

# The Cognitive Sciences of Reasoning:

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## A Bibliometric Analysis

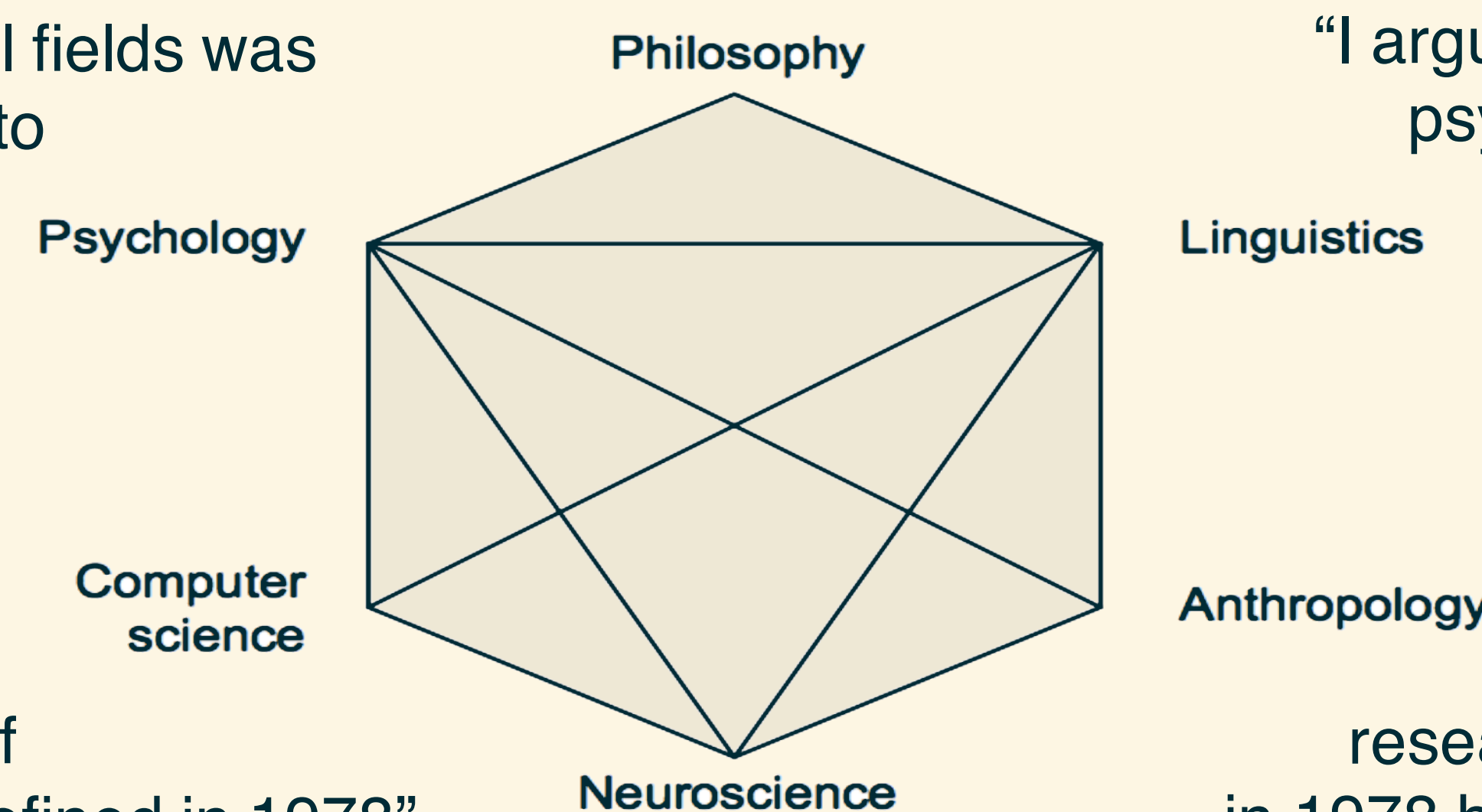


Chaire de recherche du Canada sur les transformations de la communication savante  
Pr. Vincent Larivière

### Context: Cognitive Science in 1978

"A committee of people from the several fields was assembled [by the Sloan Foundation], to summarize the state of Cognitive Science in 1978, and to write a report recommending appropriate action."

"Our report had one figure. (...) Each line in the figure represented an area of interdisciplinary inquiry that was well defined in 1978"



"I argued that at least six disciplines were involved: psychology, linguistics, neuroscience, computer science, anthropology and philosophy. I saw psychology, linguistics and computer science as central, the other three as peripheral"

"Today, I believe, all fifteen possible links could be instantiated with respectable research, and the eleven links we saw as existing in 1978 have been greatly strengthened" (Miller 2003)

What about Reasoning?

### Research Questions

- What was the state of reasoning in cognitive science in 1978?
- Were all cognitive science disciplines involved?
- Which were central? Peripheral?
- What were the interdisciplinary links between disciplines?
- Has the situation changed till then?

### Data Collection

#### Web of Science

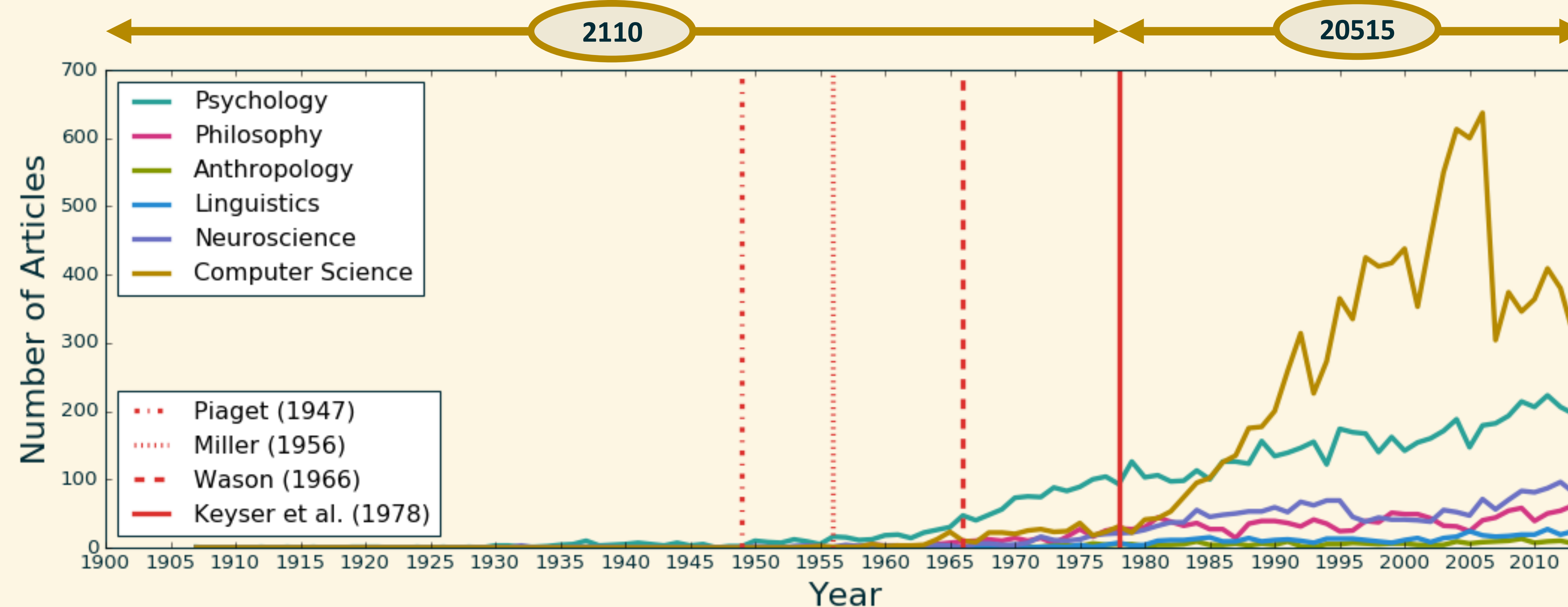
- 50,000+ Books
- 12,000+ Journals
- 160,000 Proceedings
- 90,000,000+ Records
- 1,000,000,000+ Citations

#### NSF Journal Classification

A	Anthrop. & Archaeology
CS	Computers
L	Language & Linguistics
N	Neurology & Neurosurgery
Φ	Philosophy
Ψ	BehavSci & Compl Ψ / Clin. Ψ Dev & Child Ψ / Experim Ψ / Gen Ψ Hum. Fact./ Misc Ψ / Soc Ψ

#### Title Wording Markers

- "abduct%"
- "analogical"
- "analogies"
- "analogy"
- "conditional%"
- "contradict%"
- "deduc%"
- "disjunct%"
- "disjoint"
- "infer%"
- "logic%"
- "reasoning"
- "tautolog"
- ~NS
- "induction"
- "inductive"
- "inducing"



Field Citation Probability  
(article-level) (AL) (FCP)

		A	CS	L	N	Φ	Ψ	Bio	BiomedRes	Chem	ClinMed	Earth&Space	Eng&Tech	Health	Human	Maths	Physics	ProfFields	SocSci
1978-2014	A	0,89	0,02	0,06	0,02	0,02	0,14	0,22	0,33	0,07	0,11	0,21	0,03	0,05	0,14	0,02	0,04	0,07	0,42
	CS	0	0,94	0,01	0,04	0,03	0,1	0,03	0,09	0,01	0,04	0,01	0,26	0,01	0	0,32	0,06	0,08	0,03
	L	0,03	0,09	0,8	0,04	0,23	0,27	0,01	0,07	0	0,01	0	0,02	0,07	0,13	0,05	0,01	0,1	0,16
	N	0	0,07	0,01	0,95	0	0,37	0,11	0,83	0,08	0,72	0	0,06	0,05	0	0,06	0,07	0,03	0,03
	Φ	0,01	0,09	0,07	0,01	0,86	0,07	0,01	0,03	0	0,01	0	0,01	0,01	0,05	0,2	0,02	0,04	0,32
	Ψ	0,02	0,08	0,05	0,22	0,04	0,98	0,05	0,3	0	0,24	0	0,02	0,12	0,01	0,06	0,03	0,29	0,2
	Σ	0,02	0,53	0,04	0,18	0,09	0,37	0,04	0,22	0,02	0,17	0,01	0,15	0,05	0,01	0,21	0,05	0,13	0,11
1907-1978	A	0,75	0	0,03	0	0	0,06	0,11	0,25	0	0,06	0,06	0	0	0,08	0,03	0	0,06	0,42
	CS	0	0,81	0,01	0,01	0,02	0,03	0	0,06	0,01	0,01	0,01	0,39	0	0	0,16	0,07	0,03	0,03
	L	0,03	0	0,78	0	0,03	0,12	0	0,03	0	0	0	0,03	0	0,06	0	0,03	0,03	0,03
	N	0,01	0	0,01	0,83	0	0,17	0,08	0,74	0,08	0,68	0	0	0	0	0,01	0,03	0	0,03
	Φ	0	0,02	0,02	0	0,79	0,03	0	0,03	0,02	0	0	0	0	0,02	0,17	0,05	0,01	0,12
	Ψ	0,01	0,01	0,01	0,06	0,01	0,95	0,01	0,15	0	0,19	0	0,01	0,03	0	0,04	0,02	0,19	0,03
	Σ	0,02	0,14	0,02	0,11	0,1	0,61	0,02	0,17	0,01	0,18	0	0,07	0,02	0	0,07	0,03	0,12	0,08

Extradisciplinary Degree  
(citation-level) (ED)

1978-2014	A	0,52
	CS	0,31
	L	0,54
	N	0,53
	Φ	0,42
	Ψ	0,27
	Σ	0,35
1907-1978	A	0,45
	CS	0,4
	L	0,27
	N	0,6
	Φ	0,36
	Ψ	0,23
	Σ	0,32

### Preliminary Conclusions

#### 1907-1978:

- Ψ dominance
- FCP: mostly intradisciplinary, save for extracognitive fields

#### 1978-2014:

- CS dominance
- Raise FCP (Ψ, Ψ-N), ED (L)

#### Overall:

- Interdisciplinarity of reasoning mostly extracognitive
- High FCP and Low ED suggests skewed interdisciplinarity distribution

#### Limits

- English-written publications
- Restricted to WoS

### References

- Keyser S., Miller G.A. & Walker E. 1978. Cognitive Science 1978: Report of the state of the art committee to the advisors of the Alfred P. Sloan Foundation. Technical Report.
- Miller G.A. 2003. The cognitive revolution: a historical perspective. *Trends in Cognitive Science* 7.3: 141-144.
- Thomson Reuters. ISI Web of Knowledge.



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