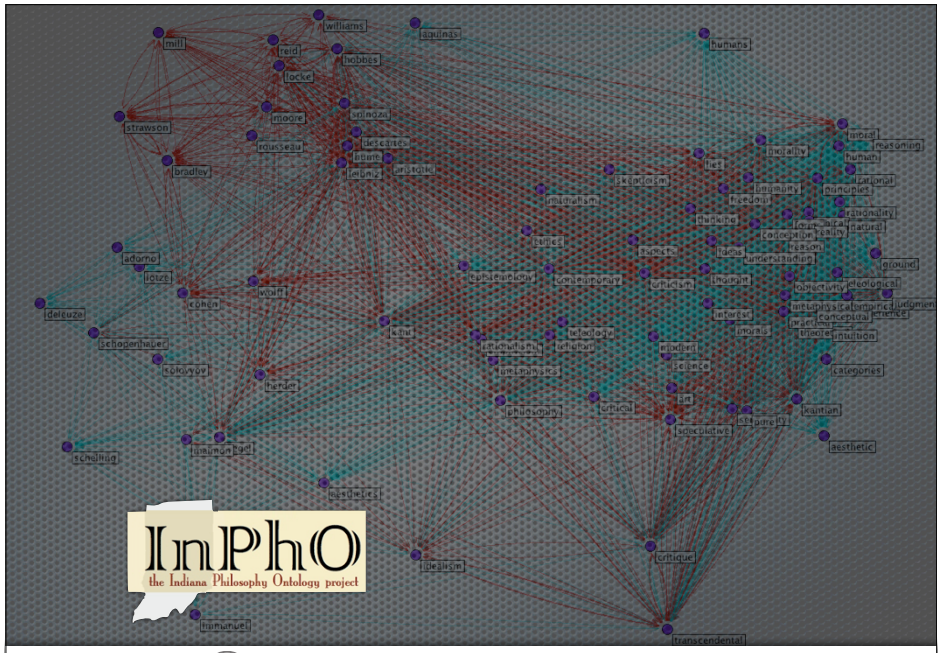
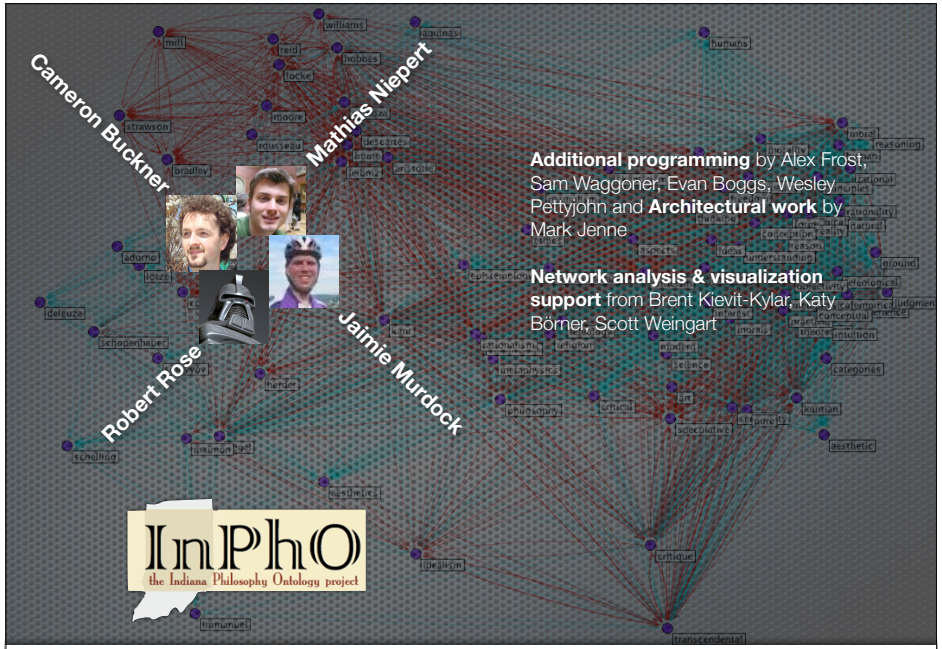
Computational Philosophy and the Examined Text

(a tale of two encyclopedias)
(and more)

Colin Allen
<colallen@indiana.edu>





Additional programming by Alex Frost, Sam Waggoner, Evan Boggs, Wesley Pettyjohn and **Architectural work** by Mark Jenne

Network analysis & visualization support from Brent Kievit-Kylar, Katy Börner, Scott Weingart

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Preservation and Access: Humanities Collections and Resources

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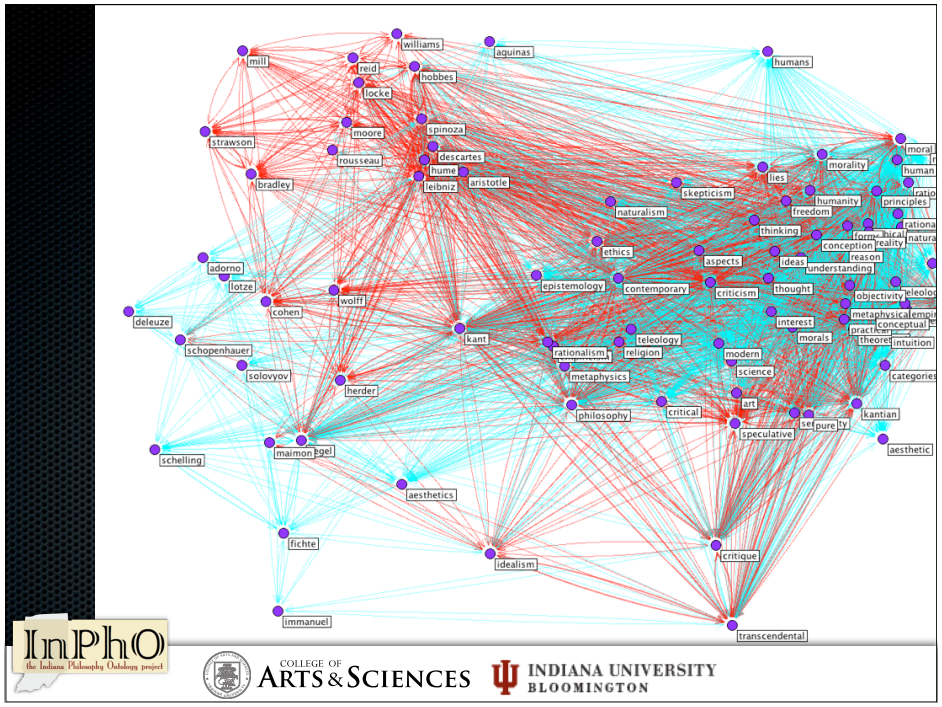
OFFICE OF DIGITAL HUMANITIES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aquinas
humans
mill
reid
hobbes
locke
moore
spinoza
strawson
descartes
rousseau
hume
aristotle
bradley
leibniz
skepticism
lies
morality
naturalism
humanity
freedom
principles
thinking
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conception
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epistemology
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kantian
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maimon
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aesthetic
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fichte
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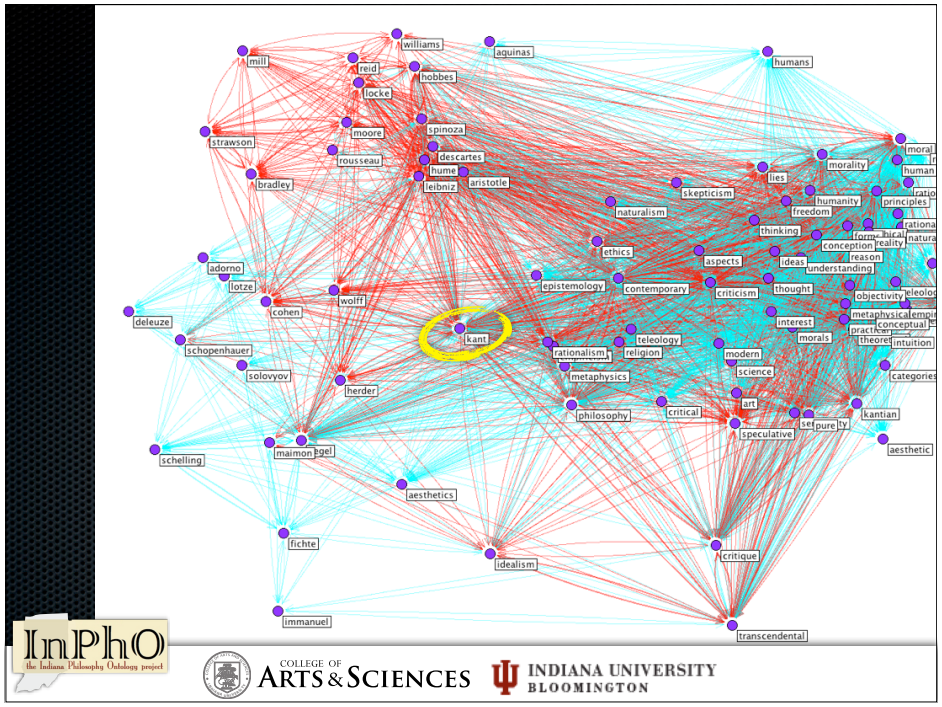
transcendental
InPhO
the Indiana Philosophy Ontology project
COLLEGE OF ARTS & SCIENCES
INDIANA UNIVERSITY BLOOMINGTON
3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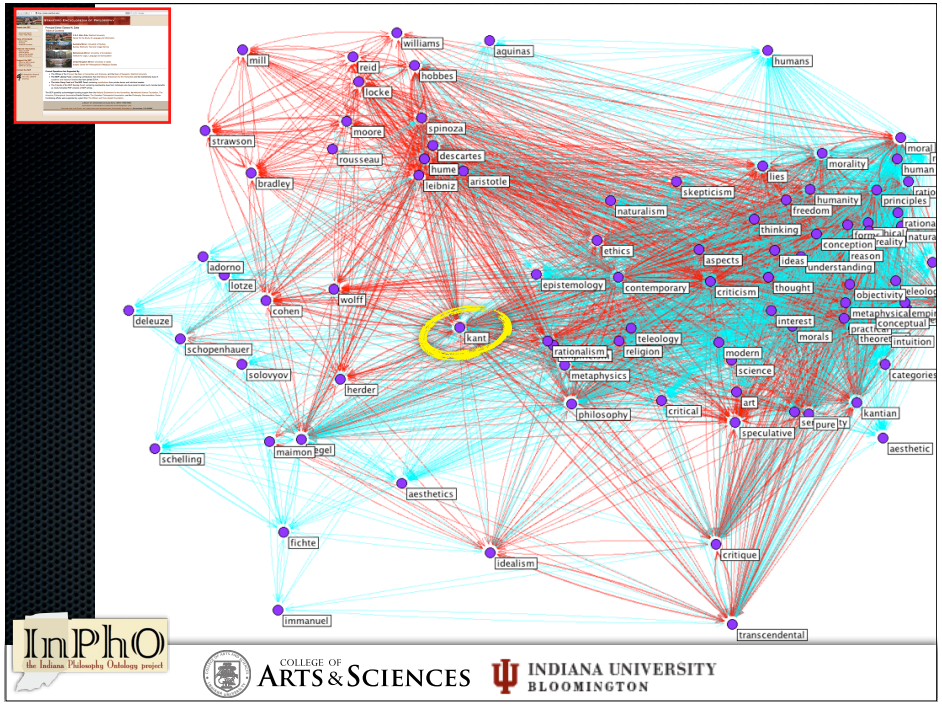
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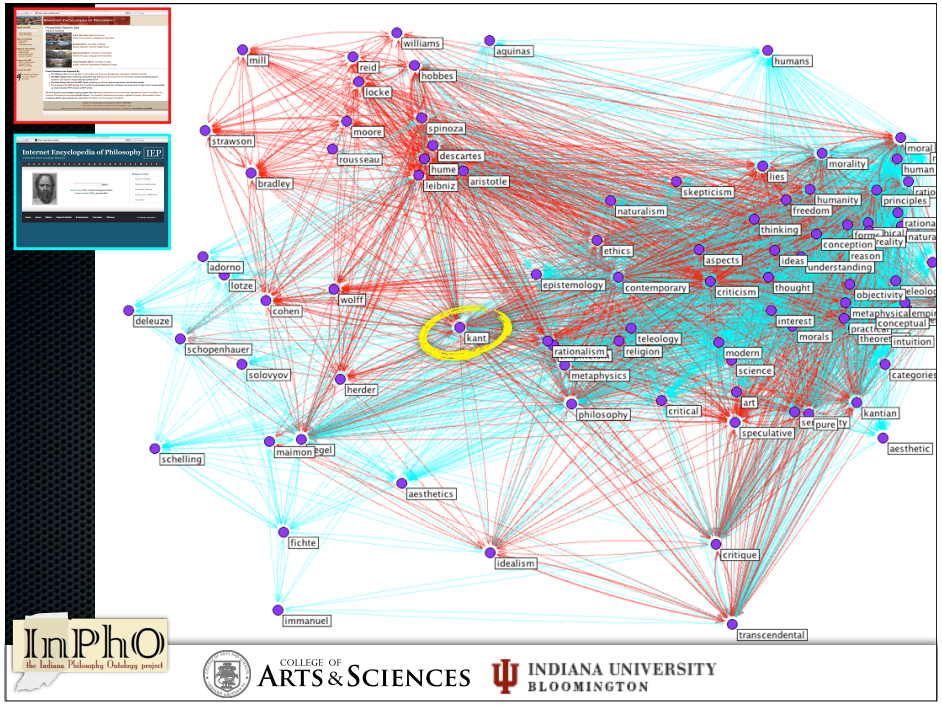
Internet Encyclopedia of Philosophy
IEP
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hobbes
locke
moore
spinoza
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3

What might philosophers do with millions of words?

- 12m IEP 4m philpapers 21m (titles/abstracts)

What might philosophers do with millions of words?

- 12m IEP 4m philpapers 21m (titles/abstracts)

- Read them all?

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What might philosophers do with millions of words?

- 12m IEP 4m philpapers 21m (titles/abstracts)
- Read them all?

  - = 2,467 hrs @ 250 w/min (= 1 s.y.)

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4

What might philosophers do with millions of words?

- 12m IEP 4m philpapers 21m (titles/abstracts)
- Read them all?
  - = 2,467 hrs @ 250 w/min (= 1 s.y.)

- Read them selectively ...?

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4

What might philosophers do with millions of words?

- 12m IEP 4m philpapers 21m (titles/abstracts)
- **Read them all?**
  - = 2,467 hrs @ 250 w/min (= 1 s.y.)
- **Read them selectively ...?**
- HATHI TRUST **Add 2.6m HT public domain volumes?**

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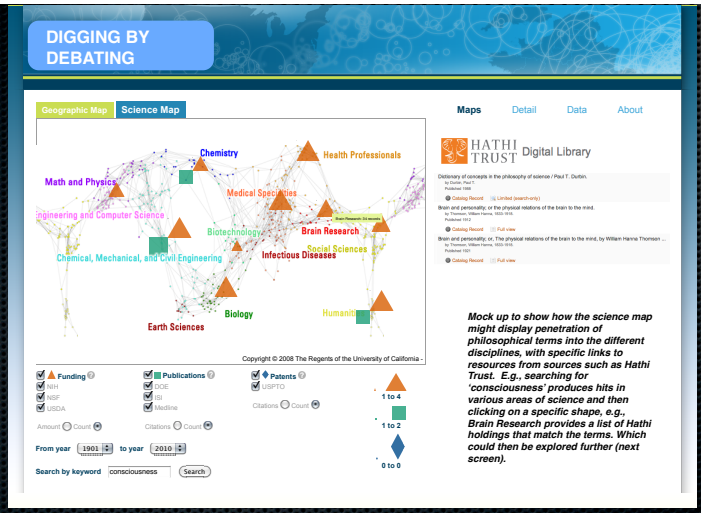
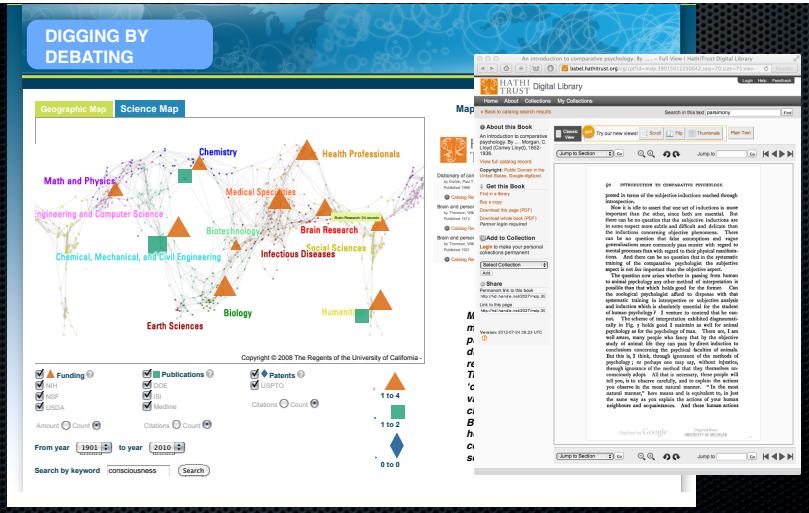
DIGGING INTO DATA CHALLENGE

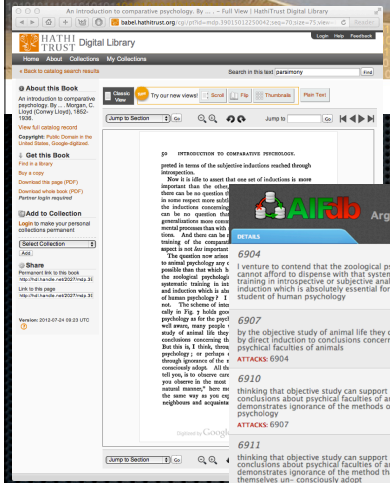


Mock up to show how the science map might display penetration of philosophical terms into the different disciplines, with specific links to resources from sources such as Hathi Trust. E.g., searching for 'consciousness' produces hits in various areas of science and then clicking on a specific shape, e.g., Brain Research provides a list of Hathi holdings that match the terms. Which could then be explored further (next screen).

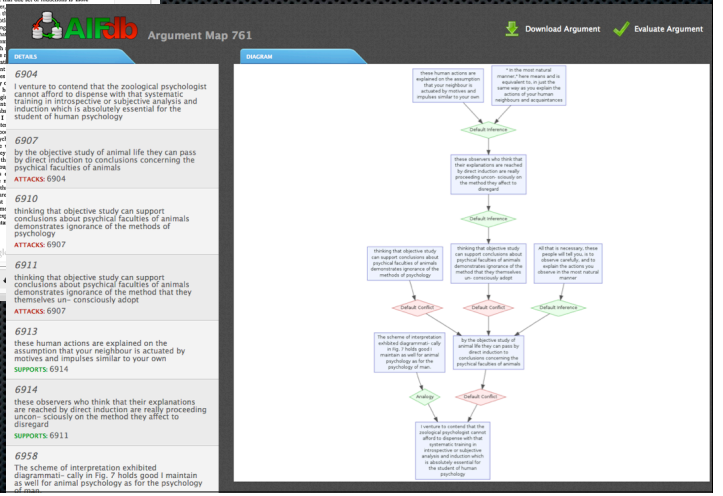
DIGGING INTO DATA CHALLENGE



DIGGING INTO DATA CHALLENGE



Digging by Debating



Where's ... anything?!

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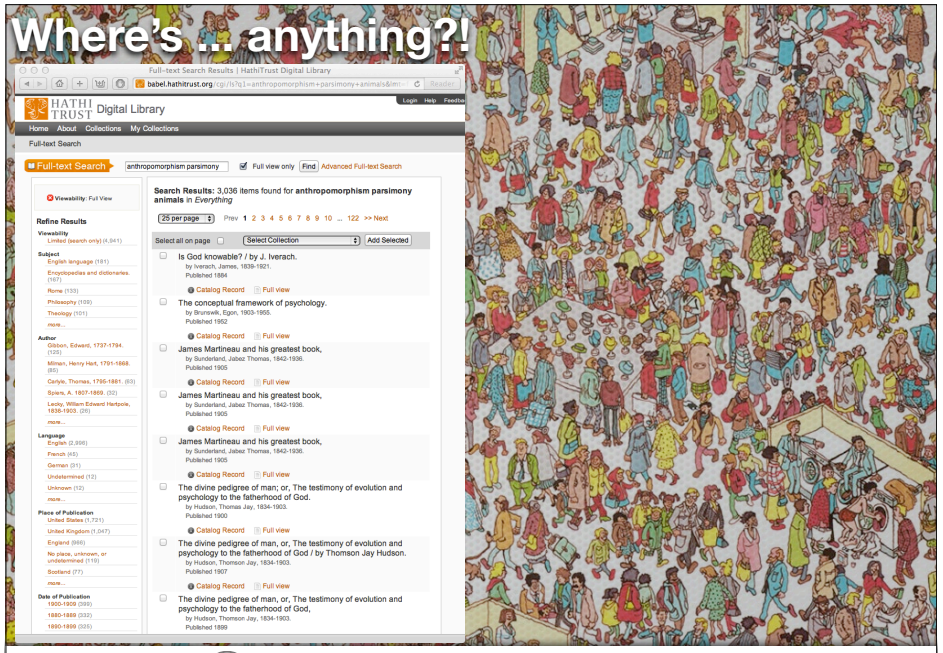
Where's ... anything?!



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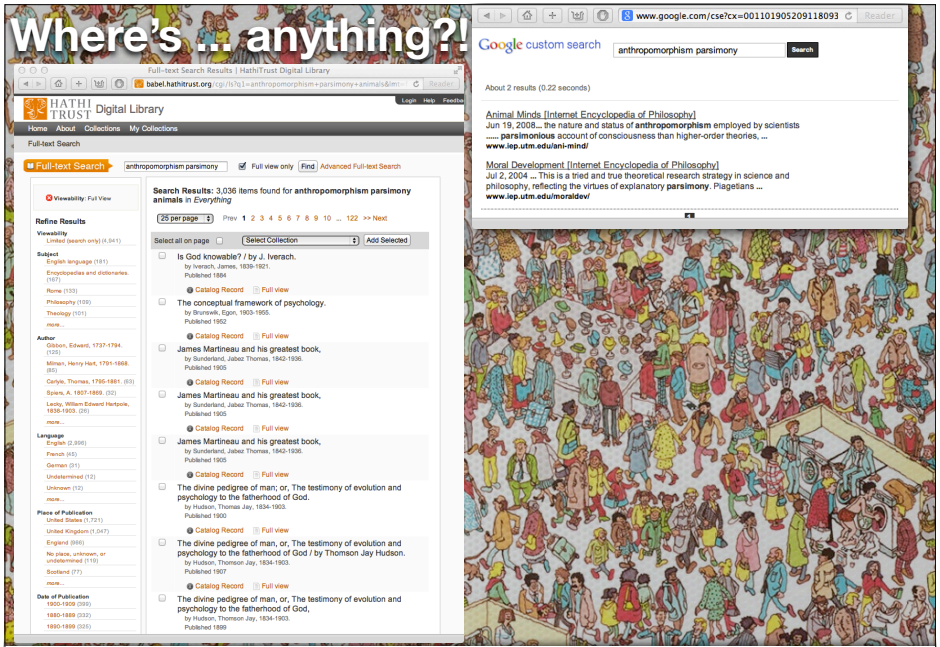
Where's ... anything?!



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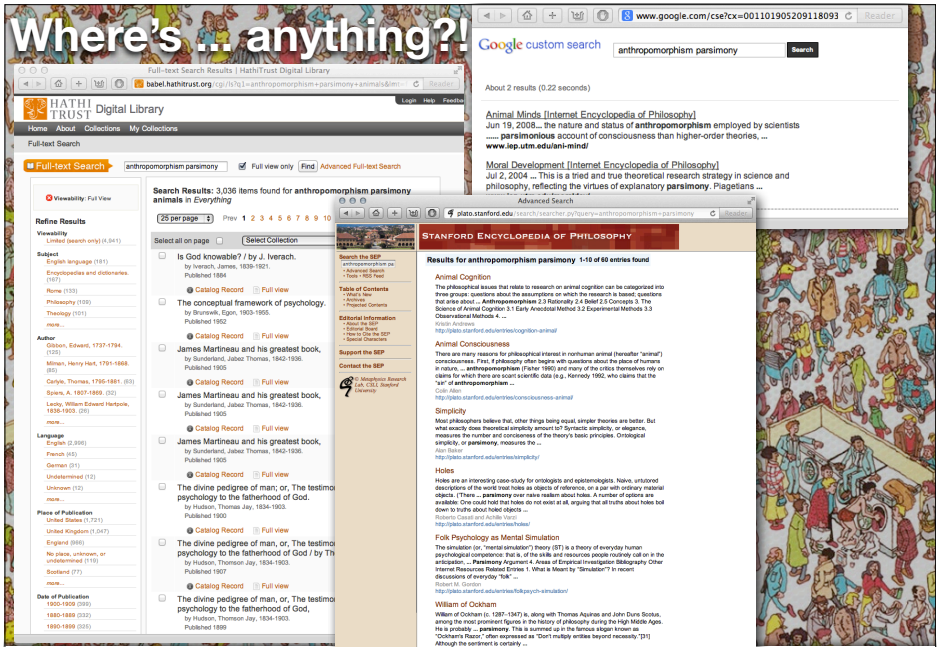
Where's ... anything?!



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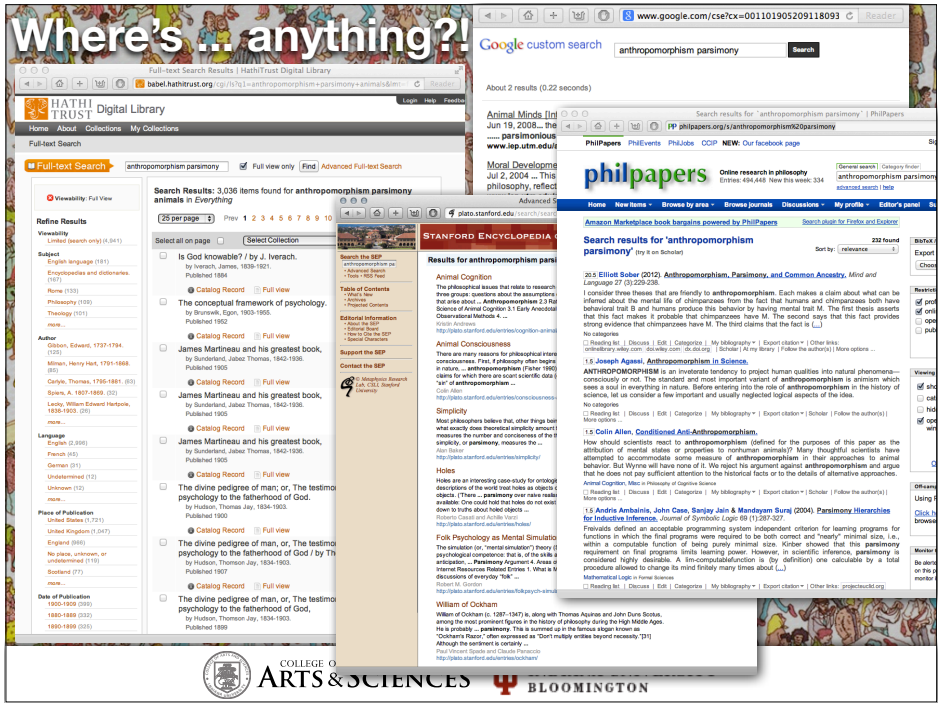

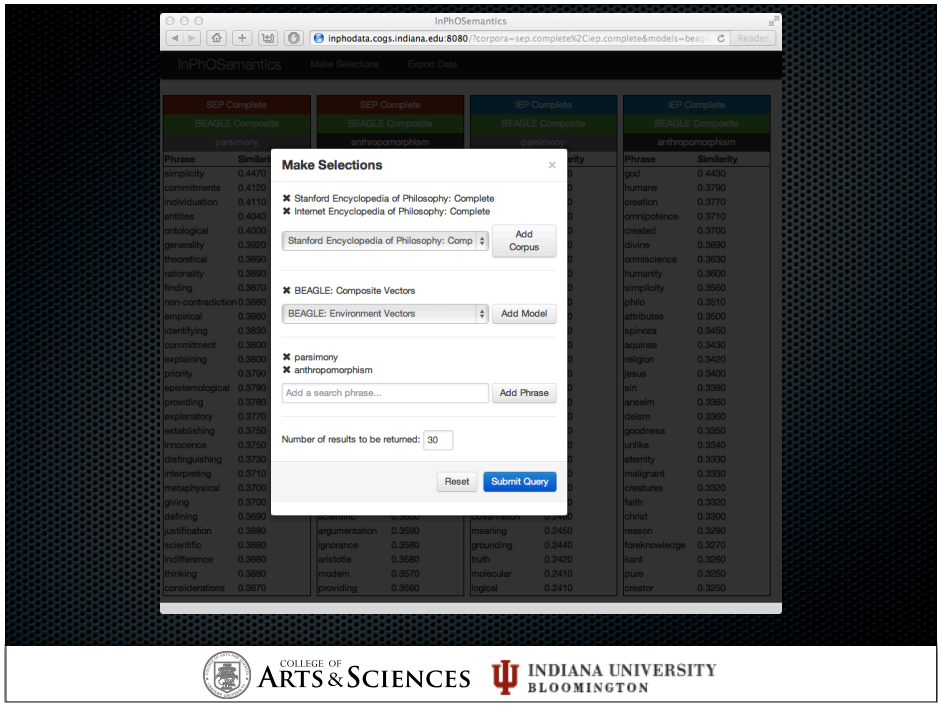

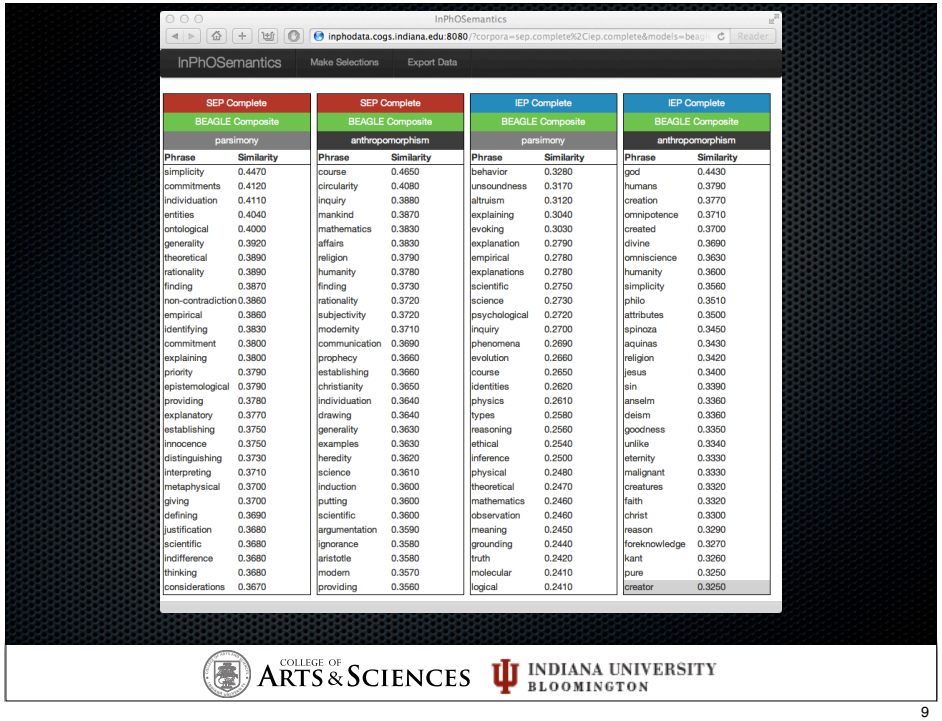

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simplicity	0.4470	course	0.4650	behavior	0.3280	god	0.4430
commitments	0.4120	circularity	0.4080	unsoundness	0.3170	humans	0.3790
individuation	0.4110	inquiry	0.3880	altruism	0.3120	creation	0.3770
entities	0.4040	mankind	0.3870	explaining	0.3040	omnipotence	0.3710
ontological	0.4000	mathematics	0.3830	evoking	0.3030	created	0.3700
generality	0.3920	affairs	0.3830	explanation	0.2790	divine	0.3690
theoretical	0.3890	religion	0.3790	empirical	0.2780	omniscience	0.3630
rationality	0.3890	humanity	0.3780	explanations	0.2780	humanity	0.3600
finding	0.3870	finding	0.3730	scientific	0.2750	simplicity	0.3560
non-contradiction	0.3860	rationality	0.3720	science	0.2730	philo	0.3510
empirical	0.3860	subjectivity	0.3720	psychological	0.2720	attributes	0.3500
identifying	0.3830	modernity	0.3710	inquiry	0.2700	spinoza	0.3450
commitment	0.3800	communication	0.3690	phenomena	0.2690	aquinas	0.3430
explaining	0.3800	prophecy	0.3660	evolution	0.2660	religion	0.3420
priority	0.3790	establishing	0.3660	course	0.2650	jesus	0.3400
epistemological	0.3790	christianity	0.3650	identities	0.2620	sin	0.3390
providing	0.3780	individuation	0.3640	physics	0.2610	anselm	0.3360
explanatory	0.3770	drawing	0.3640	types	0.2580	deism	0.3360
establishing	0.3750	generality	0.3630	reasoning	0.2560	goodness	0.3350
innocence	0.3750	examples	0.3630	ethical	0.2540	unlike	0.3340
distinguishing	0.3730	heredity	0.3620	inference	0.2500	eternity	0.3330
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justification	0.3680	argumentation	0.3590	meaning	0.2450	reason	0.3290
scientific	0.3680	ignorance	0.3580	grounding	0.2440	foreknowledge	0.3270
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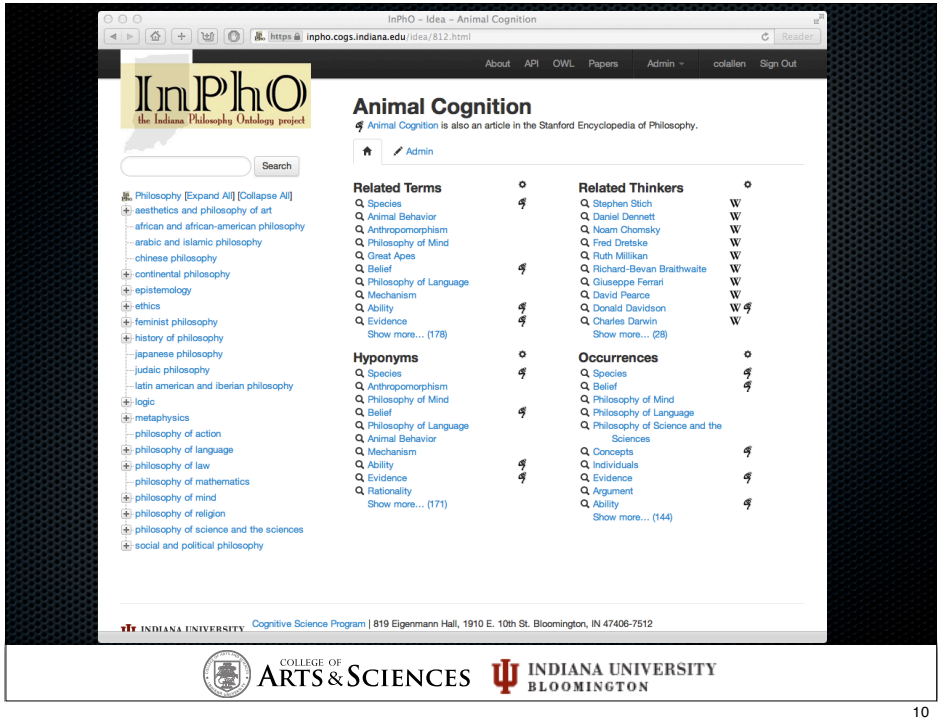
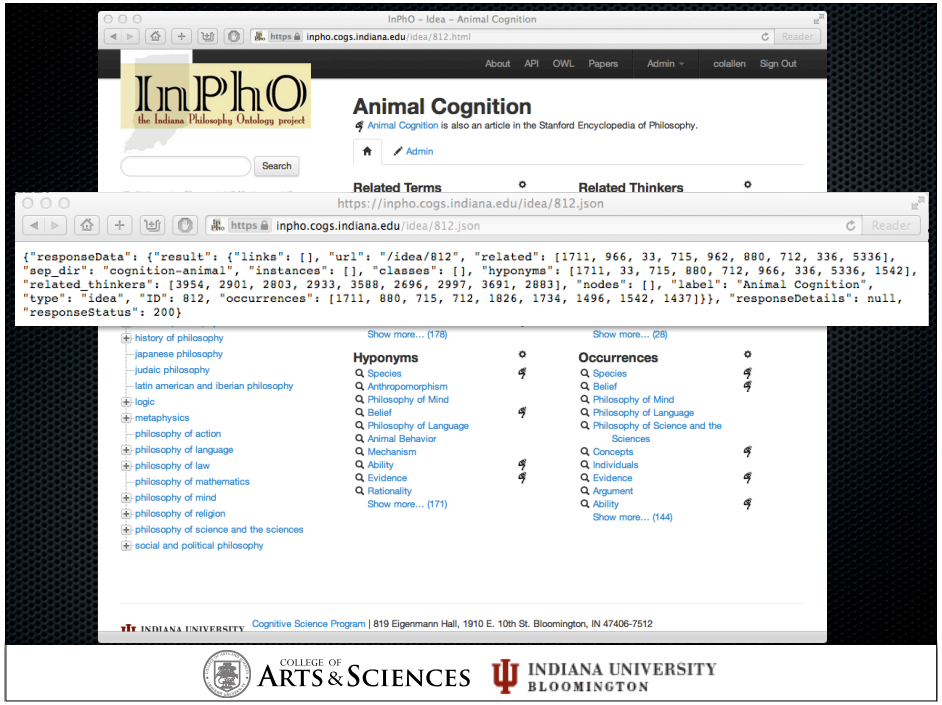
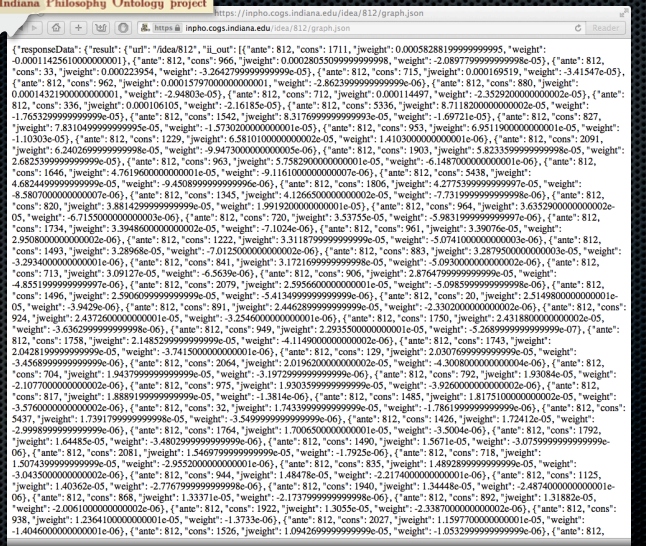




InPhO Open Data



From InPhO to

What philosophers can do with millions of words.

InPhOSemantics | Make Selections | Export Data

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Phrase	Similarity	Phrase	Similarity	Phrase	Similarity	Phrase	Similarity
plato	0.8290	philosophy	0.8130	philosophy	0.7520	ethical	0.7840
metaphysics	0.7710	philosophical	0.8040	metaphysics	0.7480	metaphysics	0.7250
boethius	0.7620	topics	0.7730	contemporary	0.7390	politics	0.7170
alexander	0.7250	aristotle	0.7710	philosophical	0.7310	contemporary	0.7070
avicenna	0.6970	metaphysical	0.7670	methodology	0.7030	philosophy	0.7010
physics	0.6920	physics	0.7660	methodological	0.7030	philosophical	0.6960
works	0.6850	theology	0.7530	science	0.7020	epistemology	0.6910
porphyry	0.6770	epistemology	0.7480	philosophers	0.7000	issues	0.6740
taking	0.6750	contemporary	0.7460	epistemological	0.6940	interest	0.6700
topics	0.6730	modern	0.7410	ethics	0.6910	practical	0.6680
augustine	0.6680	speculative	0.7400	criticism	0.6890	moral	0.6650
descartes	0.6670	critical	0.7360	critical	0.6810	topics	0.6640

IEP Complete / BEAGLE Composite / aristotle		IEP Complete / BEAGLE Composite / metaphysics		IEP Complete / BEAGLE Composite / ethics		IEP Complete / BEAGLE Composite / epistemology	
Phrase	Similarity	Phrase	Similarity	Phrase	Similarity	Phrase	Similarity
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ethics	0.6590	philosophical	0.7700	metaphysics	0.6920	epistemological	0.6820
kant	0.6480	contemporary	0.7510	virtue	0.6850	ethics	0.6730
unlike	0.6450	history	0.7280	contemporary	0.6730	naturalistic	0.6720
metaphysics	0.6450	epistemology	0.7250	epistemology	0.6730	quine	0.6600
spinoza	0.6430	modern	0.7170	moral	0.6710	contemporary	0.6490
leibniz	0.6360	science	0.7150	morality	0.6660	philosophy	0.6410
descartes	0.6320	western	0.7010	aristotle	0.6590	naturalism	0.6400
despite	0.6210	ethics	0.6920	metaethics	0.6570	knowledge	0.6350
contemporary	0.6190	metaphysical	0.6900	normative	0.6520	science	0.6320
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taking	0.6160	study	0.6710	philosophy	0.6420	skepticism	0.6180

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What philosophers can do with millions of words.

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Psychological Review
2007, Vol. 114, No. 1, 1–37

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0033-295X/07/$12.00 DOI: 10.1037/0033-295X.114.1.1

Representing Word Meaning and Order Information in a Composite Holographic Lexicon

Michael N. Jones
University of Colorado at Boulder

Douglas J. K. Mewhort
Queen's University

SEP Complete / BEAGLE Composite / aristotle
Phrase Similarity
plato 0.8290
metaphysics 0.7710
boethius 0.7620
alexander 0.7250
avicenna 0.6970
physics 0.6920
works 0.6850
porphyry 0.6770
taking 0.6750
topics 0.6730
augustine 0.6680
descartes 0.6670

SEP Complete / BEAGLE Composite / metaphysics
Phrase Similarity
philosophy 0.8130
philosophical 0.8040
topics 0.7730
aristotle 0.7710
metaphysical 0.7670
physics 0.7660
theology 0.7530
epistemology 0.7480
contemporary 0.7460
modern 0.7410
speculative 0.7400
critical 0.7360

SEP Complete / BEAGLE Composite / epistemology
Phrase Similarity
philosophy 0.7520
metaphysics 0.7480
contemporary 0.7390
philosophical 0.7310
methodology 0.7030
methodological 0.7030
science 0.7020
philosophers 0.7000
epistemological 0.6940
ethics 0.6910
criticism 0.6890
critical 0.6810

SEP Complete / BEAGLE Composite / ethics
Phrase Similarity
ethical 0.7840
metaphysics 0.7250
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philosophy 0.7010
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epistemology 0.6910
issues 0.6740
interest 0.6700
practical 0.6680
moral 0.6650
topics 0.6640

IEP Complete / BEAGLE Composite / aristotle
Phrase Similarity
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unlike 0.6450
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despite 0.6210
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IEP Complete / BEAGLE Composite / metaphysics
Phrase Similarity
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philosophical 0.7700
contemporary 0.7510
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epistemology 0.7250
modern 0.7170
science 0.7150
western 0.7010
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metaphysical 0.6900
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study 0.6710

IEP Complete / BEAGLE Composite / ethics
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virtue 0.6850
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epistemology 0.6730
moral 0.6710
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aesthetics 0.6460
philosophy 0.6420

IEP Complete / BEAGLE Composite / epistemology
Phrase Similarity
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quine 0.6600
contemporary 0.6490
philosophy 0.6410
naturalism 0.6400
knowledge 0.6350
science 0.6320
scientific 0.6240
skepticism 0.6180

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SEP Complete		SEP Complete		SEP Complete		SEP Complete	
BEAGLE Composite		BEAGLE Composite		BEAGLE Composite		BEAGLE Composite	
aristotle		metaphysics		epistemology		ethics	
Phrase	Similarity	Phrase	Similarity	Phrase	Similarity	Phrase	Similarity
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metaphysics	0.7710	philosophical	0.8040	metaphysics	0.7480	metaphysics	0.7250
boethius	0.7620	topics	0.7730	contemporary	0.7390	politics	0.7170
alexander	0.7250	aristotle	0.7710	philosophical	0.7310	contemporary	0.7070
avicenna	0.6970	metaphysical	0.7670	methodology	0.7030	philosophy	0.7010
physics	0.6920	physics	0.7660	methodological	0.7030	philosophical	0.6960
works	0.6850	theology	0.7530	science	0.7020	epistemology	0.6910
porphyry	0.6770	epistemology	0.7480	philosophers	0.7000	issues	0.6740
taking	0.6750	contemporary	0.7460	epistemological	0.6940	interest	0.6700
topics	0.6730	modern	0.7410	ethics	0.6910	practical	0.6680
augustine	0.6680	speculative	0.7400	criticism	0.6890	moral	0.6650
descartes	0.6670	critical	0.7360	critical	0.6810	topics	0.6640

IEP Complete		IEP Complete		IEP Complete		IEP Complete	
BEAGLE Composite		BEAGLE Composite		BEAGLE Composite		BEAGLE Composite	
aristotle		metaphysics		ethics		epistemology	
Phrase	Similarity	Phrase	Similarity	Phrase	Similarity	Phrase	Similarity
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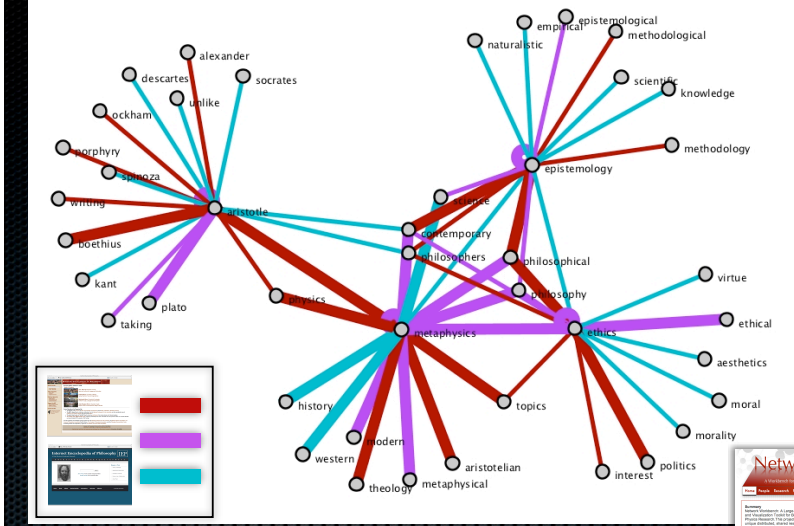
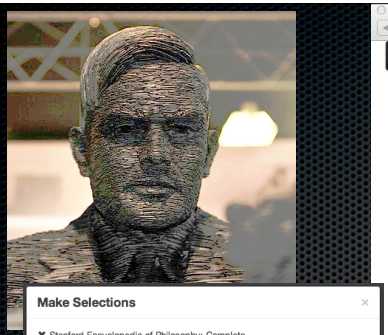
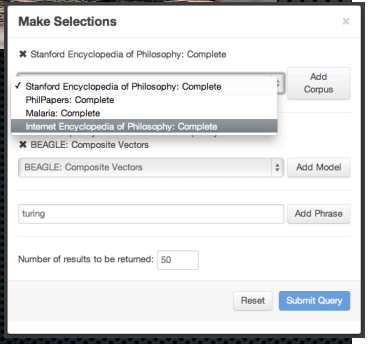
ethics	0.6590	philosophical	0.7700	metaphysics	0.6920	epistemological	0.6820
kant	0.6480	contemporary	0.7510	virtue	0.6850	ethics	0.6730
unlike	0.6450	history	0.7280	contemporary	0.6730	naturalistic	0.6720
metaphysics	0.6450	epistemology	0.7250	epistemology	0.6730	quine	0.6600
spinoza	0.6430	modern	0.7170	moral	0.6710	contemporary	0.6490
leibniz	0.6360	science	0.7150	morality	0.6660	philosophy	0.6410
descartes	0.6320	western	0.7010	aristotle	0.6590	naturalism	0.6400
despite	0.6210	ethics	0.6920	metaethics	0.6570	knowledge	0.6350
contemporary	0.6190	metaphysical	0.6900	normative	0.6520	science	0.6320
aquinas	0.6190	aesthetics	0.6870	aesthetics	0.6460	scientific	0.6240
taking	0.6160	study	0.6710	philosophy	0.6420	skepticism	0.6180







InPhOSemantics

inphodata.cogs.indiana.edu:8080/?corpora=sep.complete%2

InPhOSemantics | Make Selections | Export Data

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machines	0.6940	computing	0.5570	machines	0.5740
tape	0.6350	machines	0.5380	interrogator	0.5390
test	0.6200	computability	0.5010	total	0.5140
computable	0.6020	test	0.4790	standard	0.5070
discrete-state	0.5990	computable	0.4750	real	0.5020
halting	0.5950	church-turing	0.4310	pass	0.5020
halt	0.5940	disqualifying	0.4120	hypothesis	0.5010
continuous-state	0.5810	intelligence	0.3990	initial	0.4940
copeland	0.5780	squares	0.3960	degree	0.4930
computing	0.5640	computer-in	0.3740	defining	0.4870
utm	0.5640	alan	0.3730	loebner	0.4870
uncomputable	0.5620	computer-would	0.3720	tt	0.4870
gandy	0.5520	computer	0.3640	so-called	0.4860
digital	0.5500	i-definability	0.3600	halting	0.4820
fact-if	0.5180	compute	0.3560	ttt	0.4820
computability	0.5140	parade	0.3560	results	0.4800
instructions	0.5130	mightily	0.3500	relative	0.4780
halts	0.5110	read-write	0.3390	limit	0.4780
compute	0.4930	teletype	0.3390	minimal	0.4770
intelligence	0.4870	interrogator	0.3380	functions	0.4760
church-turing	0.4750	computers	0.3240	details	0.4740
computation	0.4750	artificial	0.3230	function	0.4720
machine-in-general	0.4570	human-level	0.3210	operation	0.4690
interrogator	0.4530	confuted	0.3120	rest	0.4680
simulated	0.4510	hardware	0.3120	description	0.4660
calculable	0.4500	digital	0.3100	structure	0.4650
guttenplan	0.4480	lambda-definable	0.3090	basic	0.4650
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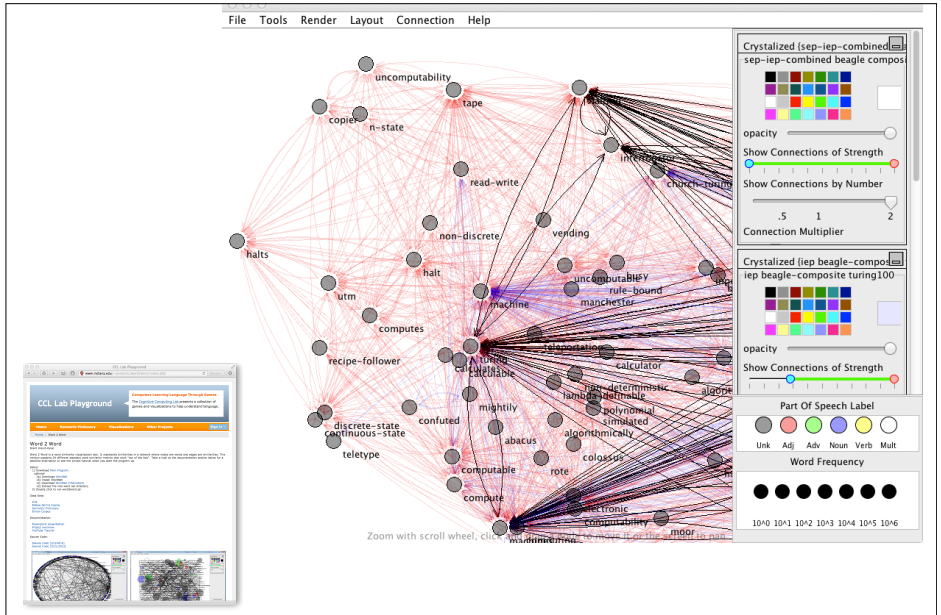
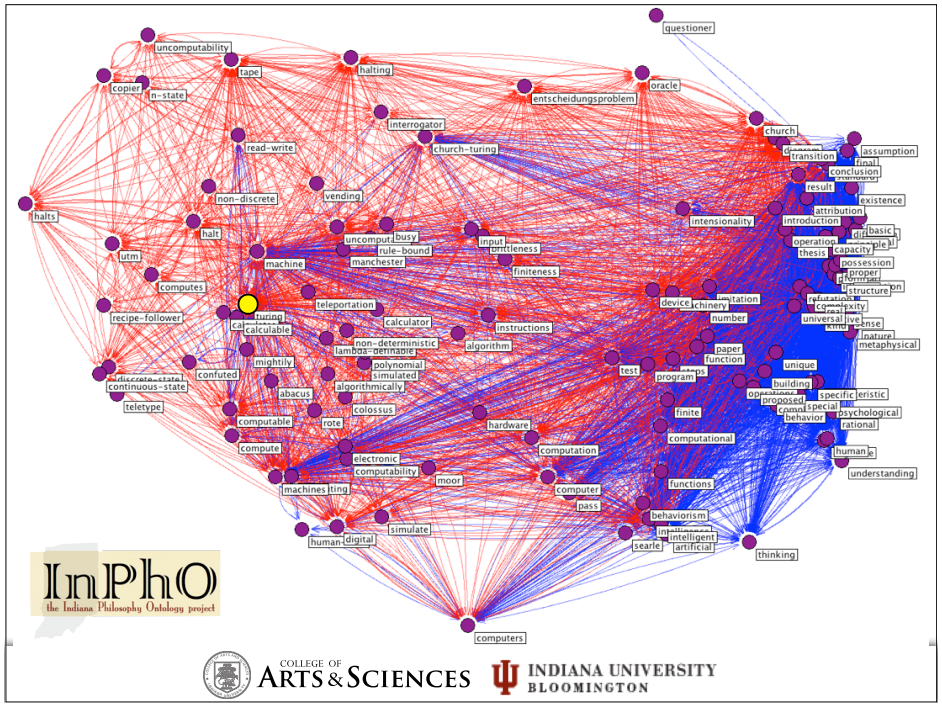
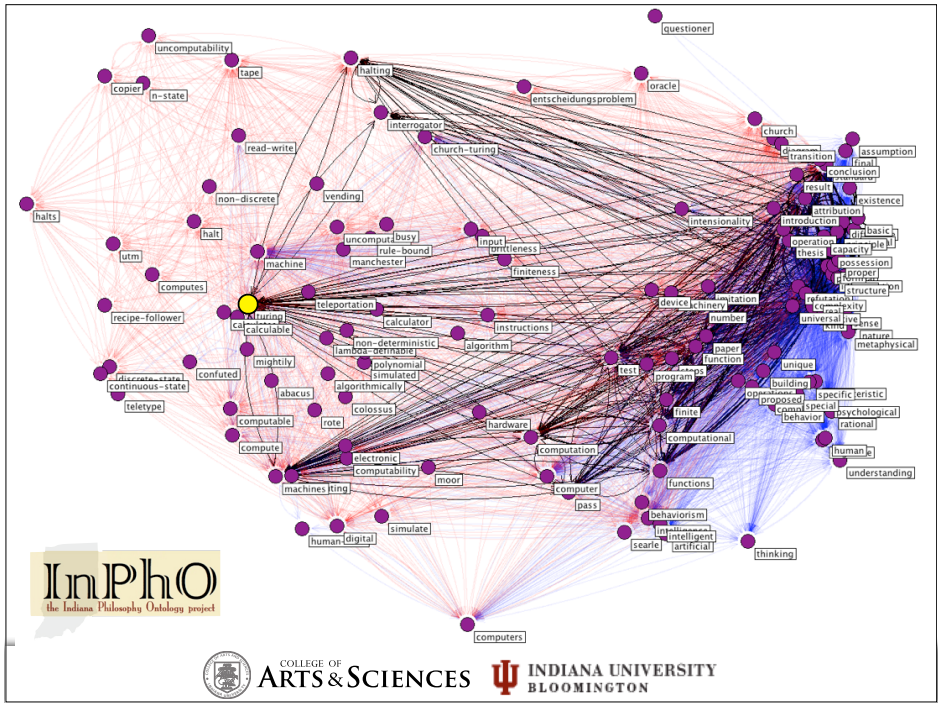
fact-that	0.4430	proposed	0.3020	controversy	0.4640







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BEAGLE Composite		BEAGLE Composite		BEAGLE Composite		BEAGLE Composite	
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Phrase	**Similarity**	**Phrase**	**Similarity**	**Phrase**	**Similarity**	**Phrase**	**Similarity**
hume	0.7920	leibniz	0.8030	reason	0.6950	spinoza	0.7420
pure	0.7620	spinoza	0.7590	hegel	0.6810	leibniz	0.6660
reason	0.7150	malebranche	0.7160	practical	0.6700	kant	0.6450
practical	0.7110	locke	0.6970	metaphysics	0.6690	aristotle	0.6320
critique	0.7080	arnauld	0.6950	pure	0.6520	thinking	0.6190
leibniz	0.6990	ideas	0.6770	critique	0.6490	unlike	0.6110
herder	0.6920	aristotle	0.6670	contemporary	0.6490	ideas	0.6070
regarding	0.6870	unlike	0.6650	aristotle	0.6480	metaphysics	0.5950
metaphysics	0.6870	hume	0.6590	understanding	0.6470	contemporary	0.5900
sensibility	0.6860	taking	0.6590	morality	0.6460	thought	0.5880
rationalism	0.6840	thought	0.6580	leibniz	0.6450	philosophers	0.5790
understanding	0.6830	kant	0.6520	descartes	0.6450	mind	0.5790
transcendental	0.6800	metaphysics	0.6490	philosophers	0.6440	understanding	0.5760
morality	0.6750	berkeley	0.6450	schopenhauer	0.6430	hegel	0.5720
criticism	0.6750	thinking	0.6400	maimon	0.6420	distinct	0.5710
cohen	0.6740	distinct	0.6380	fichte	0.6400	dualism	0.5630
judgment	0.6740	gassendi	0.6330	philosophy	0.6400	skepticism	0.5610
unlike	0.6710	galileo	0.6320	moral	0.6370	roughly	0.5610
locke	0.6660	assuming	0.6300	hume	0.6310	humans	0.5590
wolff	0.6630	augustine	0.6280	thought	0.6300	berkeley	0.5590
taking	0.6620	drawing	0.6280	judgment	0.6300	rejecting	0.5560
reflection	0.6620	cartesian	0.6270	ethics	0.6240	reason	0.5540
reflecting	0.6610	apparently	0.6270	spinoza	0.6150	anselm	0.5540
morals	0.6540	philosophers	0.6260	aesthetics	0.6140	forms	0.5540

SEP Complete		SEP Complete		IEP Complete		IEP Complete	
BEAGLE Composite		BEAGLE Composite		BEAGLE Composite		BEAGLE Composite	
kant		descartes		kant		descartes	
Phrase	**Similarity**	**Phrase**	**Similarity**	**Phrase**	**Similarity**	**Phrase**	**Similarity**
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practical	0.7110	locke	0.6970	metaphysics	0.6690	aristotle	0.6320
critique	0.7080	arnauld	0.6950	pure	0.6520	thinking	0.6190
leibniz	0.6990	ideas	0.6770	critique	0.6490	unlike	0.6110
herder	0.6920	aristotle	0.6670	contemporary	0.6490	ideas	0.6070
regarding	0.6870	unlike	0.6650	aristotle	0.6480	metaphysics	0.5950
metaphysics	0.6870	hume	0.6590	understanding	0.6470	contemporary	0.5900
sensibility	0.6860	taking	0.6590	morality	0.6460	thought	0.5880
rationalism	0.6840	thought	0.6580	leibniz	0.6450	philosophers	0.5790
understanding	0.6830	kant	0.6520	descartes	0.6450	mind	0.5790
transcendental	0.6800	metaphysics	0.6490	philosophers	0.6440	understanding	0.5760
morality	0.6750	berkeley	0.6450	schopenhauer	0.6430	hegel	0.5720
criticism	0.6750	thinking	0.6400	maimon	0.6420	distinct	0.5710
cohen	0.6740	distinct	0.6380	fichte	0.6400	dualism	0.5630
judgment	0.6740	gassendi	0.6330	philosophy	0.6400	skepticism	0.5610
unlike	0.6710	galileo	0.6320	moral	0.6370	roughly	0.5610
locke	0.6660	assuming	0.6300	hume	0.6310	humans	0.5590
wolff	0.6630	augustine	0.6280	thought	0.6300	berkeley	0.5590
taking	0.6620	drawing	0.6280	judgment	0.6300	rejecting	0.5560
reflection	0.6620	cartesian	0.6270	ethics	0.6240	reason	0.5540
reflecting	0.6610	apparently	0.6270	spinoza	0.6150	anselm	0.5540
morals	0.6540	philosophers	0.6260	aesthetics	0.6140	forms	0.5540

SEP Complete		SEP Complete		IEP Complete		IEP Complete	
BEAGLE Composite		BEAGLE Composite		BEAGLE Composite		BEAGLE Composite	
kant		descartes		kant		descartes	
Phrase	**Similarity**	**Phrase**	**Similarity**	**Phrase**	**Similarity**	**Phrase**	**Similarity**
hume	0.7920	leibniz	0.8030	reason	0.6950	spinoza	0.7420
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practical	0.7110	locke	0.6970	metaphysics	0.6690	aristotle	0.6320
critique	0.7080	arnauld	0.6950	pure	0.6520	thinking	0.6190
leibniz	0.6990	ideas	0.6770	critique	0.6490	unlike	0.6110
herder	0.6920	aristotle	0.6670	contemporary	0.6490	ideas	0.6070
regarding	0.6870	unlike	0.6650	aristotle	0.6480	metaphysics	0.5950
metaphysics	0.6870	hume	0.6590	understanding	0.6470	contemporary	0.5900
sensibility	0.6860	taking	0.6590	morality	0.6460	thought	0.5880
rationalism	0.6840	thought	0.6580	leibniz	0.6450	philosophers	0.5790
understanding	0.6830	kant	0.6520	descartes	0.6450	mind	0.5790
transcendental	0.6800	metaphysics	0.6490	philosophers	0.6440	understanding	0.5760
morality	0.6750	berkeley	0.6450	schopenhauer	0.6430	hegel	0.5720
criticism	0.6750	thinking	0.6400	maimon	0.6420	distinct	0.5710
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unlike	0.6710	galileo	0.6320	moral	0.6370	roughly	0.5610
locke	0.6660	assuming	0.6300	hume	0.6310	humans	0.5590
wolff	0.6630	augustine	0.6280	thought	0.6300	berkeley	0.5590
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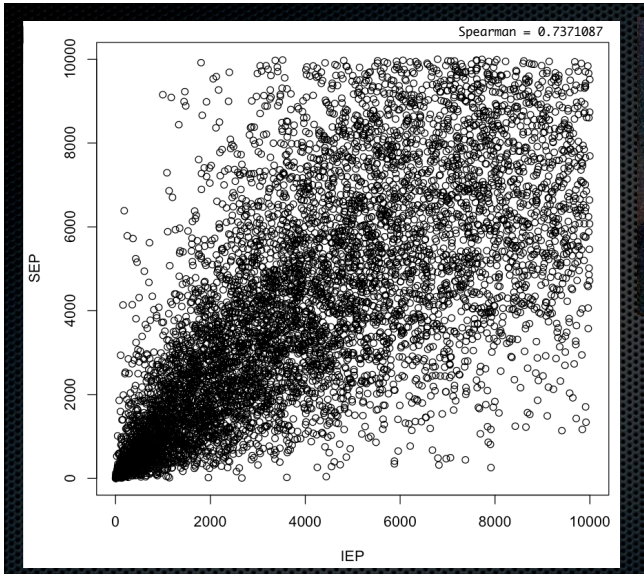
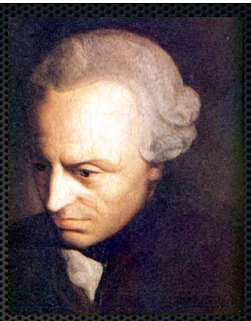
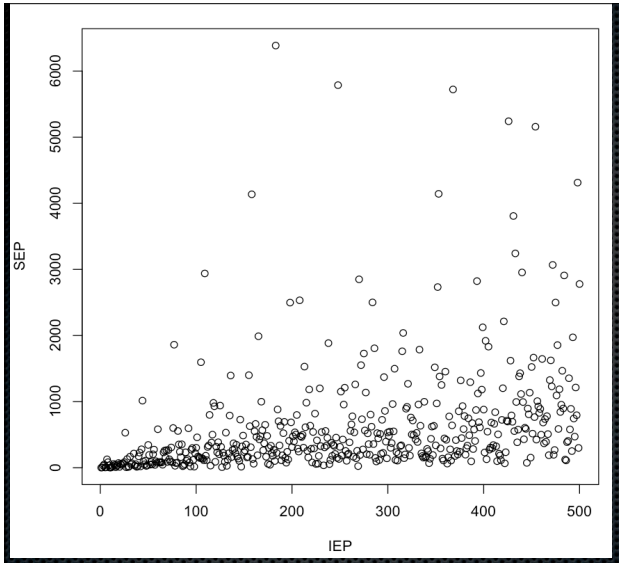
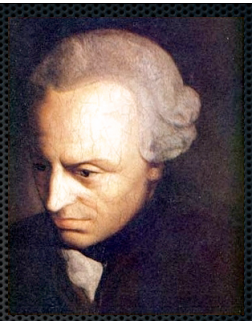
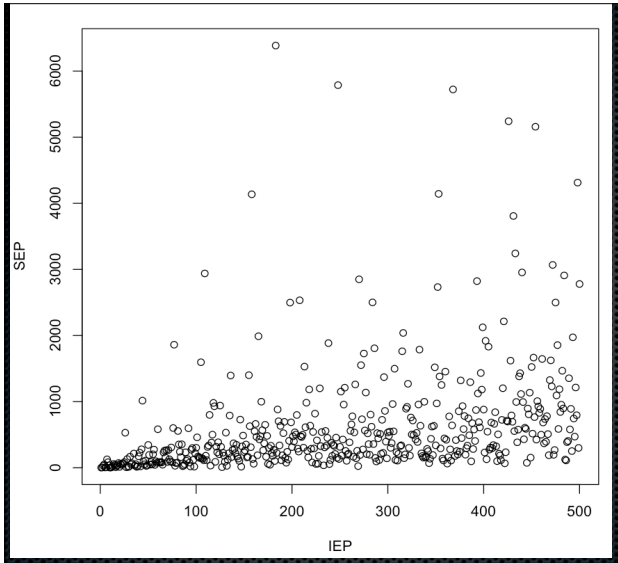
reflecting	0.6610	apparently	0.6270	spinoza	0.6150	anselm	0.5540
morals	0.6540	philosophers	0.6260	aesthetics	0.6140	forms	0.5540

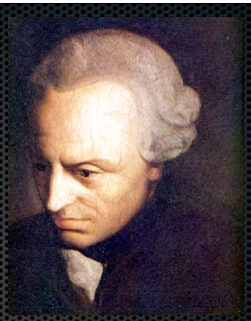


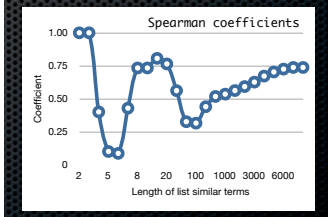












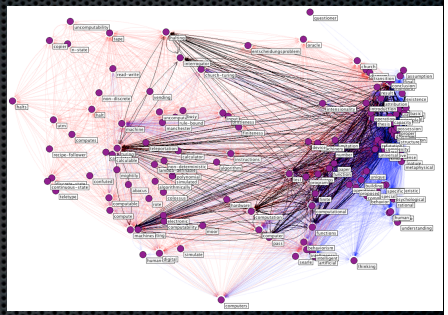
DIGGING INTO DATA CHALLENGE

- Coming July 2013: **Digging by Debating**
  - **Joint project with InPhO, Katy Börner (IU), Andrew Ravenscroft (U. East London), Chris Reed (Dundee), David Bourget (U. of London)**
  - 2.6 m volumes from HathiTrust/Google Books
  - 2.6 m books x ~350 pages/book x ~250 words/page =~ 230 BILLION words

InPhO the Indiana Philosophy Ontology project

DIGGING INTO DATA CHALLENGE

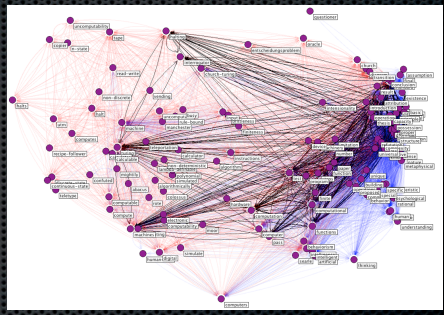
- **Digging by Debating**



InPhO the Indiana Philosophy Ontology project

DIGGING INTO DATA CHALLENGE

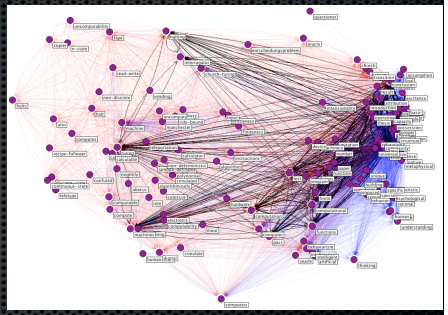
- **Digging by Debating**
  - Scaling challenges



InPhO the Indiana Philosophy Ontology project

DIGGING INTO DATA CHALLENGE

- **Digging by Debating**
  - Scaling challenges
  - Context-sensitivity (more not always better)



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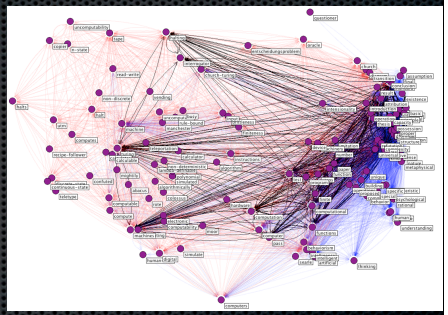
- **Digging by Debating**
  - Scaling challenges
  - Context-sensitivity (more not always better)
  - Need: multi-scale model comparisons



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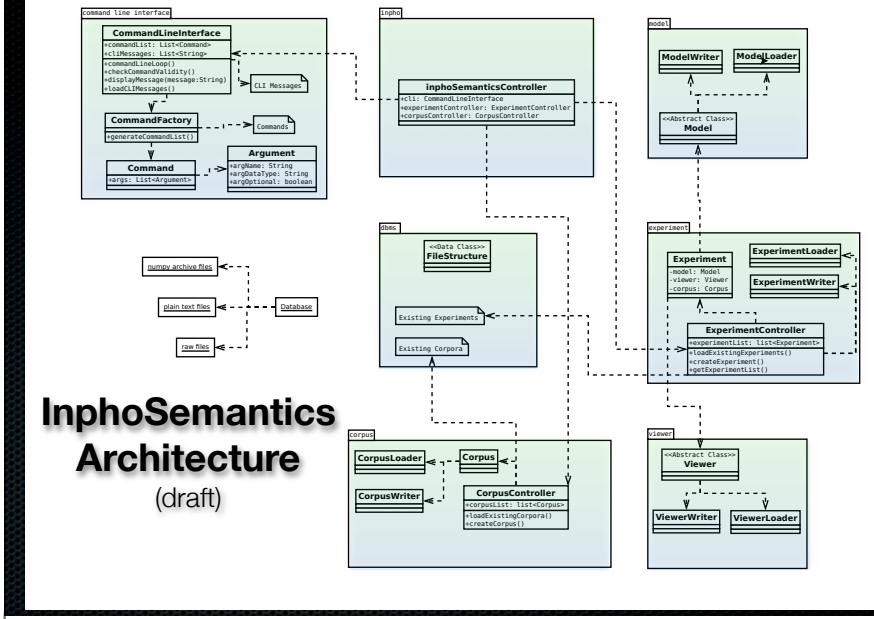

InphoSemantics Architecture
(draft)

- **Also coming in 2013: LinkedHumanities**
  - **Joint project between InPhO and Mathias Niepert (U. Mannheim=>U.Washington)**
  - **Automated matching of InPhO entities to Linked Open Data Cloud**

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Research Avenues

- Model comparison
- Context Switching
- Domain Expertise
- Corpus comparisons
- State of profession
- Controversy analysis
- Historical tracking
- (and more!)

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http://inpho.cogs.indiana.edu/