

Curs 7-8

Exemple de programare CLIPS – recursivitate

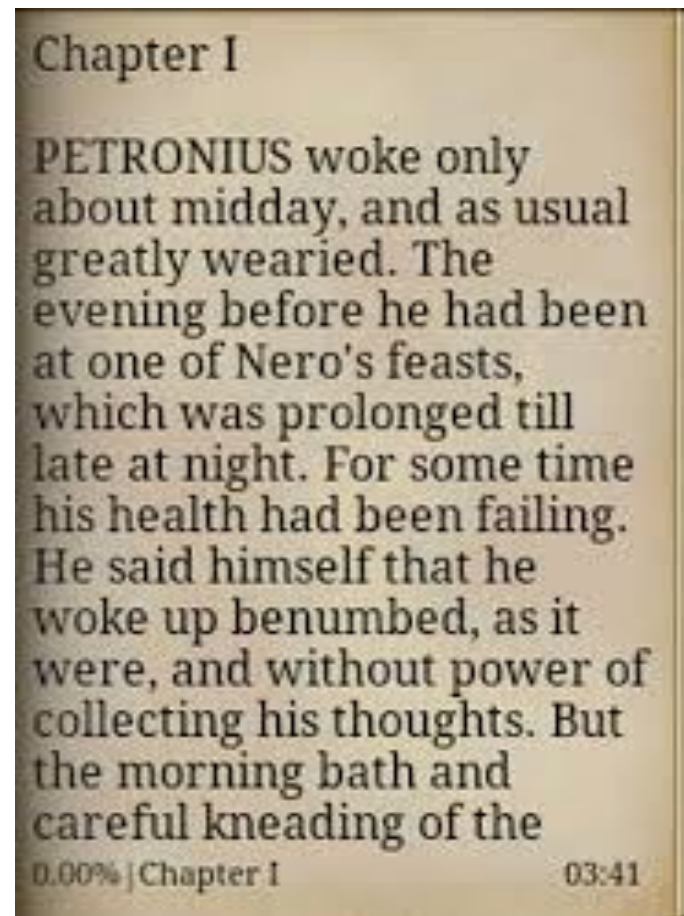
Proiect – prezentare generală

Probleme

- Recursivitate: Hanoi
 - funcția `gensym`

Proiect:
Patternuri pentru accesul la
legături semantice

The 'Quo Vadis' corpus



A corpus semantic entities and relations

- Type of entities:
 - persons
 - gods
 - groups of persons and gods
 - body parts
- Remantic relations among entities of these types



Entities

- individuals (*Marcus Vinicius, Lygia*), groups (*the Christians, the soldiers*) and classes (*the emperor*);
- syntactic realisation: NPs (determiners – *a soldier*, adjectives – *young patrician*, complement PPs included – *the son of one consul*; but no relative clauses;



Relations

- **Anaphoric** relations: **co-referential**;
- **Non-anaphoric** relations:
 - *kinship*;
 - *affective*;
 - *social*.



Kinship relations

- *parent-of*
- *child-of* (inverse of *parent-of*)
- *grandparent-of* and *grandchild-of* (inverse)
- *sibling* (symmetrical)
- *ant-uncle-of*, *nephew-of* (inverse relation)
- *cousin-of* (symmetrical)
- *spouse-of* (symmetrical)
- *unknown*



Example:

"Pardon me, Lygia. For me thou art [*<the daughter> [of a king]₂*]₁ and [*<the adopted child> [of Plautius]₄*]₃."

[1] child-of [2]; [3] child-of [4]

Social relations

- *superior-of*
- *inferior-of*
- *in cooperation-with*
- *colleague-of*
- *in competition-with*
- *opposite-to*



Example:

[*Petronius*]₁...*but to* [*his*]₂ *misfortune* [*he*]₃ <*surpassed in conversation*>
[*Cæsar himself*]₄, *hence* [*he*]₅ *roused* [*his*]₆ *jealousy*.

[3] in competition-with [4];

[3] coref [2]; [5] coref [4]; [6] coref [4]

Affective relations

- *love*
- *loved-by*
- *hate*
- *hated by*
- *upset*
- *friendship*
- *worship*



Example:

Vinicius entered Lygia's dungeon and remained there till daylight...Both changed by degrees into sad souls <in love> with [each]₁ [other]₂.

[1] rec-love [2]

A complex example

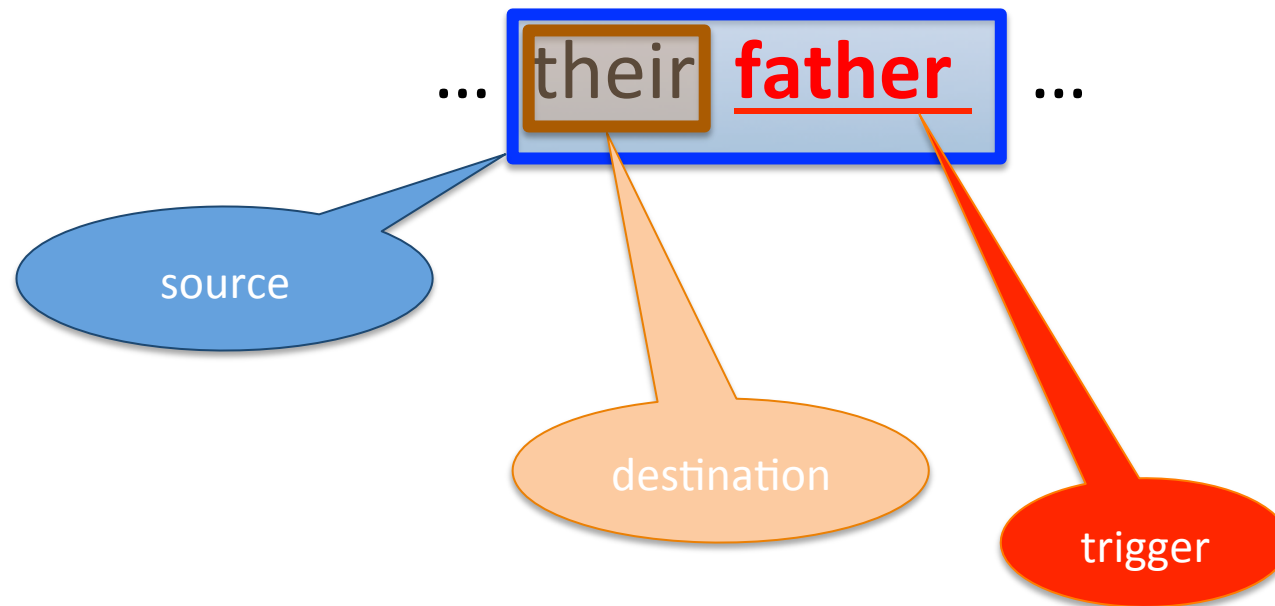
... cui i-ar fi putut trece prin minte că [un patrician]₁, [nepot și [fiu de [consuli]₄]₃]₂, ar putea să se găsească printre gropari .

[2] coref [1], [2] kinship:*grandchild-of* [4]; [3] kinship:*child-of* [4];



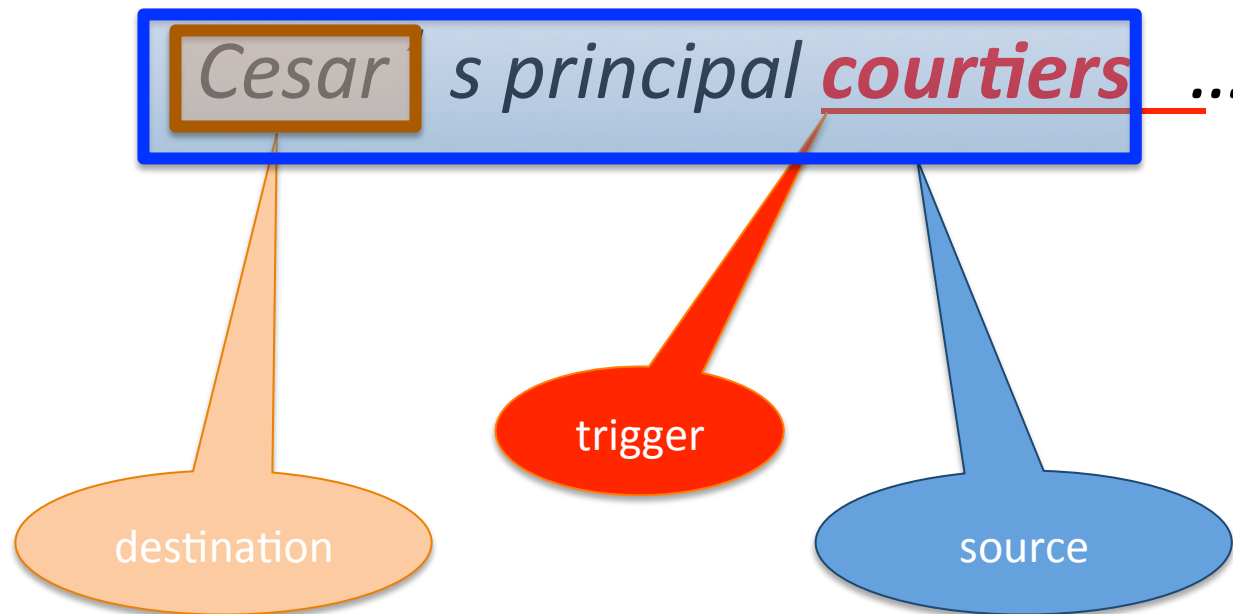
Arguments and triggers in relations

- Kinship: parent-of



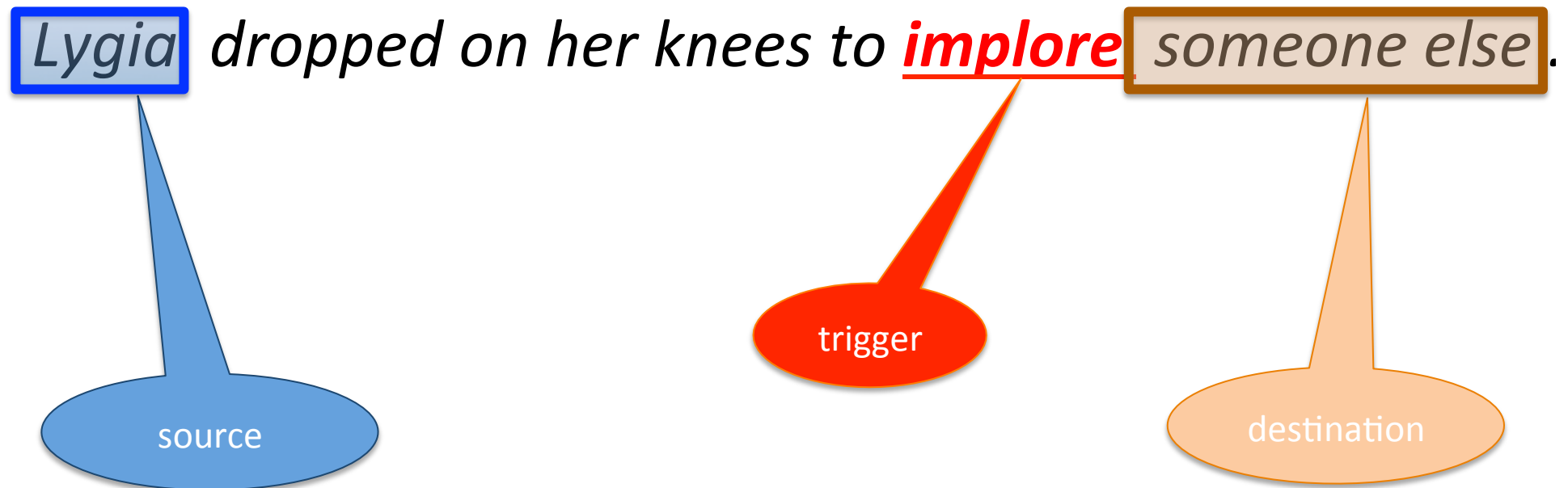
Arguments and triggers in relations

- Social: inferior-of



Arguments and triggers in relations

- Affective: worship

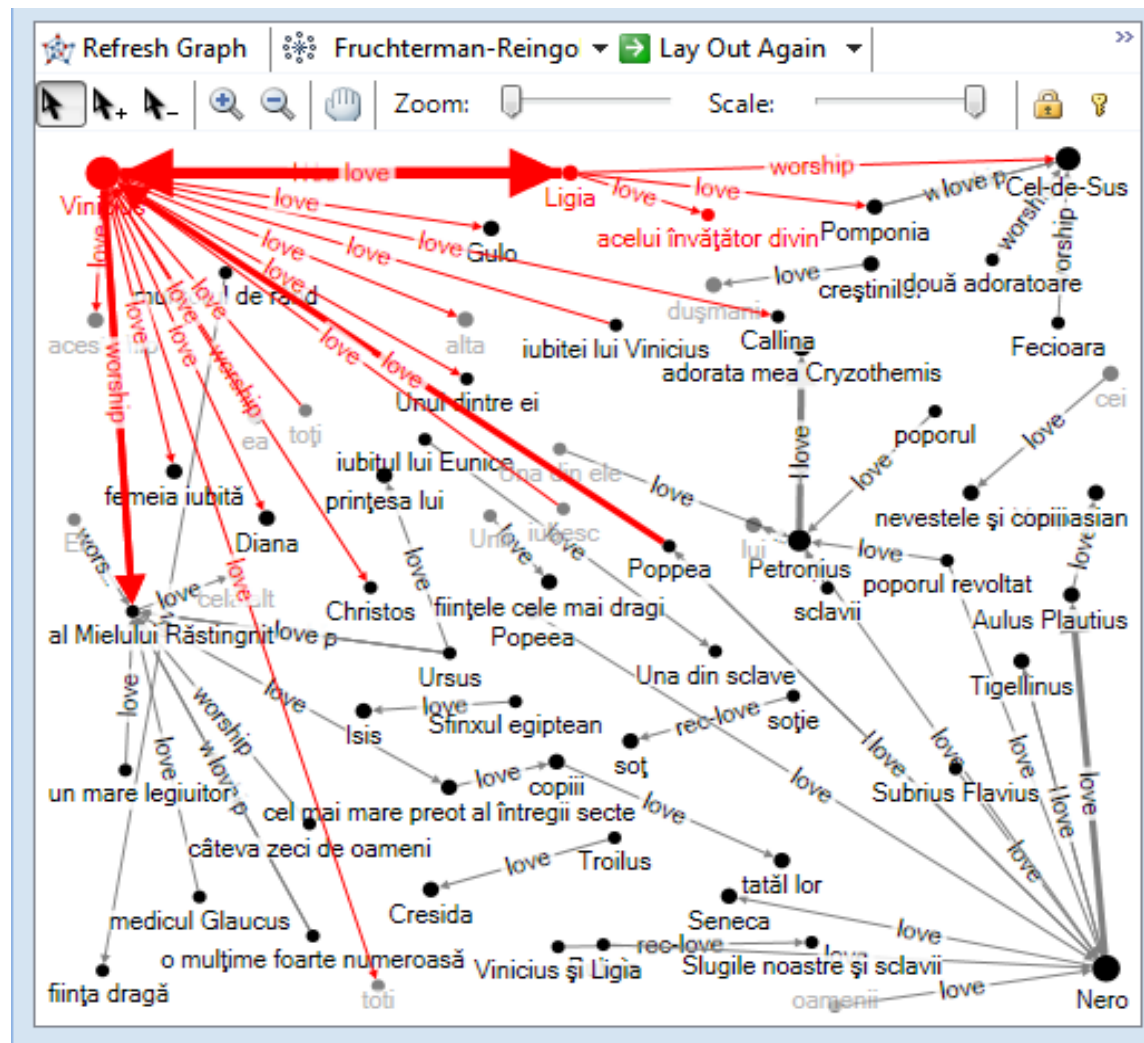


General statistics over the corpus

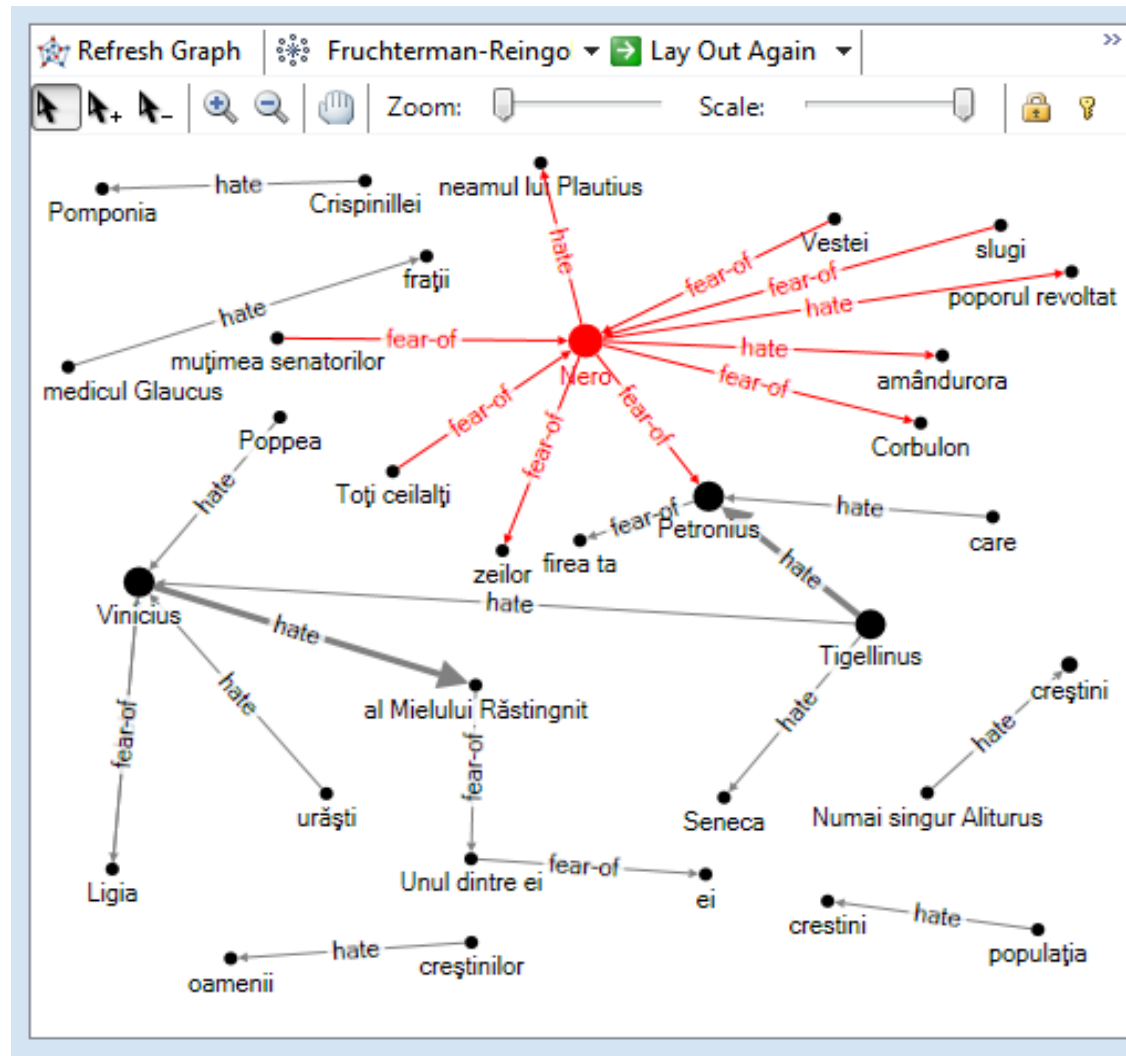
- 7,281 sentences
- 146,822 tokens, punctuation included
- 171,029 tokens summed up under all relations
- 24,636 entity mentions
- 22,301 referential relations
- 755 AKS relations (**A**ffective + **K**inship + **S**ocial)
- 752 triggers



Example: affective relations *love* and *worship*



Example: affective relations *fear-of* and *hate*

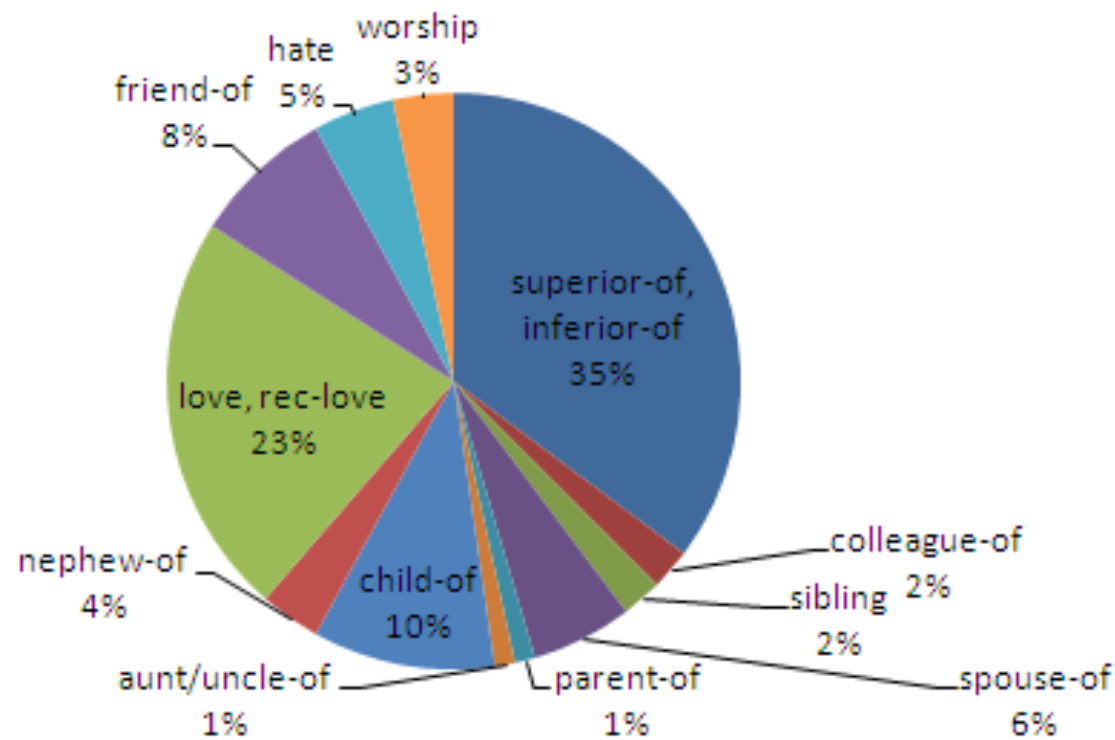


Vinicius' links with other characters



Semantic relations involving Vinicius

Vinicius' Relationships



Annotation

<ENTITY ID="E8" TYPE="PERSON">
<W id="28" LEMMA="Marcus">Marcus</W>
<W id="29" LEMMA="Vinicius">Vinicius</W>
</ENTITY>
<W id="30" LEMMA="fi">era</W>
<KINSHIP ID="KIN57" FROM="E12" TO="E11" TRIGGER="31"
TYPE="child-of">
<ENTITY ID="E12" TYPE="PERSON">
<W id="31" LEMMA="fiu">fiu</W>
<KINSHIP ID="KIN53" FROM="E11" TO="E10" TRIGGER="32"
TYPE="sibling-of">
<ENTITY ID="E11" TYPE="PERSON">
<W id="32" LEMMA="soră">surorii</W>
<ENTITY ID="E10" TYPE="PERSON">
<W id="33" LEMMA="său">sale</W>
</ENTITY>
<W id="34" LEMMA="mai">mai</W>
<W id="35" LEMMA="mare">mari</W>
</ENTITY>
</KINSHIP>
</ENTITY>
</KINSHIP>
<W id="36" LEMMA=",">,</W>
<KINSHIP ID="KIN59" FROM="E13" TO="E15" TRIGGER="44"
TYPE="spouse-of">
<ENTITY ID="E13" TYPE="PERSON">
<W id="37" LEMMA="care">care</W>
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<W id="38" LEMMA=",">,</W>
<W id="39" LEMMA="cu">cu</W>
<W id="40" LEMMA="an">ani</W>
<W id="41" LEMMA="în_urmă">în urmă</W>
<W id="42" LEMMA=",">,</W>
<W id="43" LEMMA="sine">se</W>

<W id="44" LEMMA="căsători">căsătorise</W>
<W id="45" LEMMA="cu">cu</W>
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<ENTITY ID="E15" TYPE="PERSON">
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<ENTITY ID="E14" TYPE="PERSON">
<W id="47" LEMMA="acesta">acestui</W>
</ENTITY>
</ENTITY>
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</KINSHIP>
<SOCIAL ID="SOC9" FROM="E17" TO="E16" TRIGGER="49"
TYPE="inferior-of">
<ENTITY ID="E17" TYPE="PERSON">
<W id="49" LEMMA="consul">consul</W>
<W id="50" LEMMA="pe">pe</W>
<W id="51" LEMMA="vreme">vremea</W>
<W id="52" LEMMA="el">lui</W>
<ENTITY ID="E16" TYPE="PERSON">
<W id="53" LEMMA="Tiberiu">Tiberiu</W>
</ENTITY>
</ENTITY>
</SOCIAL>
<W id="54" LEMMA=".">.</W>

<REFERENTIAL ID="REF37" FROM="E12" TO="E8" TYPE="coref" /
REFERENTIAL>
<REFERENTIAL ID="REF38" FROM="E13" TO="E11" TYPE="coref" /
REFERENTIAL>
<REFERENTIAL ID="REF39" FROM="E14" TO="E8" TYPE="coref" /
REFERENTIAL>
<REFERENTIAL ID="REF40" FROM="E17" TO="E15" TYPE="class-
of" /REFERENTIAL>

Proiect

- Faza I: se dă un fișier cu relațiile semantice extrase și sortate => să se scrie un set de patternuri care să permită interogarea lui
- Faza II: se dă un text adnotat XML la POS, leamnă, NP, FDG => să se scrie un set de patternuri care să permită descoperirea de relații semantice

Limbajul de interogare – exemplu

- FROM REL.SUBREL TO
 - Vinicius AFFECTIVE.love Ligia => toate instanțele acestei relații
 - Vinicius love ? => pe cine iubește Vinicius?
 - ? love ? => toate entitățile ENT1 ENT2 din corpus, astfel încât ENT1 love ENT2

- $?x: ?x \text{ love } ?\text{Vinicius} \text{ AND } (\text{OR } (\text{NOT } (?y \text{ love } ?x)) (\text{NOT } (?x \text{ love } ?y)))$
- $(q \langle e1 \rangle \langle R \rangle \langle e2 \rangle)$
- Cine e personajul din carte care mai întâi îl urăște pe Vinicius și apoi îl iubește?

(entity (ID ...) (name Vinicius) (POS)
(MSD) ())

(relation (ID ...) (class KINSHIP) (type child-of)
(from ...) (to ...))