any bias toesas de con-petitos must be counter bola-ad by the wider co PV/PV >1.

I we could naturally expect this to be the case I evenit to ate because of 90 > pv ]

Then:

ETTE > PUET

$$\frac{\mathcal{E}_{\overline{V}}}{\mathcal{E}_{\overline{V}}} \rightarrow \frac{\mathcal{P}_{\overline{V}}}{\mathcal{F}_{C}}$$

both we natural anaptions

also assured here: 90 > Po &

maybe assure that: If = To+ Ex with 0 = Ex muall & PV+EV=9V 19ith 068-68=

NTS: P(sg | V) > P(sc | V) [ proof exists (?) for flat prior ig = to and initial string likelihood Pr = 92]

# Computational Pragmatics

· ohay, it is deer that any price for as for Sq will pull dose (4) towards by i show that, by new libelihood, the same result is expected; so set: Ex=0

$$\frac{PV}{PV + 9V} > \frac{-9\bar{v}}{P\bar{v} + 9\bar{v}}$$

$$\Rightarrow \frac{PV}{9V} \Rightarrow \frac{9V}{PV}$$

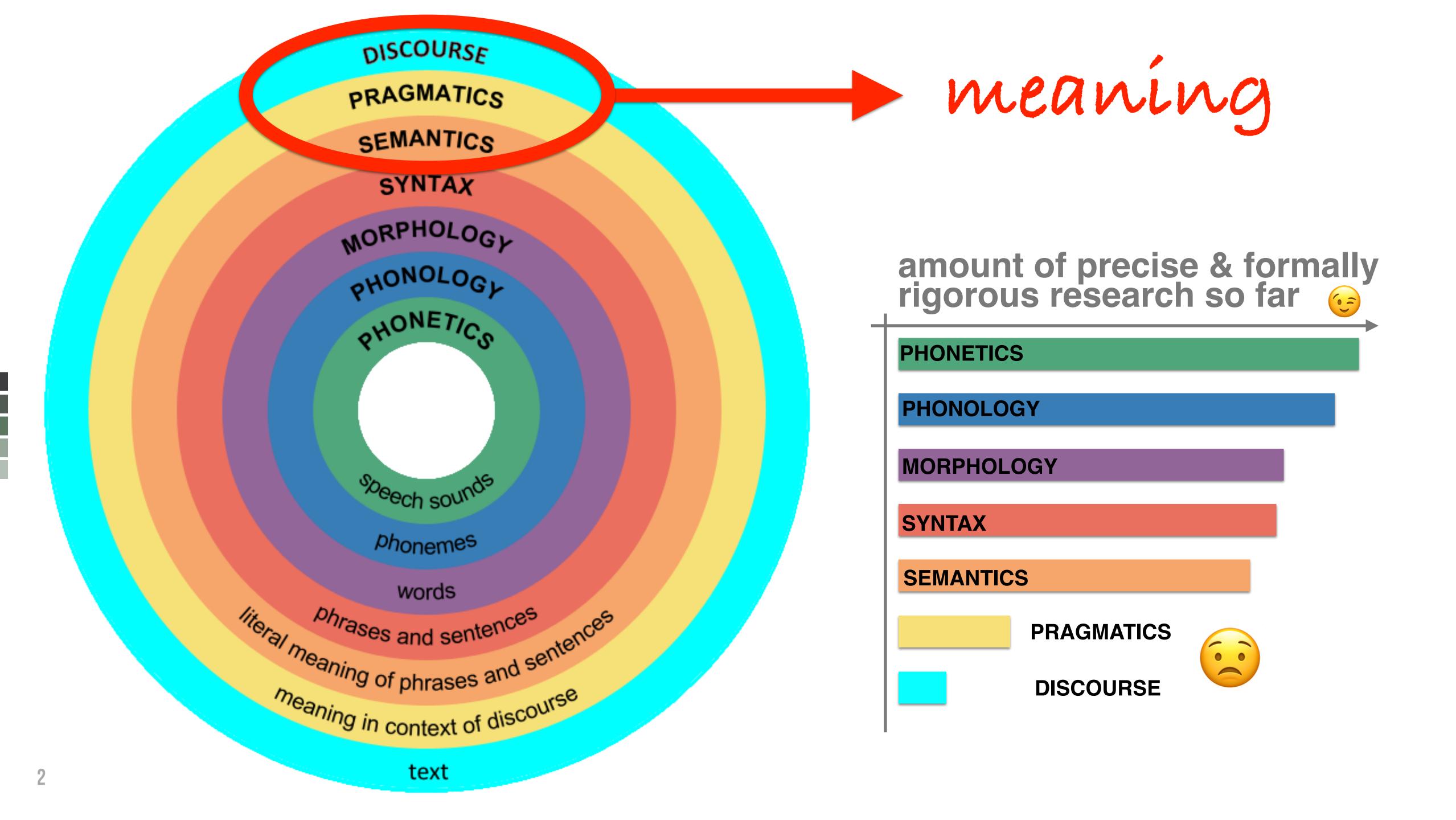
anne:

$$9\sqrt{-}9\sqrt{+}\epsilon q$$
  $\epsilon q \epsilon p$ 
 $e^{2}$ 
 $e^{2$ 

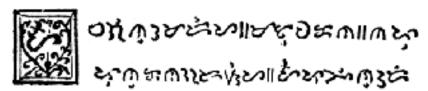
is less likely than producing V when adequate ] PVK9-Epooducing Violen inadequote is less likely then producing Vishen inadequate 1

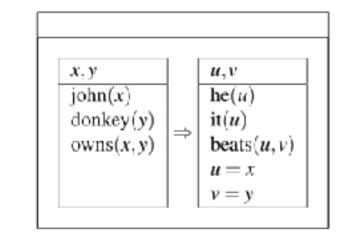
**Introduction to Pragmatics** 

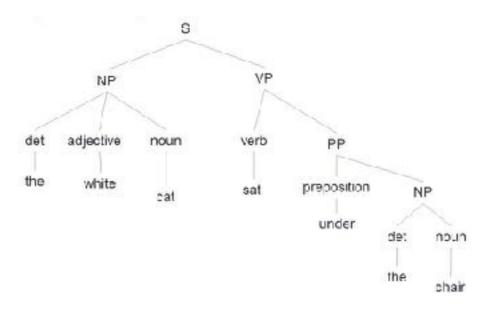
**Session 1** 



# Two views of language







#### sentence | 'sentns

nour

- 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 obi. ]

declare the punishment decided for (an offender): ten army officers were sentenced to death.

# structure









# function

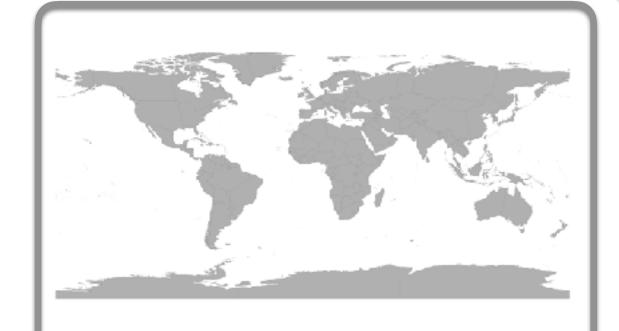






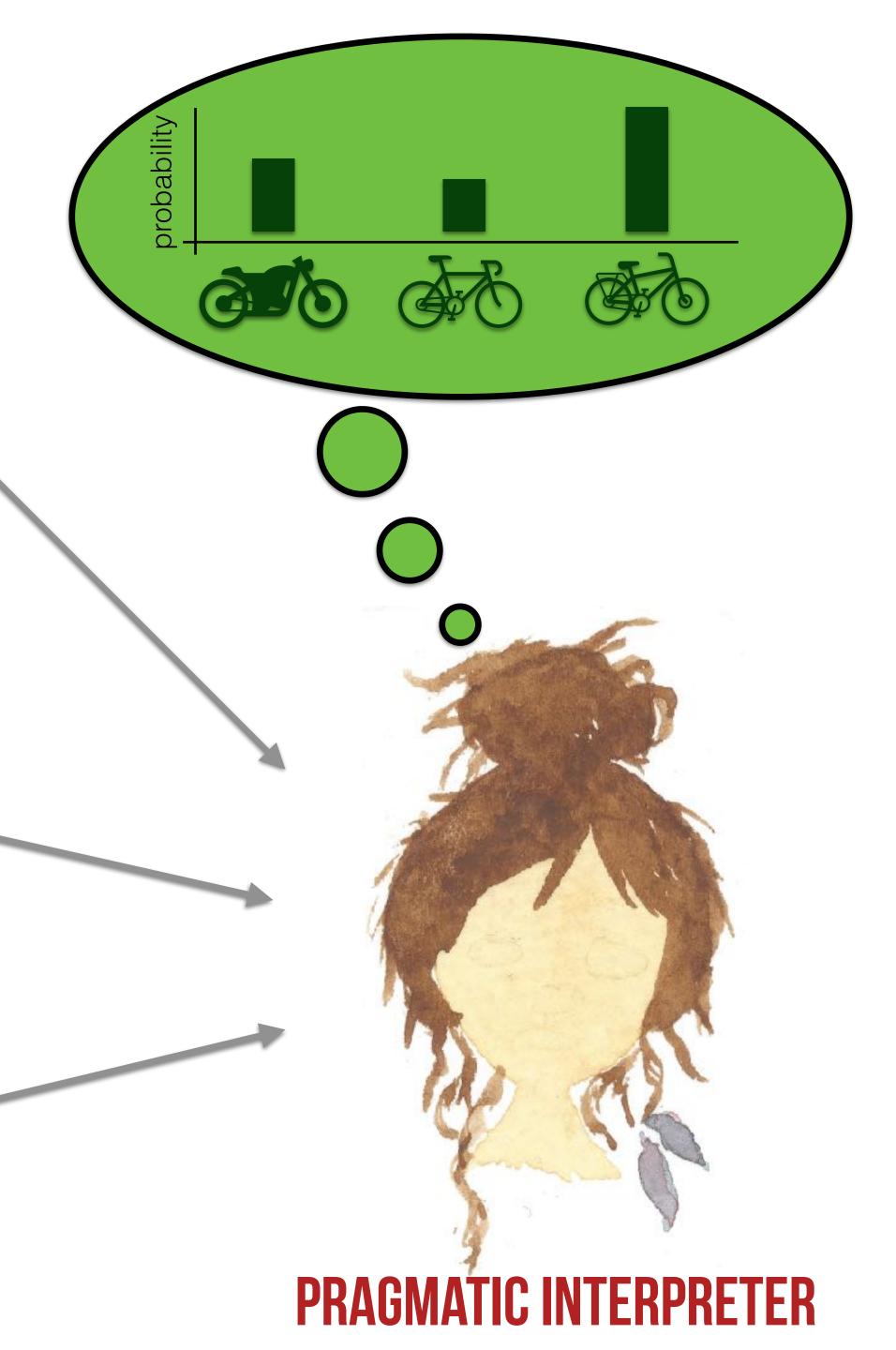
 $[[Joe]] = \lambda e . \lambda w . Joe(e, w)$ 

# **KNOWLEDGE OF LANGUAGE**

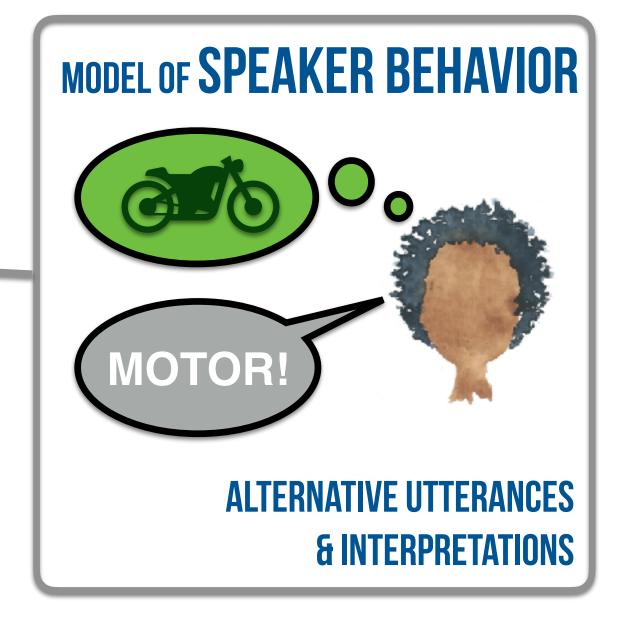


GENERAL WORLD KNOWLEDGE



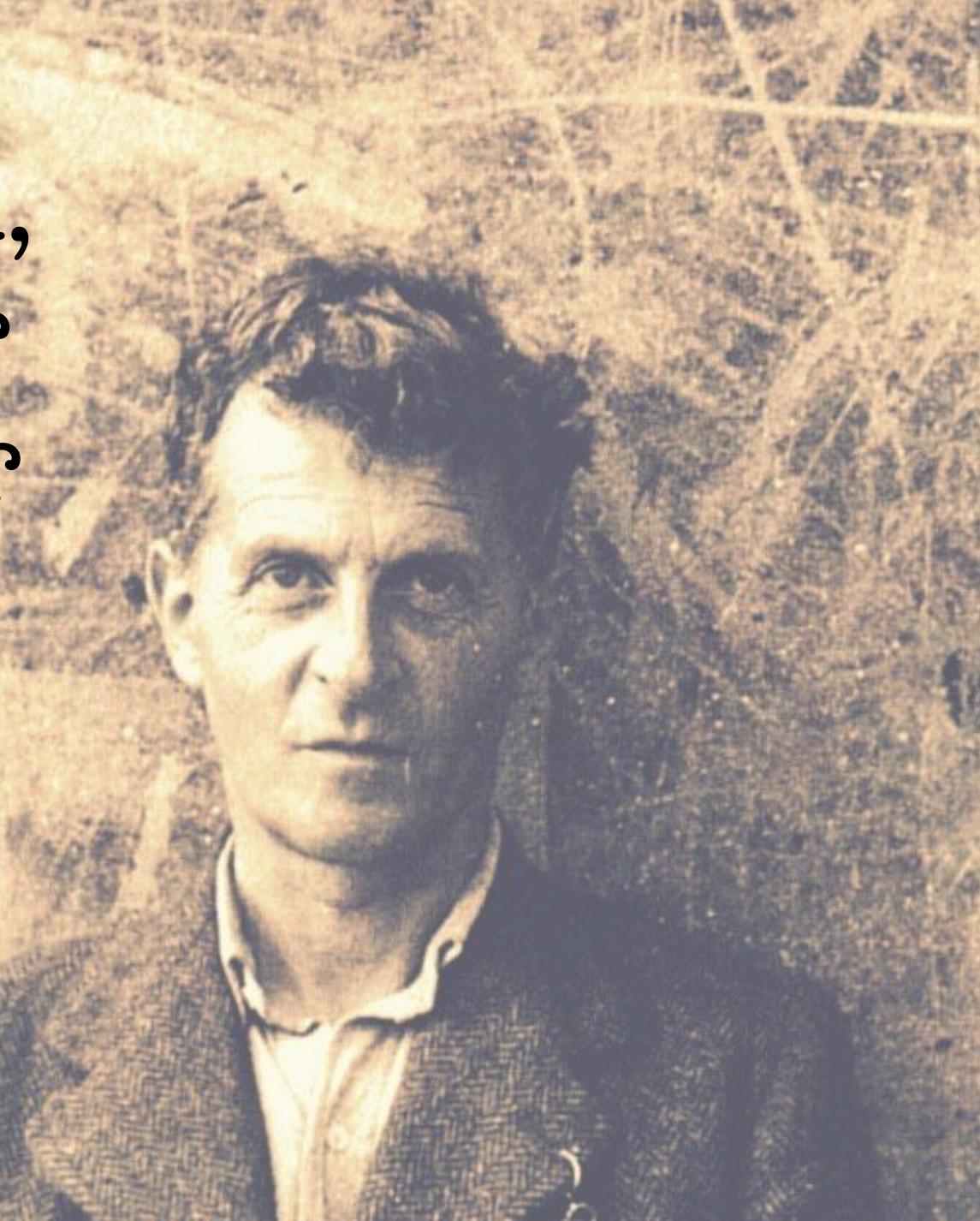






# Semantics

Einen Satz verstehen, heißt, wissen was der Fall ist, wenn er wahr ist. (TLP 4.024)





# BEGRIFFSSCHRIFT,

EINE DER ARITHMETISCHEN NACHGEBILDETE

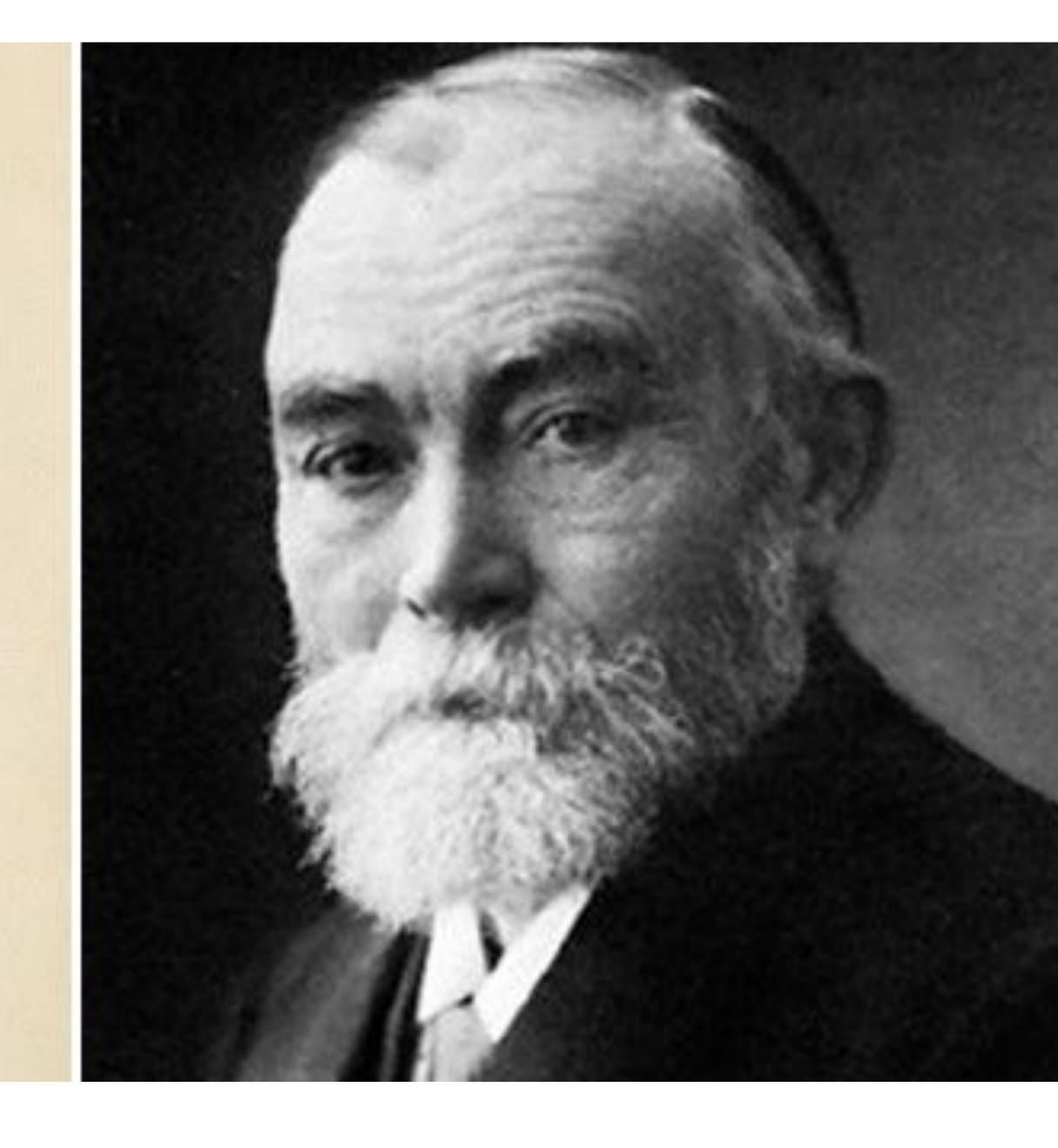
FORMELSPRACHE

DES REINEN DENKENS.

VON

D"- GOTTLOB FREGE.

PRIVATENCENTEN DER MATHEMATIK AN DER UNIVERSITÄT JENA.



| φ | $\psi$ | $ \varphi \wedge \psi$ | $\varphi \lor \psi$ | $\varphi 	o \psi$ |
|---|--------|------------------------|---------------------|-------------------|
| 1 | 1      | 1                      | 1                   | 1                 |
| 1 | 0      | 0                      | 1                   | 0                 |
| 0 | 1      | 0                      | 1                   | 1                 |
| 0 | 0      | 1 0 0 0                | 0                   | 1                 |

- (1) a. They got married and had kids.
  - b. They had kids and got married.
- (2) One more ukulele song and I'm out.

| $\varphi$ | $\psi$ | $\mid arphi \wedge \psi$ | $arphi \lor \psi$ | $arphi  ightarrow \psi$ |
|-----------|--------|--------------------------|-------------------|-------------------------|
| 1         | 1      | 1                        | 1                 | 1                       |
| 1         | 0      | 0                        | 1                 | 0                       |
| 0         | 1      | 0                        | 1                 | 1                       |
| 0         | 0      | 1<br>0<br>0<br>0         | 0                 | 1                       |

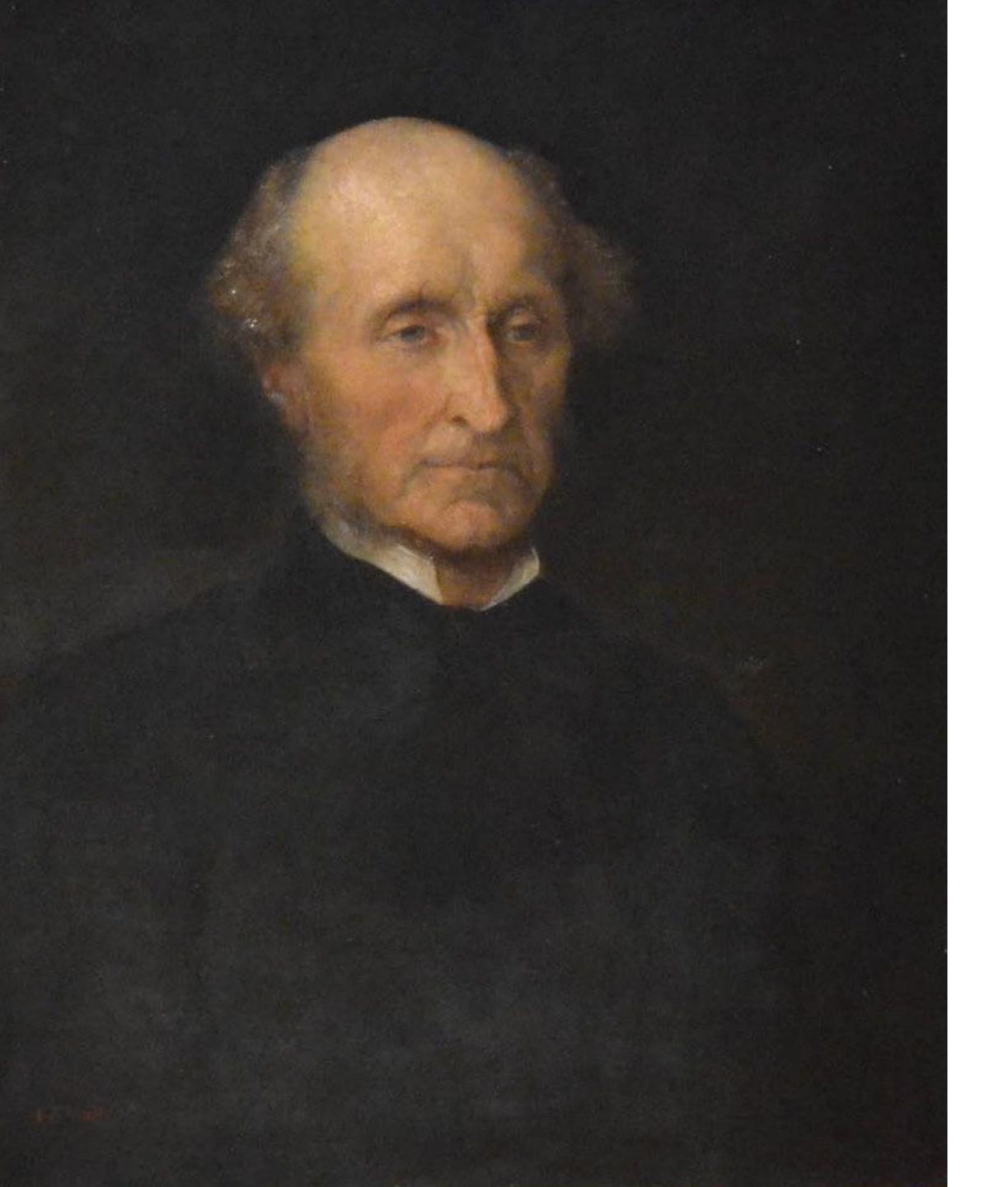
- (3) Jon had no coin or he would have given it to him.
- (4) If you pour sugar in your coffee, it tastes great.

  But if you pour sugar and gasoline in your coffee, it tastes awful.

\_\_\_\_

- (5) A: Do you speak Portuguese?
  - **B:** My wife does.

# Pragmatics Gricean CS



"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)

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

(Grice 1975)

#### Maxim of Quality

Try to make your contribution one that is true.

- (i) Do not say what you believe to be false.
- (ii) Do not say that for which you lack adequate evidence.

### Maxim of Quantity

- (i) Make your contribution as informative as is required for the current purposes of the exchange.
- (ii) Do not make your contribution more informative than is required.

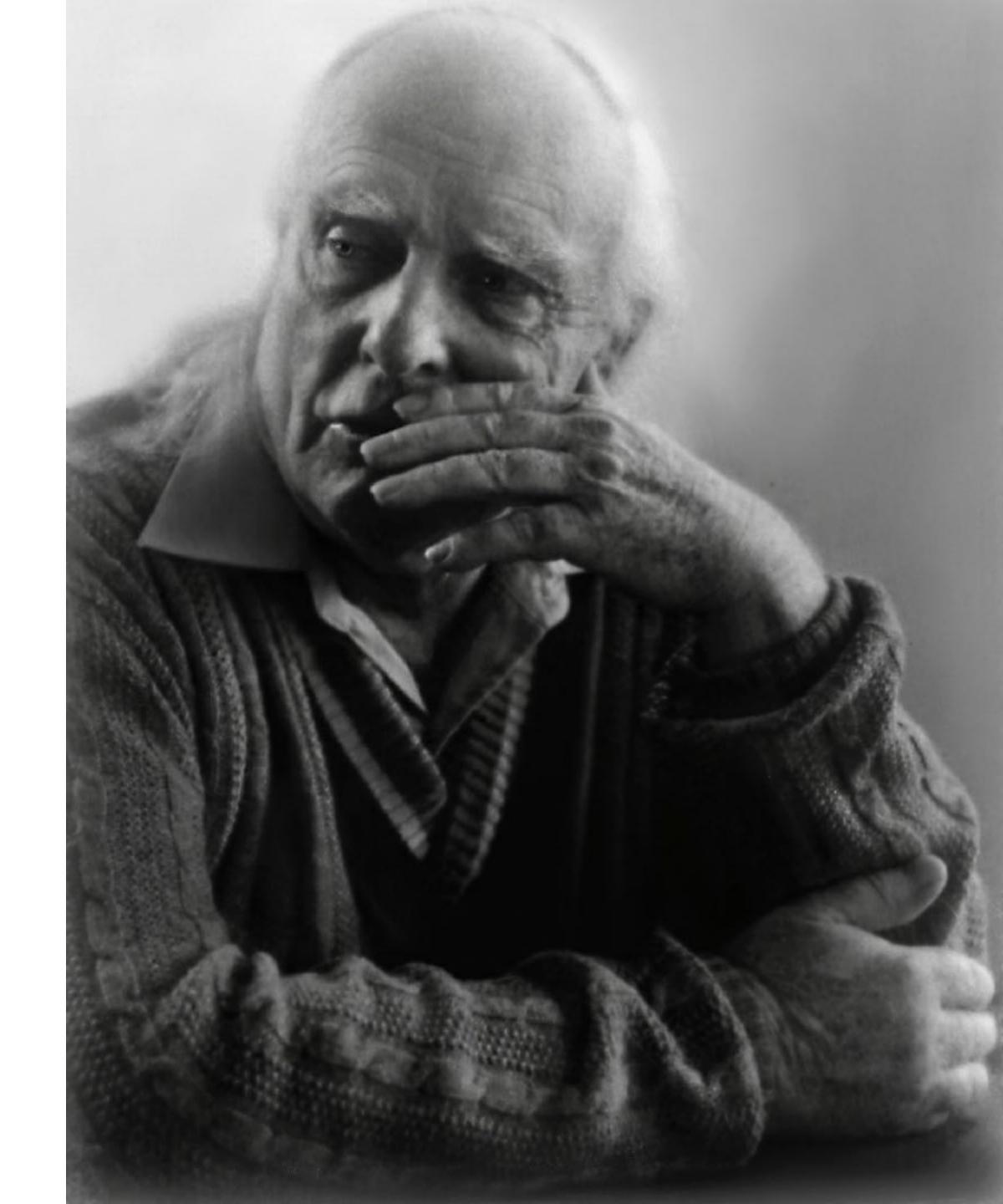
#### Maxim of Relation

(i) Be relevant.

#### Maxim of Manner

Be perspicuous.

- (i) Avoid obscurity of expression.
- (ii) Avoid ambiguity.
- (iii) Be brief (avoid unnecessary prolixity).
- (iv) Be orderly.



- (1) a. They got married and had kids.
  - b. They had kids and got married.

Lassumes Sobeys Maxims

by Manner, Lassumes S to be "orderly"

Lexpects **S** to present events in chronological order (unless otherwise indicated)

(5) A: Do you speak Portuguese?

**B:** My wife does.

Lassumes Sobeys Maxims

by Quantity & Relevance, L assumes S to give all the relevant information S is able to

if **S** was able to speak Portuguese, **S** would/ should have said so

# **Q-Implicatures**

- (6) I saw some of your children.
  - → I saw some but not all of your children.
- (7) I saw Jack or Jill.

# **I-Implicatures**

- (8) Every ten minutes a man gets mugged in New York City.
  - → Not the same poor fellow every time.
- (8) Every ten minutes a light blinks on the machine.
  - → The same light every time.

# **M-Implicatures**

- (9) Black Bart caused the sherif to die.
  - In some unusual manner, perhaps by accident.



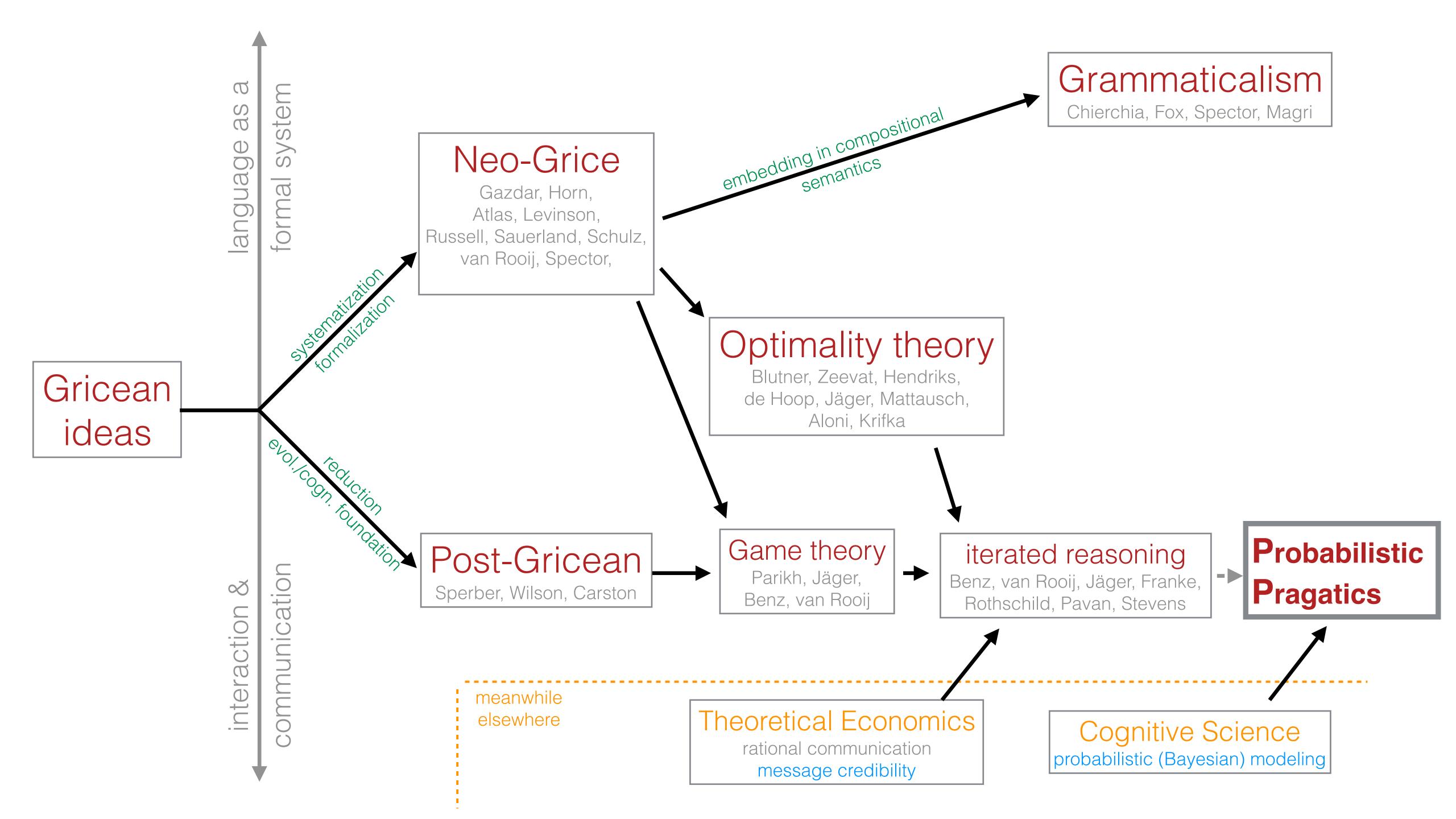
Levinson



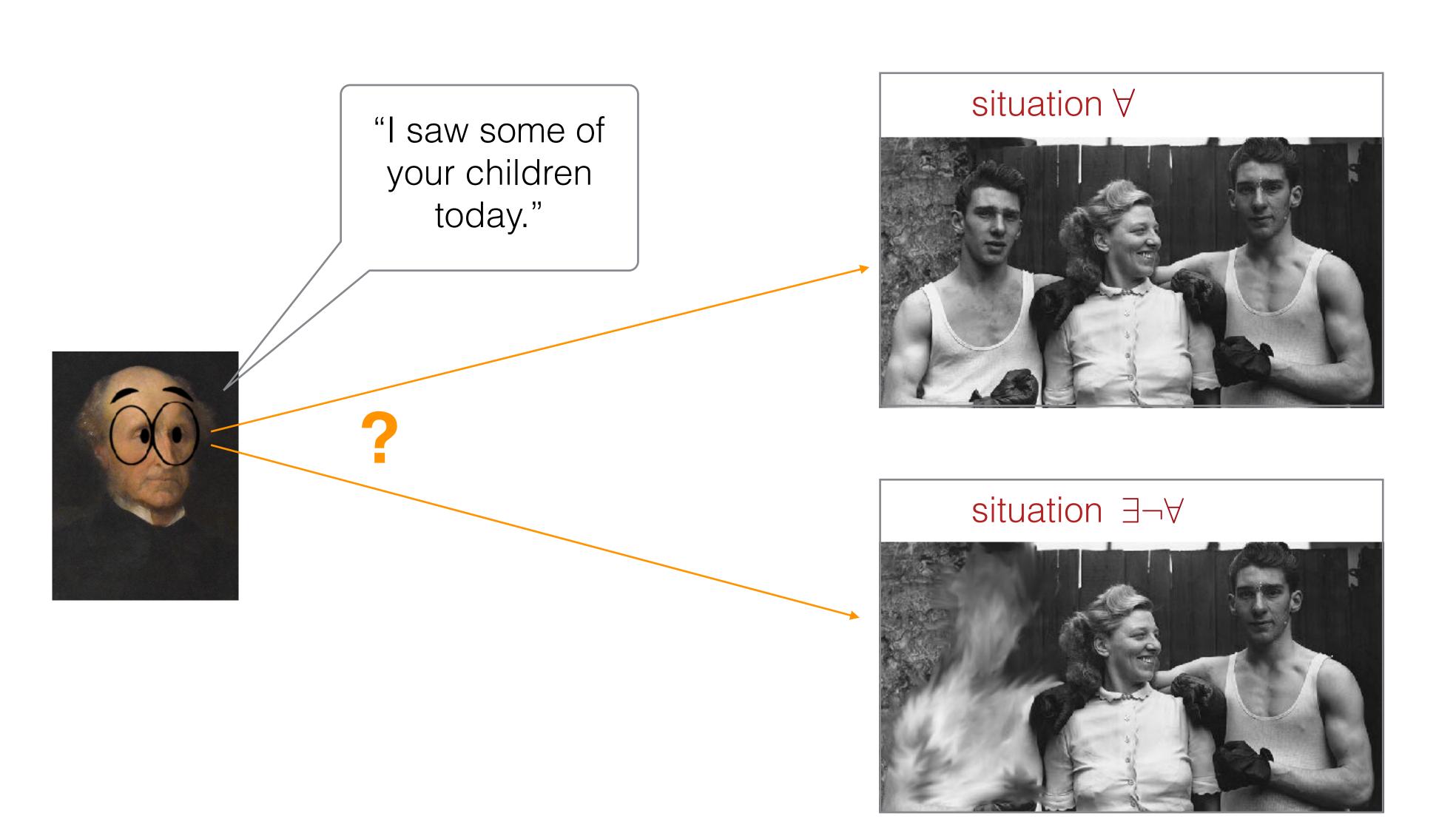
Horn



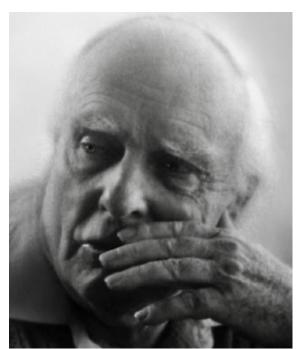
Atlas

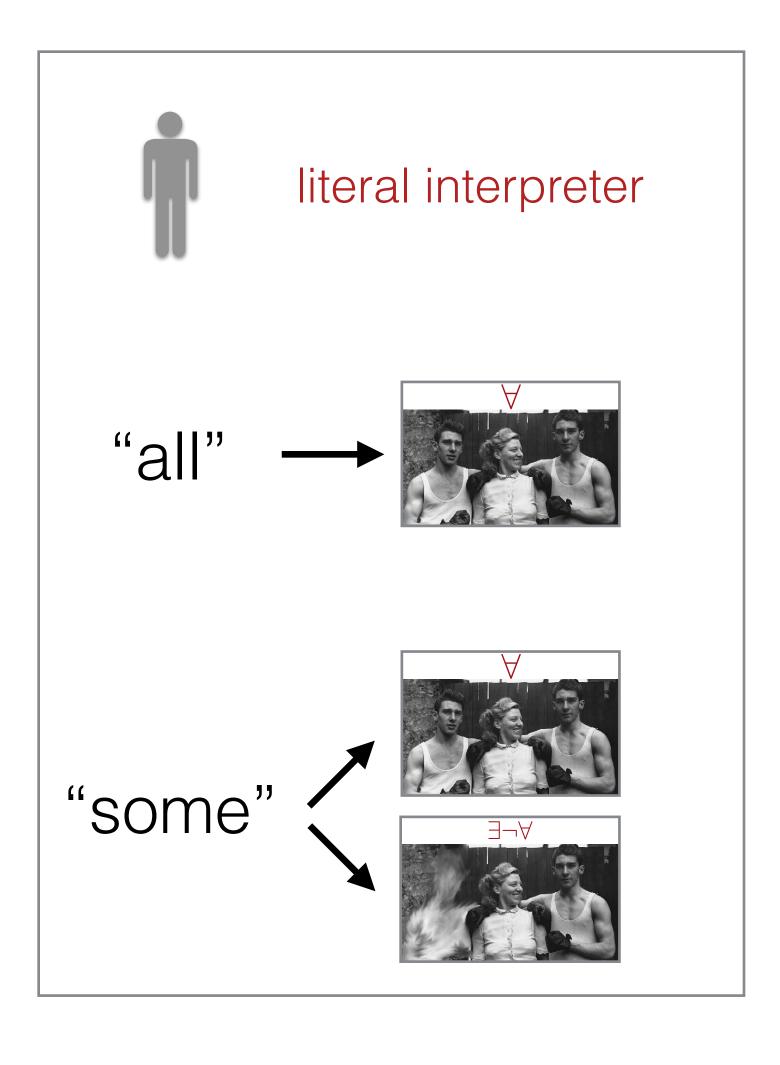


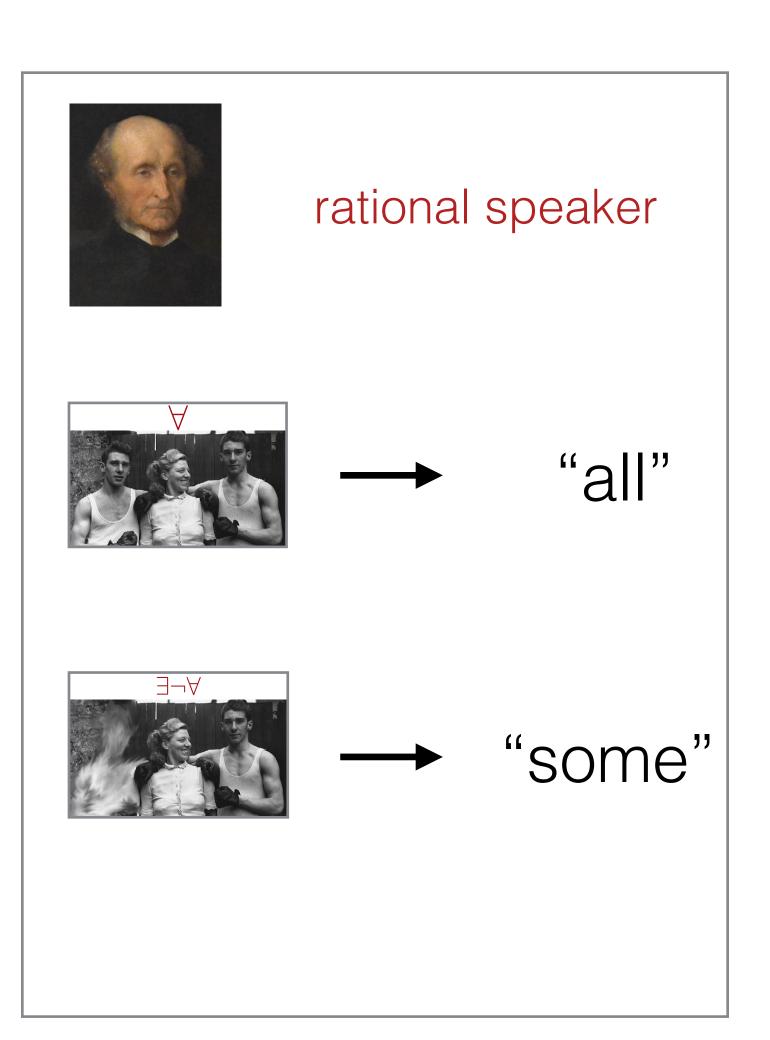
# Pragmatics Pragmatics

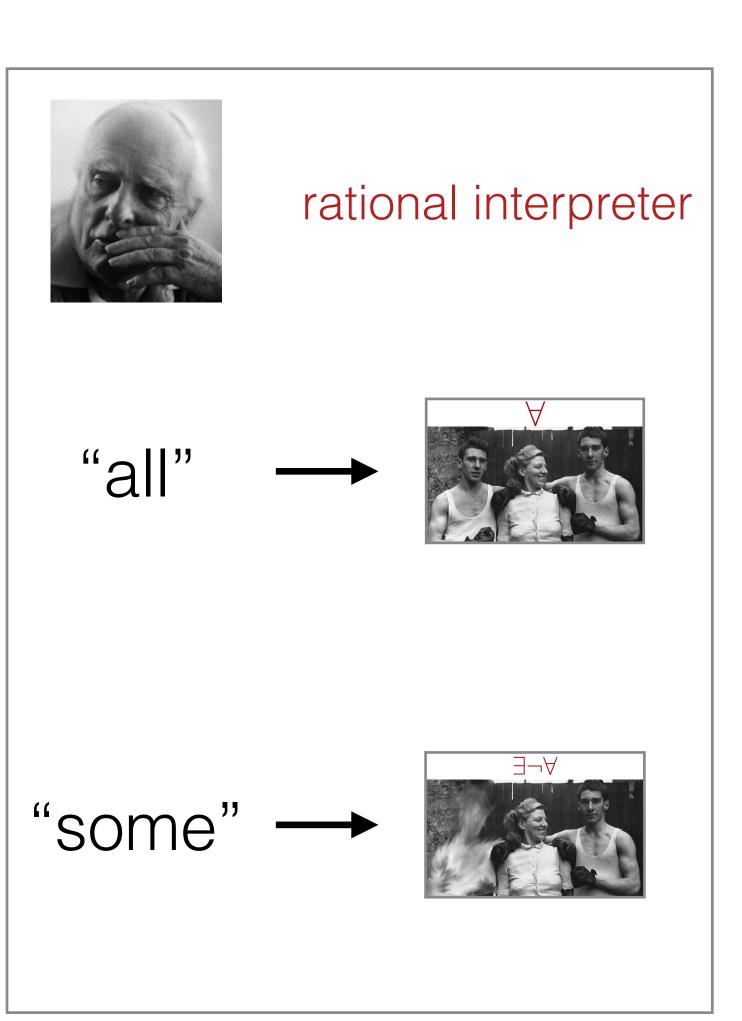


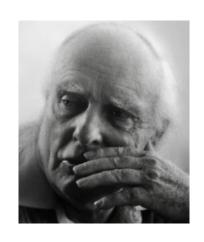












rational interpreter



rational speaker





# rational interpreter

|        | $\forall$ | $\exists \neg \forall$ |
|--------|-----------|------------------------|
| "all"  | 1         | 0                      |
| "some" | 0         | 1                      |



rational speaker

|                        | "all" | "some" |
|------------------------|-------|--------|
| $\forall$              | 1     | 0      |
| $\exists \neg \forall$ | 0     | 1      |

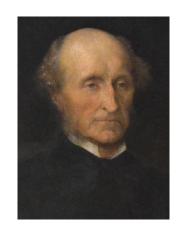


|        | $\forall$ | $\exists\neg\forall$ |
|--------|-----------|----------------------|
| "all"  | 1         | 0                    |
| "some" | .5        | .5                   |



### rational interpreter

|        | $\forall$ | $\exists\neg\forall$ |
|--------|-----------|----------------------|
| "all"  | .9        | .1                   |
| "some" | .1        | .9                   |

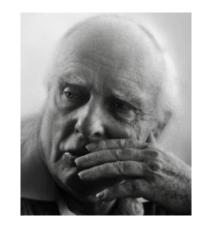


approximately rational speaker

|                        | "all" | "some" |
|------------------------|-------|--------|
| $\forall$              | .9    | .1     |
| $\exists \neg \forall$ | .1    | .9     |



|        | $\forall$ | $\exists\neg\forall$ |
|--------|-----------|----------------------|
| "all"  | 1         | 0                    |
| "some" | .5        | .5                   |



rational interpreter

|        | $\forall$ | $\exists\neg\forall$ |
|--------|-----------|----------------------|
| "all"  | .9        | .1                   |
| "some" | . 1       | .9                   |

### listener behavior

$$U \to \Delta(S)$$



approximately rational speaker

|                        | "all" | "some" |
|------------------------|-------|--------|
| $\forall$              | .9    | .1     |
| $\exists \neg \forall$ | . 1   | .9     |

# speaker behavior

$$S \to \Delta(U)$$



|        | $\forall$ | $\exists\neg\forall$ |
|--------|-----------|----------------------|
| "all"  | 1         | 0                    |
| "some" | .5        | .5                   |

# Rational Speech Act model



#### STRATEGIC DEPTH 0

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



GRICEAN SPEAKER

STRATEGIC DEPTH 1



$$P_{S}(u \mid s) \propto \exp\left(\alpha \left(\log P_{lit}(s \mid u) - C(u)\right)\right)$$



GRICEAN INTERPRETATION

STRATEGIC DEPTH 2



$$P_L(s \mid u) \propto P(s) P_S(u \mid s)$$

### This course

# applications

referential communication (epistemic) scalar implicatures non-literal language use vagueness politeness

. . .

#### technicalities

WebPL Bayesian Data Analysis

. . .