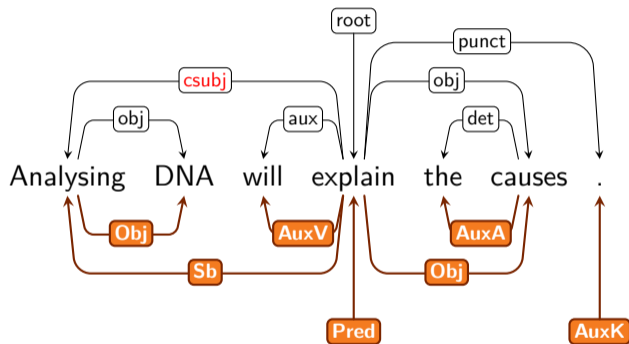
Nominals



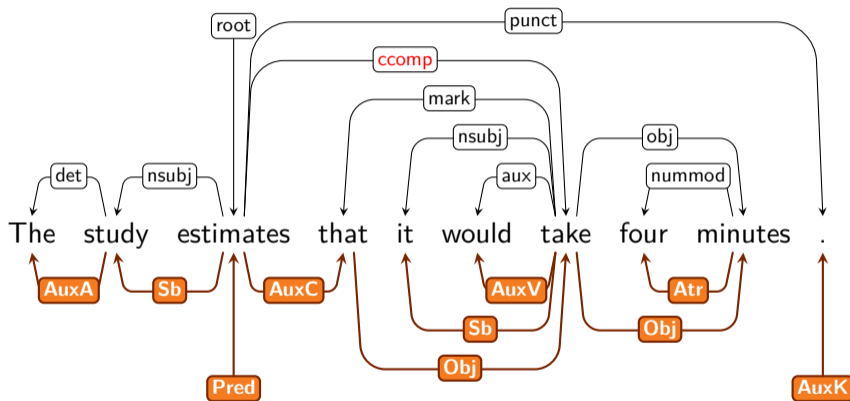
Coordination



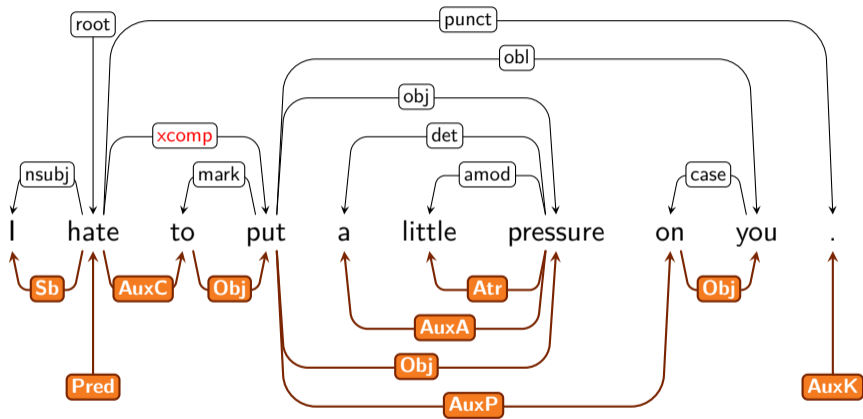
Subject Clauses



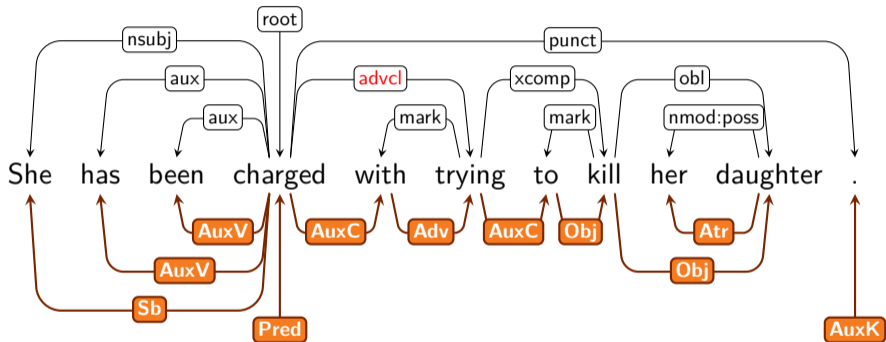
Complement (Object) Clauses



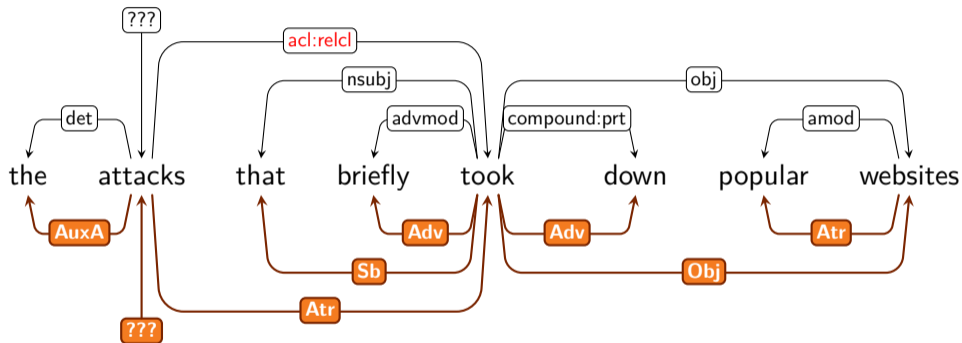
Open Clausal Complements



Adverbial Clauses

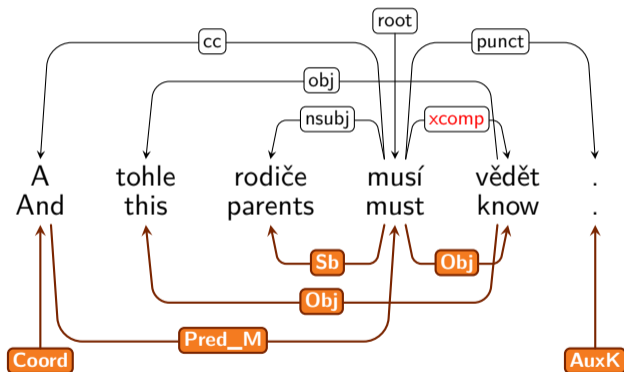


Adnominal Clauses



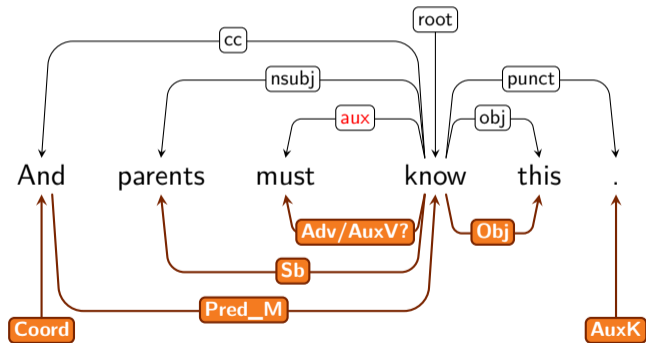
Modal Verbs

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

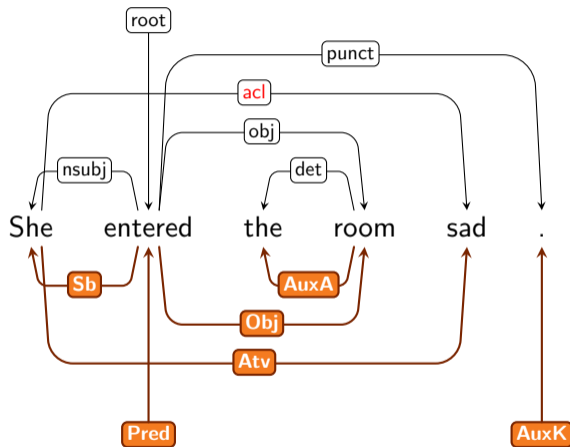


Modal Verbs

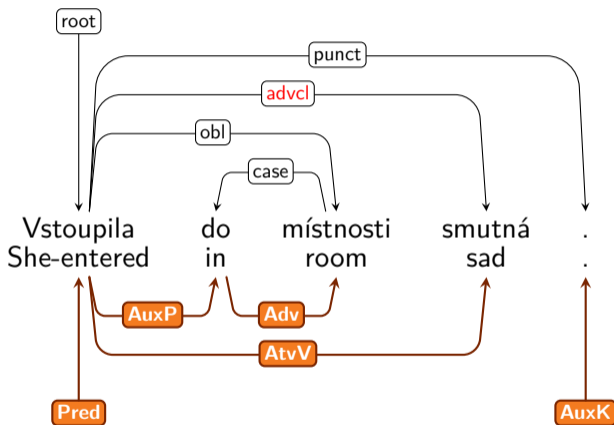
- In English UD, modal verbs are considered auxiliary
⇒ modal verb + infinitive = 1 clause!
- Analytical layer in PCEDT is estimated automatically from the tectogrammatical layer
⇒ modals come out as adverbial modifiers there.



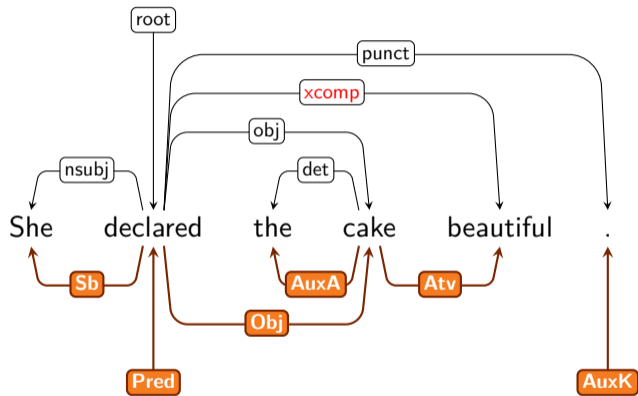
Secondary Predication (“Doplněk” in Czech Grammar)



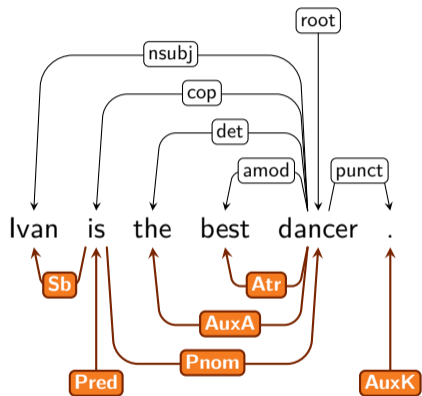
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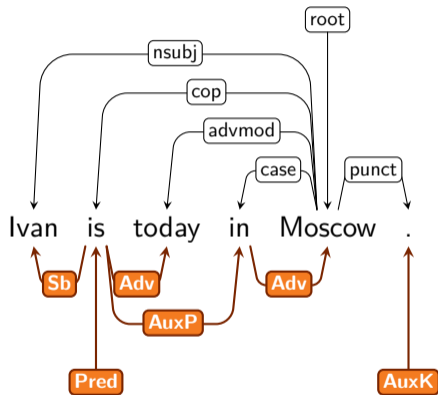
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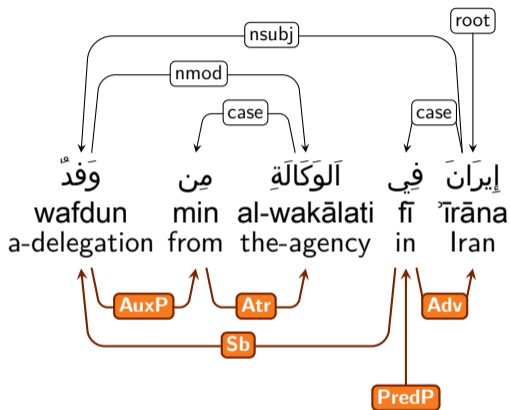
Nonverbal Predicates with Copulas



Locative Predicates with Copulas

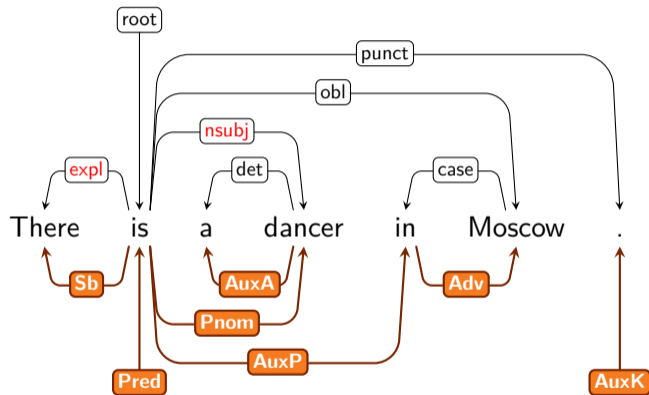


Nonverbal Predicates without Copula

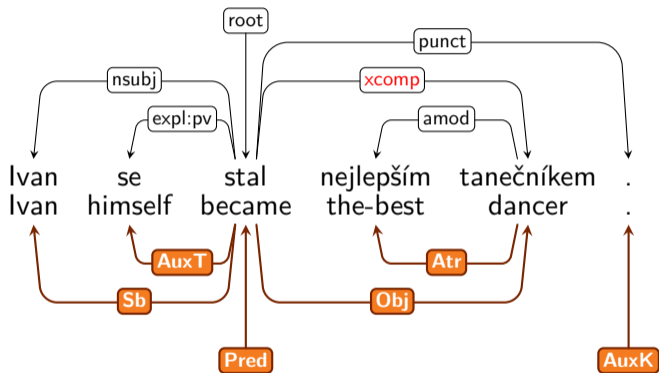


“A delegation from the Agency is in Iran.”

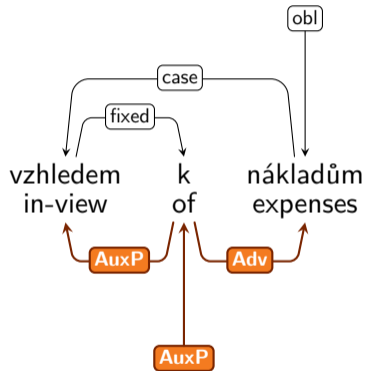
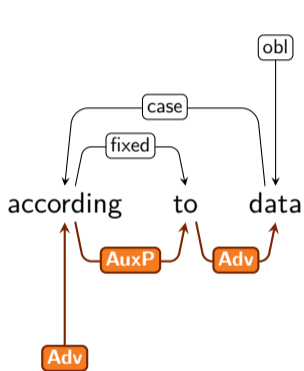
English Existential Clauses



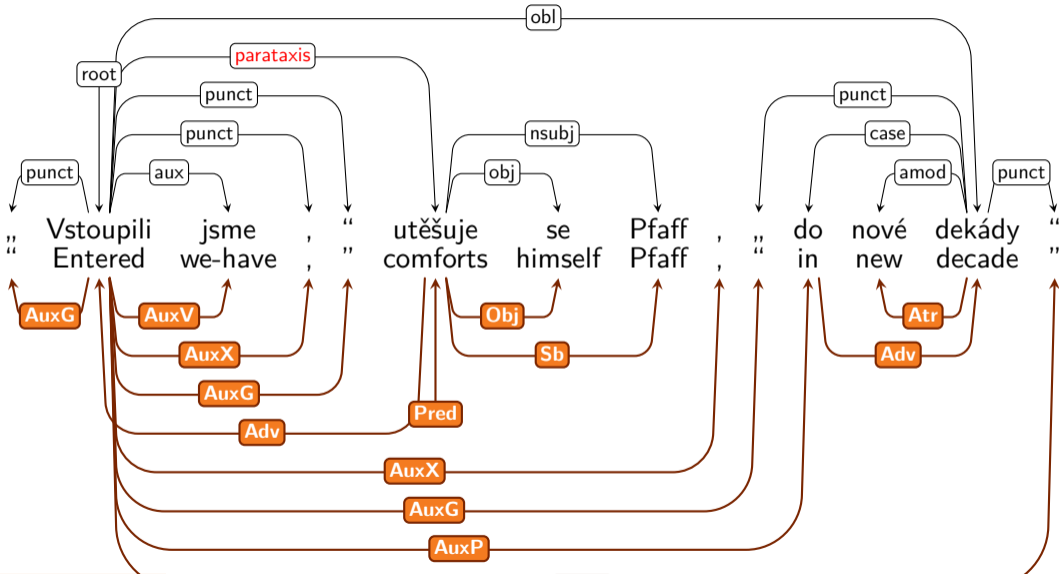
Pseudo-Copulas

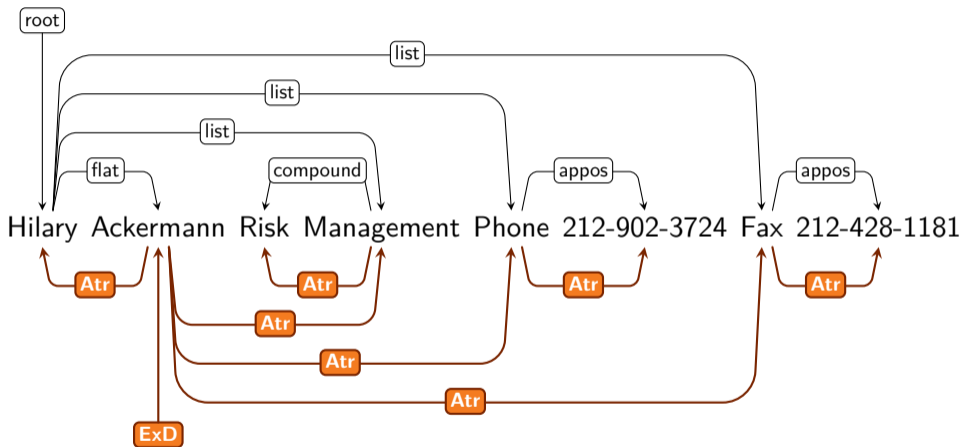


Fixed Multiword Expressions



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	nsubj	csubj		
Non-Core	obl vocative dislocated expl	advcl	advmod discourse	aux cop mark

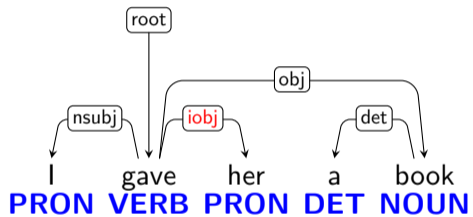
Dependents of Verbs, Adjectives and Adverbs

	Nominal	Clausal	Modifier
Core	obj iobj	ccomp xcomp	
Non-Core	obl expl	advcl	advmod

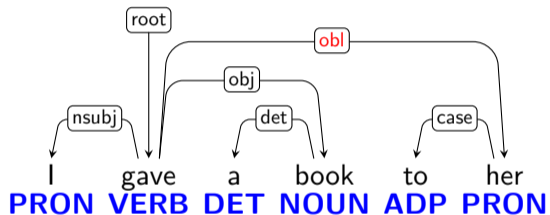
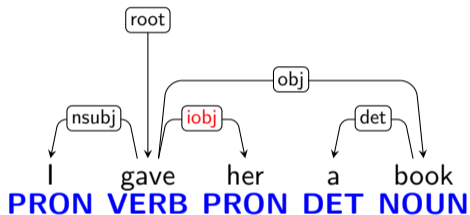
Dependents of Nominals

	Nominal	Clausal	Modifier	Function
	nmod appos	acl	amod nummod	det case

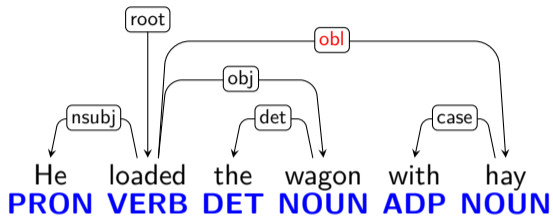
Information Packaging



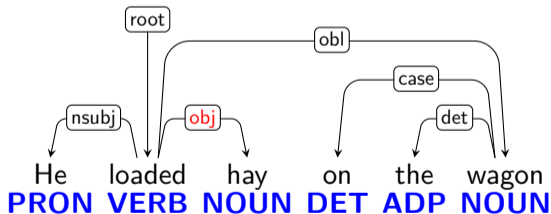
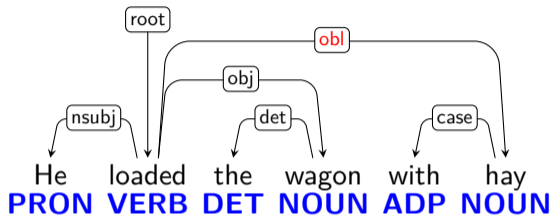
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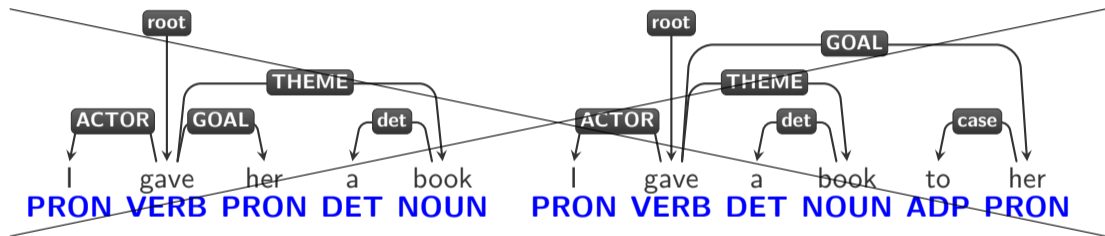
Information Packaging



Information Packaging



UD is NOT about Semantic Roles!



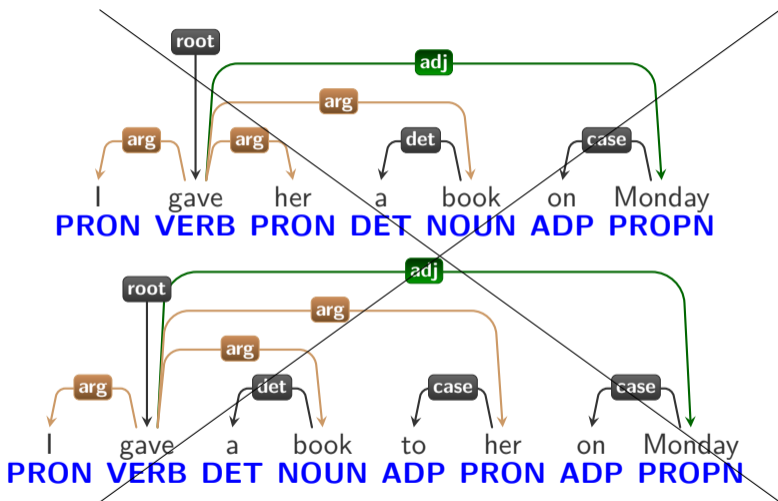
Manning's Law – What If We Do Semantic Roles?

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:
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- BUT:
 - Cannot be eliminated completely
 - Some people/data have it and want to keep it
 - It aligns well with traditional grammars
 - \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)
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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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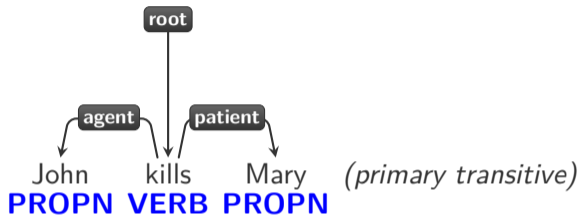
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 - Actor/agent = function **A**
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 - Note the way they are coded
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 - Generalize to other predicates with same coding and rules
- Then define:
 - function **A** \Rightarrow **nsubj**
 - function **P** \Rightarrow **obj**

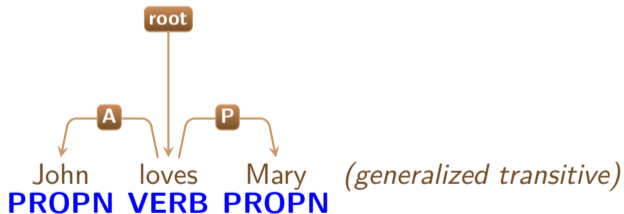
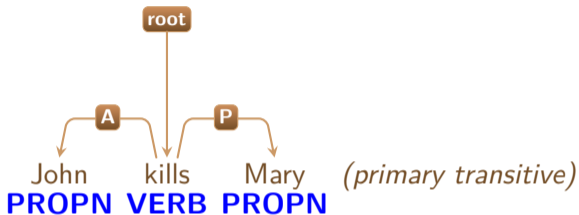


Transitive Predicates in English



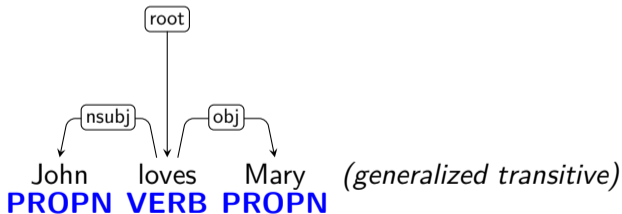
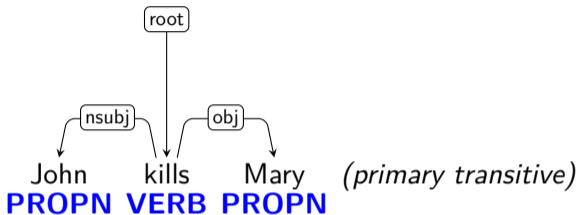


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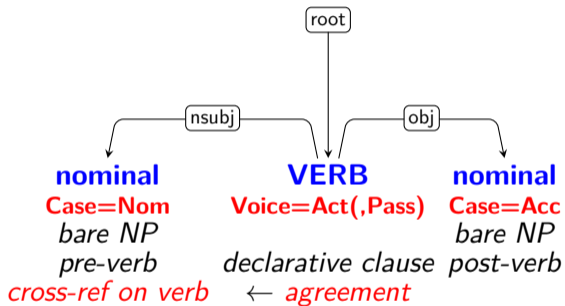


Transitive Predicates in English



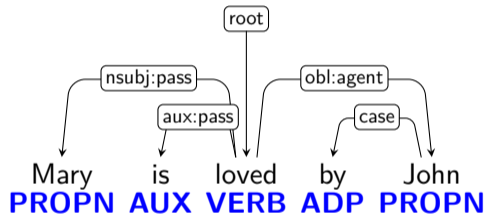
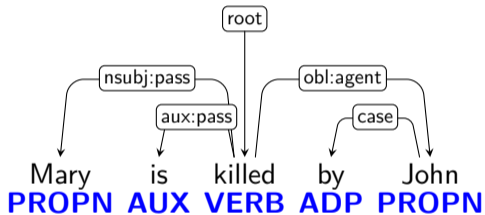


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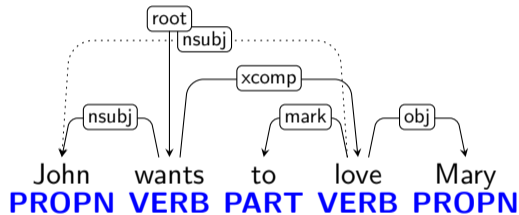
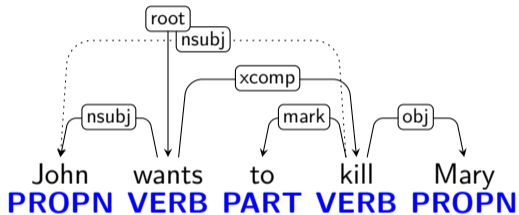


Passivization in English



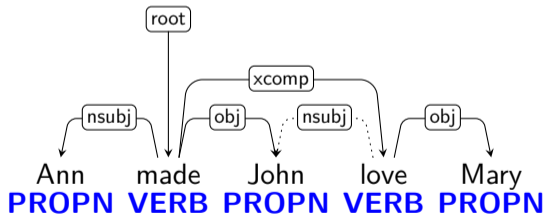
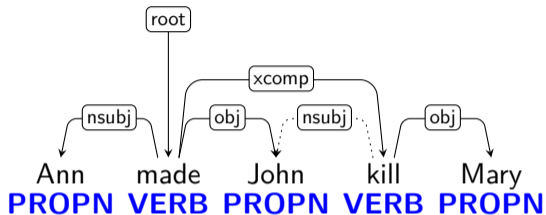


Subject Control in English





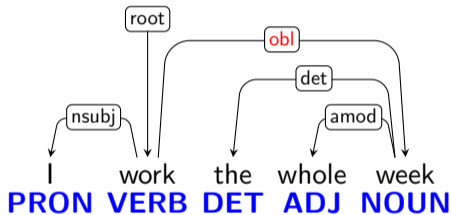
Object Control in English





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...



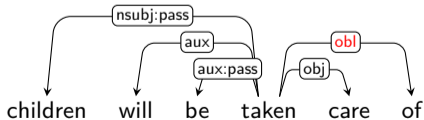
Some Problems

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

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- Semantic roles needed when starting a new language
- Argument-adjunct might help with exceptions
 - Although we managed to explain *the whole week* without it



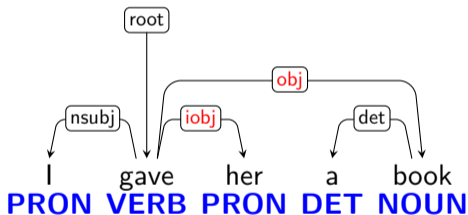
Intransitive Predicates

- 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**

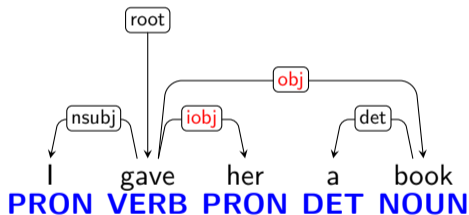


- Passivization:
 - *She* was given a book by me.
 - *?A book* was given her by me.



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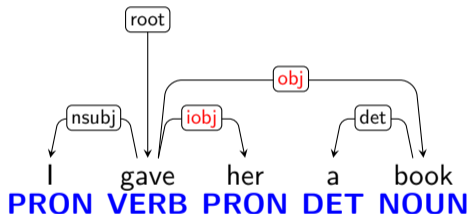


- Fronting in questions:
 - *What did I give her?*
 - **Who did I give a book?*

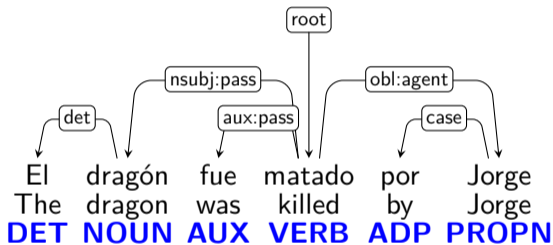
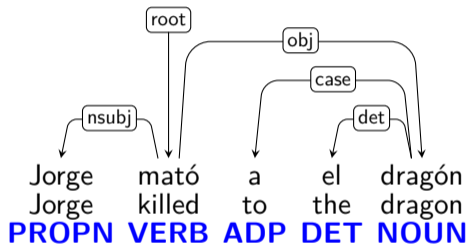


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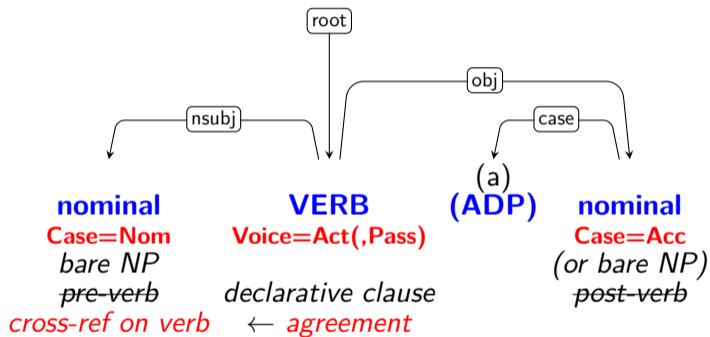


- Andrews (2007): *the status of the notion of 'indirect object' is problematic and difficult to sort out. The top priority is to work out what properties recipients and themes do and do not share with P arguments of primary transitive verbs.*



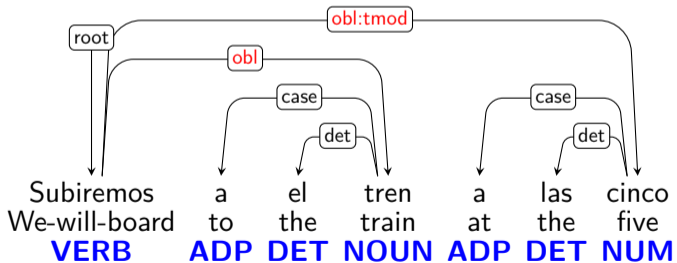
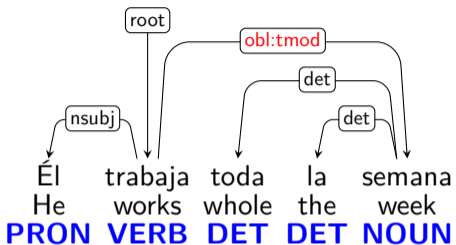


Spanish Transitive Clauses



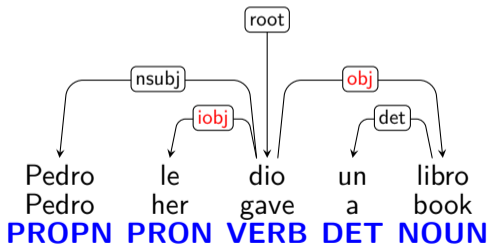
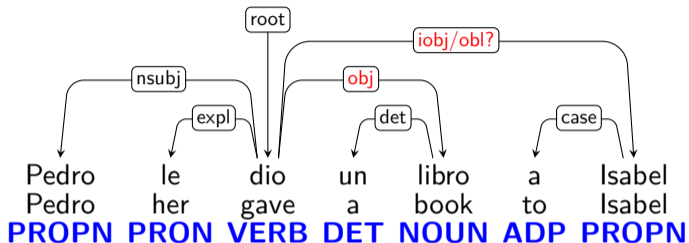


Spanish Adjunct Exceptions



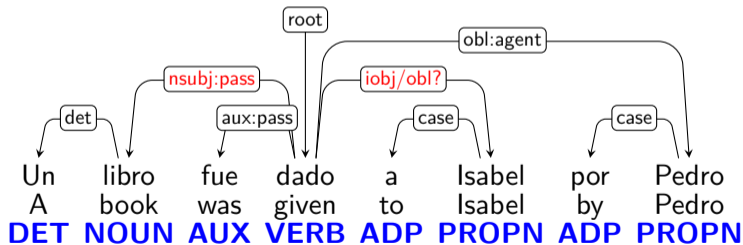
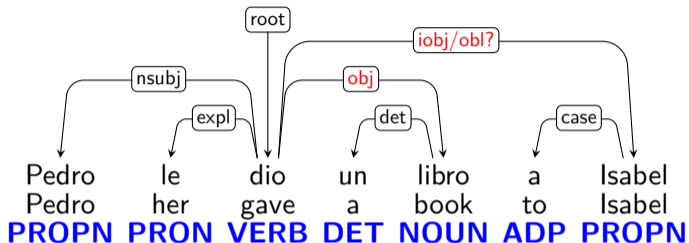


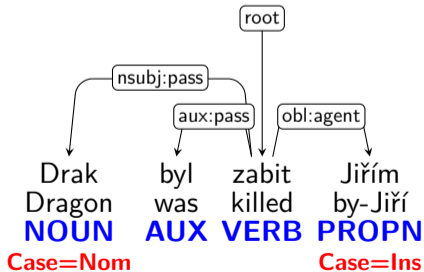
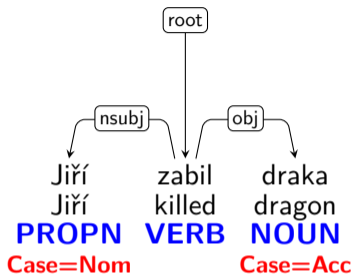
Spanish Ditransitive Clauses





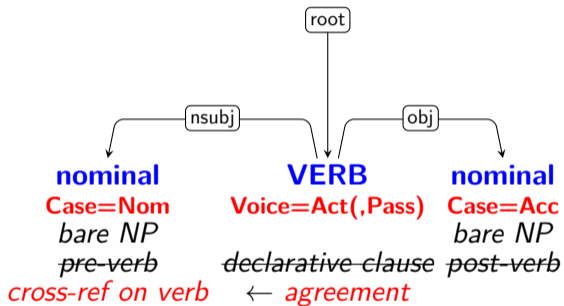
Spanish Ditransitive Clauses





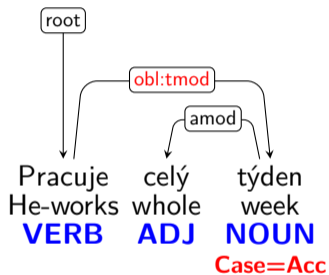


Czech Transitive Clauses



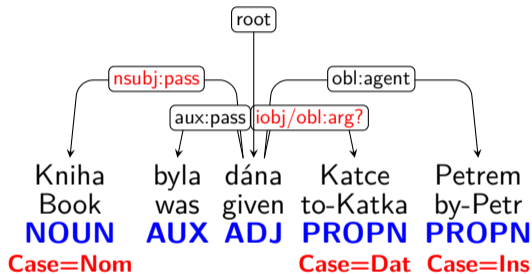
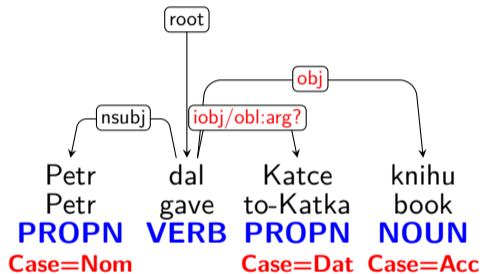


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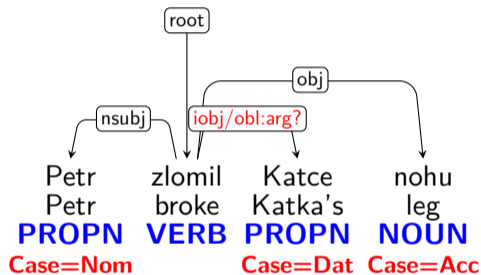
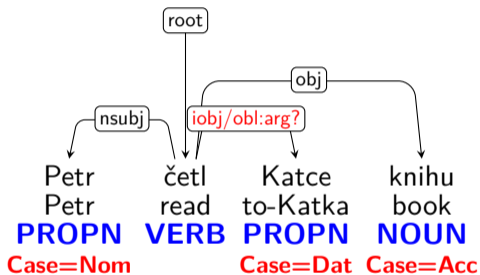




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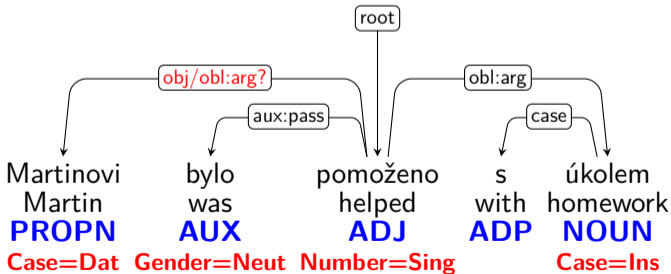
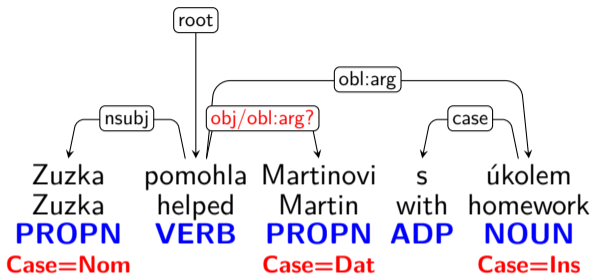


Dative: Recipient vs. Beneficiary



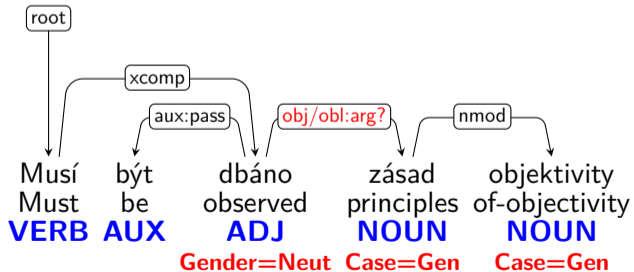
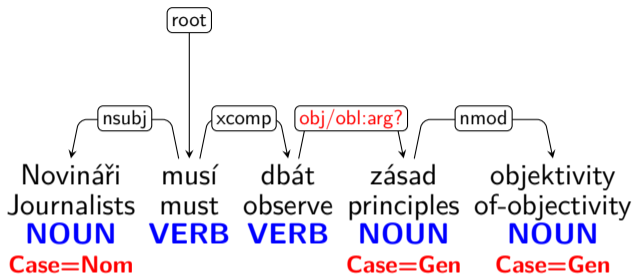


Monotransitive with Dative?



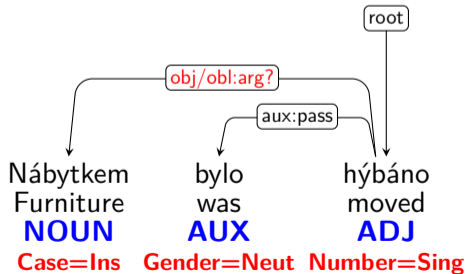
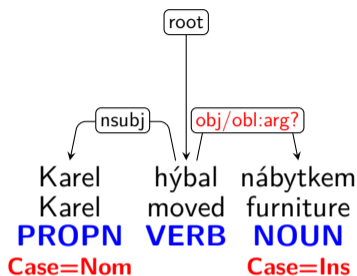


Monotransitive with Genitive?

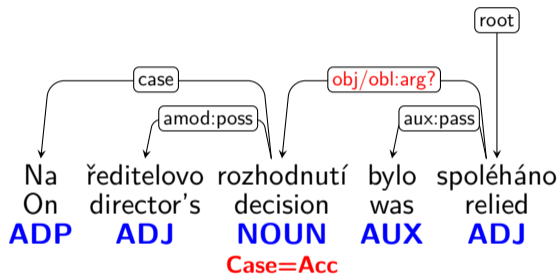
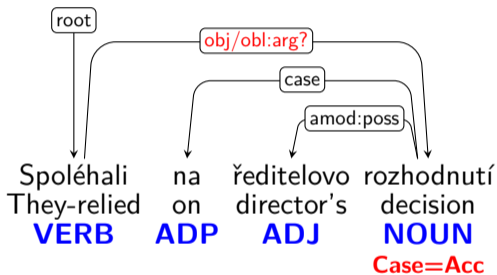




Monotransitive with Instrumental?



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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 - **Nom, Acc, Gen, Dat, Ins** > **ADP + adjuncts**
- UD Czech 2.6 (May 2020):
 - **Nom, Acc** > **Gen, Dat, Ins, ADP + adjuncts**



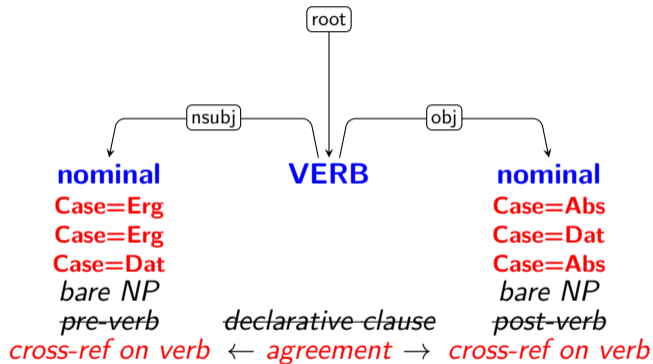
Tentative Summary 2



- There is a core-oblique scale:
- **Nom** > **Acc** > **Gen,Dat** > **Ins** > **preposition**
- Where is the borderline?
- UD Czech 1.0: object = argument
 - **Nom, Acc, Gen, Dat, Ins, ADP** > “adverbial”
- UD Czech 2.1–2.5: bare NP > PP
 - **Nom, Acc, Gen, Dat, Ins** > **ADP + adjuncts**
- UD Czech 2.6 (May 2020):
 - **Nom, Acc** > **Gen, Dat, Ins, ADP + adjuncts**
 - \Rightarrow No ditransitives in Czech!
 - (Exception: *učit* “to teach” takes two Acc.)

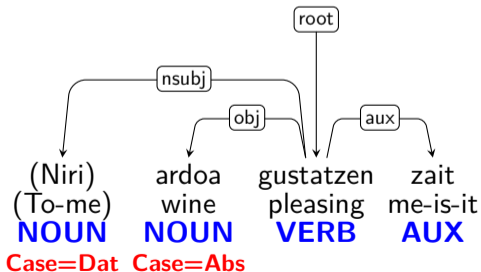
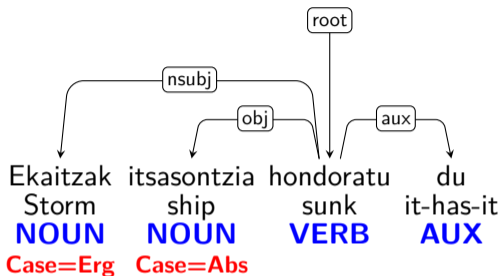


Basque Transitive Clauses



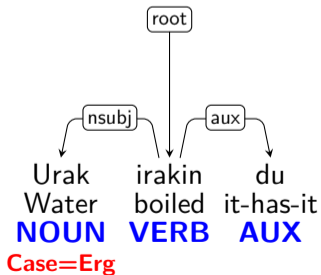
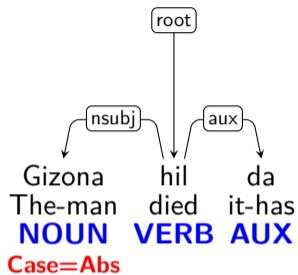


Basque Transitive Clauses



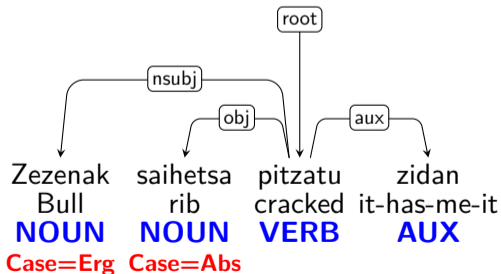
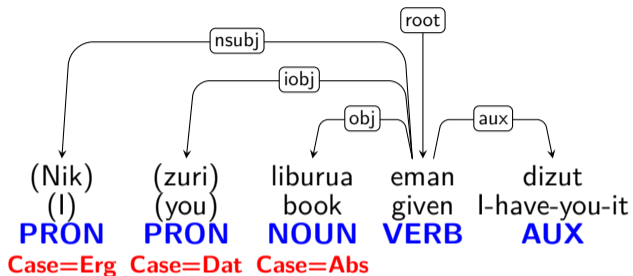


Basque Intransitive Clauses



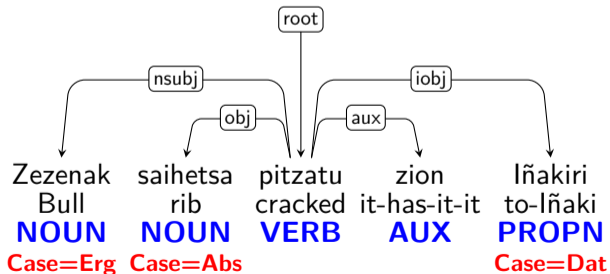
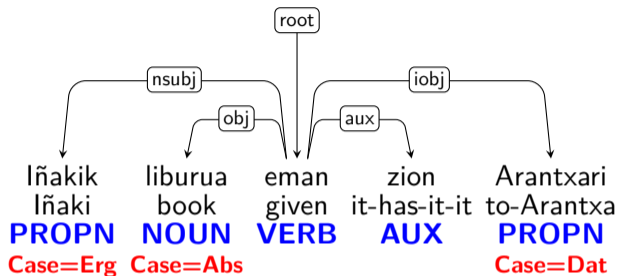


Basque Ditransitive Clauses



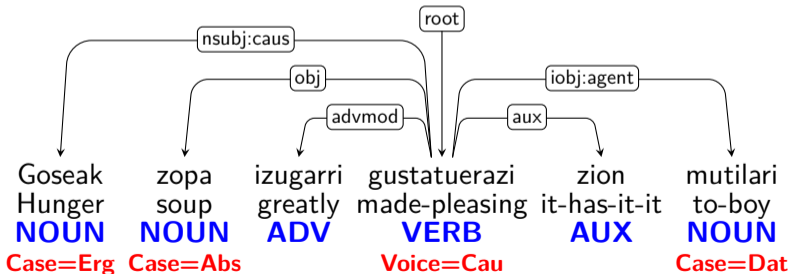
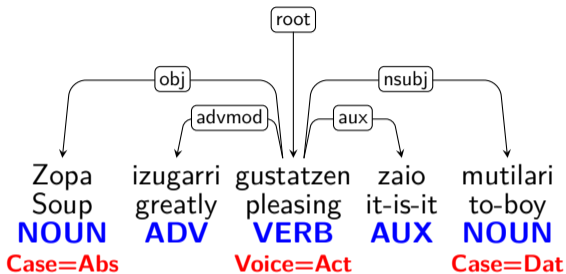


Basque Ditransitive Clauses



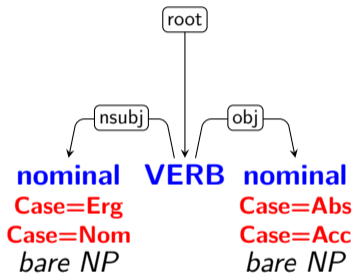


Basque Causative Applied to Dative Subject



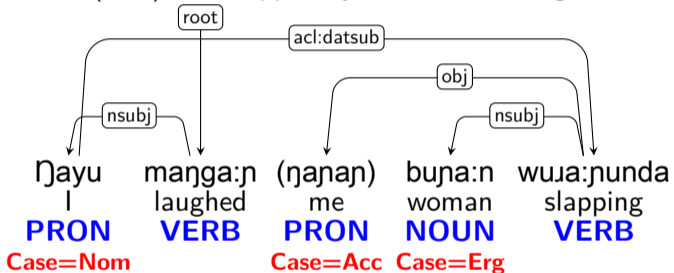


Yidj Transitive Clauses



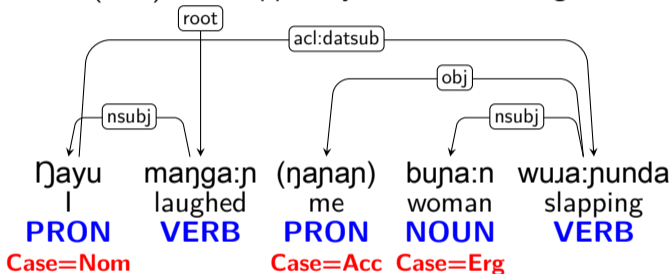
Yidinj “Dative” Adnominal Clauses

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



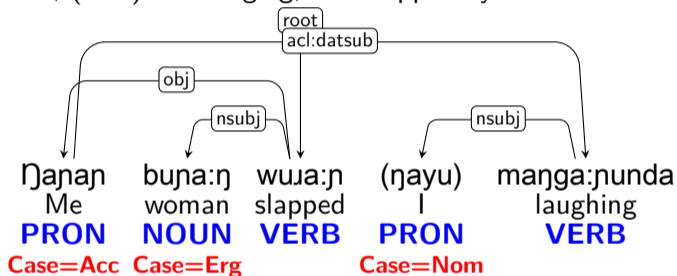
Yidinj “Dative” Adnominal Clauses

“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”

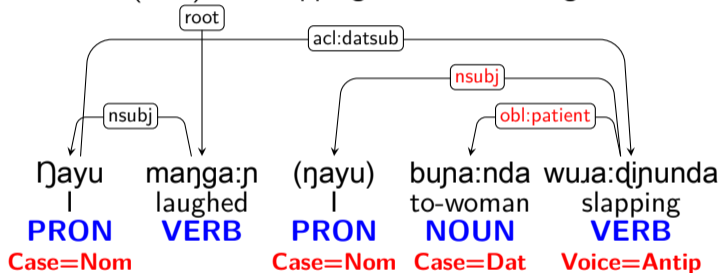


The coreferential (and elidable) NP must have **S** or **P** function.



Yidj Antipassive

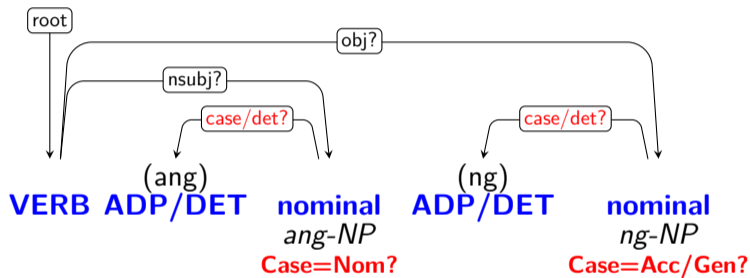
“I, (who) was slapping the woman, laughed”

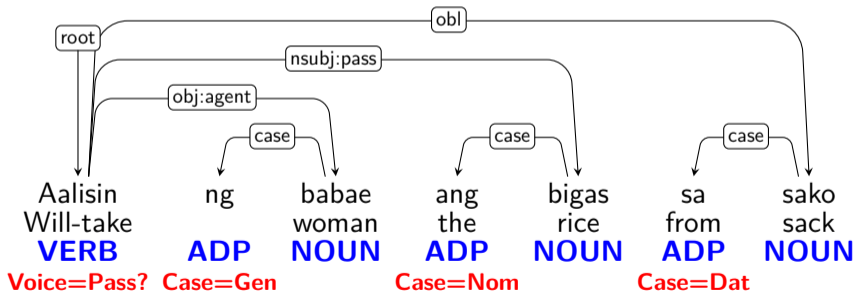
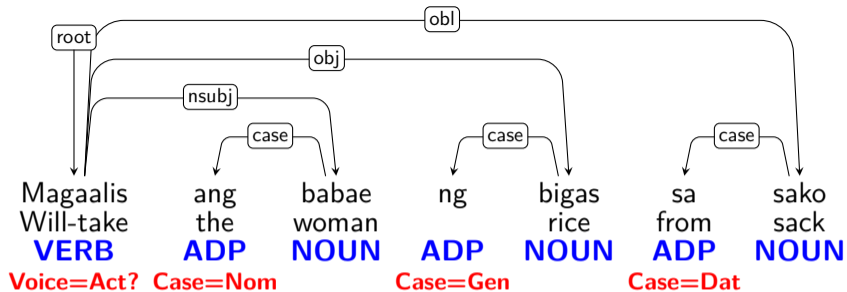


Original P is now oblique and original A is now S.



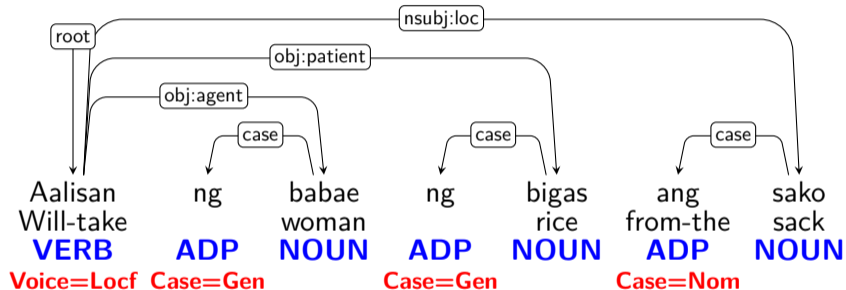
Tagalog Transitive Clauses





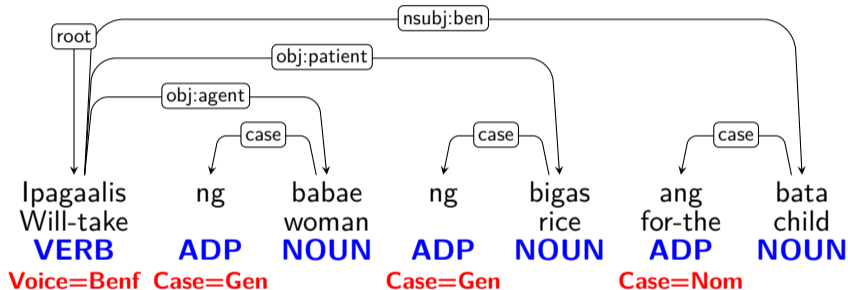


Tagalog Locative Voice \Rightarrow Ditransitive!



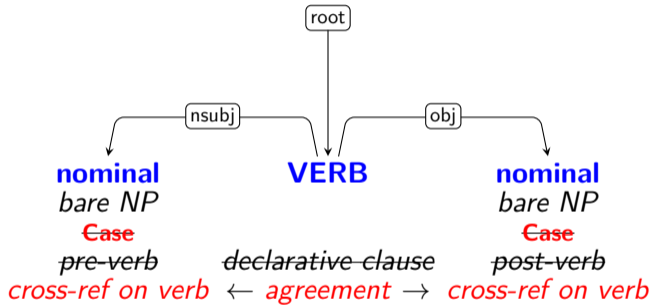


Tagalog Benefactive Voice \Rightarrow Ditransitive!



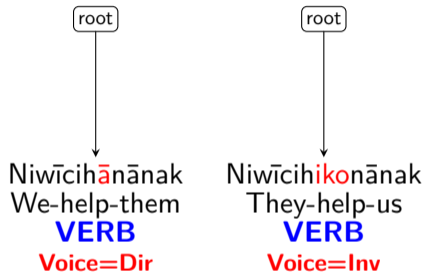


Plains Cree Transitive Clauses





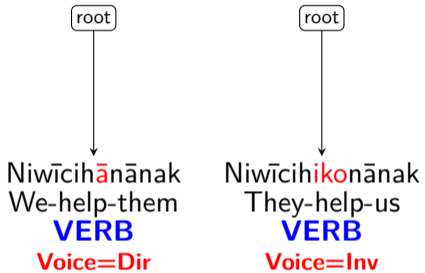
Direct-Inverse Voice in Plains Cree



Animacy hierarchy: 1st person > 3rd person



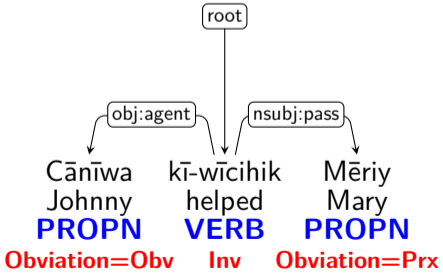
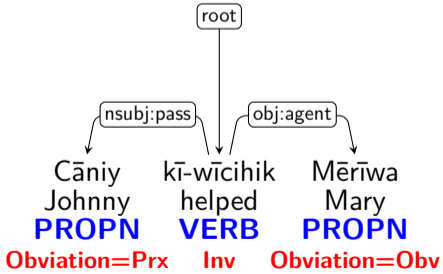
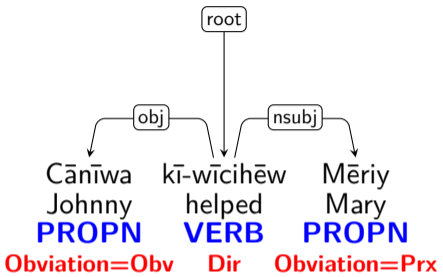
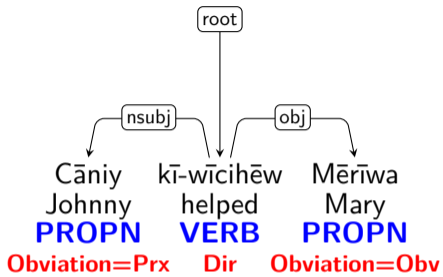
Direct-Inverse Voice in Plains Cree



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

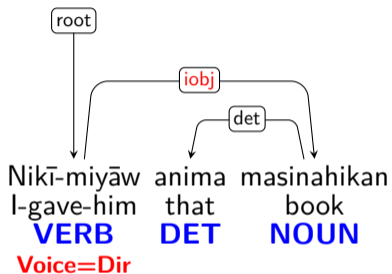


Direct-Inverse Voice in Plains Cree





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>