Computational Pragmatics

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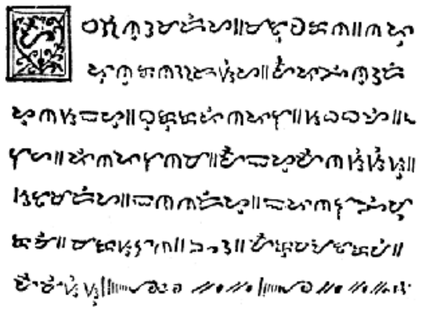
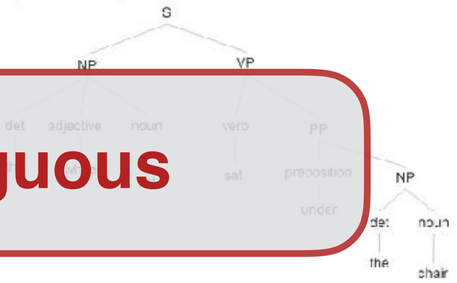
Two views of language



x, y	u, v
john(x)	he(u)
donkey(y)	it(u)
owns(x, y)	beats(u, v)
	$u = x$
	$v = y$



ambiguous

sentence | ˈsentns |
noun
1 a set of words that is complete in itself, typically containing a subject and predicate, conveying a statement, question, exclamation, or command, and consisting of a main clause and sometimes one or more subordinate clauses.
• Logic a series of signs or symbols expressing a proposition in an artificial or logical language.
2 the punishment assigned to a defendant found guilty by a court, or fixed by law for a particular offense: *her husband is serving a three-year* ***sentence*** *for fraud* | *slander of an official carried an eight-year prison sentence.*

verb [with obj.]
declare the punishment decided for (an offender): *ten army officers were* ***sentenced*** *to death.*

structure

disambiguated by pragmatic reasoning

function

Language use & pragmatic inference

"If I say to any one, '**I saw some of your children to-day**', he might be justified in inferring that I did not see them all, not because the words mean it, but because, if I had seen them all, it is most likely that I should have said so."

(Mill 1867)

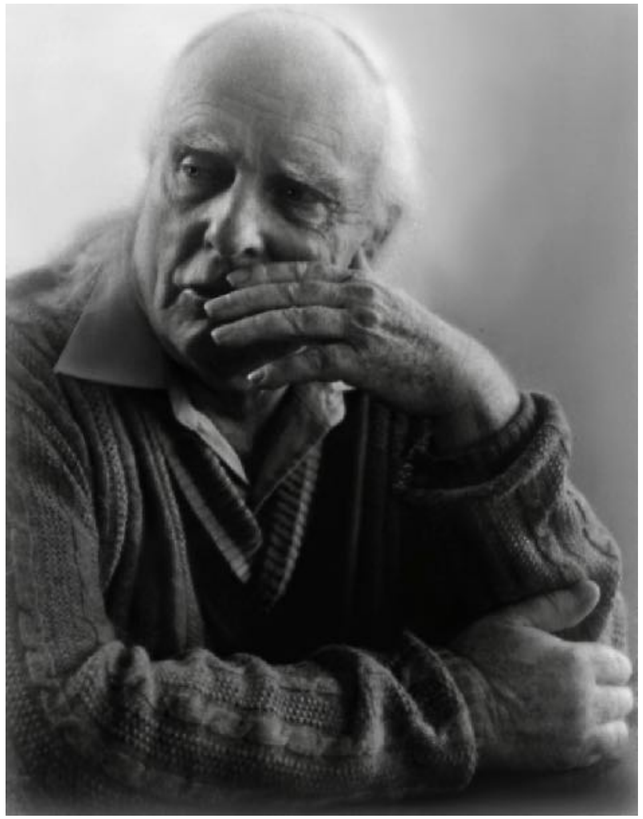
Language use & pragmatic inference

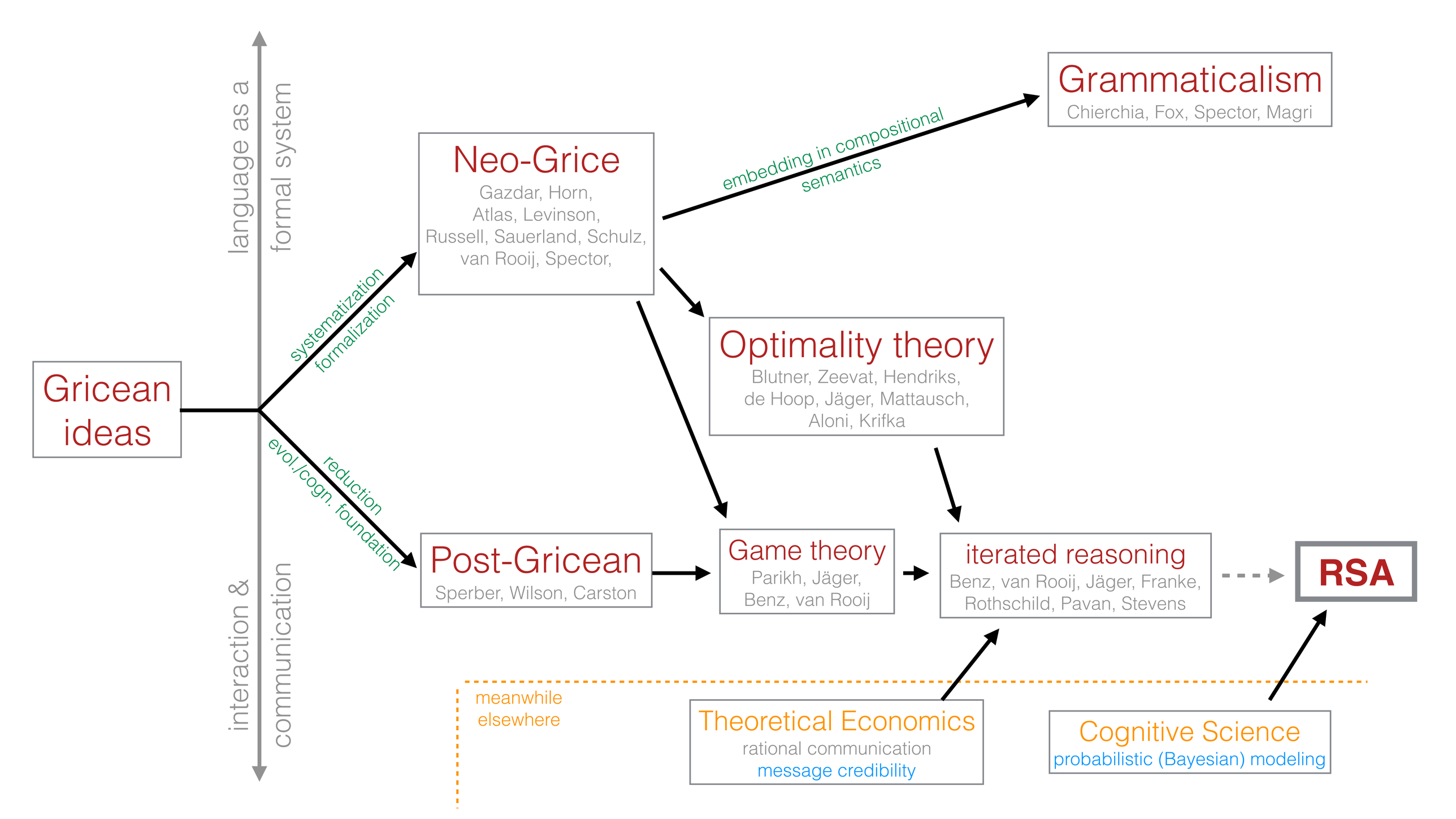
Maxims of Conversation

Be truthful, informative, relevant, brief, clear …

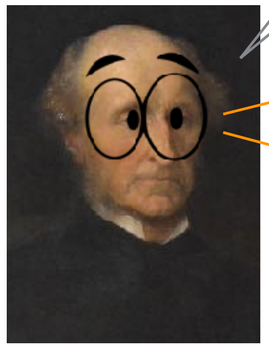
"[O]ne of my avowed aims is to see talking as a special case or variety of purposive, indeed rational, behaviour."

(Grice 1975)




language as a formal system
interaction & communication
Gricean ideas
systematization
formalization
reduction
evol./cogn. foundation
Neo-Grice
Gazdar, Horn, Atlas, Levinson, Russell, Sauerland, Schulz, van Rooij, Spector,
embedding in compositional semantics
Grammaticalism
Chierchia, Fox, Spector, Magri
Optimality theory
Blutner, Zeevat, Hendriks, de Hoop, Jäger, Mattausch, Aloni, Krifka
Post-Gricean
Sperber, Wilson, Carston
Game theory
Parikh, Jäger, Benz, van Rooij
iterated reasoning
Benz, van Rooij, Jäger, Franke, Rothschild, Pavan, Stevens
RSA
meanwhile elsewhere
Theoretical Economics
rational communication
message credibility
Cognitive Science
probabilistic (Bayesian) modeling

Pragmatics from rational social reasoning



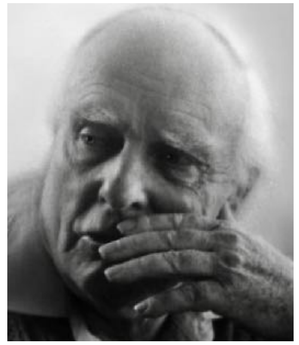
"I saw some of your children today."

?

situation ∀

situation ∃¬∀

?



Pragmatics from rational social reasoning

literal interpreter

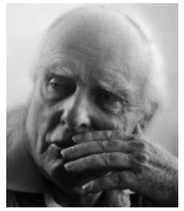
“all” → 

“some” → 

rational speaker

→ “all”

→ “some”

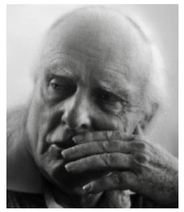


rational interpreter

“all” → 

“some” → 

Pragmatics from rational social reasoning

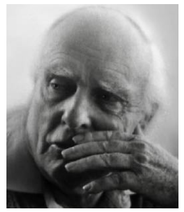


rational interpreter

rational speaker

literal interpreter

Pragmatics from rational social reasoning



rational interpreter

	∀	∃¬∀
“all”	1	0
“some”	0	1

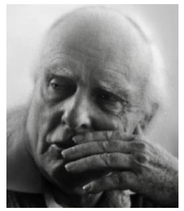
rational speaker

	“all”	**“some”**
∀	1	0
∃¬∀	0	1

literal interpreter

	∀	∃¬∀
“all”	1	0
“some”	.5	.5

Pragmatics from rational social reasoning



rational interpreter

	∀	∃¬∀
“all”	.9	.1
“some”	.1	.9

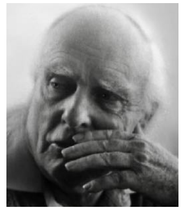
approximately rational speaker

	“all”	**“some”**
∀	.9	.1
∃¬∀	.1	.9

literal interpreter

	∀	∃¬∀
“all”	1	0
“some”	.5	.5

Pragmatics from rational social reasoning



rational interpreter

	∀	∃¬∀
“all”	.9	.1
“some”	.1	.9

approximately rational speaker

	“all”	**“some”**
∀	.9	.1
∃¬∀	.1	.9

literal interpreter

	∀	∃¬∀
“all”	1	0
“some”	.5	.5

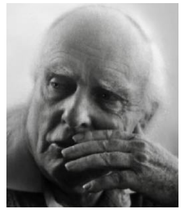
listener behavior

$$U \rightarrow \Delta(S)$$

speaker behavior

$$S \rightarrow \Delta(U)$$

Rational Speech Act model



pragmatic listener L_1

$$P_{L_1}(s \mid u) \propto P_{S_1}(u \mid s) \cdot P(s)$$

pragmatic speaker S_1

$$P_{S_1}(u \mid s) = P_{L_0})(s \mid u)^{\alpha}$$

literal listener L_0

$$P_{L_0}(s \mid u) = P(s \mid [\![u]\!])$$

This course

applications

referential communication
(epistemic) scalar implicatures
vagueness
generics
politeness
…

technicalities

WebPPL
Bayesian Data Analysis
…

referential communication

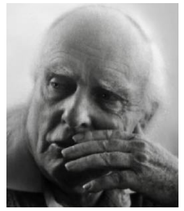
context
set of objects/referents

utterances
single properties of objects

$$U = \{\text{"square"}, \text{"circle"}, \text{"green"}, \text{"blue"}\}$$

which object do you think a speaker meant when she selects “blue”?

RSA for reference games (example)



rational interpreter

			
“square”	.82	0	.18
“circle”	0	1	0
“green”	0	0	1
“blue”	.82	.18	0

rational speaker

	“square”	**“circle”**	**“green”**	**“blue”**
	.5	0	0	.5
	0	.89	0	.11
	.11	0	.89	0

literal interpreter

			
“square”	.5	0	.5
“circle”	0	1	0
“green”	0	0	1
“blue”	.5	.5	0