

Using Formal Models in the Humanities: challenges and misdirections

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Summary

1. The Digital Humanities

- where we're coming from / what we're aiming at
- examples of problems we have

2. Modeling humanities subjects #1: philosophical ideas

- approach
- modeling patterns for navigation

3. Modeling humanities subjects: citations

- problem description
- first results

4. Conclusions

Digital Humanities: (still) looking for a definition

I think of "Digital Humanities" is a vague and ambiguous term; in fact, I think it causes a fair amount of confusion both inside and outside of the academy. DH is an umbrella term that, depending on who you are talking to, covers a huge territory: everything from applied text analysis and corpus stylistics to the more esoteric and theoretical realms of video game criticism.

Digital Humanities is the use of digital technologies for the pursuit of a greater understanding of the humanities

A field of study that looks at the application of digital technology to the research areas of the humanities. It is not necessarily undertaking that humanities research, but examining the methodology and provision of possibilities for enabling that research or new conceptions of related research. The majority of work in this area, however, gets characterised by those outside the field as IT professionals just doing a bit of programming work for them while uselessly banging on about long-term preservation formats, open data, and not really doing real research.

Univ. of Alberta, Tapor Wiki: <http://bit.ly/1oSvX>

Digital Humanities: key facts

[...] with the advent of the World Wide Web, digital humanities has broadened its reach, yet it has remained in touch with the goals that have animated it from the outset: **using information technology to illuminate the human record, and bringing an understanding of the human record to bear on the development and use of information technology.**

<http://www.digitalhumanities.org/companion/>

- essentially, two broad ways to look at it:

- **from humanities**, to computing... eg. 'new media studies'

- **from computing**, to the humanities... eg 'applied computing'

Digital Humanities: key facts

- varying relationship to computer science

- using vs building?

- not one, but many DH!

- archeology

- history

- classical studies

- literary studies, linguistics, and lexicography

- musicology

- philosophy and religion

- art history

Digital Humanities: increasing need for data integration solutions

Anglo-Saxon charter S65

A.D. 704 (13 June). Swæfred, king of Essex, and Pæogthath, comes, with the consent of Æthelred, king of Mercia, to Waldhere, bishop; grant of 30 hides (cassati) at Twickenham, Middx, with confirmation by Cenred and Ceolred, kings of Mercia. Ceolred's confirmation took place at Arcencale. Latin with bounds.

Digital Humanities: increasing need for data integration solutions

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Kemble

<http://www.trin.cam.ac.uk/kemble/singlesheets/4-24.html>

Langscape

http://www.langscape.org.uk/descriptions/editorial/L_65_000.html

Pase

<http://www.pase.ac.uk/pase/apps/ASC/persons.jsp?sourceKey=341>

ESawyer

<http://www.esawyer.org.uk/content/charter/65.html>

ASchart

<http://www.aschart.kcl.ac.uk/content/charters/text/s0065.html>

Digital Humanities: increasing need for data integration solutions

Transaction

Factoid
(PASE)

Title Factoid
(KEMBLE)

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Confirmation

Factoid
(PASE)

Place Factoid
(LANGSCAPE)

Data integration in DH: desiderata

- **data sharing**

- maintain provenance and integrity
- eliminate redundancy
- allow for comparative perspective (e.g. visualise conflicts of interpretations)

- **models exposure**

- what is an event (e.g. Anglo-Saxon project: what is a transaction in PASE?), a person, a place?
- Can a certain consensus be reached? Necessity to establish community of practices around modeling exercises, clusters of consensus around knowledge domains or specific disciplines

Project/Data	ASChart	E-Source	Kemble	LangScape	PASE
A				X	X
C				X	X
E				X	X
I				X	X
S					X
M				X	
Language	X	X			X
Language of part of text				X	
Full text					
E					
E					
E					
A					X
A					
I					X
Editorial notes			X	X	X

A cross-discipline KR research agenda in DH?

Viewpoints, ideas

People and ph. objects

Information objects

Historical events & time



- history

- performing arts

- visual arts

- law

- religion

- art history

- literary studies

linguistics

- philosophy

- archeology

- classical studies

- musicology

lexicography

A cross-discipline KR research agenda in DH?

Contradictory information

Interpretation events

Debate, argumentation

Uncertainty, partial knowledge



Viewpoints, ideas

People and ph. objects

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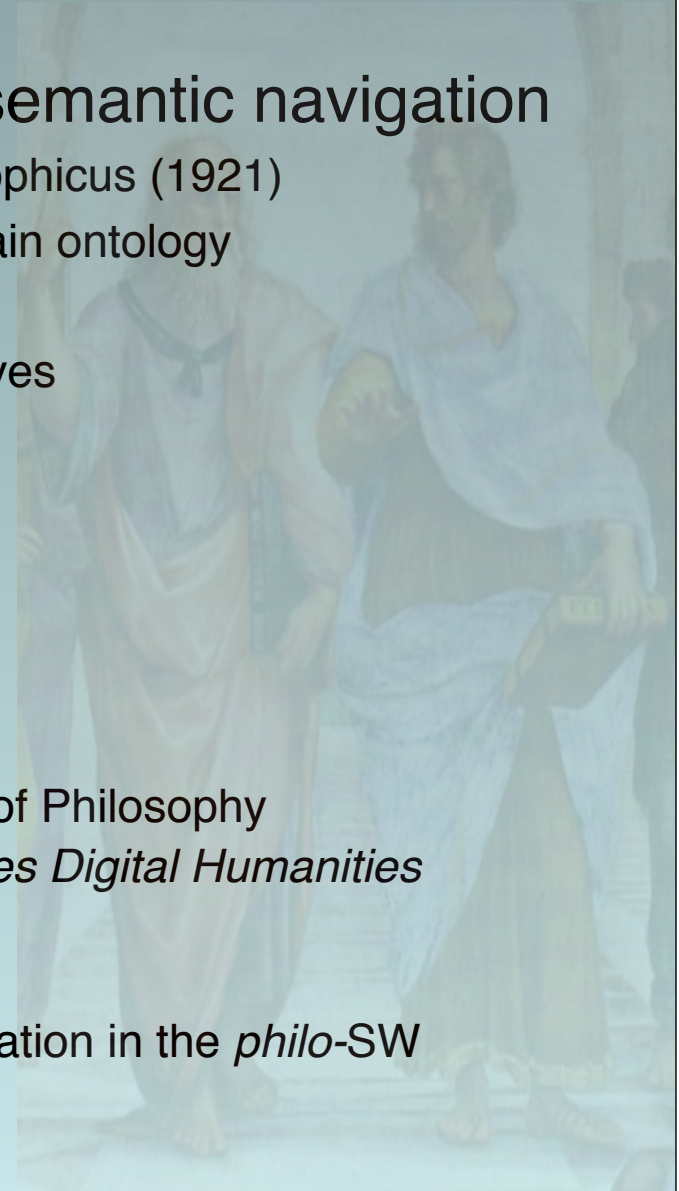
example #1..

modeling

philosophy

PhiloSurfical: background and rationale

- PhiloSURFical (2007): learning through semantic navigation
 - prototyped with Wittgenstein's **Tractatus** Logico-Philosophicus (1921)
 - **Annotation of learning materials** *by means of* a domain ontology
 - Reasoning on annotated resources
 - Dynamic reorganization according to different perspectives
 - Mechanisms for **contextual navigation**
 - Tools for providing not answers, but documents!
- Other notable projects:
 - InPhilo Project (USA, 2007)
 - Ontological backbone for the Stanford Encyclopedia of Philosophy
 - Funded by the *National Endowment for the Humanities Digital Humanities Initiative*
 - Discovery Project (Europe, 2006)
 - Generic framework for collaborative annotation/navigation in the *philo-SW*
 - Funded by the EU EcontentPlus Grant



What we'd like: a vision...

7
What we cannot speak about we must pass over in silence.



Ludwig Wittgenstein 1889-1951,
Tractatus Logico-Philosophicus

6.2
Mathematics is a logical method. The propositions of mathematics are equations, and therefore pseudo-propositions.

Interpretative



Max Black 1909-1988,
Commentary on the Tractatus

Comparative

B. Russell, 1872-1970



Cambridge, 1920-1930



F. Ramsey, 1903-1930



G.E. Moore, 1873-1948

Textual

empiricism platonism
logicism
realism formalism

Theoretical

epistemology
ph.of logic
ph.of mathematics
ph.of language

Theoretical

PhiloSURFical: main page



PhiloSURFical

Browse Thematically Wittgenstein's Tractatus Logico-Philosophicus

Welcome...


Browse the text

Browse the annotations

Browse the pathways

Browse the ontology

What is PhiloSURFical?

PhiloSURFical is a tool for browsing a philosophical text, taking advantage of a map of the concepts relevant to the text. You can imagine it as the real book, with the enhancement of a *smart* analytical index, which is constantly updated depending on the context. Find out more using the help  buttons!

Why the Tractatus?

The PhiloSURFical application has been prototyped with Wittgenstein's *Tractatus Logico-Philosophicus*. The choice of the Tractatus is not casual: it is a very structured text, therefore it facilitates the analytical task of dissecting its components and annotating them. Secondly, the Tractatus is a very influential work in the twentieth century philosophy, investigating several issues concerning language and meaning, which in recent times have become of interest to various other disciplines. Finally - cause it's *freely available*!!
[legalese: **The Tractatus Logico-Philosophicus is used solely for the purposes of research for a non-commercial purpose under s 29(i) of the Copyright designs and Patents Act 1988.**]

How does it work?

Thanks to an underlying *ontology*, that is, a formal representation of the entities of a world. We created this model with the specific purpose of facilitating the exchange of philosophy-related data on the web. PhiloSURFical shows how this can be done: all the contents you see are processed by means of the ontology. This technology exists in the context of the *Semantic Web* initiative: we expect that whenever more resources in the humanities (but not only) will be 'marked-up' using these techniques, the scope and complexity of the available scholarly applications will also improve considerably. To find out more, check out the *F.A.Q.* section or go to the main *project site*.

PhiloSURFical: annotation categories

The screenshot displays the PhiloSURFical web application interface. At the top, there are navigation tabs: "Welcome...", "Browse the text", "Browse the annotations" (highlighted with a red box), "Browse the pathways", and "Browse the ontology". On the left side, there is a sidebar with a "Categories" tab and a "Local" sub-tab. Below this is a "HELP" icon. The main content area is titled "Annotation Categories:" and lists several categories: VIEW, ARGUMENT, DISTINCTION, CONCEPT, METHOD, PROBLEM (highlighted in purple), FIELD-OF-STUDY, and RHETORICAL-FIGURE. Below the categories, there are two entries: "negation problem by wittgenstein" and "shopenauer problem of will by wittgenstein". The main content area also displays a list of annotations. The first annotation is "2.01 A state of affairs (a state of things) is a combination of objects (things)". The second is "2.011 It is essential to things that they should be possible constituents of states of affairs." The third is "2.012 In logic nothing is accidental: if a thing can occur in a state of affairs, the possibility of the state of affairs must be written into the thing itself." The fourth is "2.0121 It would seem to be a sort of ac". On the right side, there is a "Describe" tab and an "Inspect" sub-tab. Below this is another "HELP" icon. The main content area is titled "Annotation:" and contains the text "Select an annotation to see its description here". At the bottom right, there is a URL: <http://philosurfical.open.ac.uk> (highlighted with a dashed box).

PhiloSURFical: local annotations

The screenshot displays the PhiloSURFical web application interface. At the top, there are navigation tabs: "Welcome...", "Browse the text", "Browse the annotations" (which is active), "Browse the pathways", and "Browse the ontology". Below these, there are sub-tabs for "Categories" and "Local".

On the left side, there is a sidebar titled "Local Annotations :". It features a "HELP" icon and a list of annotations for "Satz 2.1":

- philosophy of language
- picture theory of language by wittgenstein
- picture

The main content area shows "Propositions annotated with instance:... PICTURE". A list of proposition IDs is displayed: 2.0212, 2.022, 2.1, 2.11, 2.12, 2.141, 2.1513, 2.19, 2.2, 3.01, and 4.01. A red dashed box highlights the first few IDs.

Below the list, the text for proposition 2.0212 is shown: "In that case we could not sketch any picture of the world (true or false).".

Proposition 2.022 is shown: "It is obvious that an imagined world, however difference it may be from the real one, must have something-- a form--in common with it."


Proposition 2.1 is highlighted in a light blue box: "We picture facts to ourselves."

On the right side, there is a sidebar titled "Annotation:". It features a "HELP" icon and the following information:

- Annotation:** PICTURE
- (instance of CONCEPT)
- IS-GENERALIZATION-OF :*
 - logical picture
 - proposition
- IS-RELATED-TO-IDEA :*
 - the notes metaphor

Pathway: problem-centric map

Pathways Recent items & Search

 **HELP**

Item in focus:

FOUNDATIONS-OF-MATHEMATICS-PROBLEM [change](#) | [instance_info](#)

Pathways list

- Ideas having the same name
- Generic and specific schools of thought
- Influences among related views
- Generic map of related ideas
- **Problem-centric map of the attempt to solve a problem**
- Other documents about the same idea
- Strict string-matching on other resources

Type of pathway:
THEORETICAL

Description : This pathway takes a problem instance and retrieves information related to the competing views (theories, schools of thought, philosophies) that tackle and attempt to solve the problem

Results [\[see in a graph\]](#)

Problem-centric map of the attempt to solve a problem

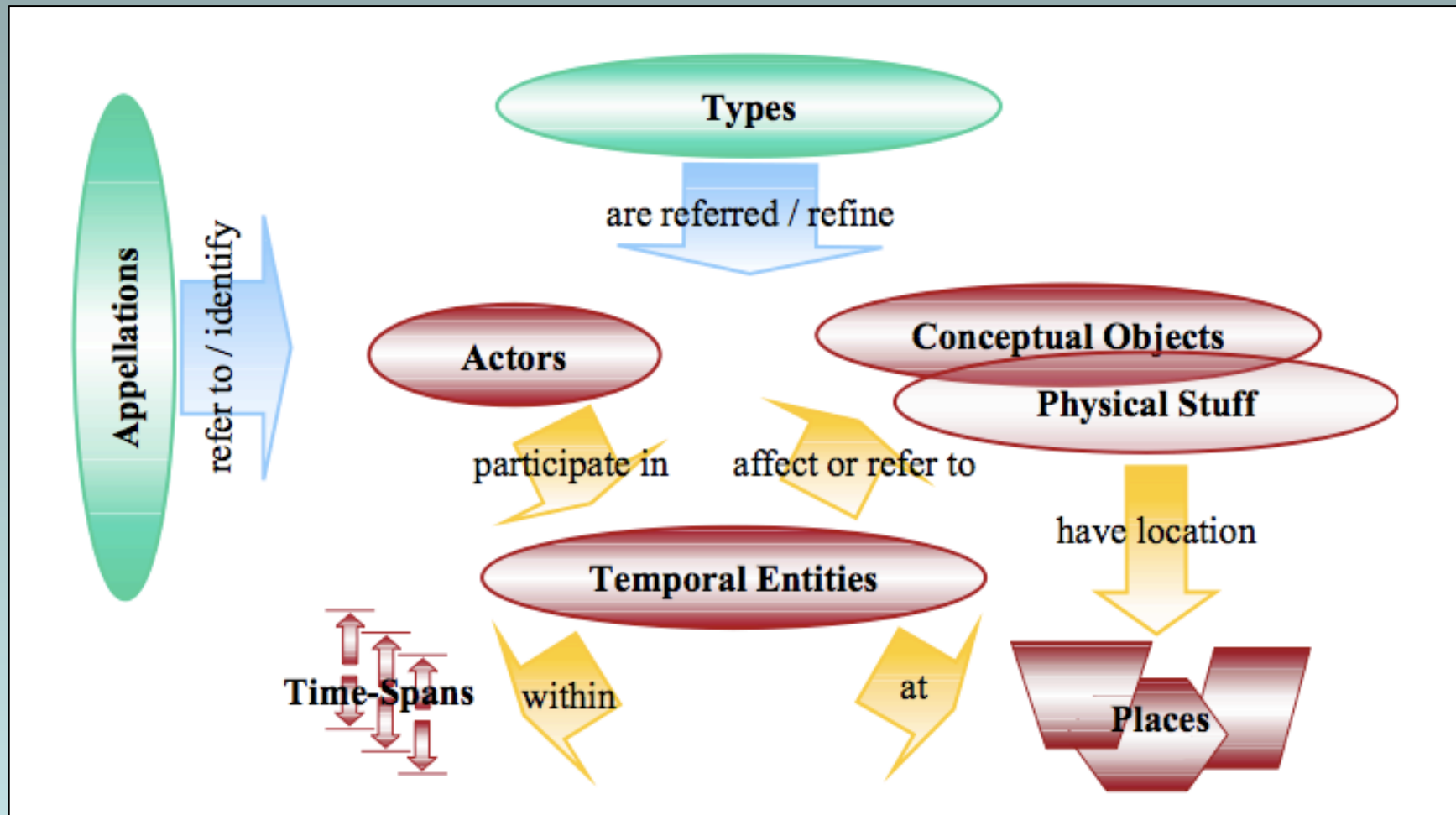
Item:
the problem of the foundations of mathematics

- IS-TACKLED-BY-VIEW ----> PLATONIST MATHEMATICAL REALISM, which ...
 - HAS-MAIN-EXPONENT ----> Plato
 - HAS-EXEMPLAR-THEORY ----> the theory of ideas by Plato
 - OPPOSES-VIEW ----> Nominalism
 - OPPOSES-VIEW ----> Anti-Realism
 - OPPOSES-VIEW ----> Intuitionism-Math-Int
- IS-TACKLED-BY-VIEW ----> MATHEMATICAL LOGICISM, which ...
 - HAS-MAIN-EXPONENT ----> Gottlob Frege
 - HAS-EXEMPLAR-THEORY ----> The philosophy of Frege
 - CLASSIFIES-VIEW ----> The philosophy of Frege
 - CLASSIFIES-VIEW ----> The philosophy of Russell
 - CLASSIFIES-VIEW ----> The philosophy of Whitehead
 - CLASSIFIES-VIEW ----> The philosophy of the Tractatus
 - HAS-MAIN-THESIS ----> Logicism-Math-Thesis
- IS-TACKLED-BY-VIEW ----> MATHEMATICAL FORMALISM, which ...
 - HAS-MAIN-EXPONENT ----> David Hilbert
 - HAS-EXEMPLAR-THEORY ----> The philosophy of Hilbert
 - CLASSIFIES-VIEW ----> the philosophy of Carnap
 - CLASSIFIES-VIEW ----> The philosophy of Carnap

<http://philosurfical.open.ac.uk>

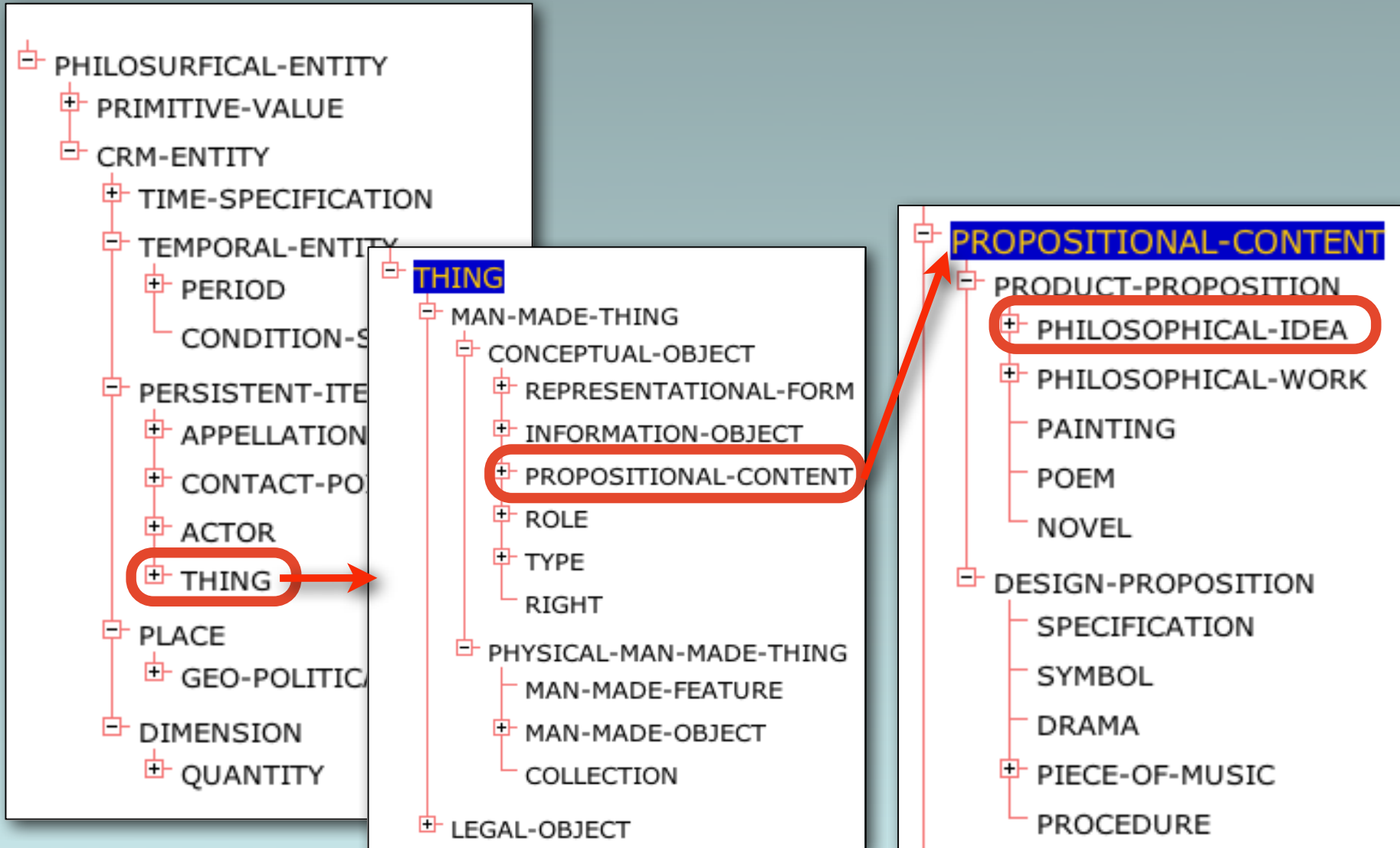
CIDOC Conceptual Reference Model

1996 ICOM initiative, 2006 ISO standard (version 4.2)

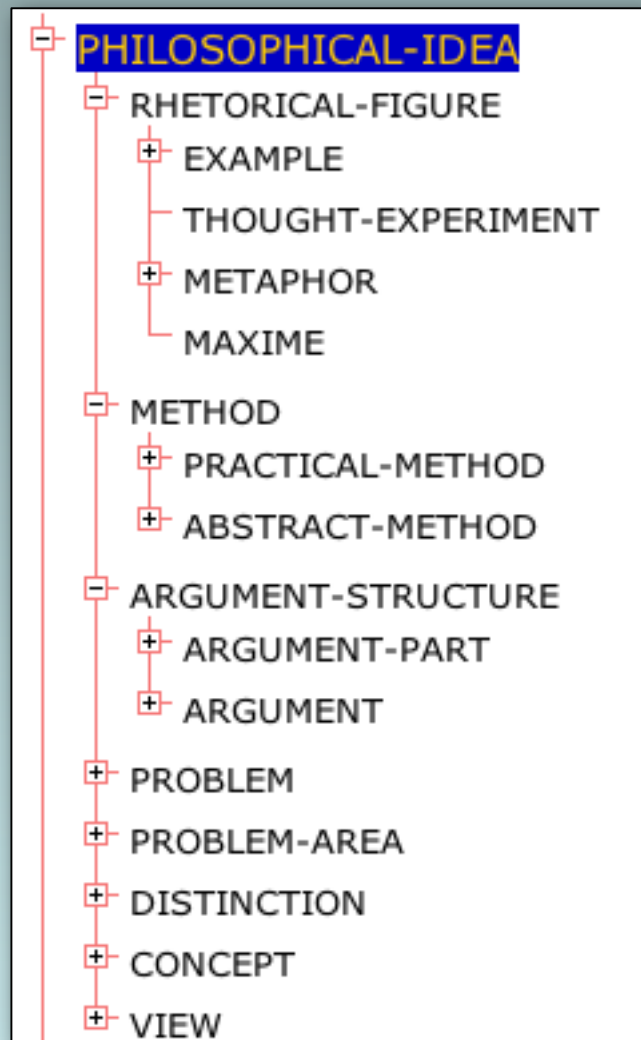


Adapted from CIDOC specification, 2005

Onto Walkthrough: conceptual objects



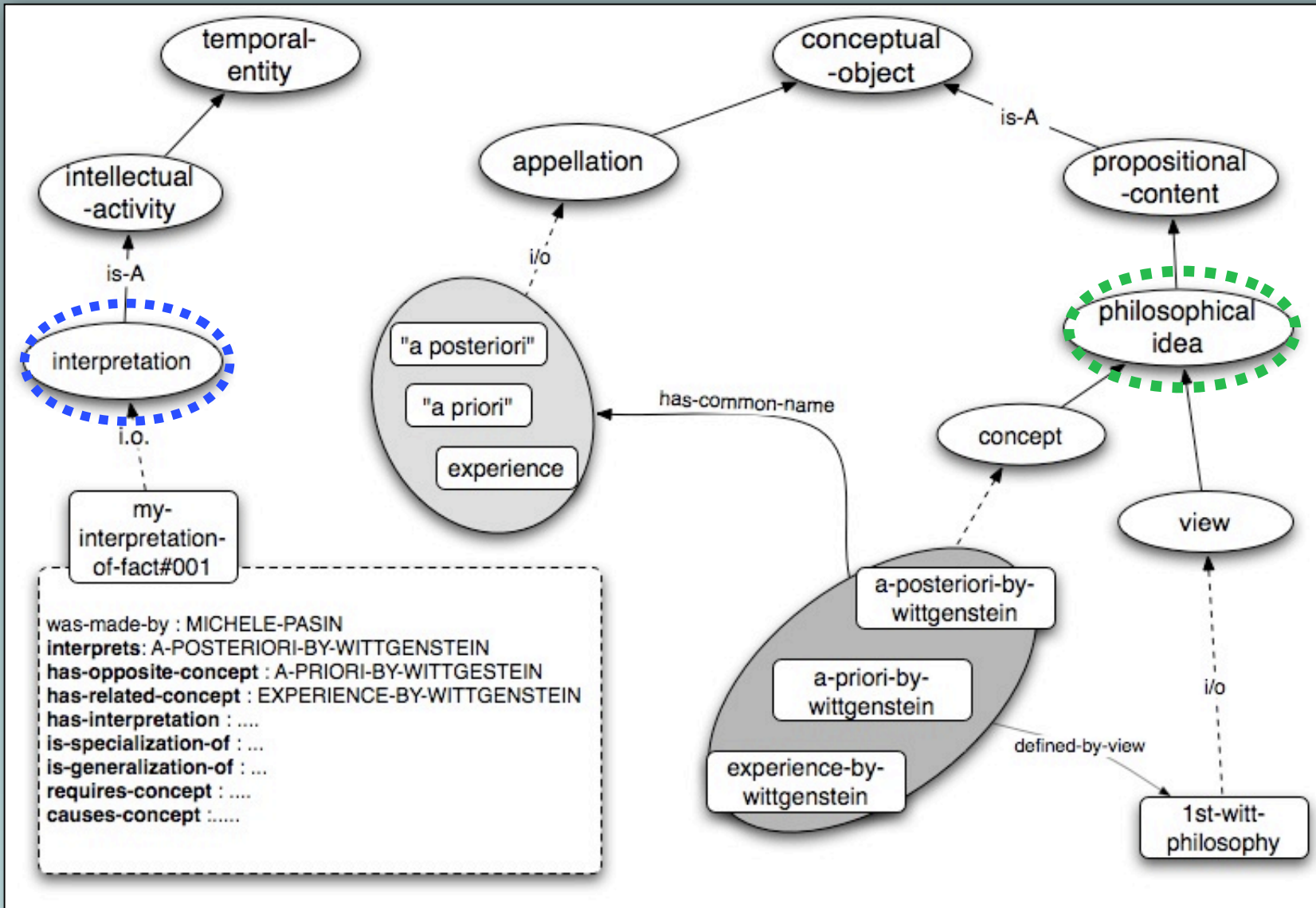
Onto Walkthrough: philosophical ideas



- **Constructivist** approach:
'pragmatic minimalism'
...“stone” can be a concept, if
there’s a view defining it!

- **Goal:** individuate the types
of non-physical objs which
play a role in the construction
of viewpoints!

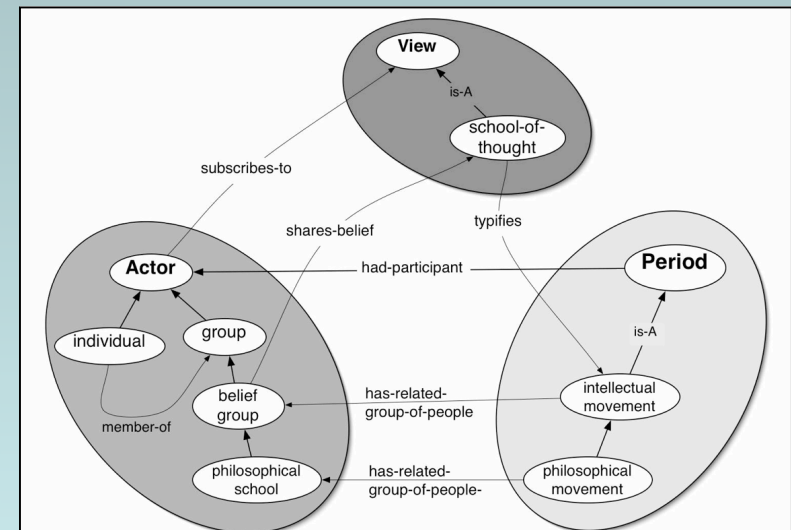
Important: interpretations vs ideas



Modeling pattern I: how many rationalisms?

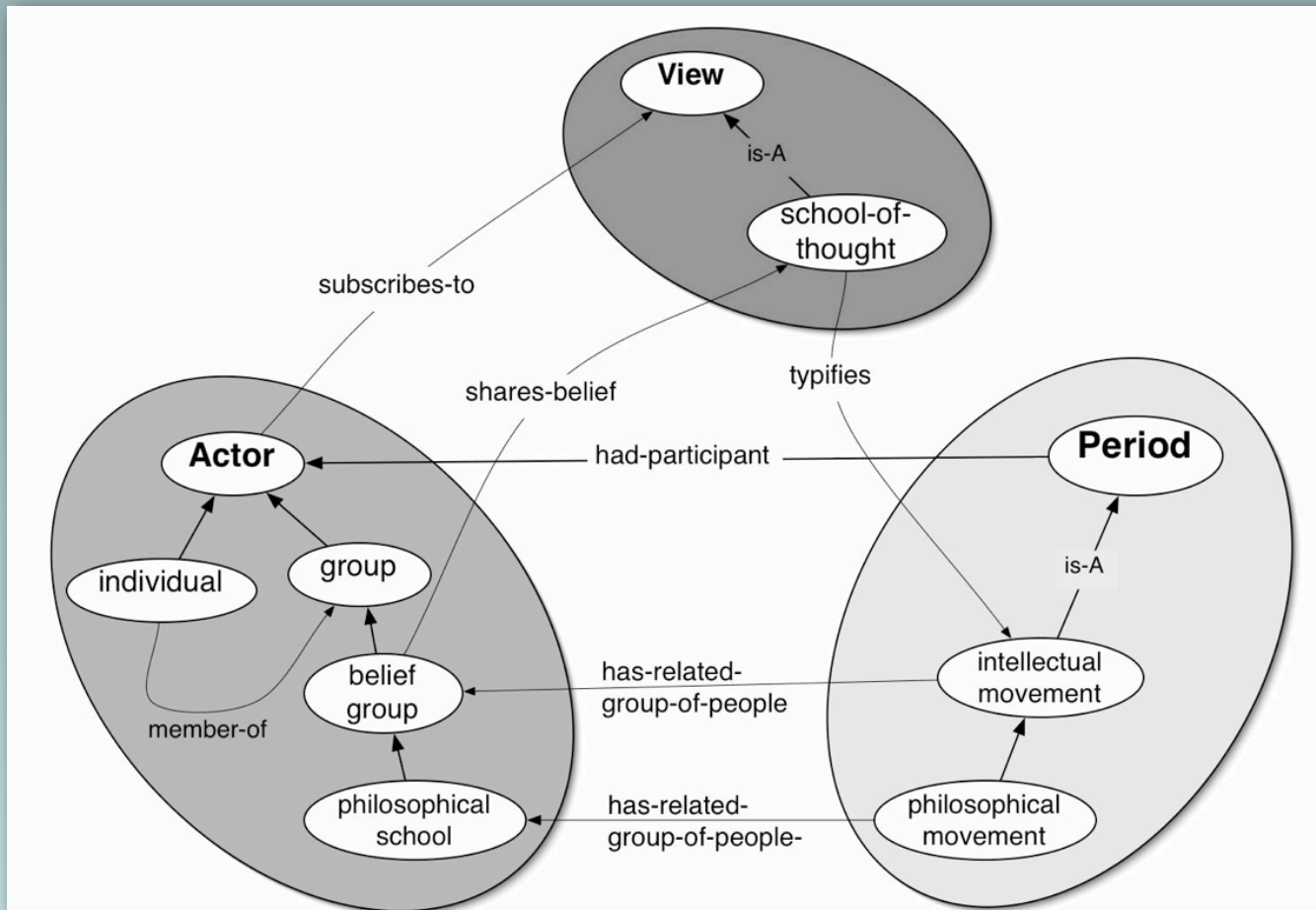
- Problem: natural language often hides type-differences
- Tip: taking advantage of natural language ambiguities, so to present resources which are potentially explicative

- Advantage: it allows navigations of ontologically distant entities (belief-groups, views, events)



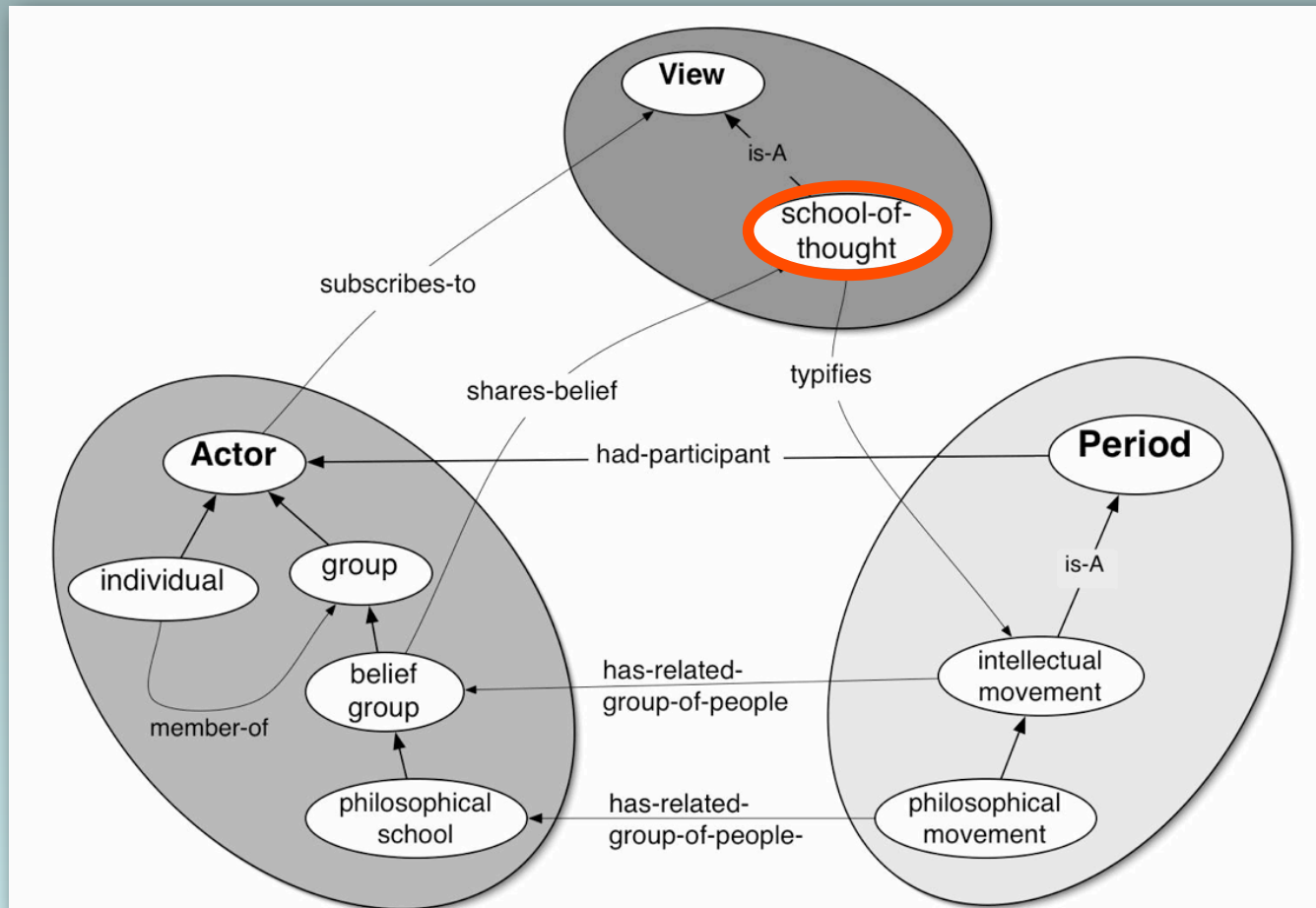
Ex. I: how many senses of rationalism?

*“This theory is clearly a new and re-shaped **rationalism**”*
*“Descartes was one of the founders of modern **rationalism**”*
*“Throughout history, the attacks of **rationalism** against empiricism has diminished”*



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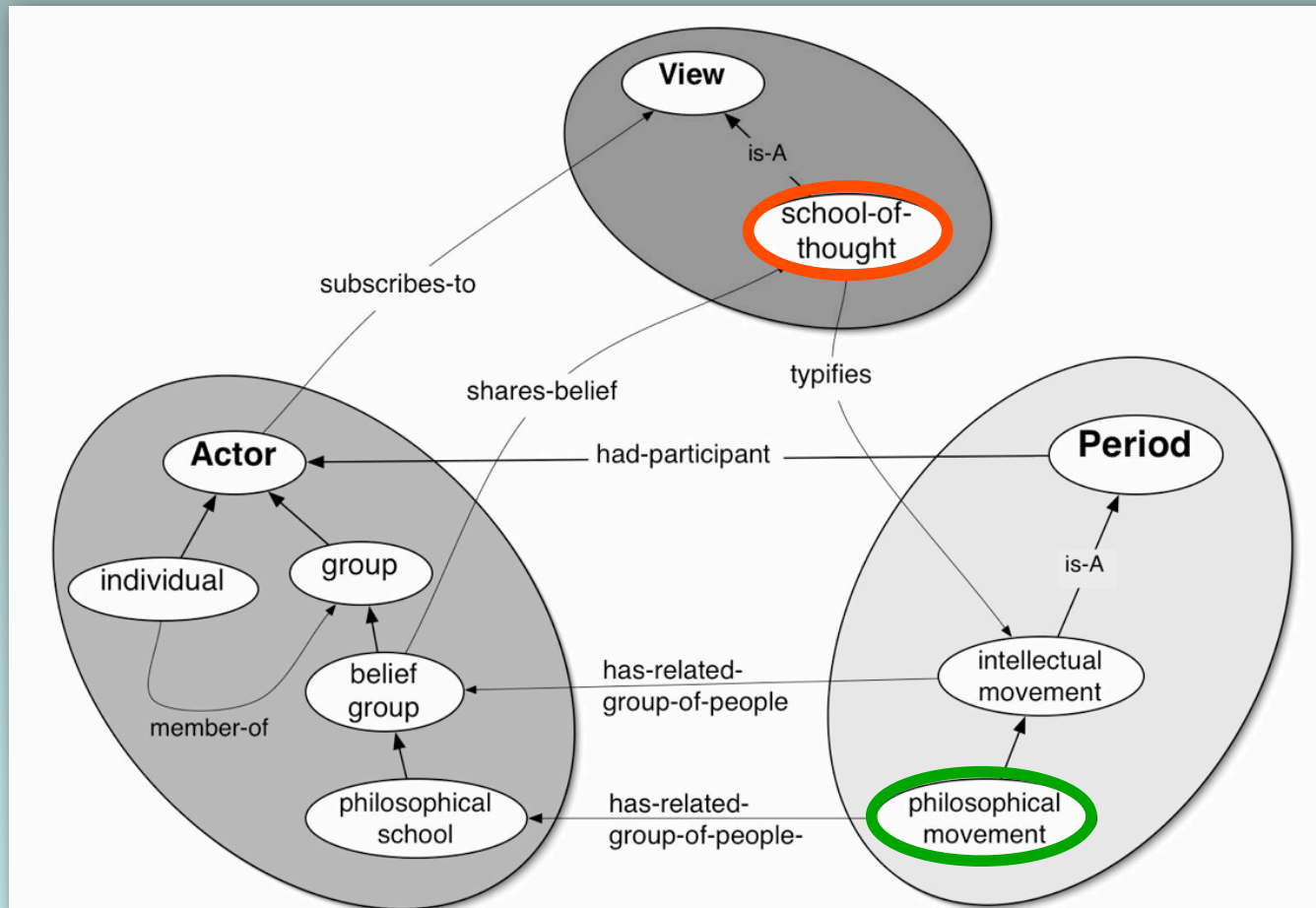


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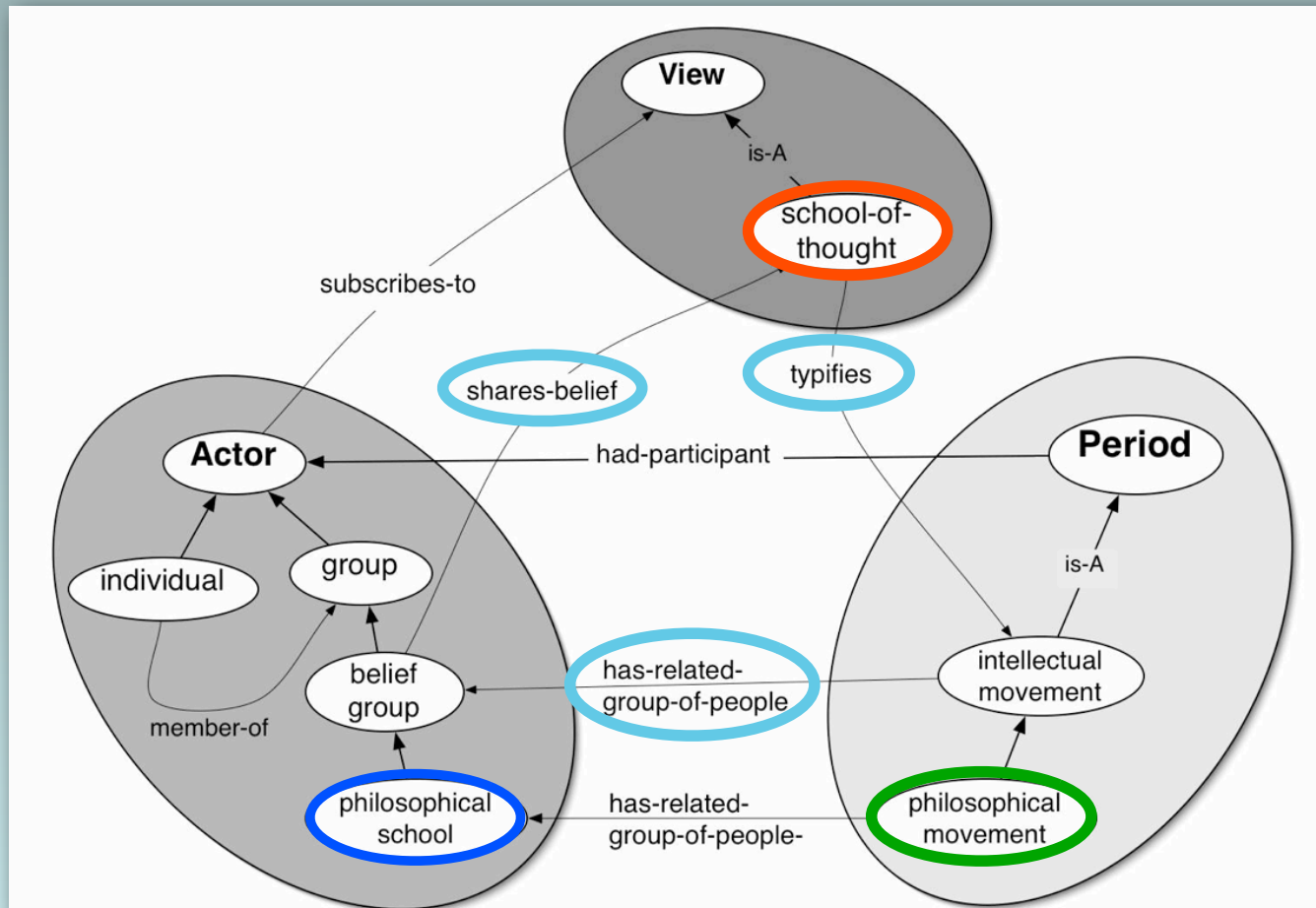


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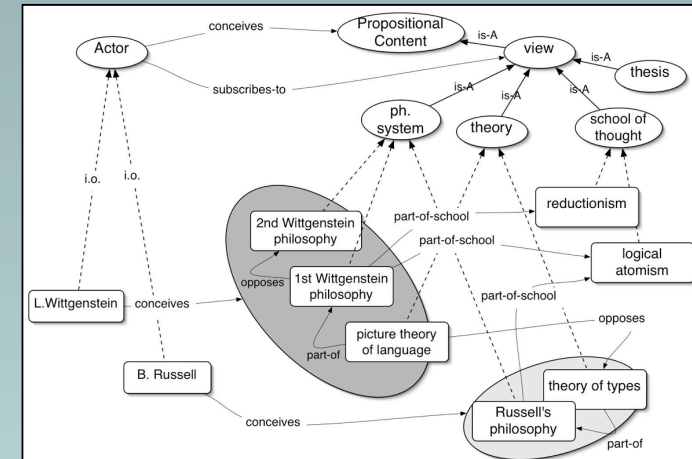


Pattern II : various granularities for theories

- Concerns only the “philosophical idea” branch of the ontology

-Taxonomies of viewpoints?

- Dolce: not suited for philosophical ideas
- Cyc: very convoluted, unusable
- Wordnet: flat hierarchy

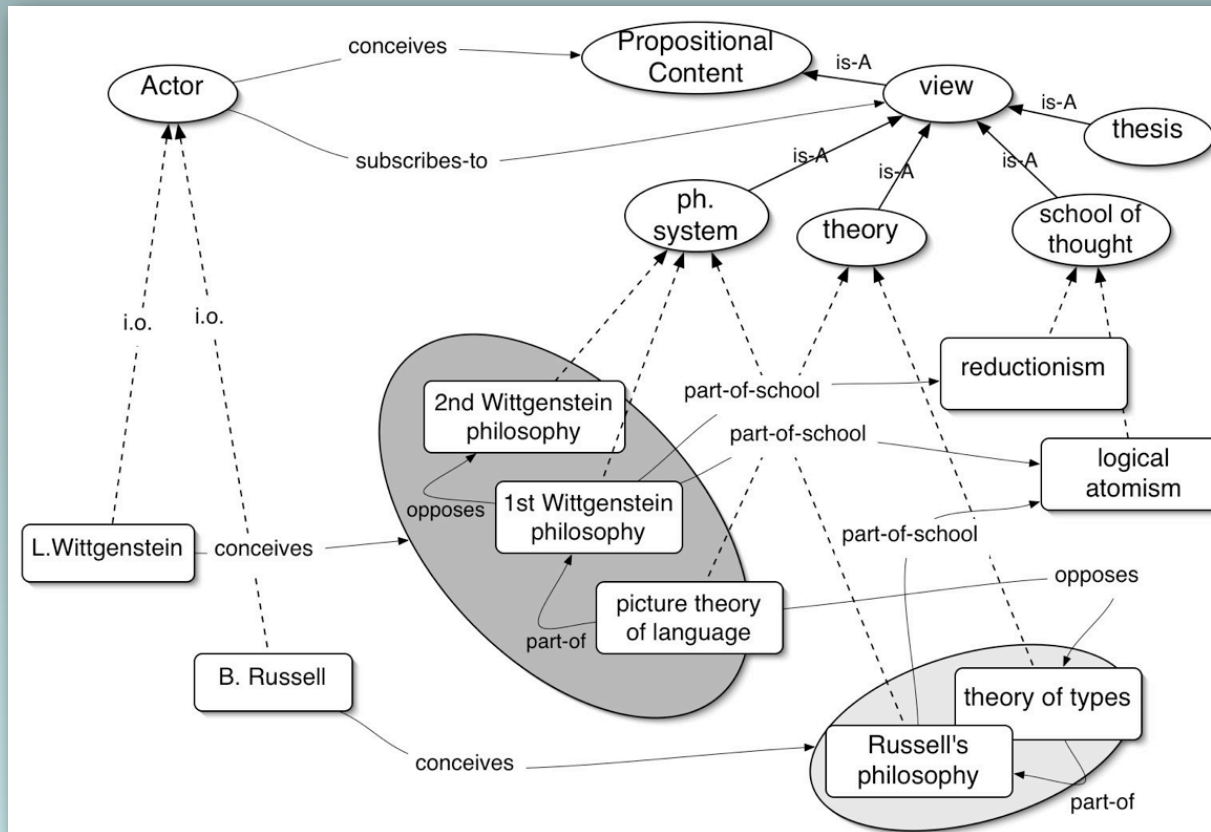


- Allows navigations which give viewpoints a “theoretical” context

- e.g. views an author had, within a problem area, consistent with a school of thought etc..

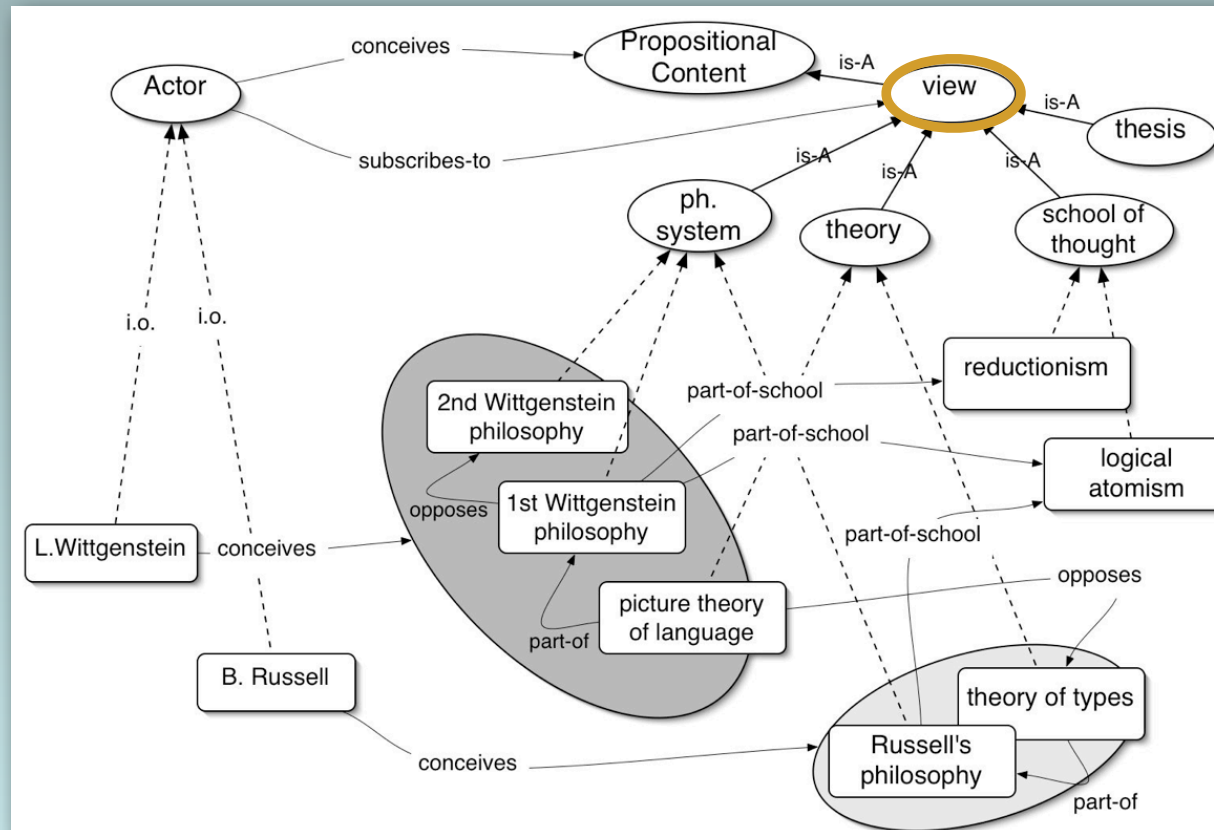
Ex. II: not all views are theories!

“Wittgenstein’s philosophy, differently from Frege’s one, deals also with problems typical of aesthetics”
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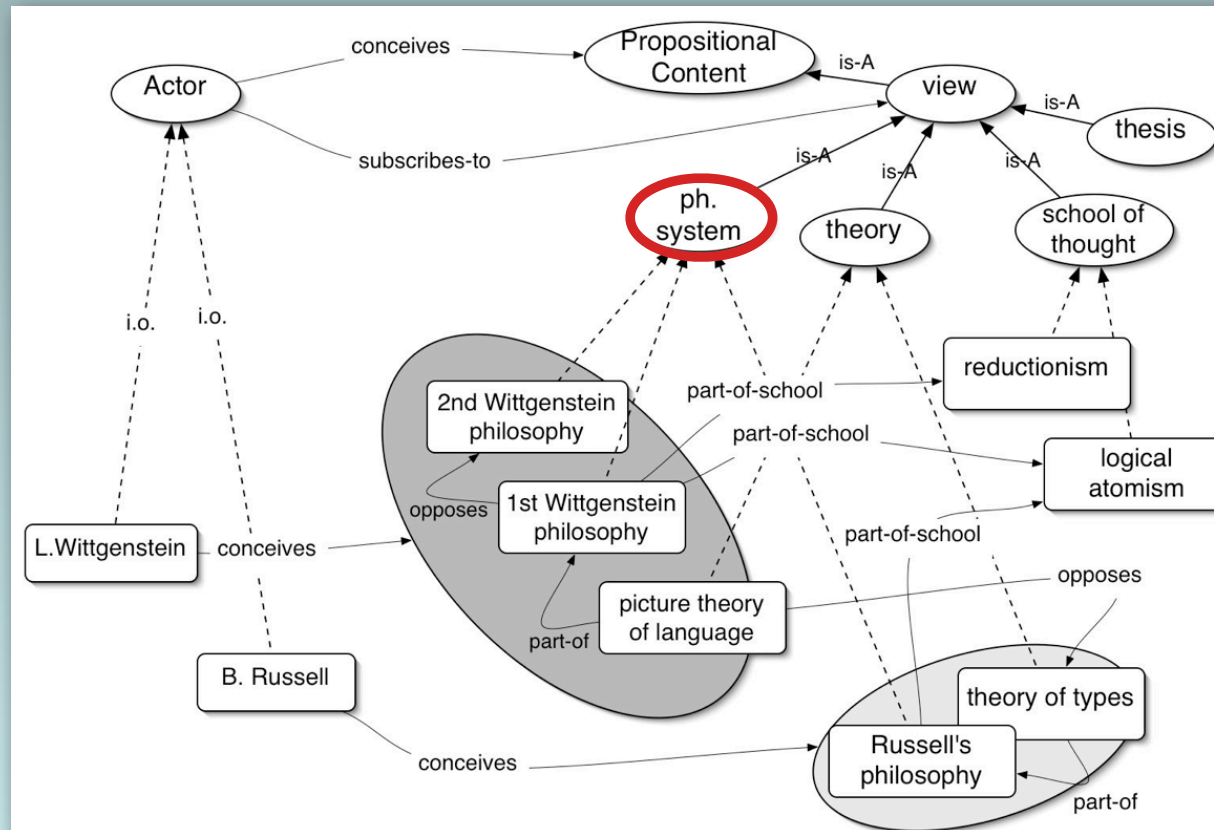
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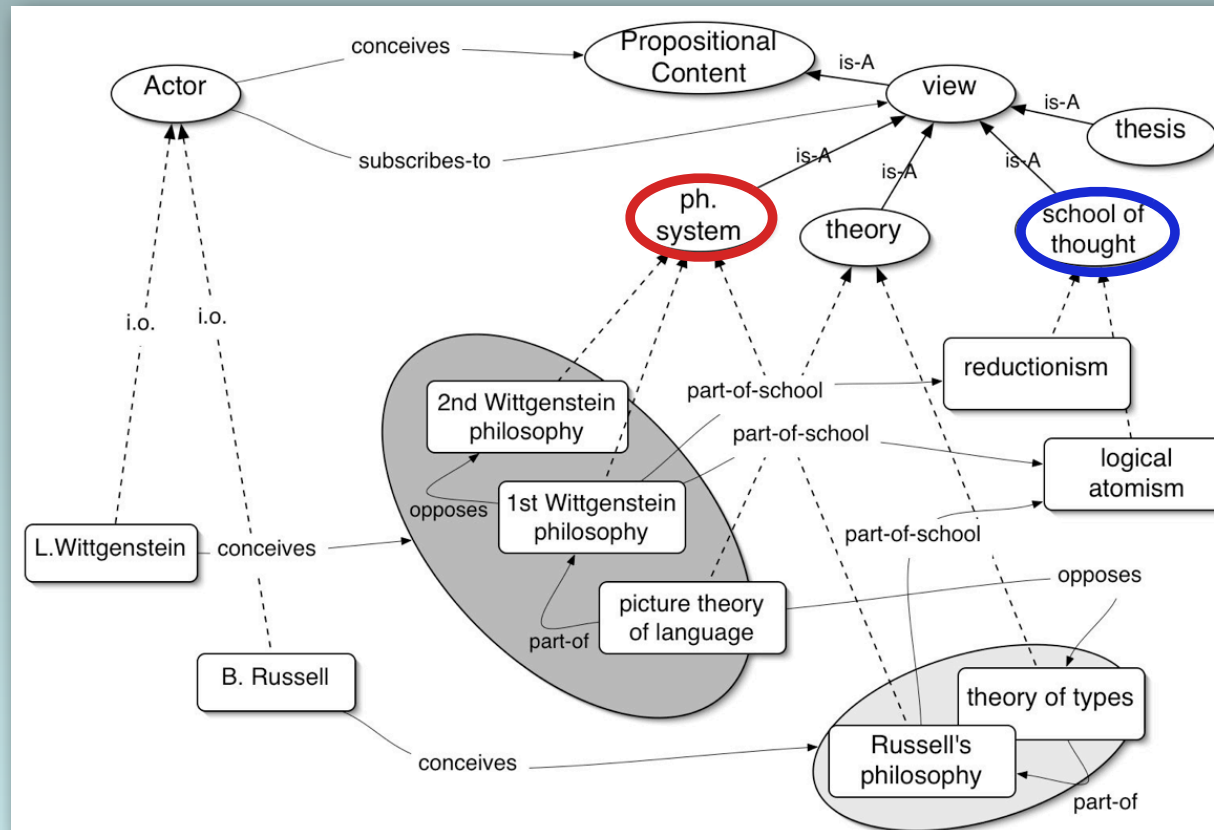
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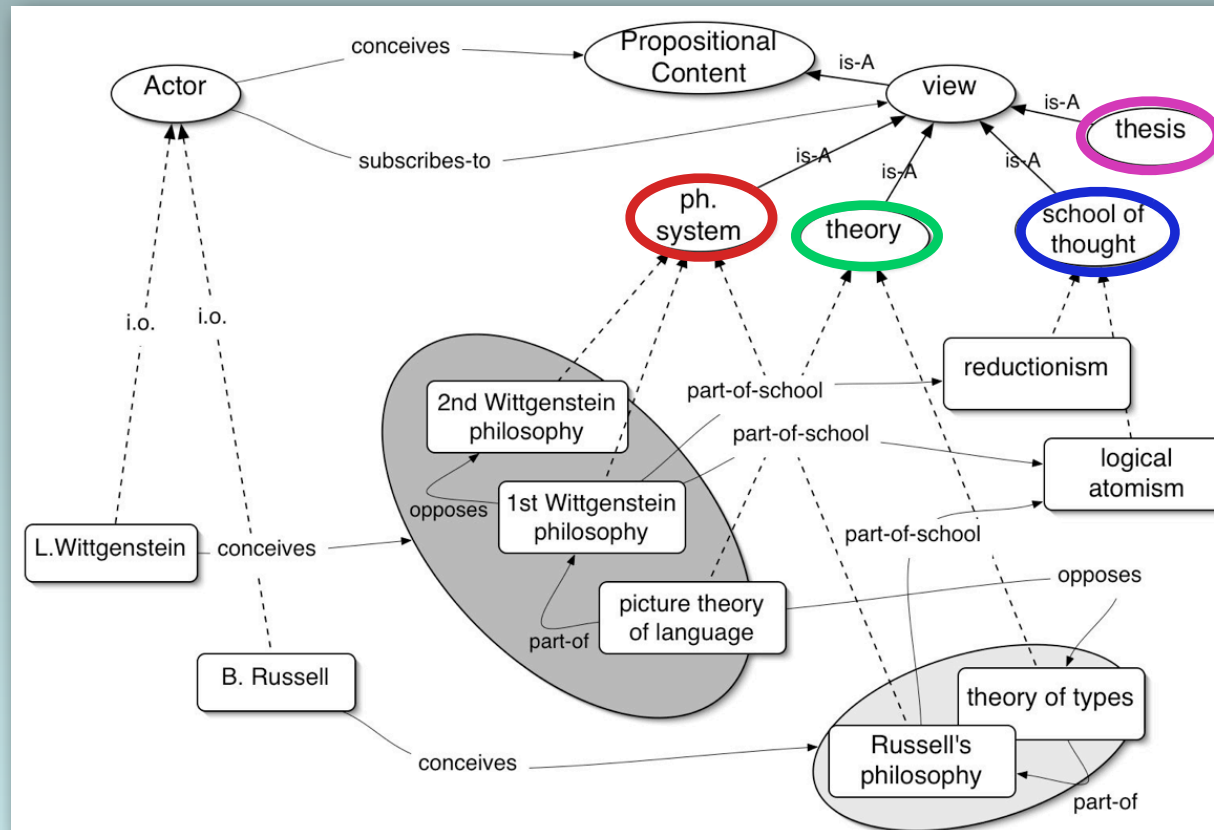
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Lesson learned: modeling patterns for navigation

- **Disclaimer:** different from “normal” ontology modeling patterns!
 - not focused on architectural issues
 - not involved in the ontology creation process
 - they are not prescriptive!
- **Purpose:** interpreting a (philosophical) concept/text, so to create *applicable* formal models for navigation
 - they open up new senses which can be used for exploring a subject domain
- **Strategy:** taking advantage of natural language ambiguities, overlapping word senses, hidden categories in language

example #2 ..

**modeling
citations**

Modeling citations: background

- It's very much a work in progress...

- work started by Matteo Romanello @ Kings College in 2010

- purpose: create a framework for text mining of citations in classics / 'ancient' references management

- ontology as the backbone of the system

- Other projects looking at citations

Shotton. **CiTO**, the Citation Typing Ontology, (2009)

D'Arcus and Giasson. **BIBO**: Bibliographic Ontology (2009)

Kruk et al. **MarcOnt**: integration ontology for bibliographic description formats. (2005)

Gruber. The Bibliographic Data Ontology (1992)

The classic way to model citations

```
<http://example1.com/citingwork>
  cito:cites <http://example2.com/citedwork> ;
  cito:inTextCitationFrequency [
    a cito:InTextCitationCount ;
    cito:inTextCountValue "10"^^xsd:integer ;
    cito:inTextCitationTarget
      <http://example2.com/citedwork> ;
  ] ; .
<http://example2.com/citedwork>
  cito:isCitedBy <http://example1.com/citingwork> ;
  cito:globalCitationFrequency [
    a cito:GlobalCitationCount ;
    cito:globalCountValue "206"^^xsd:integer ;
    cito:globalCountSource
      <http://scholar.google.com>;
    cito:globalCountDate "2009-03-11"^^xsd:date ;
  ] ; .
```

Shotton. CiTO, the Citation Typing Ontology.
(2009)

Textual Transmission History

Smith, J. Edward Sherburne's
Letters to Dudley Carleton, 1950, XII

[...] The Prentizes on shrove Tewsday last, to the number of 3. or .4000 comitted extreame insolencies; part of this nomber, taking their course for Wapping, did there pull downe to the grownd 4 houses, spoiled all the goods therein, defaced many others, & a Justice of Peace coming to appease them, while he was reading a Proclamacion, had his head broken with a brick batt. Th' other part, making for Drury Lane, where lately a newe Playhouse is erected, they besett the house round, broke in, wounded divers of the players, broke open their trunckes, & whatt apparrell, bookes, or other things they found, they burnt & cutt in peeces; [...]

Gerald Eades Bentley (1968), *The Jacobean and Caroline Stage*, vol 6
Oxford:Oxford University Press, 54-

[...] The most detailed account was transcribed by Halliwell-Phillipps from a letter among the State Papers in the Public Record Office. The letter was written by Edward Sherburne and is dated '8th Marche, 1616' (Sherburne, 1616, VI):

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Textual Transmission History in EMLoT

EMLoT Transcription Record:

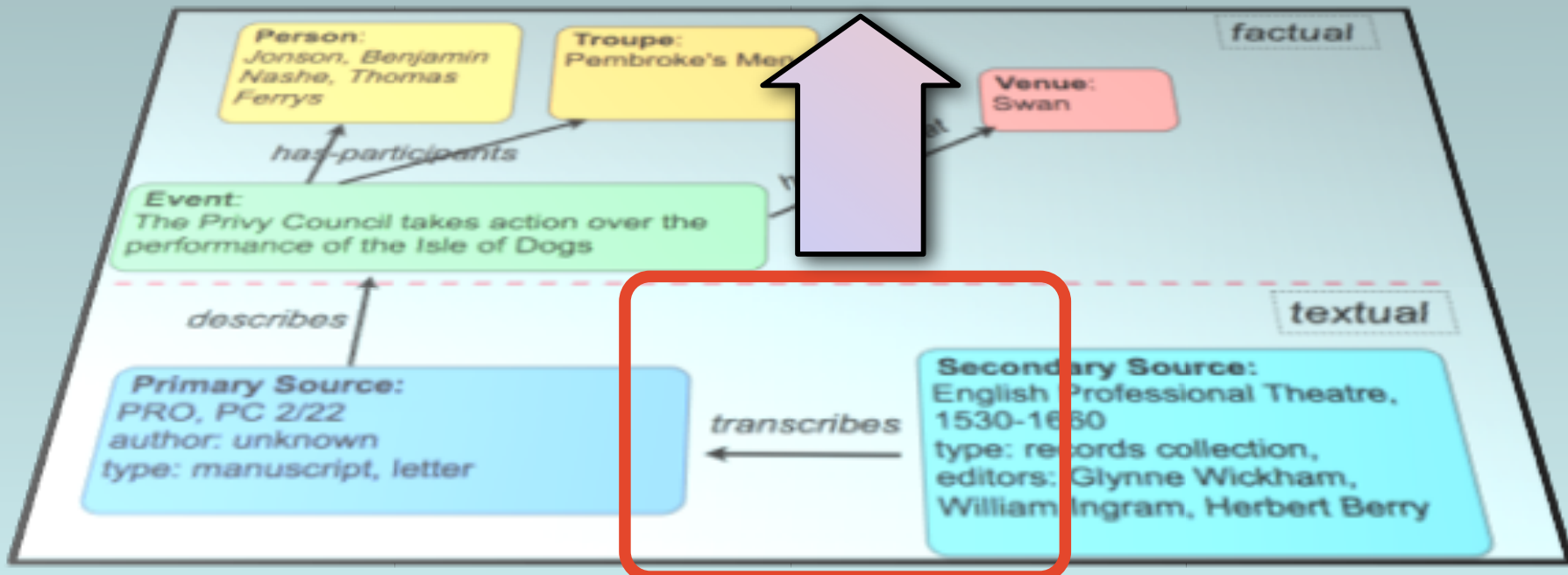
Authored by: Tanya Hagen

Primary Source Transcribed: PRO, PC 2/22

Location of Transcription (in Sec.Source): pag. 120, vol. 2

Primary Source as Cited in Sec.Source: PRO, PC 2/22/m.724d.

Transcription Notes: excerpted; parenthetical date(s);
parenthetical note(s); spelling and punctuation standardized



Further evidence: Canonical Citations

Classics: three levels of information objects

Primary sources: inscriptions, papyrus, manuscripts

Secondary sources: modern editions of works by ancient authors (text established by editors on the basis of primary sources)

Tertiary sources: works by modern authors (i.e. monographs, commentaries, journal papers, etc.)

Citation of resources

Different citation STYLES at the level of scholarly communities (i.e. journals, schools, personal choices, etc.)

Different styles need to be modeled on CANONICAL forms (inspired by secondary sources)

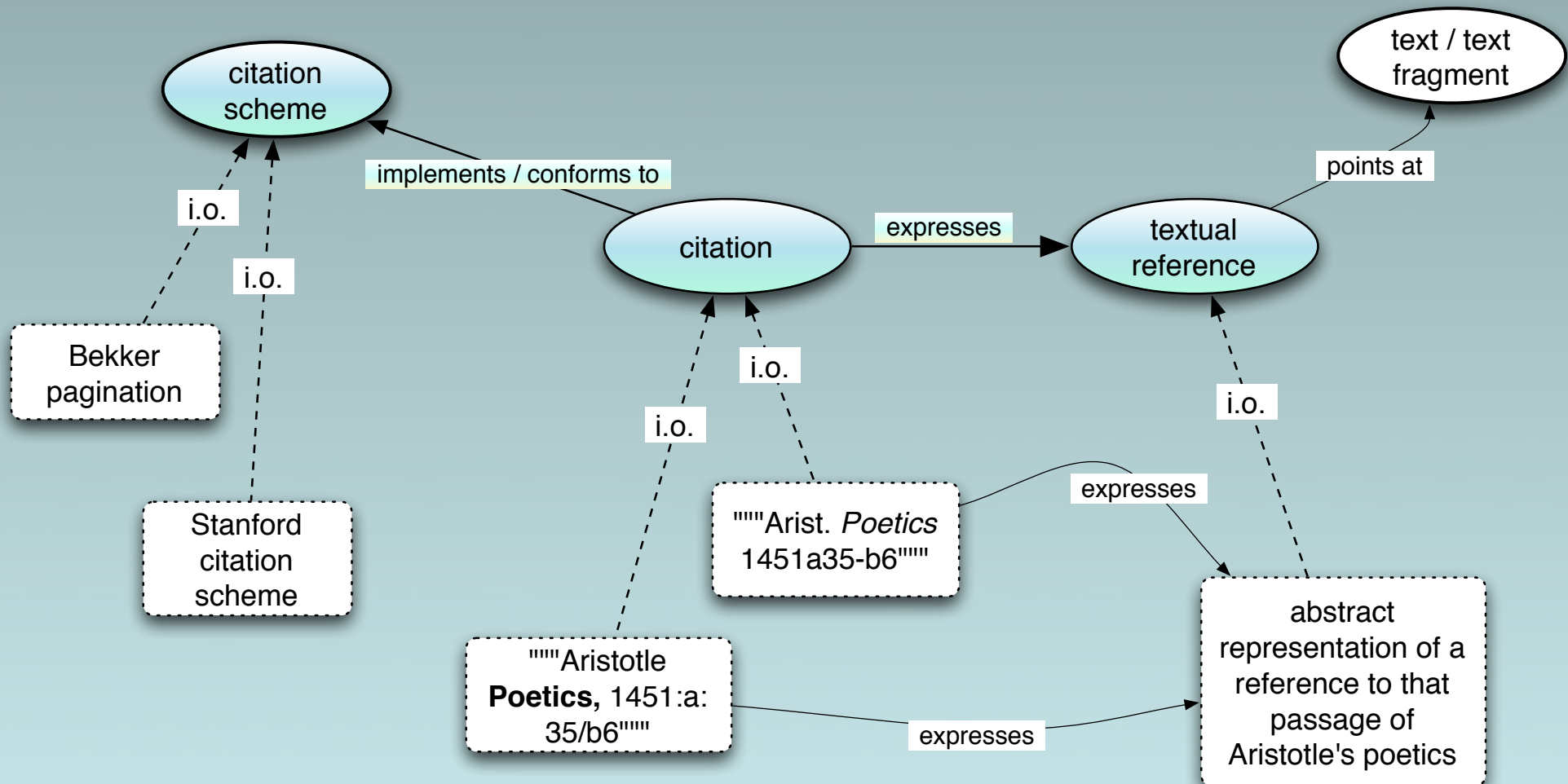
Canonical Citations: coordinate systems for ancient works

- what is a canonical reference?

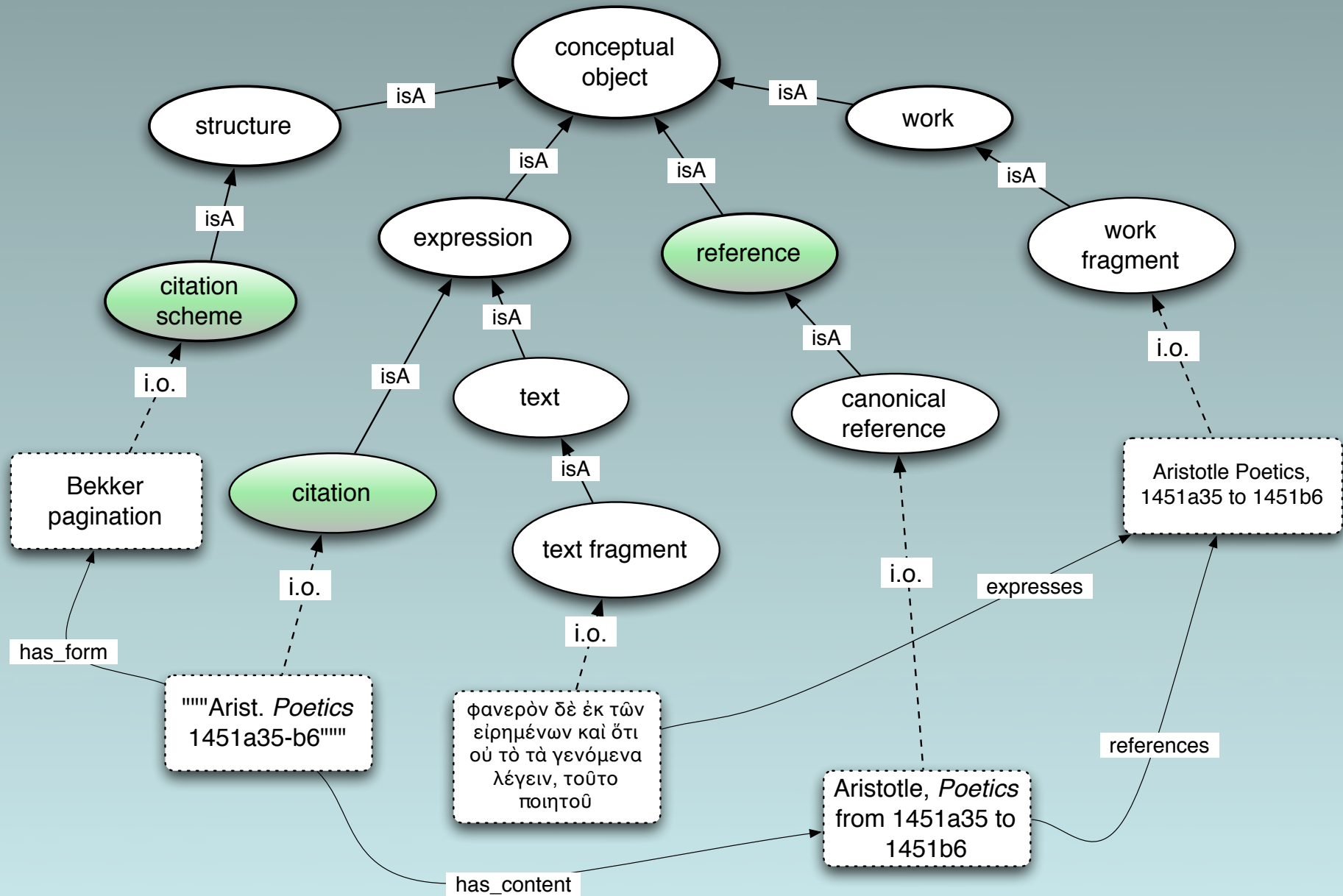
- encodes the 'way to find a passage', using a logical scheme (vs a physical one) agreed upon by the community

- | | |
|---|-------------|
| (1) [...] the <i>Politics</i> of Aristotle | Author name |
| (2) Homer and the Papyri | Work Title |
| (3) <i>Ar.</i> 'Arch.' 803 | Text Range |
| (4) Protean Forms and Disguise in 'Odyssey' 4 | Edition |
| (5) Aesch. 'Sept.' 565-67, 628-30 | |
| (6) Aesch. 'Pers.' 265, 711, 1008 | |
| (7) Hes. fr. 321 M.-W. | |
| (8) Callimaco, 'ep.' 28 Pf., 5-6 | |
| (9) Paus. 7.23.1-3 | |
| (10) [...] sulla parodo dell'"Ifigenia in Aulide" di Euripide (vv. 231-302) | |
| (11) <i>Epibateuo</i> in Aristophanes' "Frogs" (v. 48) | |

Citations as first class objects?



Early attempts to model Canonical R.



Wrapping up

The Digital Humanities

- rapidly evolving field(s)
- data integration solutions are strongly needed

Modeling humanities subjects can't always be reduced to similar models in scientific ones

- eg modeling philosophical ideas
- eg modeling citations *in* the humanities

There's more: modeling the 'discourse' of humanities subjects

- solutions already exist? Please let me know!
- future work?

... thank you ...

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