

Challenges in linking electrophysiological data to the theory of scalar implicatures

Stephen Politzer-Ahles

2017.06.19

Workshop on “Revising formal semantic
and pragmatic theories from a
neurocognitive perspective”

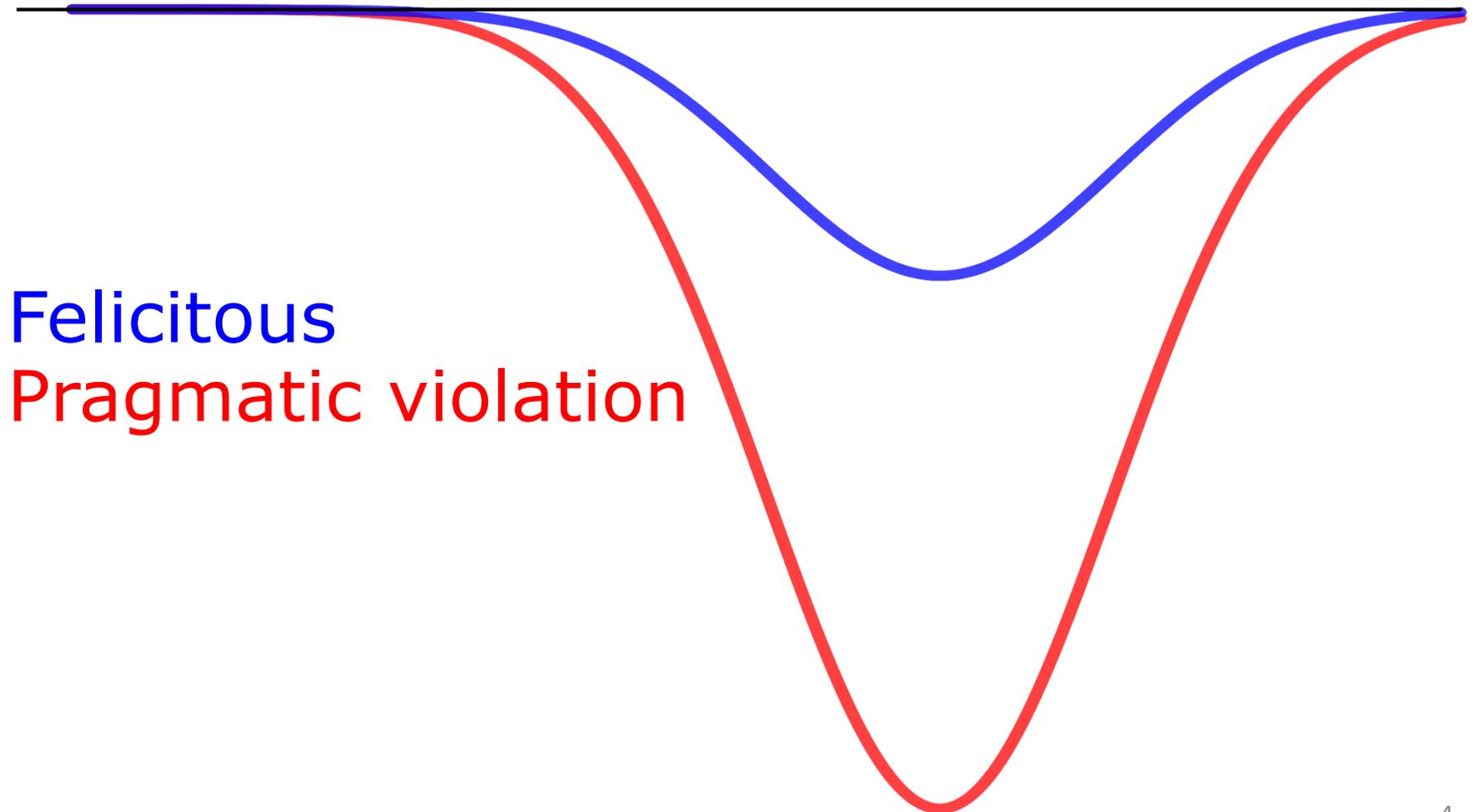
THE DOOMED(?) SEARCH FOR “NEURAL CORRELATES”



She is chilly.

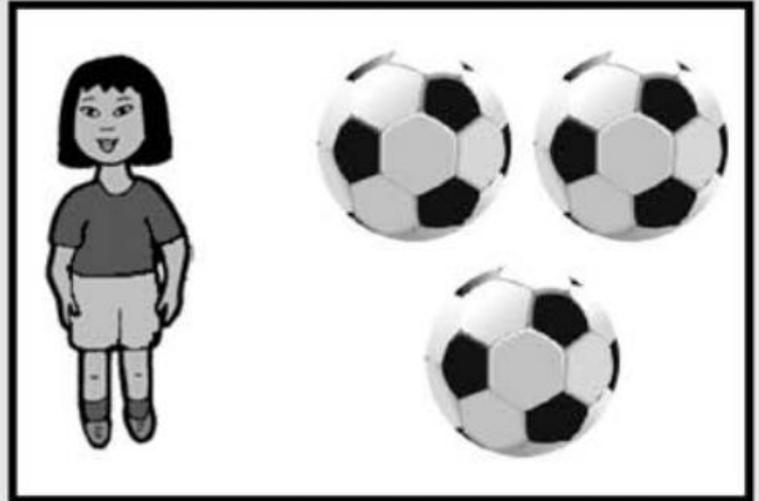
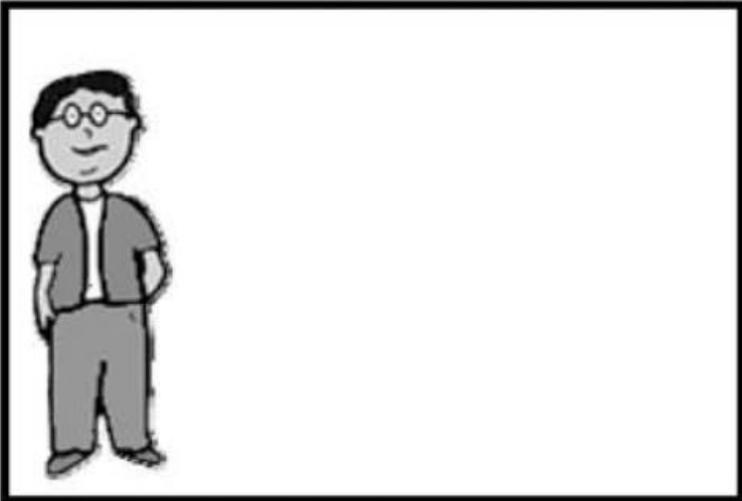
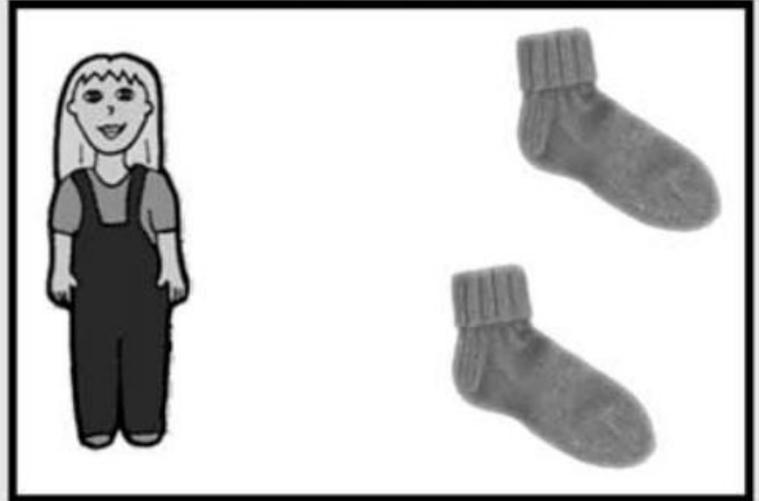
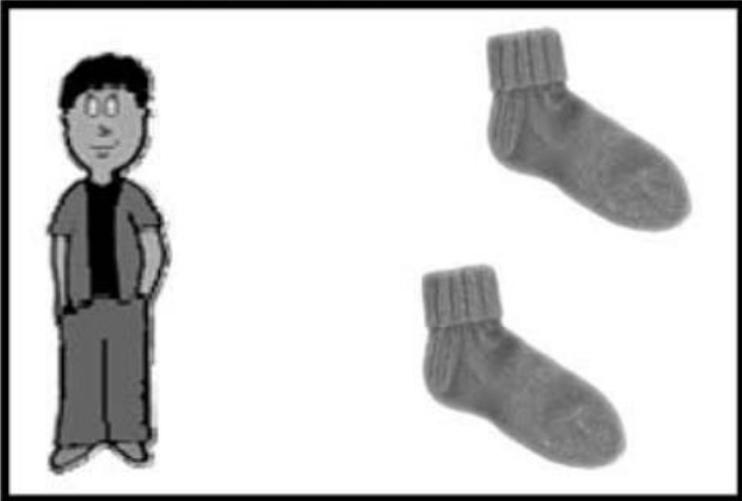


He is chilly.

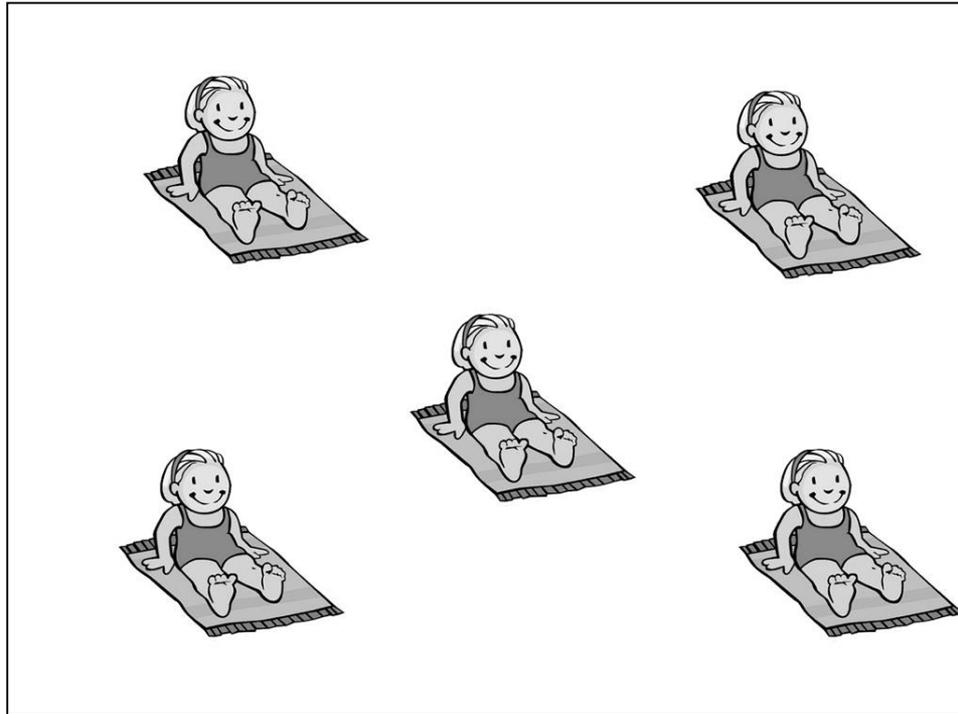


Felicitous
Pragmatic violation





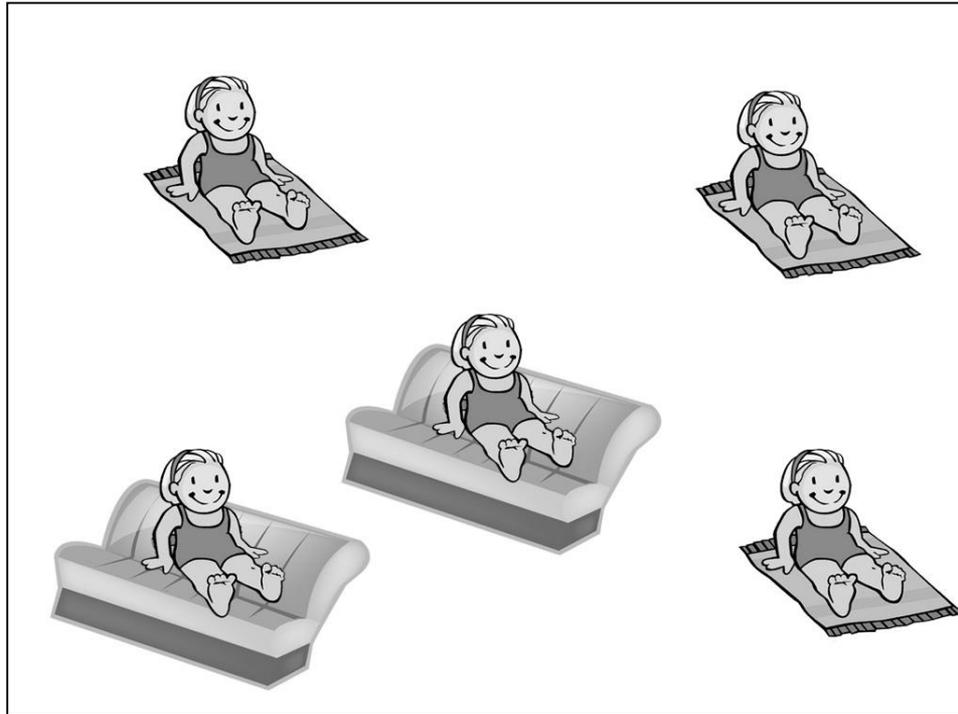
Pragmatic violation



图片里，有的 女孩 坐在 毯子上 晒太阳。
In the picture, **some of** the girls are sitting on blankets sunbathing.

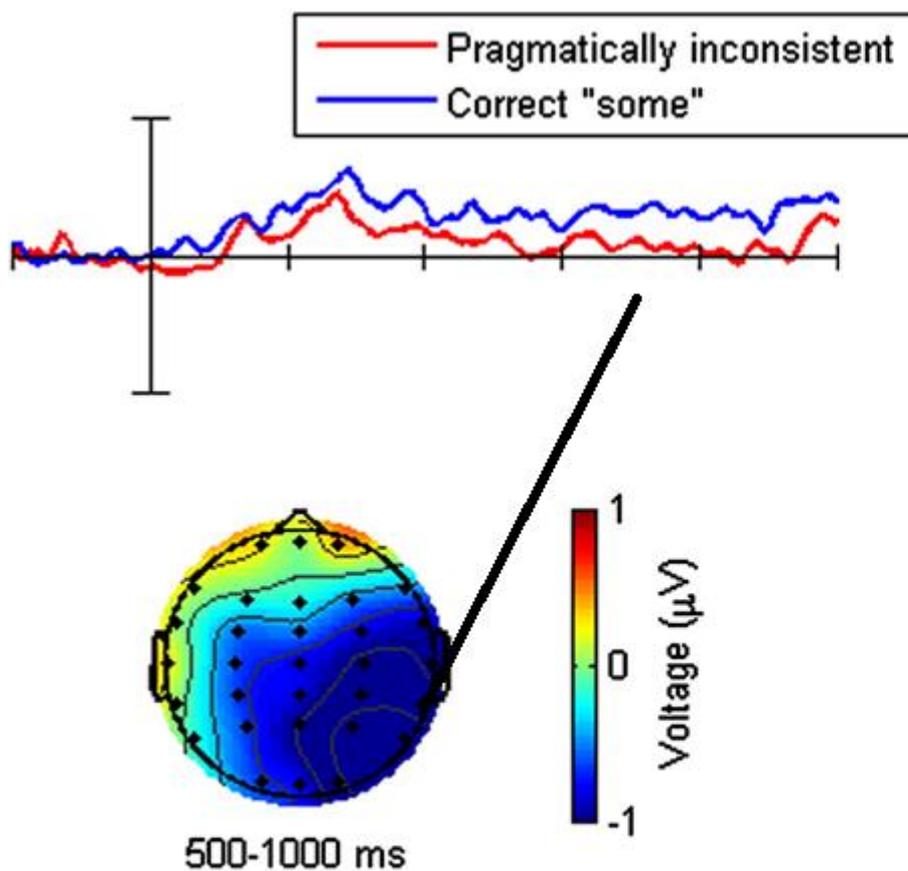
Politzer-Ahles, Fiorentino, Jiang, & Zhou (2013); Politzer-Ahles (2013)

Semantic violation

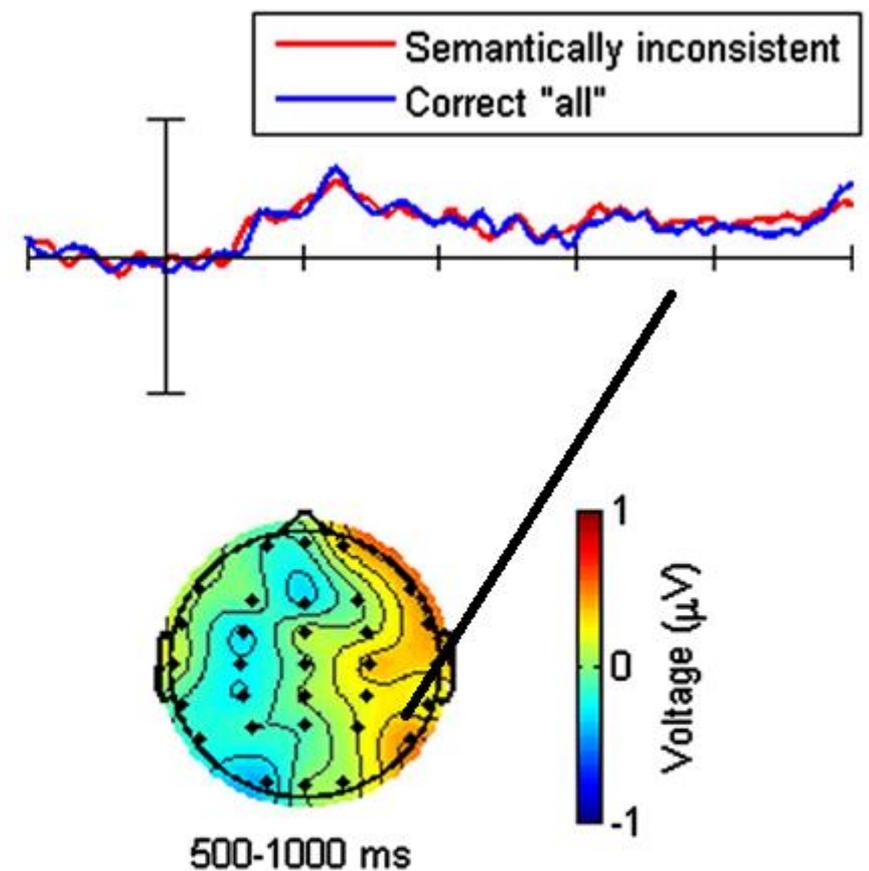


图片里，所有的 女孩 都坐在 毯子上 晒太阳。
In the picture, all of the girls are sitting on blankets suntanning.

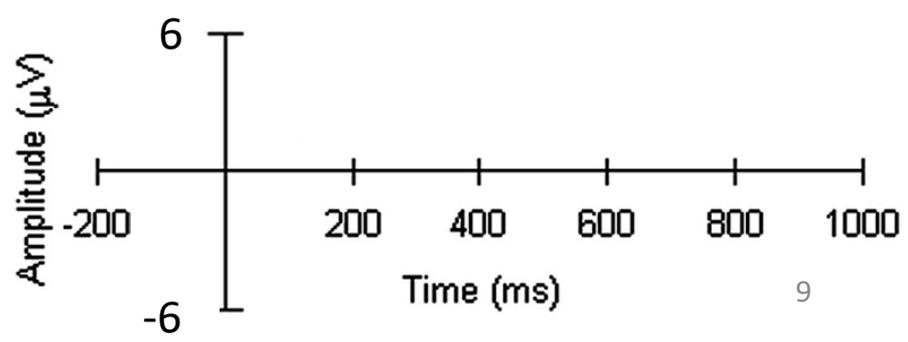
Politzer-Ahles, Fiorentino, Jiang, & Zhou (2013); Politzer-Ahles (2013)



Pragmatically Inconsistent -
Correct "some"



Semantically Inconsistent -
Correct "all"



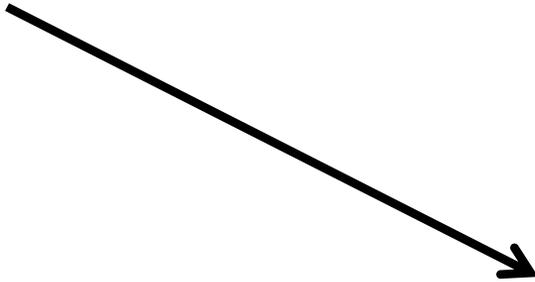
Politzer-Ahles, Fiorentino, Jiang, & Zhou (2013)

Correct

Will the pitcher
overflow the cup?



maybe



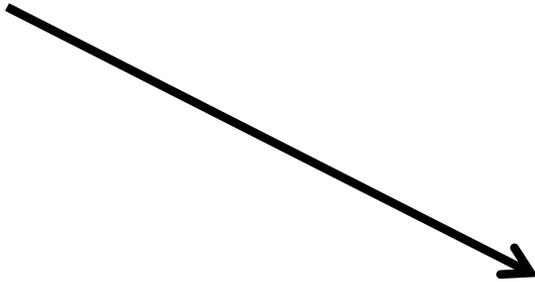
Politzer-Ahles (2015)

Semantic violation

Will the pitcher
overflow the cup?



maybe



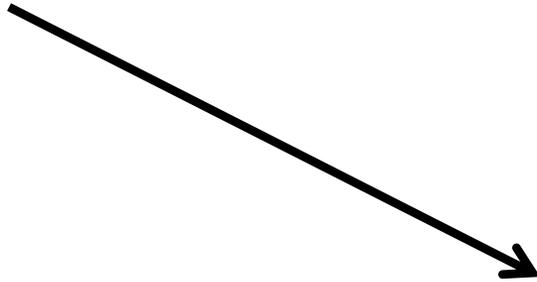
Politzer-Ahles (2015)

Pragmatic violation

Will the pitcher
overflow the cup?



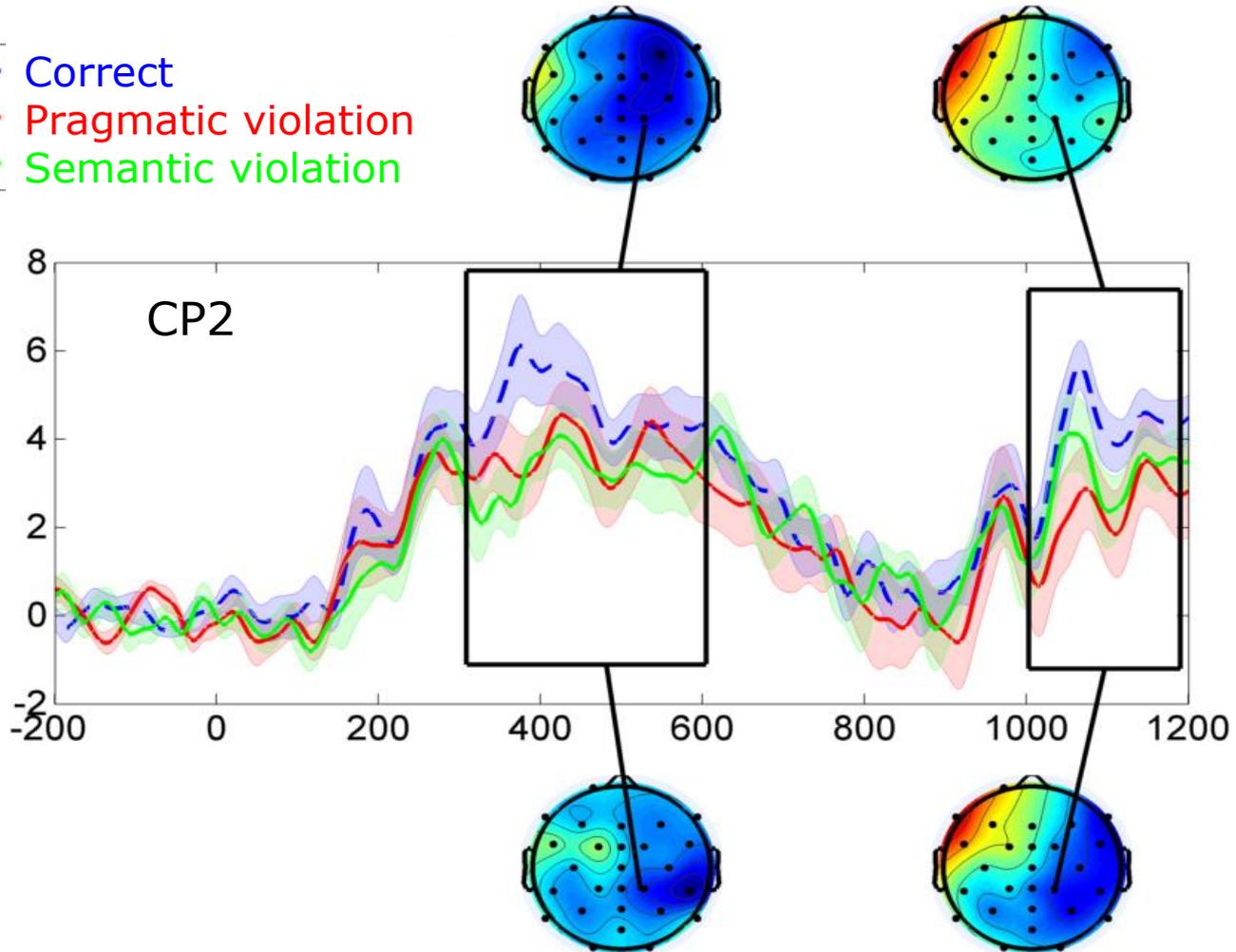
maybe



Politzer-Ahles (2015)

Pragmatic violation - Correct

- Correct
- Pragmatic violation
- Semantic violation

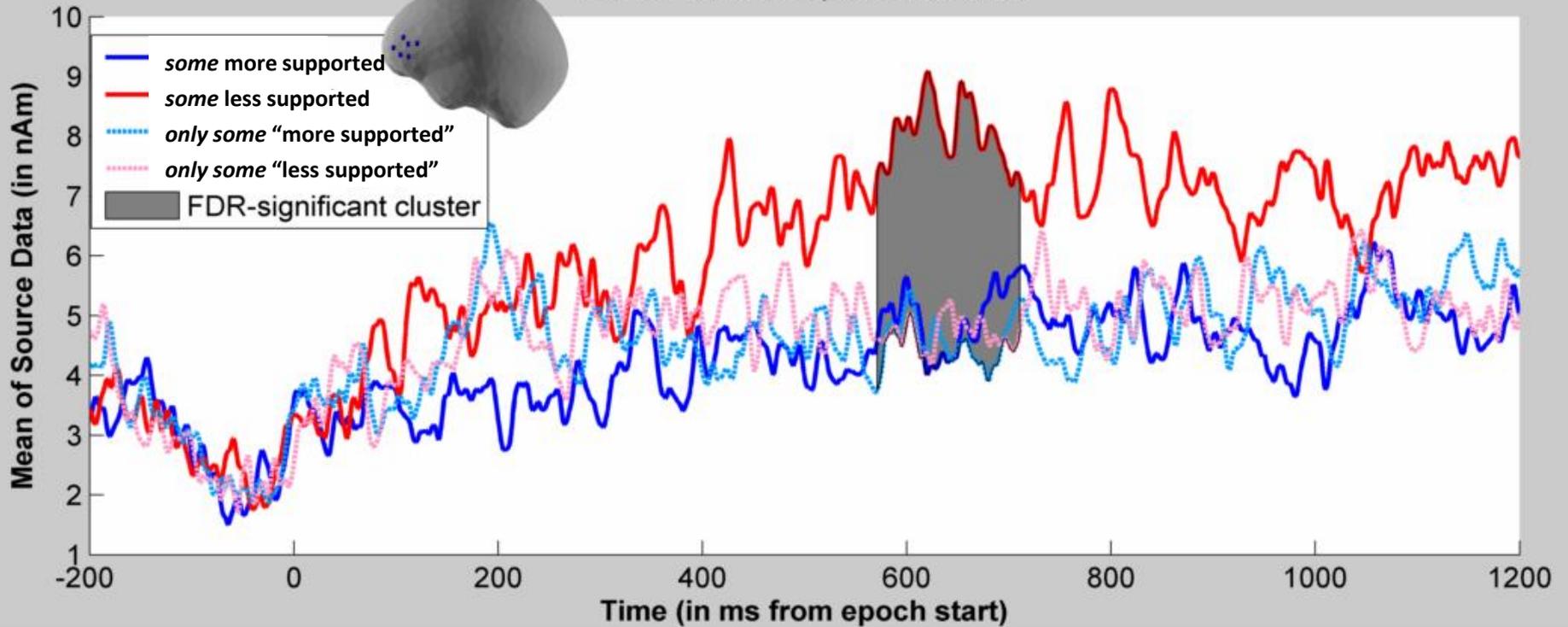


Politzer-Ahles (2015)

Semantic violation - Correct

- ***More supportive***: Mary asked John whether *all* of his relatives were staying in his apartment. He said that some of them were.
- ***Less supportive***: Mary asked John whether *any* of his relatives were staying in his apartment. He said that some of them were.

Left BA 46: Middle prefrontal cortex

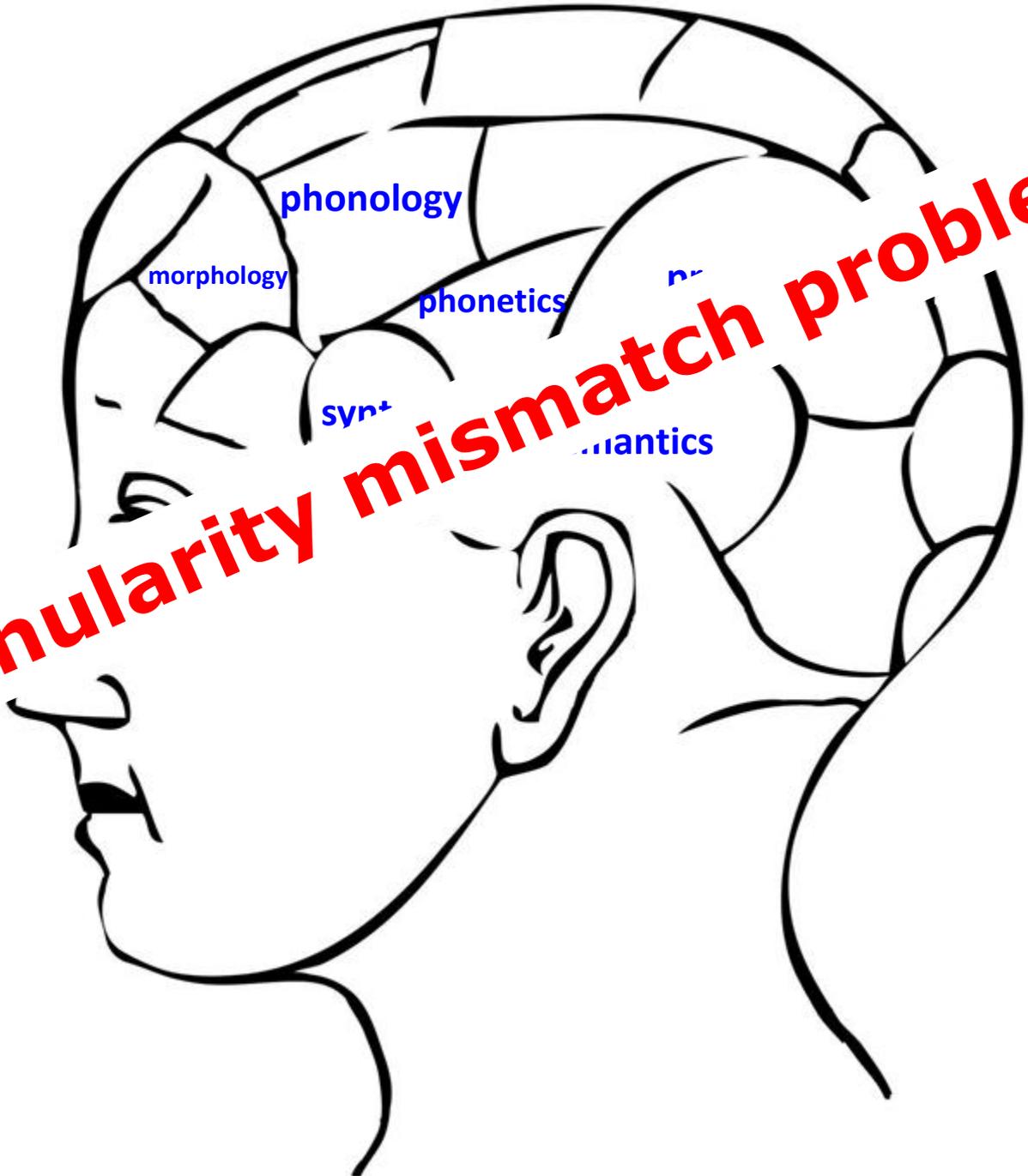


Politzer-Ahles & Gwilliams (2015, LCN)

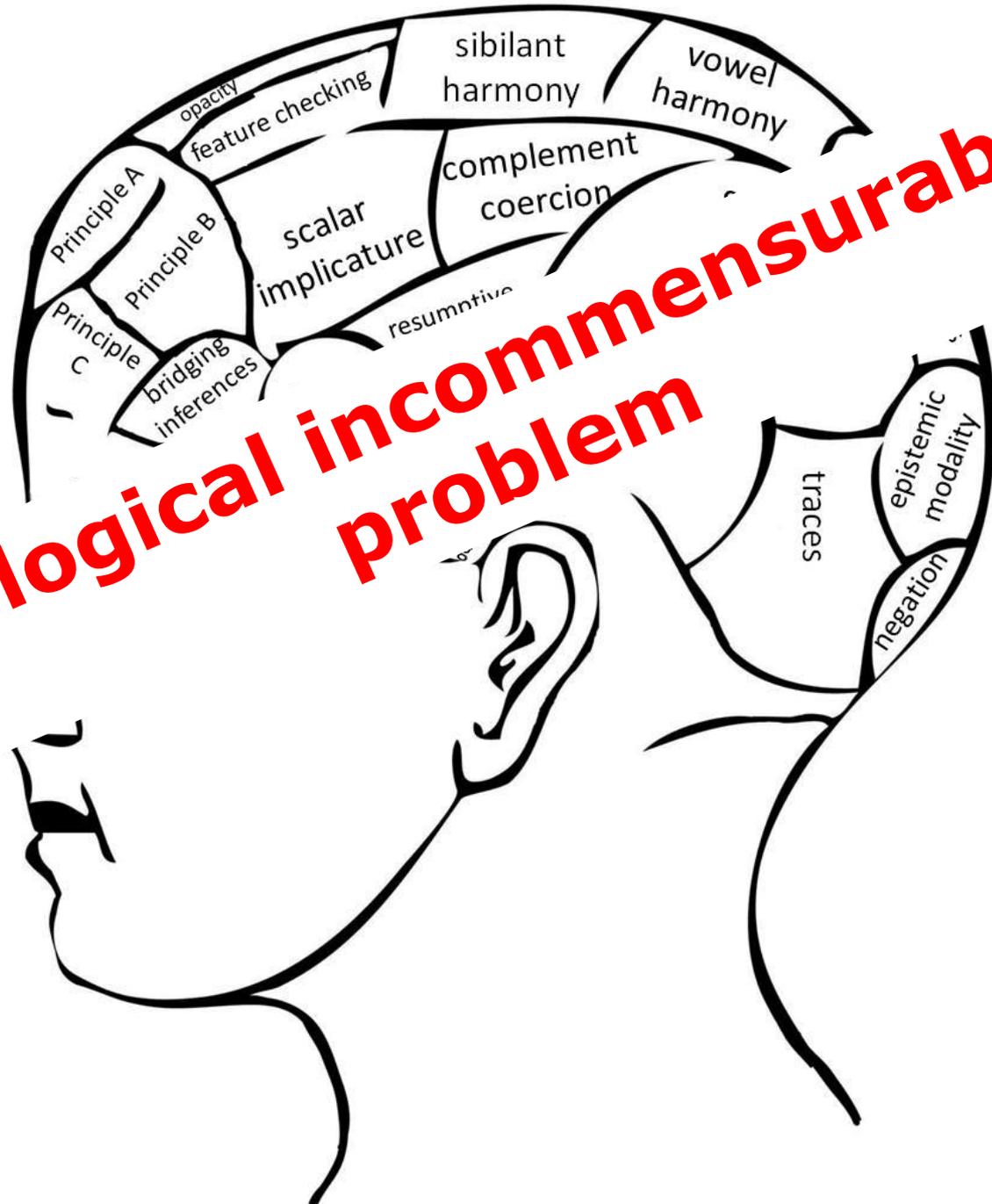
- Poeppel & Embick (2005)
 - *Granularity mismatch problem*
 - *Ontological incommensurability problem*

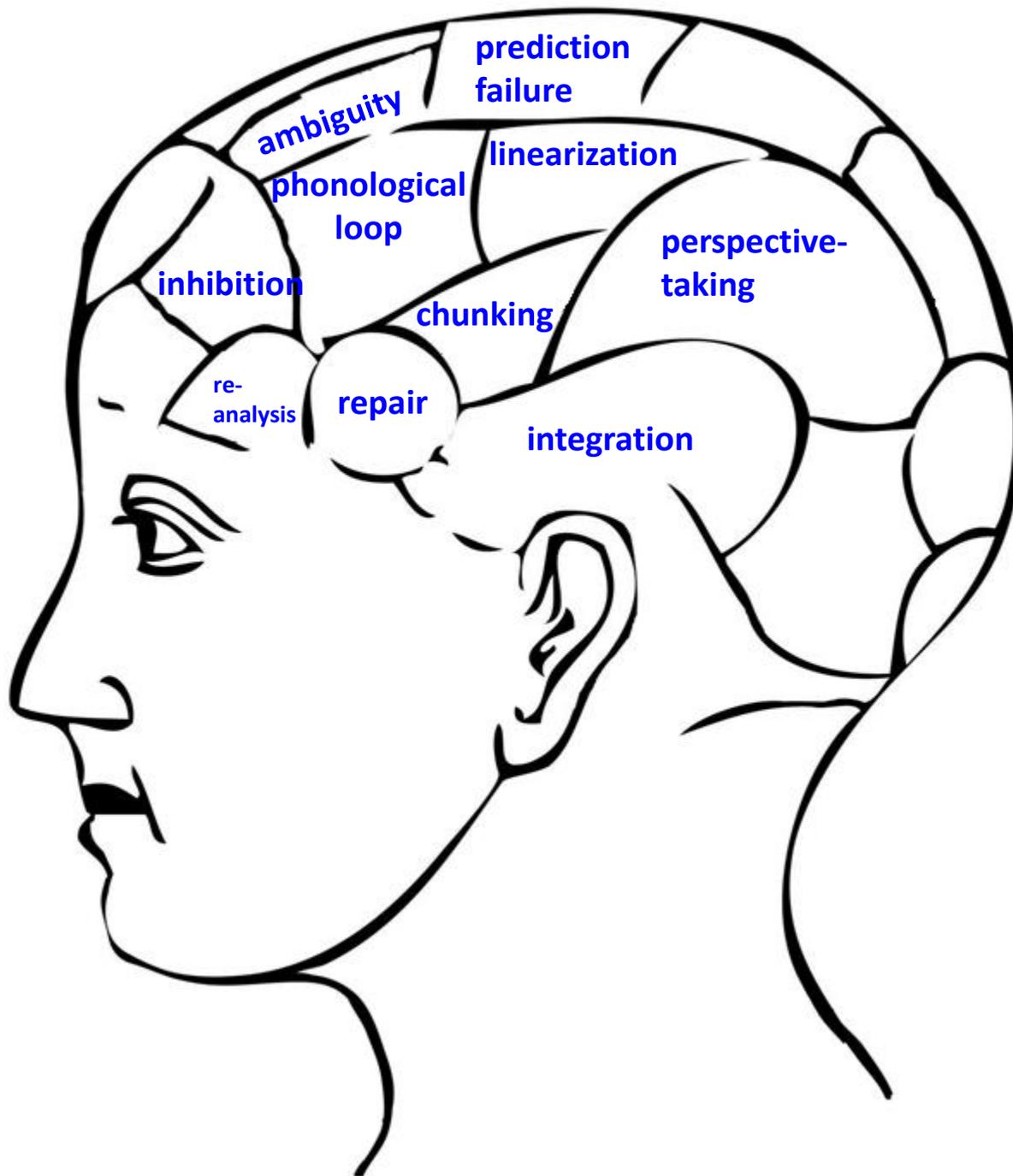
(also Van Berkum [2009, 2010])

Granularity mismatch problem



Ontological incommensurability problem





A BETTER WAY?

Neuroscience approaches (Van Berkum, 2010)

- Neuro Lite
- **Instrumental**
- Modestly ontological
- Deeply ontological



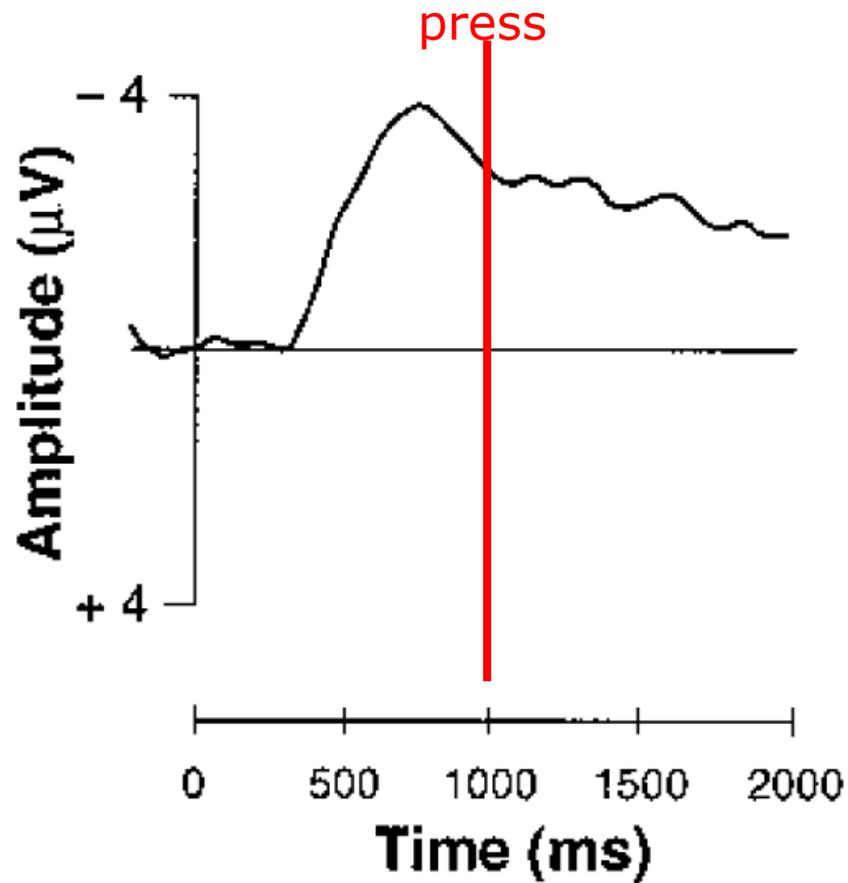
Two kinds of hypothesis (Luck, 2005)

- Effect-specific hypothesis
- Effect-nonspecific hypothesis

van Turenhout et al. (1998)

- EEG as a window into things that you *thought about doing*, but never actually *did*

Lateralized readiness potential (LRP)



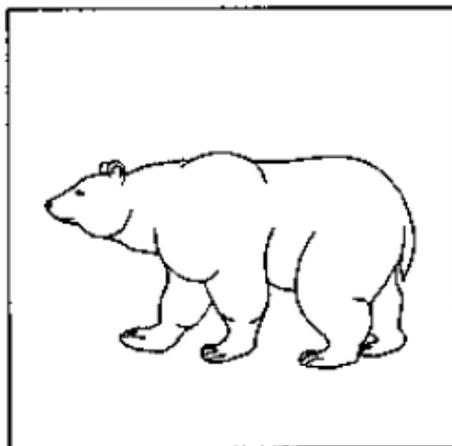
van Turennout et al. (1998)

left hand

common gender

go

word-
initial /b/



/rode beer/
(red bear)

right hand

neuter gender



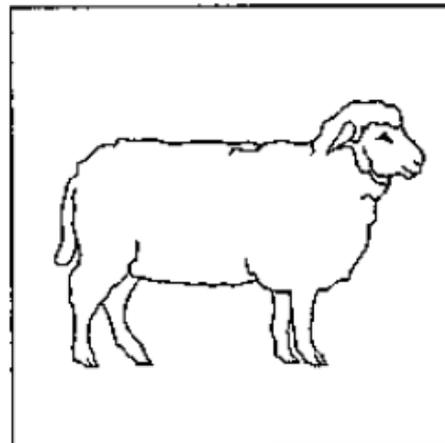
/rood boek/
(red book)

no go

word-
initial /s/

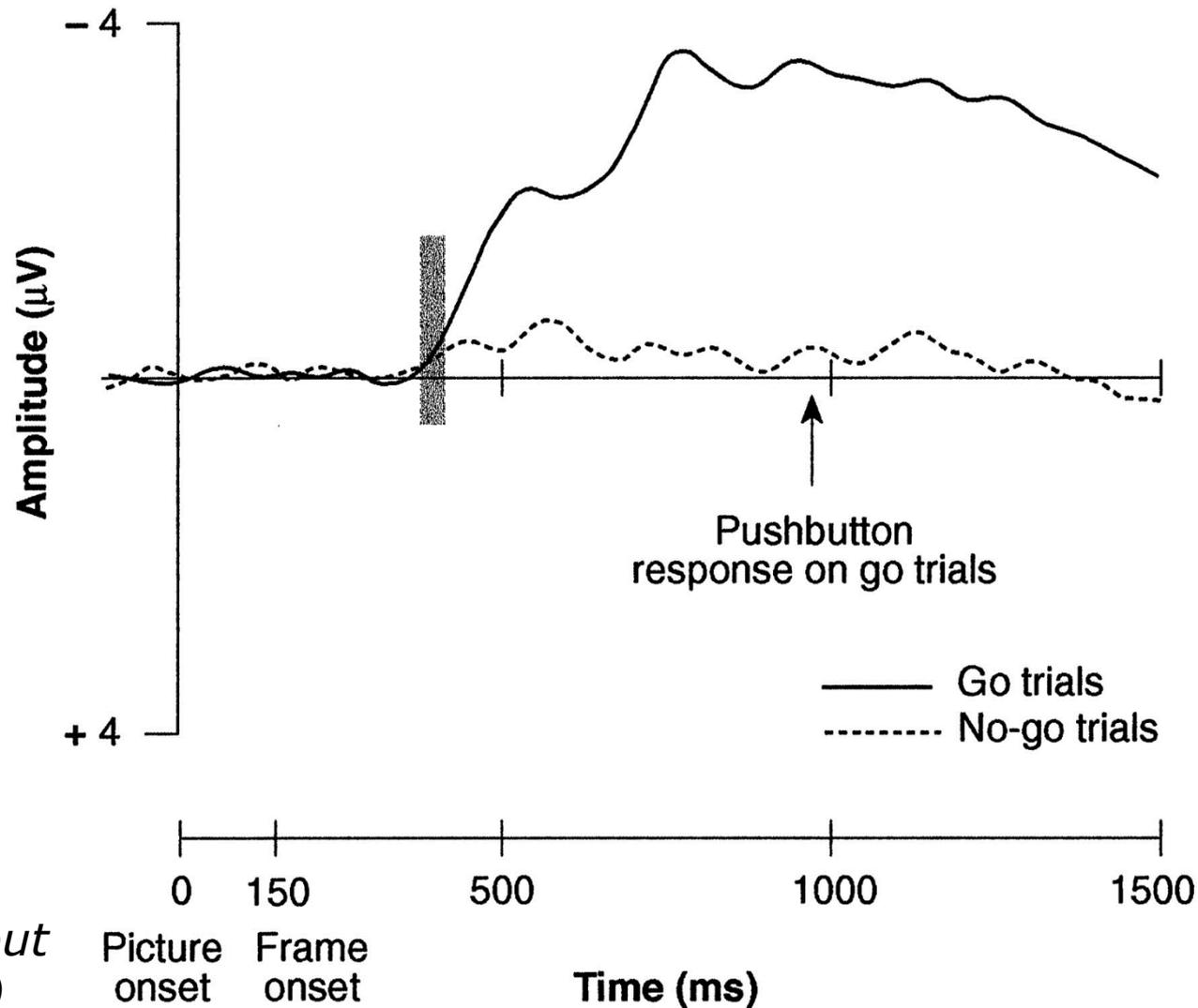


/rode schoen/
(red shoe)



/rood schaap/
(red sheep)

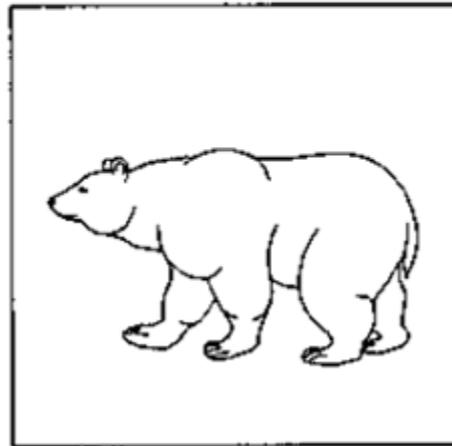
Task 1: do gender judgment if the word starts with /b/, otherwise do nothing



van Turenout et al. (1998)

left hand

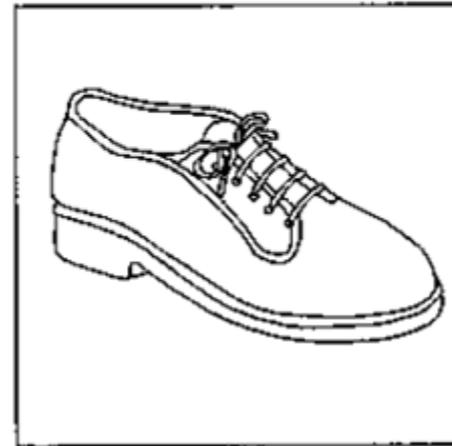
word-
initial /b/



/rode beer/
(red bear)

right hand

word-
initial /s/



/rode schoen/
(red shoe)

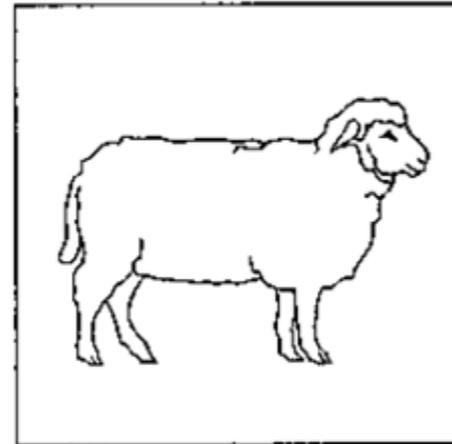
go
common
gender

no go

neuter
gender



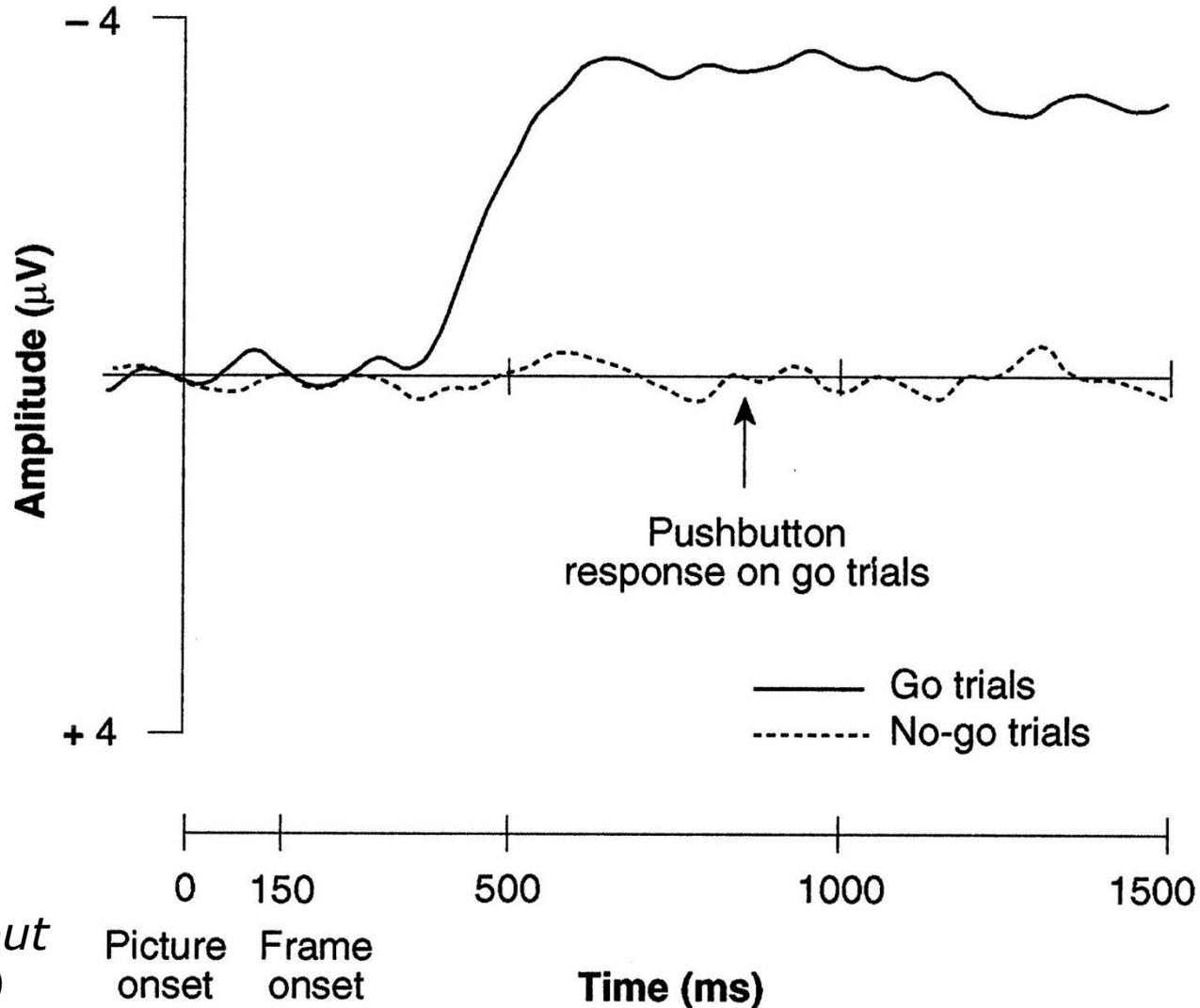
/rood boek/
(red book)



/rood schaap/
(red sheep)

*van Turenout et
al. (1998)*

Task 2: do sound judgment if the word is *common* gender, otherwise do nothing



van Turenout
et al. (1998)

Van Turrenout et al. (1998)

- Not trying to learn about the LRP itself
- Just using LRP as a *tool* to learn about other processes

Barbet & Thierry (2016)

- P300: detection of a “target”

Put your hand up when the
number of **green** characters
matches the meaning

ALL

Put your hand up when the
number of **green** characters
matches the meaning

THREE

Put your hand up when the
number of **green** characters
matches the meaning

NONE

Put your hand up when the
number of **green** characters
matches the meaning

SOME

Put your hand up when the
number of **green** characters
matches the meaning

TWO

Put your hand up when the
number of **green** characters
mismatches the meaning

NONE

Put your hand up when the number of **green** characters mismatches the meaning

TWO

Put your hand up when the number of **green** characters mismatches the meaning

SOME

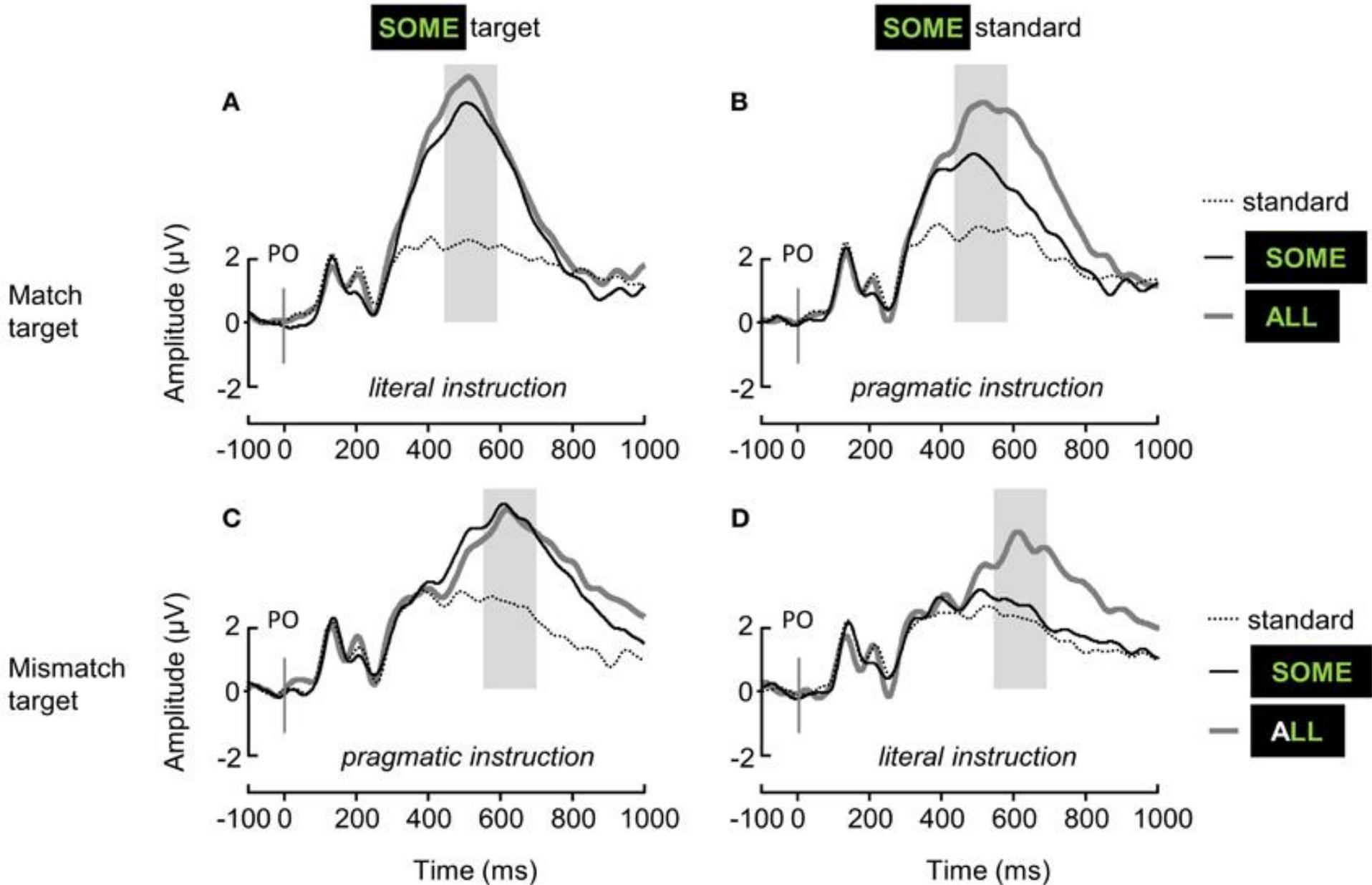
Put your hand up when the number of **green** characters mismatches the meaning

THREE

Put your hand up when the
number of **green** characters
mismatches the meaning

ALL

SOME



Barbet & Thierry (2016)

Barbet & Thierry (2016)

- Not trying to learn about the P300 or show that the P300 is the neural correlate of pragmatics
- Just using P300 as a *tool* to see which interpretation of *SOME* was activated

- Poster 14 on Wednesday night at XPrag

Drawbacks

- Many of these tasks are unnatural
- Requires a clearly articulated psychological theory with direct predictions
 - ...whereas the hypothesis space for psychological theories of scalar implicature is very wide (Chemla & Singh, 2014)

Thank you!