Syntax in Universal Dependencies

Daniel Zeman

April 1, 2020
Outline

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

George killed the dragon

PROPN VERB DET NOUN
Same Thing Same Way

George killed the dragon

Mharaigh Seoirse an dragan

Syntax in Universal Dependencies

Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies  Core vs. Oblique
Same Thing Same Way

George killed the dragon

Mharaigh Seoirse an dragan

Jorge mató al dragón
Same Thing Same Way

George killed the dragon

Mharaigh Seoirse an dragan

Jorge mató a el dragón
Same Thing Same Way

George killed the dragon
Mharaigh Seoirse an dragan

Jorge mató a el dragón
Draka zabil Jiří

Syntax in Universal Dependencies
Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies  Core vs. Oblique
4/105
Same Meaning ≠ Same Construction!

He killed the dragon

PRON VERB DET NOUN
Same Meaning ≠ Same Construction!

He killed the dragon.

The dragon was killed by him.

Syntax in Universal Dependencies
Same Meaning ≠ Same Construction!

He killed the dragon

The dragon was killed by him

His killing of the dragon

Syntax in Universal Dependencies

Syntax Tour · Copula · Prague Dependency Trees vs. Universal Dependencies · Core vs. Oblique
Same Meaning ≠ Same Construction!

- **He killed the dragon**
  - **He**: PRON
  - **killed**: VERB
  - **the**: DET
  - **dragon**: NOUN

- **The dragon was killed by him**
  - **The**: DET
  - **dragon**: NOUN
  - **was**: AUX
  - **killed**: VERB
  - **by**: ADP
  - **him**: PRON

- **His killing of the dragon**
  - **His**: PRON
  - **killing**: NOUN
  - **of**: ADP
  - **the**: DET
  - **dragon**: NOUN

- **The dragon that was killed**
  - **The**: DET
  - **dragon**: NOUN
  - **that**: PRON
  - **was**: AUX
  - **killed**: VERB

**Syntax in Universal Dependencies**:
- Same Annotation
- Syntax Tour
- Copula
- Prague Dependency Trees vs. Universal Dependencies
- Core vs. Oblique
राजा विष्णुशर्मान आहुया प्रोवाच
rājā viṣṇuśarmāṇam āhūya provāca
king Vishnusharma having-summoned said
summoned

**Sentence:**
राजा विष्णुशर्मान आहुया प्रोवाच
rājā viṣṇuśarmāṇam āhūya provāca
king Vishnusharma having-summoned said
summoned

**Syntax in Universal Dependencies:**

- **Noun:** राजा (king)
- **Propositional Phrase:** विष्णुशर्मान (Vishnusharma)
- **Verb:** आहुया (having-summoned)
- **Conjunction:** प्रोवाच (said)

**Syntactic Relations:**
- NOUN: राजा (king)
- PROPN: विष्णुशर्मान (Vishnusharma)
- VERB: आहुया (having-summoned)
- VERB: प्रोवाच (said)

- **Verb Form:**
  - आहुया (VerbForm=Conv)
  - प्रोवाच (VerbForm=Fin)
The king summoned Vishnusharma and said, "having summoned Vishnusharma, I say."
Syntax Tour
Outline

1. Same Annotation
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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
The cat could have chased all the dogs down the street.

- Content words are related by dependency relations
Content words are related by dependency relations

Function words attach to closest content words
The cat could have chased all the dogs down the street.

- Content words are related by dependency relations
- Function words attach to closest content words
- Punctuation attach to head of phrase or clause
The cat could have chased all the dogs down the street.

Not “dependency” in the strictly syntactic sense!
The dog was chased by the cat.

Кучето се преследваше от котката.
The dog was chased by the cat.
The dog was chased by the cat.

Кучето беше преследвано от котката.
The dog was chased by the cat.
### Dependents of Clauses (Verbal or Not)

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### Dependents of Verbs, Adjectives and Adverbs

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<td>nummod</td>
<td>case</td>
</tr>
<tr>
<td>compound</td>
<td></td>
<td></td>
<td>clf</td>
</tr>
<tr>
<td>flat</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Example Sentence

```
the American singer Johnny Cash
```

#### Diagram

```
  det
 /     \
det -----> amod
       /     \\n  det -----> flat
          /     \
appos -----> flat
          /     \\nappos -----> punct
          /     \\n  det -----> det
          /     \\n  det -----> nmod
```

---

**Syntax in Universal Dependencies**

- Same Annotation
- Copula
- Prague Dependency Trees vs. Universal Dependencies
- Core vs. Oblique

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Coordination

- 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

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

- 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

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

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<td>acl:relcl</td>
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<td>compound:prt</td>
<td>Verb particle (dress up)</td>
</tr>
<tr>
<td>nmod:poss</td>
<td>Possessive nominal (Mary’s book)</td>
</tr>
<tr>
<td>obl:agent</td>
<td>Agent in passive (saved by the bell)</td>
</tr>
<tr>
<td>cc:preconj</td>
<td>Preconjunction (both ... and)</td>
</tr>
<tr>
<td>det:predet</td>
<td>Predeterminer (all those ...)</td>
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Copula
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Some languages use a copula verb:

Ivan is the best dancer.

Some languages use a copula pronoun:

Ivan – to najlepszy tancerz.
Ivan – it best dancer.
Nonverbal Predicate and Copula

- Some languages use a copula verb:

  Ivan is the best dancer.

- Some languages omit the copula:

  Иван лучший танцор.
Some languages use a copula verb:

- Ivan was the best dancer.

Some languages use it *only in some tenses*:

- Ivan был лучшим танцором.
- Ivan was best dancer.
Copula Verbs: We Are Restrictive!

- *To be* is copula:

  Ivan is the best dancer.

- *To become* is not copula:

  Ivan became the best dancer.
Once Copula, Always Copula!

- This is parallel with Russian:

```
Ivan is the best dancer .
```

- This is also parallel with Russian:

```
Ivan is today in Moscow .
```
Well, Almost...

- This is parallel with Russian:

- But not with this in English:
A clause can be the subject:

The problem is that he is missing.

But it cannot be annotated as the nonverbal predicate:

The problem is that he is missing.
Prague Dependency Trees vs. Universal Dependencies
Simple Clauses

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula

Core vs. Oblique

George killed the dragon yesterday.

[Diagram of a tree structure representing the sentence]
Monica will give me the book on Monday.
Osobně věřím v úspěšnost mise.

Personally I-believe in success of-mission.
the American singer Johnny Cash, an icon of country music
Coordination

Syntax in Universal Dependencies
Analysing DNA will explain the causes.
The study estimates that it would take four minutes.
I hate to put a little pressure on you.
She has been charged with trying to kill her daughter.
the attacks that briefly took down popular websites
In Czech, modal verbs are not considered auxiliary
⇒ modal verb + infinitive = 2 clauses!
Modal Verbs

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

Syntax in Universal Dependencies
- Same Annotation
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Secondary Predication ("Doplněk" in Czech Grammar)

She entered the room sad.
She entered in room sad.
She declared the cake beautiful.
Nonverbal Predicates with Copulas

Ivan is the best dancer.

Syntax in Universal Dependencies

Same Annotation Syntax Tour Copula

Core vs. Oblique
Locative Predicates with Copulas

Ivan is today in Moscow.
Nonverbal Predicates without Copula

“A delegation from the Agency is in Iran.”
There is a dancer in Moscow.
Ivan himself became the best dancer.
Fixed Multiword Expressions

according to data

vzhledem k nákladům

in-view of expenses

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Core vs. Oblique  48/105
Vstoupili jsme, utěšuje se Pfaff, do nové dekády.

Entered we-have, comforts himself Pfaff, in new decade.
Core vs. Oblique
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Information Packaging

I gave her a book.
He loaded the wagon with hay.
He loaded the wagon with hay.

He loaded hay on the wagon.
UD is NOT about Semantic Roles!

I gave her a book.

I gave a book to her.
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:

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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!

I gave her a book on Monday.

I gave a book to her on Monday.

Core vs. Oblique
Avoiding an Argument-Adjunct Distinction

- From the guidelines:
  - Subtle, unclear, and frequently argued over
  - Questionable as a categorical distinction
  - Best practical solution is to eliminate it

BUT:
- Cannot be eliminated completely
- Some people/data have it and want to keep it
- It aligns well with traditional grammars
  - 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.)
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So What Is Core and Why?
Community Confusion

- UD v1 guidelines took core-oblique for granted

- English (simplified):
  - Bare noun phrase $\Rightarrow$ core argument ($\text{nsubj}$, $\text{obj}$, $\text{iobj}$)
  - Prepositional phrase $\Rightarrow$ oblique argument or adjunct ($\text{obl}$)

Other languages: not necessarily! (Spanish, Japanese)

But some people simply took the English rule...

Manning's law: non-linguists!

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...
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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
    - ⇒ easy for annotators and non-linguists!

- **Why are core arguments special?**
  - They tend to be *targeted by grammatical rules*
    - Passivization
    - Control verbs
    - Reflexives
    - ...

Language-specific Coding Strategy

- Core vs. oblique is not defined in traditional grammar
- How shall we define it?

Andrews, 2007 (In Shopen: Language Typology)

Identify primary transitive predicates

We need semantic roles for this! (One-time only.)

- Actor/agent = function \(A\)
- Undergoer/patient = function \(P\)

Note the way they are coded

Note other grammatical rules that target them

Generalize to other predicates with same coding and rules

Then define:

- function \(A\) \(\rightarrow\) \(nsubj\)
- function \(P\) \(\rightarrow\) \(obj\)
Language-specific Coding Strategy

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  - Note the way they are coded
  - Note other grammatical rules that target them
  - Generalize to other predicates with same coding and rules

- Then define:
  - function A ⇒ nsubj
  - function P ⇒ obj
Transitive Predicates in English

- **John** kills **Mary** (primary transitive)

- **John** loves **Mary** (generalized transitive)
Transitive Predicates in English

### Primary Transitive

**Example:**

John **kills** Mary

- **John** (Subject)
- **kxlls** (Verb)
- **Mary** (Object)

### Generalized Transitive

**Example:**

John **loves** Mary

- **John** (Subject)
- **loves** (Verb)
- **Mary** (Object)

(Primary and generalized transitive concepts are illustrated through syntactic trees.)
Transitive Predicates in English

- **Primary transitive**: John kills Mary
- **Generalized transitive**: John loves Mary

Syntax in Universal Dependencies

Copula Prague Dependency Trees vs. Universal Dependencies
Passivization in English

Syntax in Universal Dependencies

Passivization in English

Mary is killed by John

PROPN AUX VERB ADP PROPN

root

nsubj:pass aux:pass obl:agent case

Mary is loved by John

PROPN AUX VERB ADP PROPN

root

nsubj:pass aux:pass obl:agent case
Subject Control in English

John wants to kill Mary

PROPN VERB PART VERB PROPN

John wants to love Mary

PROPN VERB PART VERB PROPN
Object Control in English

[Diagram showing the dependency structure of two sentences:]

1. Ann made John kill Mary
2. Ann made John love Mary

[Annotations and labels indicating the parts of speech and dependency relations]
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.
The borderline is inherently fuzzy
No universally applicable and exact algorithm
Better described in terms of probability
The borderline is inherently fuzzy
No universally applicable and exact algorithm
Better described in terms of probability

Core coding **not favored by adjuncts**
Oblique coding **similar to most adjuncts**
Passivization etc. may help...
... but does **not** work as strict criterion
Tentative Summary?

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

- ⇒ function $S$
  - Regardless of semantic role:
    - John runs.
    - John sleeps.
    - John falls.

- Then define:
  - function $S \Rightarrow \text{nsubj}$
Ditransitive Predicates

- Three core arguments
- Is one of them “least core”? ⇒ \texttt{iobj}
- (Alternatively, we could look at the semantic roles once again.)

![Diagram of ditransitive predicate]

- Passivization:
  - \textit{She} was given a \textit{book} by \textit{me}.
  - \textit{?A book} was given \textit{her} by \textit{me}.
Ditransitive Predicates

- Three core arguments
- Is one of them “least core”? ⇒ \textit{iobj}
- (Alternatively, we could look at the semantic roles once again.)

![Diagram of sentence structure]

- Fronting in questions:
  - \textit{What did I give her?}
  - *\textit{Who did I give a book?}
Ditransitive Predicates

- Three core arguments
- Is one of them “least core”? ⇒ iobj
- (Alternatively, we could look at the semantic roles once again.)

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.
Jorge mató al dragón.

El dragón fue matado por Jorge.
Spanish Transitive Clauses

(a) nominal
Case=Nom
bare NP
(pre-verb)
cross-ref on verb

VERB
Voice=Act(,Pass)
declarative clause
← agreement

(ADP)

nominal
Case=Acc
(or bare NP)
(post-verb)

Syntax in Universal Dependencies
Spanish Adjunct Exceptions

**Él trabaja toda la semana**
- *He works whole the week* (nsubj, obl:tmod, det, det, root)

**Subiremos a el tren a las cinco**
- *We-will-board to the train at the five* (obl:mod, obl, case, det, det, root)
Spanish Ditransitive Clauses

Pedro le dio un libro a Isabel

PROPN PRON VERB DET NOUN ADP PROPN

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Spanish Ditransitive Clauses

Pedro le dio un libro a Isabel

PROPN PRON VERB DET NOUN ADP PROPN

Un libro fue dado a Isabel por Pedro

DET NOUN AUX VERB ADP PROPN ADP PROPN

Syntax in Universal Dependencies
Jiří zabil draka.

Drak byl zabit Jiřím.
Czech Transitive Clauses

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Czech Adjunct Exceptions

Pracuje celý týden
He-works whole week

Syntax in Universal Dependencies
Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Czech Ditransitive Clauses

- **Petr** dal **Katce** knihu
  - *Petr* gave *Katka* book

- **Kniha** byla dána **Petrem** to-Katka
  - *Book* was given by-Petr to-Katka

Syntax in Universal Dependencies

- Same Annotation
- Syntax Tour
- Copula
- Prague Dependency Trees vs. Universal Dependencies
Dative: Recipient vs. Beneficiary

Syntax in Universal Dependencies
Monotransitive with Dative?

Zuzka pomohla Martinovi úkolem.

Zuzka helped Martin with homework.

Martinovi bylo pomůženo s úkolem.

Martin was helped with homework.
Monotransitive with Genitive?

Novináři musí dbát zásad objektivity.

Journalists must observe principles of objectivity.

Musí být dbáno zásad objektivity.

Must be observed principles of objectivity.
Monotransitive with Instrumental?

- Karel
  - nsubj
    - PROPN
    - VERB
      - Case=Nom
      - nsubj

- hýbal
  - obj/obl:arg?
    - VERB
      - Case=Ins

- nábytkem
  - aux:pass
    - NOUN
      - Case=Ins
      - Gender=Neut
      - Number=Sing

- Nábytkem
  - obj/obl:arg?
    - NOUN
      - Case=Ins

- bylo
  - aux:pass
    - AUX
      - Case=Ins

- hýbáno
  - root
    - ADJ
      - Gender=Neut
      - Number=Sing
Monotransitive with Preposition?

Spoléhali na ředitelovo rozhodnutí

They relied on director’s decision

Na ředitelovo rozhodnutí bylo spoléháno

On director’s decision was relied

Syntax in Universal Dependencies
There is a core-oblique scale:
- $\text{Nom} > \text{Acc} > \text{Gen, Dat} > \text{Ins} > \text{preposition}$

Where is the borderline?
There is a core-oblique scale:

- \( \text{Nom} > \text{Acc} > \text{Gen, Dat} > \text{Ins} > \text{preposition} \)

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

No ditransitives in Czech!

Exception: \( učit \) “to teach” takes two Acc.
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
• There is a core-oblique scale:
  - Nom > Acc > Gen, Dat > Ins > preposition

• Where is the borderline?

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There is a core-oblique scale:

- **Nom** > **Acc** > **Gen, Dat** > **Ins** > **preposition**

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- UD Czech 2.6 (May 2020):
  - Nom, Acc > Gen, Dat, Ins, ADP + adjuncts
  - No ditransitives in Czech!
  - (Exception: **učit** “to teach” takes two Acc.)
Basque Transitive Clauses

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Basque Transitive Clauses

Syntax in Universal Dependencies

Ekaitzak itsasontzia hondoratu du
Storm ship sunk it-has-it
NOUN NOUN VERB AUX
Case=Erg Case=Abs

(Niri) ardoa gustatzen zait
(To-me) wine pleasing me-is-it
NOUN NOUN VERB AUX
Case=Dat Case=Abs
Basque Intransitive Clauses

Gizona
The-man
NOUN

hil
died
VERB

da
it-has
AUX

Case=Abs

Urak
Water
NOUN

irakin
boiled
VERB

du
it-has-it
AUX

Case=Erg

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Basque Ditransitive Clauses

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Basque Ditransitive Clauses

Syntactic tree for Basque ditransitive clauses:

```
root
  /  
 nsubj obj iobj
  /  
 Iñakik lliburua eman zion Arantxari
  PROPN NOUN VERB AUX PROP
  Case=Erg Case=Abs Case=Dat
  Zezenak saihtesa pitzatu zion Iñakiri
  NOUN NOUN VERB AUX PROP
  Case=Erg Case=Abs Case=Dat
```

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Basque Causative Applied to Dative Subject

Zopa

izugarri
gustatzen
zaio
mutilari

Soup
greatly
pleasing
it-is-it
to-boy

NOUN
ADV
VERB
AUX
NOUN

Case=Abs
Voice=Act
Case=Dat

Goseak
zopa
izugarri
gustatuferazi
zion
mutilari

Hunger
soup
greatly
made-pleasing
it-has-it-it
to-boy

NOUN
ADV
VERB
AUX
NOUN

Case=Erg
Case=Abs
Voice=Cau
Case=Dat
Yidiɲ Transitive Clauses

Syntax in Universal Dependencies

Same Annotation Syntax Tour Copula Prague Dependency Trees vs. Universal Dependencies
"I, (who) was slapped by the woman, laughed"
“I, (who) was slapped by the woman, laughed”

The coreferential (and elidable) NP must have S or P function.
“I, (who) was lauging, was slapped by the woman”

The coreferential (and elidable) NP must have S or P function.
“I, (who) was slapping the woman, laughed”

Original P is now oblique and original A is now S.
Tagalog Transitive Clauses
Magaalis Will-take ang the babae woman ng bigas rice sa from sako sack

Aalisin Will-take ng babae woman ang the bigas rice sa from sako sack
Tagalog Locative Voice ⇒ Ditransitive!
Ipagaalis ng babae ng bigas ang bata

Will-take woman rice for-the child

Voice=Benf  Case=Acc  Case=Acc  Case=Nom
Plains Cree Transitive Clauses

Syntax in Universal Dependencies

Same Annotation  Syntax Tour  Copula  Prague Dependency Trees vs. Universal Dependencies
Direct-Inverse Voice in Plains Cree

Animacy hierarchy: 1st person > 3rd person
Direct-Inverse Voice in Plains Cree

Niwīcihānānak
We-help-them
VERB
Voice=Dir

Niwīcihikonānak
They-help-us
VERB
Voice=Inv

Animacy hierarchy: 1st person > 3rd person
Should we set *nsubj* > *obj*?
Direct-Inverse Voice in Plains Cree

Cāniy kī-wīcihēw Mērīwa
Johnny helped Mary

Obviation=Prx Dir Obviation=Obv

Cāniwa kī-wīcihēw Mēriy
Johnny helped Mary

Obviation=Obv Dir Obviation=Prx

Syntax in Universal Dependencies
Same Annotation Syntax Tour Copula Prague Dependency Trees vs. Universal Dependencies
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