Linguistic annotation of Ancient Greek and Latin inscriptions

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Outline

1. Linguistic annotation: what is it?
2. Treebank of Euboean Greek inscriptions of Sicily through manual annotation (Arethusa)
3. Annotation of (Latin) inscriptions in the framework of the WoPoss project (focus: modality) through both types of annotation, manual and automatic
4. Some ideas to explore a linguistically annotated corpus
5. Exercise

Preliminary remarks

1. linguistic annotation of Ancient Greek and Latin inscriptions is developing right now

2. there is no standard (yet) for the linguistic annotation (treebank) of Ancient Greek and Latin inscriptions

Linguistic annotation in general: what is it?

- core linguistic annotation
  1) parts of speech (POS): N, V, A, etc.
  2) lemma: *possum, potes, possim, potuerunt,* etc. –> 'possum'
  3) morphology: person, gender, number, case, tense, mood, aspect…
  4) syntactic relations (dependencies)
  - –> treebank

- less frequently annotated levels of linguistic analysis:
  - phonetics/phonology: how sounds are pronounced (vowels: short/long, open/close and so on)?
    - spelling (ancient languages)
  - semantics: e.g. modality, Smyth Grammar layer (genitive of possession, genitive of separation, etc.), animacy
  - pragmatics

- onomastics: named entities

Some already extant exemples of linguistic annotation of Ancient Greek and Latin inscriptions

Digital Marmor Parium

- a complete analysis and study of this Hellenistic inscription entails also a linguistic analysis
- http://www.digitalmarmorparium.org/linguistics.html
- –> pioneering annotation (treebank)
  - POS
  - Lemma
  - Morphology
  - Syntactic dependencies
  - Semantics (Smyth Grammar layer)

CLaSSES- Corpus for Latin Sociolinguistic Studies on Epigraphic textS

- spelling variants as “clues for phonetic-phonological (and morpho-phonological) variation” (De Felice, Marotta & Donati 2015: 127)
  - the user can search for a predefined set of linguistic phenomena
- http://classes-latin-linguistics.fileli.unipi.it/en

- manual annotation
  - lemma
  - spelling: annotation of non-classical variants
    - vowels
    - consonants
    - morpho-phonology

Table 2
Classification of the 1869 words constituting CLaSSES I according to their graphic form.

Graphic form							
complete	*abbreviat.*	*incomplete*	*integrated*	*misspelling*	*uncertain*	*number*	*(lacunae)*
1017	560	153	28	12	56	9	34
54.4%	30%	8.2%	1.5%	0.6%	3%	0.5%	1.8%

De Felice, Marotta & Donati (2015: 127)

A treebank of Euboean inscriptions from Sicily

For an introduction to Arethusa:

https://github.com/SunoikisisDC/SunoikisisDC-2019-2020/wiki/DC-Session-6-Treebanking-1

The guidelines of the Ancient Greek Dependency Treebank 2.0 have been written to annotate Ancient Greek texts. The epigraphic texts, however, pose a challenge for those carrying out morphosyntactic annotation: **should we remain as close as possible to the actual epigraphic text, or represent it in an interpreted and normalized version? How should all epigraphic peculiarities which do not have standard editorial representation, such as, for example, punctuation marks, be treated?** A small corpus such as that of the inscriptions of the Euboean colonies of Sicily of the archaic and classical period has allowed us to test different options and evaluate the annotation challenges. This contribution is the result of a discussion about the advantages and disadvantages of often opposed annotation

possibilities.

Dell'Oro - Celano (2019: 1)

Why to work with short inscriptions as a test-case?

- with short inscriptions, you are more often constrained to take into account the extra-linguistic context
  –> inscribed object to be read in its extra-linguistic context

- with short inscriptions, hopefully you will have to deal with a problem at a time

Greek local alphabets and dialectal variants

- If you normalize, you can use the MATE tagger and Morpheus morphological analyzer (Arethusa)
- If you decide not to mormalize the text, you will have to annotate PoS and morphology by yourself

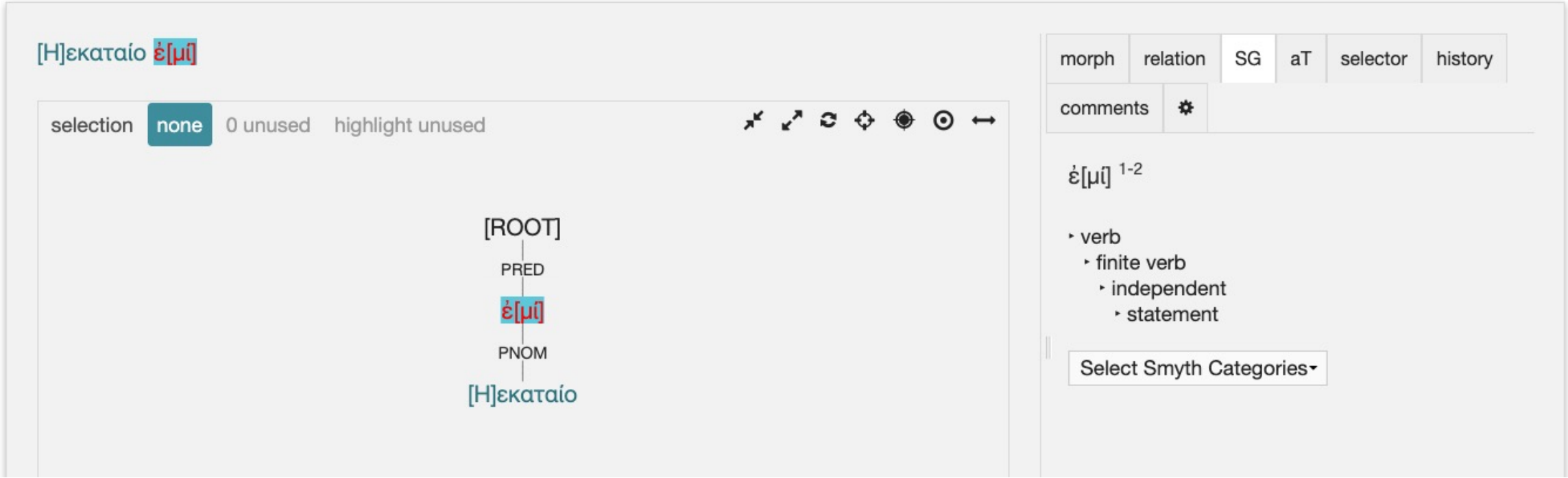
- “Manuscripts attest the form Ζάγκλη for the ancient name of Messene, but inscriptions and coin legends attest the same name in the form Δάνκλη (e.g., IGASMG III 39). Morpheus cannot recognize Δάνκλη as the same lemma as Ζάγκλη. In this case, it is not necessary to introduce a second lemma: the annotator can specify that the lemma is the same, in that Ζάγκλη is taken to be a dialectal variant of Δάνκλη. This is in accordance with standard practice in non-dialectal Ancient Greek dictionaries (e.g. Liddell and Scott, 1996).”

Ellipsis

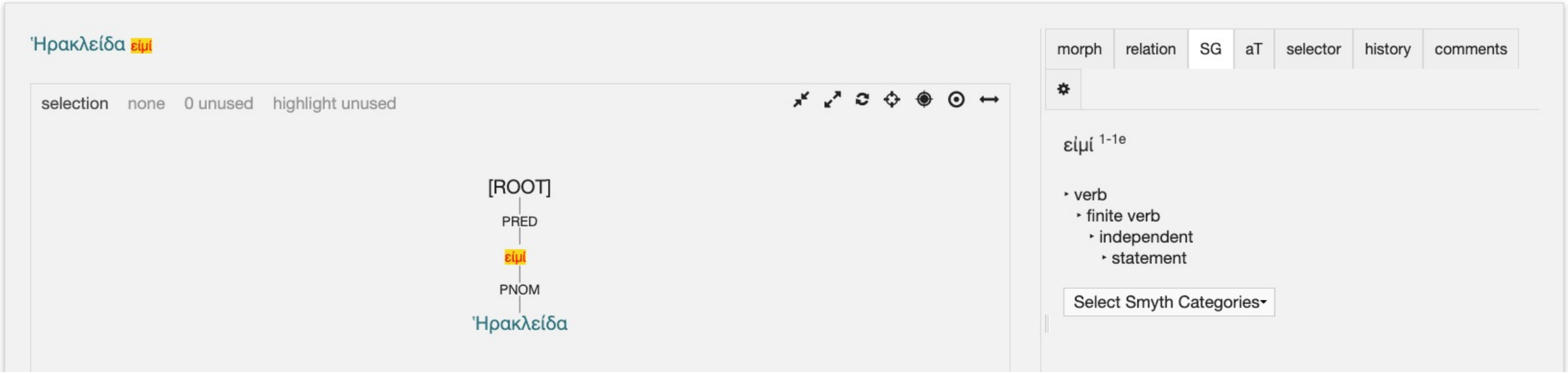
- IGDS I 14b: Ἡρακλείδα

1. look for a template in other inscriptions –> speaking objects: IGDS I 14a: [H]εκαταίο ἐ[μί] ‘I am of Hekataios’
2. determine what is missing: ἐ[μί] ‘I am…’
3. Add it as an elliptical node

IGDS I 14a: I am of [PROPER NAME (gen)]



IGDS I 14b: ? of PROPER NAME (gen)



IGDS I 4a

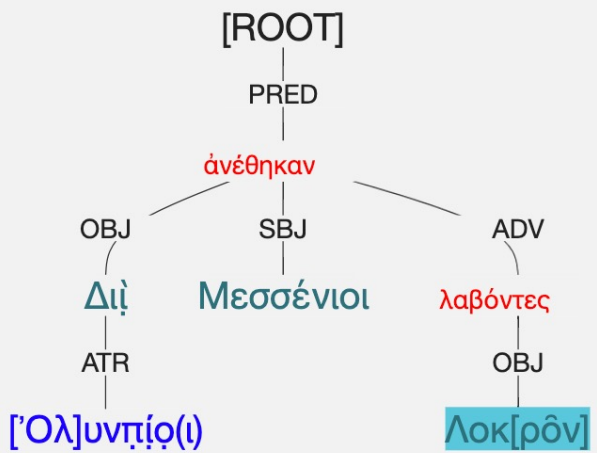
- dedication on leg armor: Διὶ [Ὀλ]υνπ̣ί̣ο̣(ι) Μεσσένιοι Λοκ[ρῶν]

- Lazzarini (1976: 317): nominative (victorious people who made the dedication) + genitive (the defeated) + λαβόντες or ἑλόντες
- comparison with
  - IG I3 1467 (Olympia): Διὶ Ἀθεναῖοι Μέδον λαβόντες “The Athenians (dedicated this taken) from the Medes"
  - but see also: IGASMG V 13a (Olympia): σκῦλα ἀπὸ Θουρίον Ταραντῖνοι ἀνέθεκαν Διὶ Ὀλυμπίοι δεκάταν “The Tarantines dedicated the spoils (taken) from the Thurians to Olympian Zeus as a tithe”

IGDS I 4a

Διὶ [Ὀλ]υνπίῳ(ι) Μεσσένιοι Λοκ[ρὸν] ἀνέθηκαν λαβόντες

selection none 0 unused highlight unused



morph relation SG aT selector history

Λοκ[ρὸν] 1-5

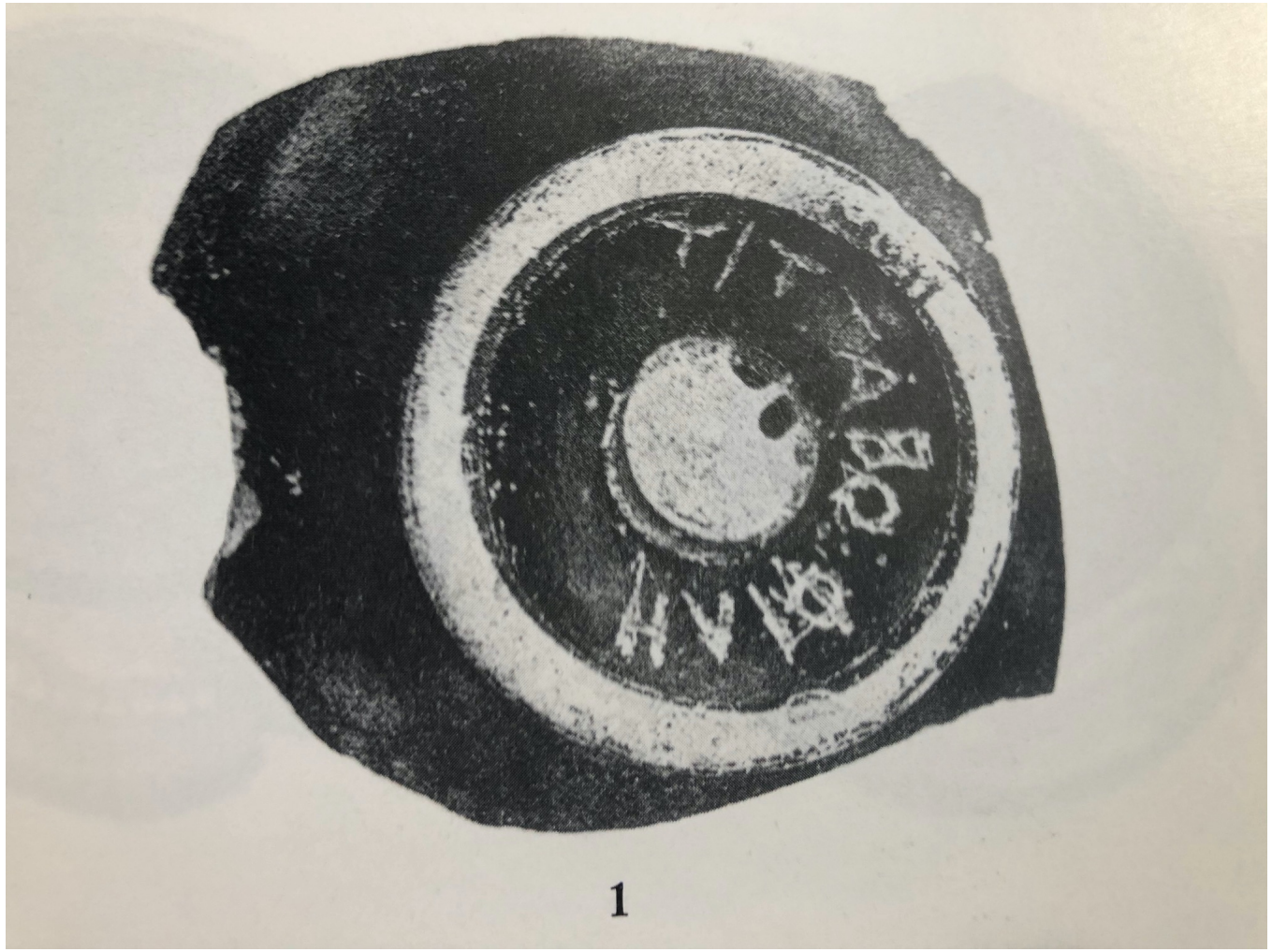
- noun
  - genitive
    - dependent
      - ablatival
        - separation
          - concrete

Select Smyth Categories

Punctuation

- Morpurgo Davies (1987)
  - accentual and/or prosodic units: enclitics and proclitics are not separated from ‘their’ word by punctuation

IGASMG I, 75 (= IGDS I, 1)



graffito on the foot of an Attic kylix

end of the 5th century BCE

omicron –> omega in the common alphabet

but there is already heta

three points = ponctuation –> how to interpret it?
How to annotate it according to AGDT 2.1?

One possible interpretation: *Tittabó, (she) is dear (to me)*

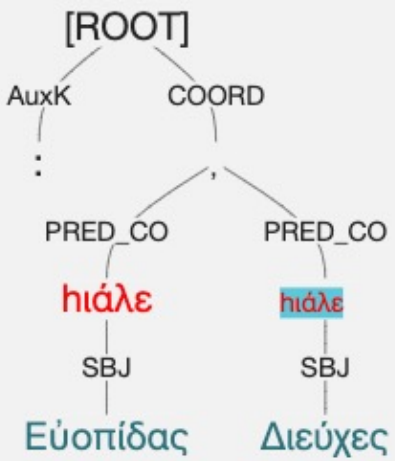
- other possible interpretations: *Tittabó! (She) is dear (to me) / (you) are dear (to me)*

- introduction of a special tag for inscriptional punctuation?

IGDS I 11, 1

Εὐοπίδας ηιάλε Διεύχες : , ηιάλε

selection none 0 unused highlight unused



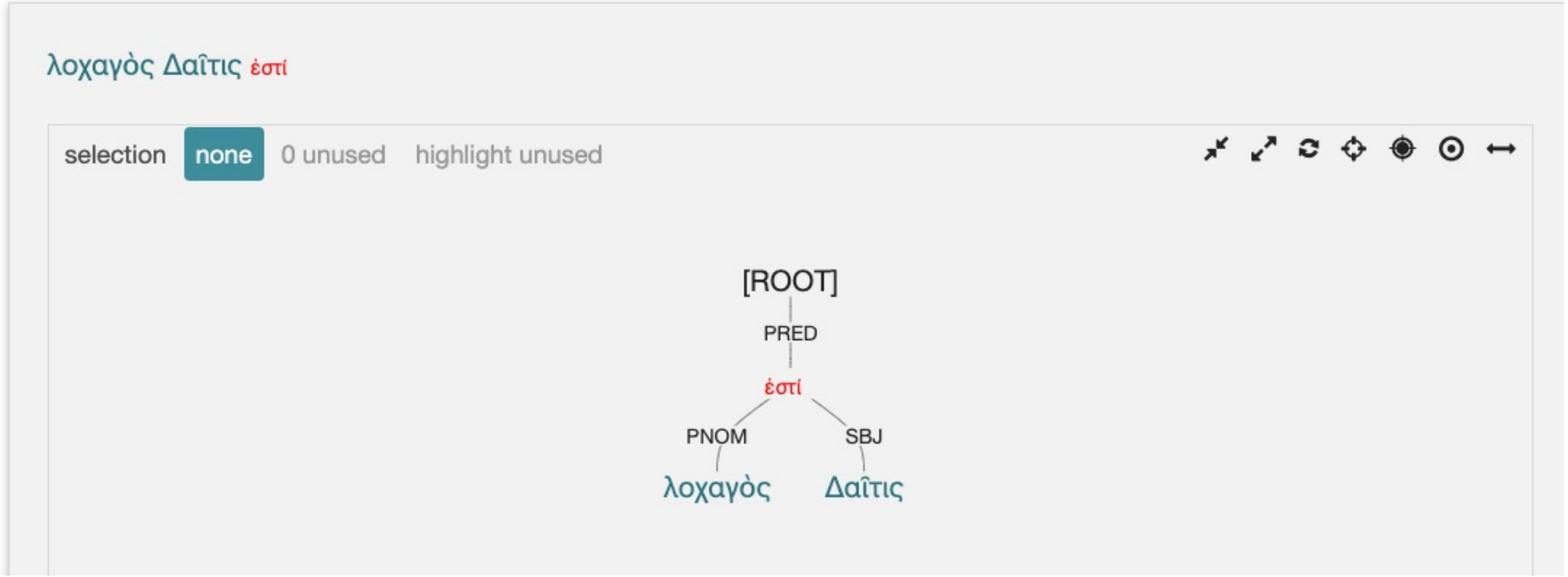
morph relation SG aT selector history

ηιάλε 1-5e

- verb
  - finite verb
    - independent
      - statement

Select Smyth Categories

IGDS I 11, 2


λοχαγὸς Δαῖτις ἐστί
selection
none
0 unused
highlight unused
[ROOT]
PRED
ἐστί
PNOM
SBJ
λοχαγὸς
Δαῖτις

The WoPoss project: automatic and manual linguistic annotation

Annotation of Latin inscriptions from lemmatisation to semantics

WoPoss. A World of Possibilities. Modal pathways over an extra-long period of time: the diachrony of modality in the Latin language

The SNSF-funded project *A world of possibilities. Modal pathways over an extra-long period of time: the diachrony of modality in the Latin language* (WoPoss) aims at reconstructing **the evolution of modal meanings from the prehistory of the Latin language up to the 7th century CE**. The WoPoss team is working on **the linguistic annotation of a selection of modal markers in a diachronic corpus of Latin literary and documentary texts**.

What is modality?

Expression of the notional domains of necessity, possibility and volition.

- lexical markers: *possum, debeo, volo, forsitan*…
- morphological markers: *-bilis*, *-ndus*, *-turus*
- (NB. mood: sentence types, realis/irrealis, indicative/subjunctive)

- see I. Nuyts & J. van der Auwera 2016 on the distinction ‘modality’ and ‘mood’

Automatic annotation

We use models trained on the treebank data in order to carry out an automatic annotation of:

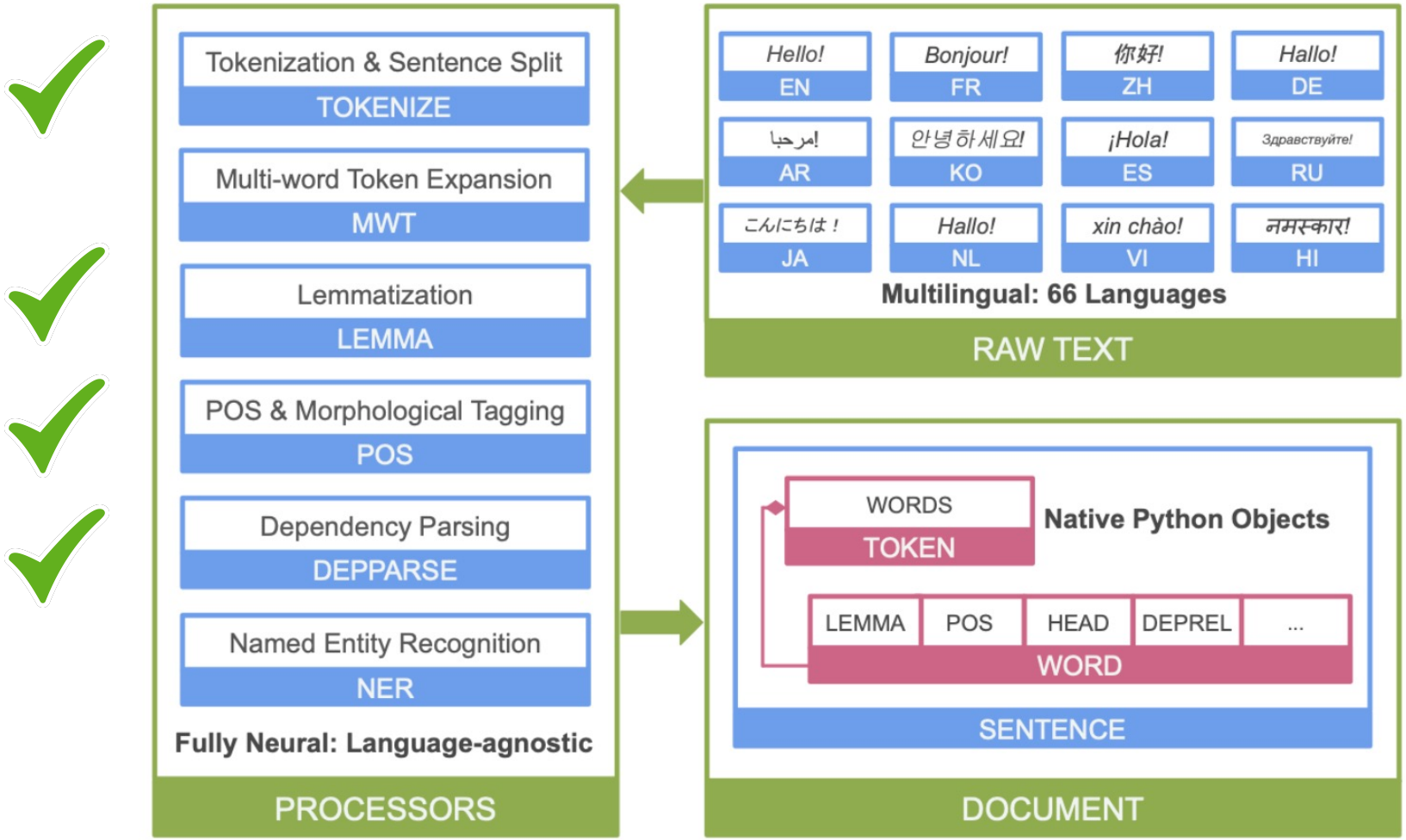
- PoS
- lemmas
- morphological features
- dependencies

Stanza – A Python NLP Package for Many Human Languages

“Stanza is a Python natural language analysis package. It contains tools, which can be used in a pipeline, to convert a string containing human language text into lists of sentences and words, to generate base forms of those words, their parts of speech and morphological features, to give a syntactic structure dependency parse, and to recognize named entities. The toolkit is designed to be parallel among more than 60 languages, using the Universal Dependencies formalism.”

- https://universaldependencies.org

How Stanza works…



From https://stanfordnlp.github.io/stanza/

Processors work based on pretrained models

Models were trained on the Universal Dependencies treebanks

Latin: ITTB, PROIEL and Perseus

Ancient Greek: PROIEL and Perseus

For all models https://stanfordnlp.github.io/stanza/available_models.html

You can try it yourself:

https://github.com/WoPoss/automatic_annotation

From the already extant treebanks to WoPoss

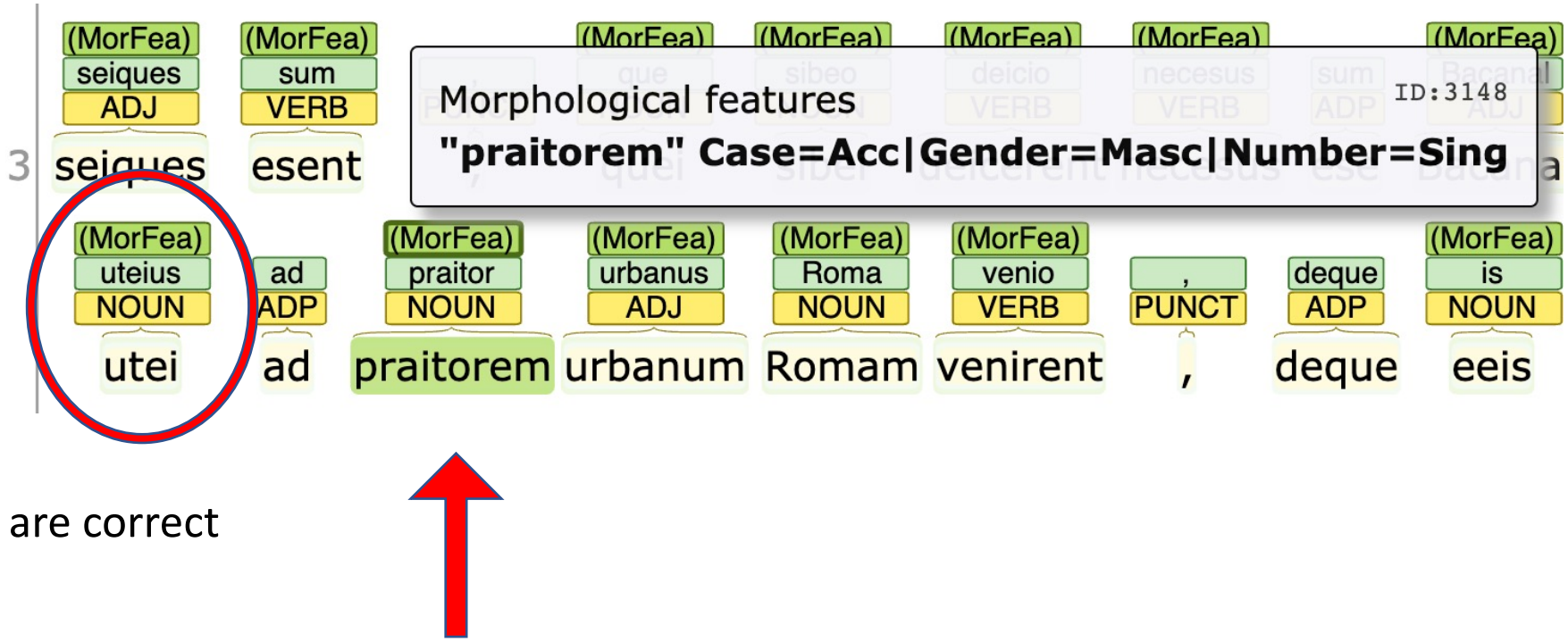
Treebanks of Ancient Greek and Latin

Stanford NLP used them to create models for Stanza

The WoPoss team uses Stanza to automatically annotate other texts which are not part of those treebanks

Senatus consultum de Bacchanalibus, 4-5: …*utei ad praitorem urbanum Romam venirent* ‘they are to come to Rome to the praetor urbanus’

- many archaic forms
  - *utei*
    - PoS SCONJ
    - Lemma *ut*
    - No MorFea
  - *praitor*
    - Lemma *praetor*
    - But PoS and MorFea are correct



Manual annotation

- semantics
  - annotation of modality: by using the *WoPoss guidelines for annotation*
    - https://zenodo.org/badge/DOI/10.5281/zenodo.3560951.svg
  - Inception plateform

Types of modality

- dynamic modality: (1) abilities / needs; (2) external circumstances; (3) generic possibility / necessity
  - (1) *He can stand on his head without using his hands.*
  - (2) *The garage is free so you can park your car there.*
  - (3) *It can rain here every day in winter.*

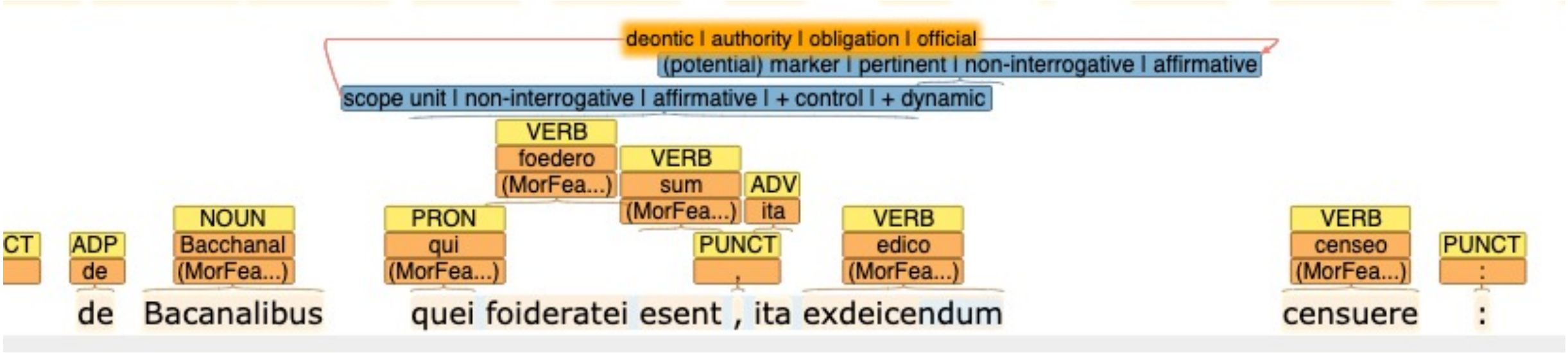
- deontic modality: (1) obligation / permission; (2) moral desirability; (3) volition and intention
  - (2) *This initiative of the federal government is highly deplorable.*
  - (3) *I want to hear the whole story.*

- epistemic modality: *That's probably the postman bringing today's newspaper.*

archaic Latin: *De Bacanalibus, quei foideratei esent, ita exdeicendum censuere…*

classical Latin: *De Bacchanalibus (iis) qui foederati essent, ita exdicendum (esse) censuerunt…*

‘Regarding the Bacchanalia, they advised that it was necessary to issue an edict as follows to those who are in alliance (with us)…’

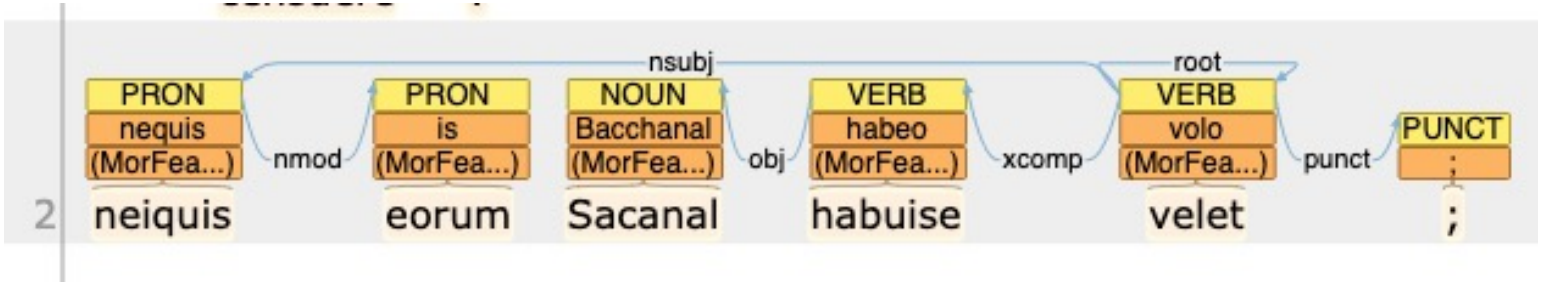


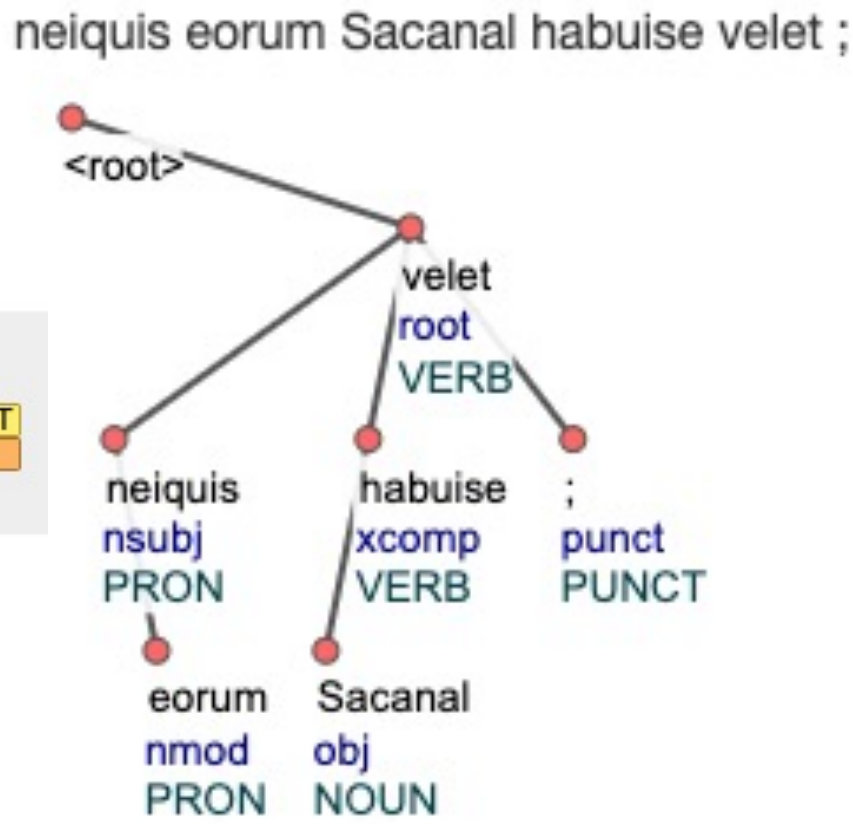
archaic Latin: ...*neiquis eorum Sacanal habuise velet;*

classical Latin: ...*nequis eorum Bacchanal habuisse vellet;*

‘No one of them should have a sanctuary’

Syntactic dependencies





Towards corpus research with inscriptions: TXM

- TXM textométrie
  - big corpora
  - http://textometrie.ens-lyon.fr/

- research questions: which are the most common co-occurrents of modal markers? Are there personal pronouns among these co-occurrents of impersonal modal markers (e.g. *oportet*)? Is co-occurrence meaningful from a statistical point of view?
  - specifity score (≥ 3) http://txm.sourceforge.net/doc/manual/0.7.9/fr/manual59.xhtml (French) or http://textometrie.ens-lyon.fr/files/documentation/TXM%20Manual%200.7.pdf (English)
  - left context: between 0 and 4 words
  - right context: between 0 and 4 words

Corpus (EDH)

- automatic annotation (Treetagger)
  - tokenisation
  - lemmatisation
  - POS tagging (with basic morphological analysis)

- the annotation needs to be tested and corrected
- the corpus is not homogeneous from the chronological point of view

- reference corpus: Cicero

CICERO/<[latinlemma="oporteo"]>@latinle...

Requête [latinlemma="oporteo"]

Paramètres

Propriétés des cooccurrents : latinlemma Éditer Seuils : Fmin ≥ 0 Cmin ≥ 0 Indice ≥ 0,0

Contexte : forme structure s Utiliser le contexte gauche Utiliser le contexte droit inclure la structure contenant le pivot dans le décompte

de - 4 à - 0 et de 0 à 0

Cooccurrent	Fréquence	CoFréquence	Indice	Distance moyenne
non	17697	164	28	.8
puto	2298	54	26	1.2
fio	1586	35	16	1.1
nego	774	22	13	.5
specto	211	13	12	.4
lex	1585	28	11	1.4
oporteo	930	21	10	2.7
sumo	383	13	8	.7
dico	8552	65	8	1.5
restituo	218	9	7	.7
putelputo	406	11	6	.7
uti	306	9	5	1.1
credo	778	12	4	.2
quoque	802	12	4	1.3
pulsio	3	2	4	1.0
censeo	462	9	4	1.2
depulsio	22	3	4	2.0
accusator	282	7	4	1.6
intentio	26	3	4	2.0
prius	72	4	3	.8
valeo	804	11	3	.2
scio	1260	14	3	1.1
iudicationem	8	2	3	.0
discepto	42	3	3	0

t pivot 930, v cooc 1026, t cooc 3275, T corpus 1370127

Results for the specificity score (≥ 3)

Inscriptions (EDH)

- EGO OPORTET 1
- OPORTET EGO 0

- TU OPORTET –
- OPORTET TU –

- NOS OPORTET –
- OPORTET NOS –

- VOS OPORTET –
- OPORTET VOS –

- **IS OPORTET 7**
- **OPORTET IS 13**

Cicero

- EGO OPORTET 1
- OPORTET EGO 0

- TU OPORTET 2
- OPORTET TU 0

- NOS OPORTET 2
- OPORTET NOS –

- VOS OPORTET 1
- OPORTET VOS –

- **IS OPORTET 3**
- **OPORTET IS 4**

Exercice

- annotation of a modal passage of an inscription (EDR 150769) in Arethusa
  - .txt file
  - .xml file

- annotation of a modal passage in the Inception Sandbox
  - .zip file

Acknowledgements

- Swiss National Science Foundation: project n° 176778 (http://p3.snf.ch/project-176778)

- Center for Hellenic Studies (https://chs.harvard.edu/)

- EAGLE-IDEA (https://www.eagle-network.eu/category/idea-association/)

The WoPoss annotators

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Universal Dependencies: https://universaldependencies.org/

UD Greek Perseus: https://universaldependencies.org/treebanks/grc_perseus/index.html

UD Greek PROIEL: https://universaldependencies.org/treebanks/grc_proiel/index.html

UD Latin ITTB: https://universaldependencies.org/treebanks/la_ittb/index.html

UD Latin Perseus: https://universaldependencies.org/treebanks/la_perseus/index.html

UD Latin PROIEL: https://universaldependencies.org/treebanks/la_proiel/index.html