

Yesterday

- ❑ Approach: pieces of cognition in pieces of cortical tissue (“Brodmann’s modularity conjecture”)
- ❑ The anatomical pieces: microscopically determined borders
- ❑ Some relevant behavioral results
 - Reaction times for sentences containing the DE quantifier are greater than those with UE (at least for the pairs <more, less> and <many, few>).
 - No such difference is detected for non-linguistic, quasi-algebraic expressions (>, <).
 - This effect is independent of the properties of the scenario that is to be verified.
 - *Hint*: past results suggest a truth-value X monotonicity interaction

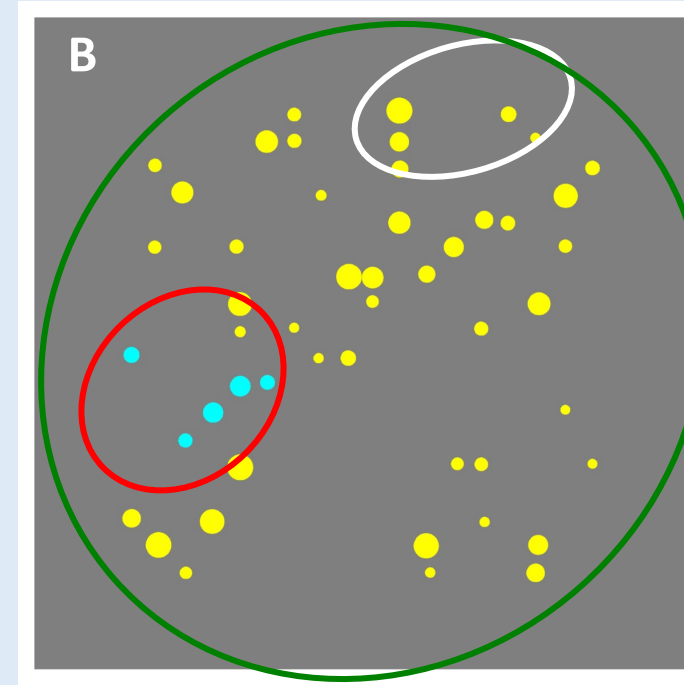
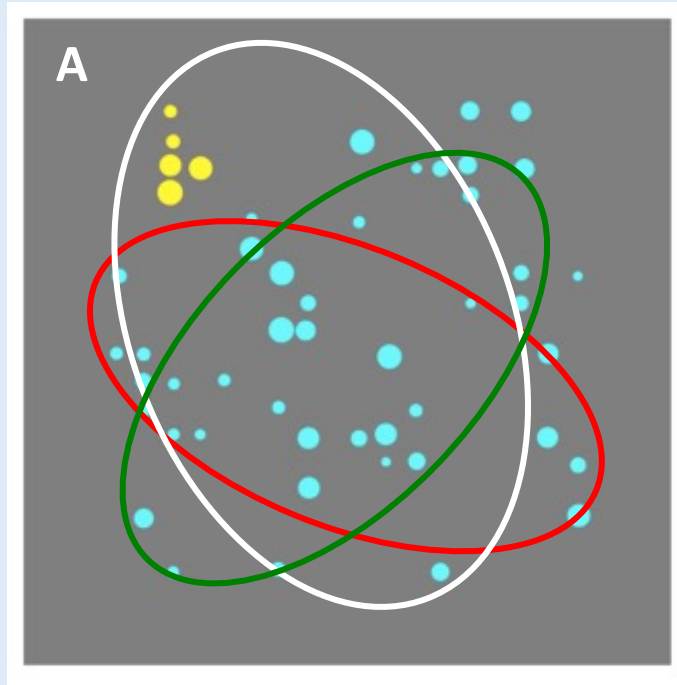
Barwise & Cooper on verification and monotonicity

Verification strategies are determined by monotonicity (“witness set”)

In truth determination by repeated sampling, verification of a proposition that contains a UE function requires less steps than one with a DE function

“we predict that response latencies for verification tasks involving decreasing quantifiers would be somewhat greater than for increasing quantifiers...These predictions are based on the complexity of the checking procedure we have suggested” (1981, p. 192)

Semantics: B & C's "witness set" verification algorithm



more-than-half of the circles are blue:

T iff among the sets with $> \frac{1}{2}$ of the circles there is an all blue set

The presence of other sets that satisfy the requirements ($\{\text{GREEN}\}$) does not affect truth value.

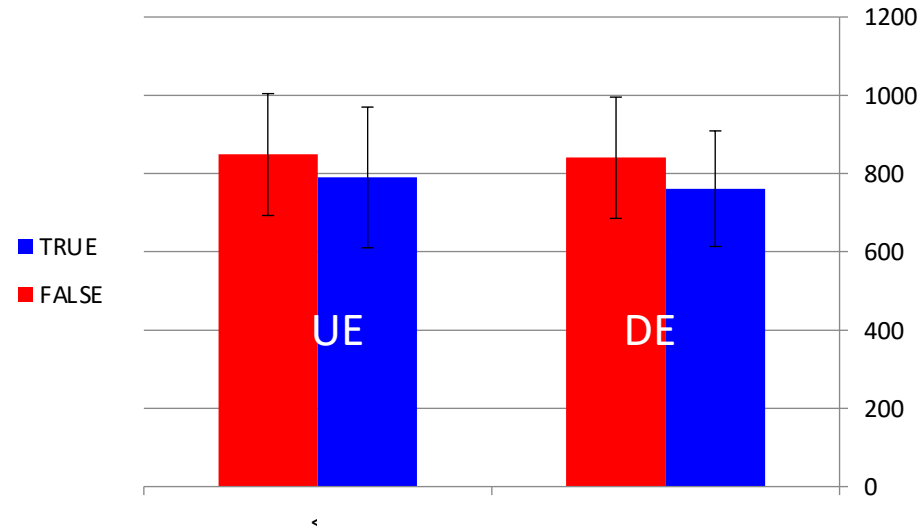
less-than-half of the circles are blue:

T iff the sets of blue circles all contain $< \frac{1}{2}$ of the circles

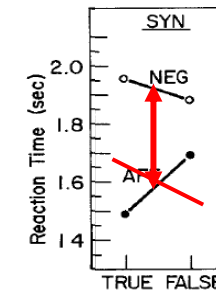
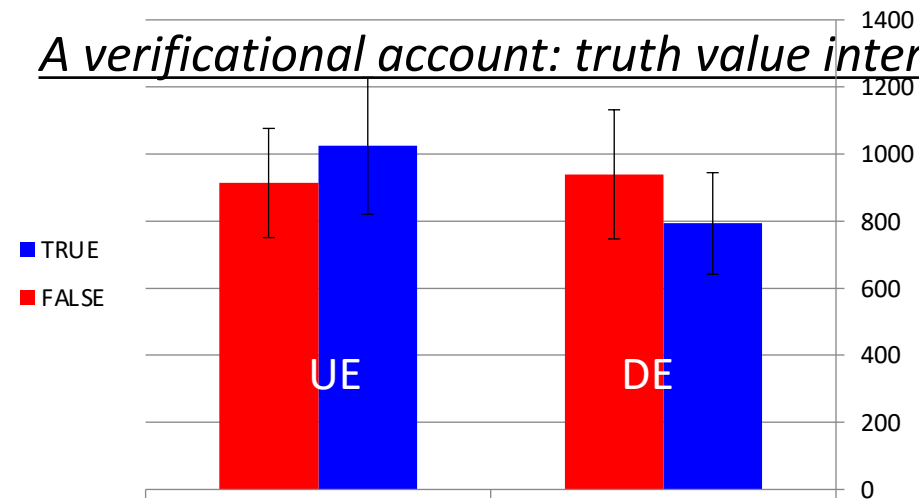
This search must ensure that no set of blue circles has $\frac{1}{2}$ or $> \frac{1}{2}$ circles

Possible outcomes

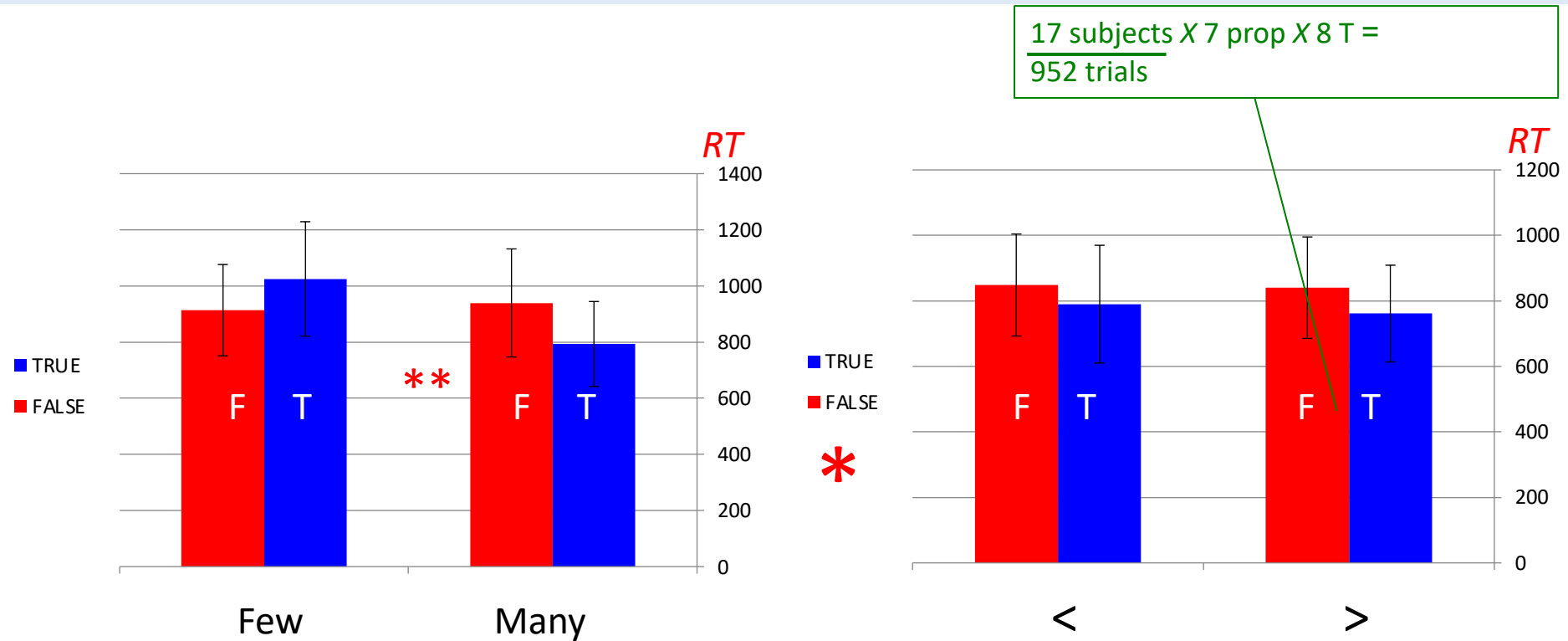
A non-verificational account: truth value is orthogonal to RT



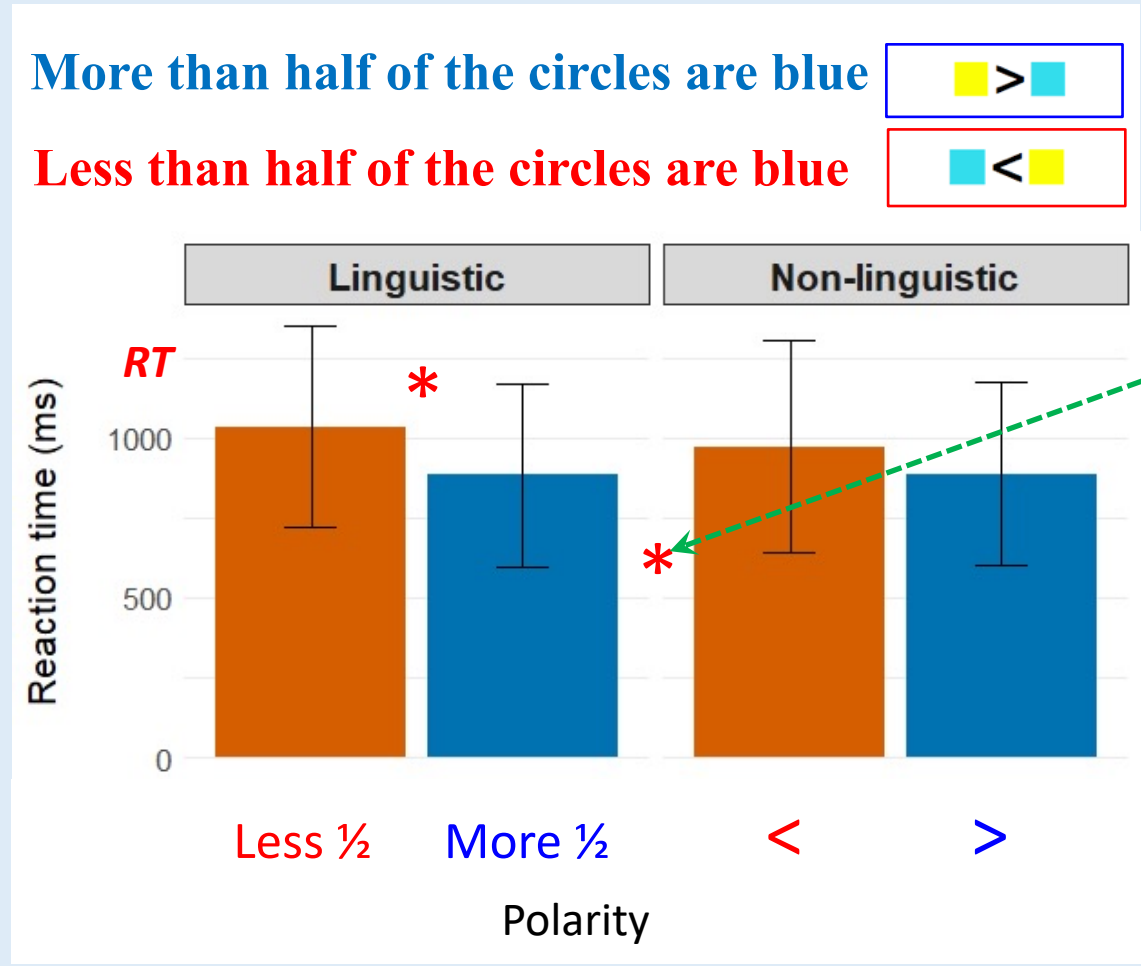
A verificational account: truth value interacts with RT



Degree quantifiers show the pattern predicted by the semantic account
($r=24$, across all 7 proportions)



Lead result: Polarity \times linguistic interaction



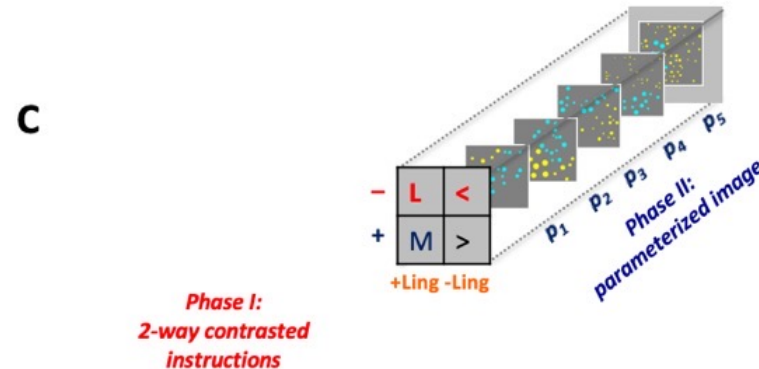
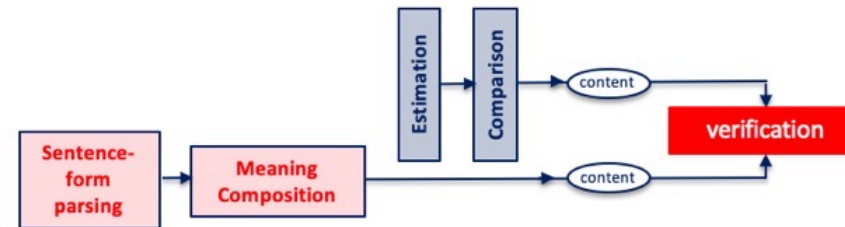
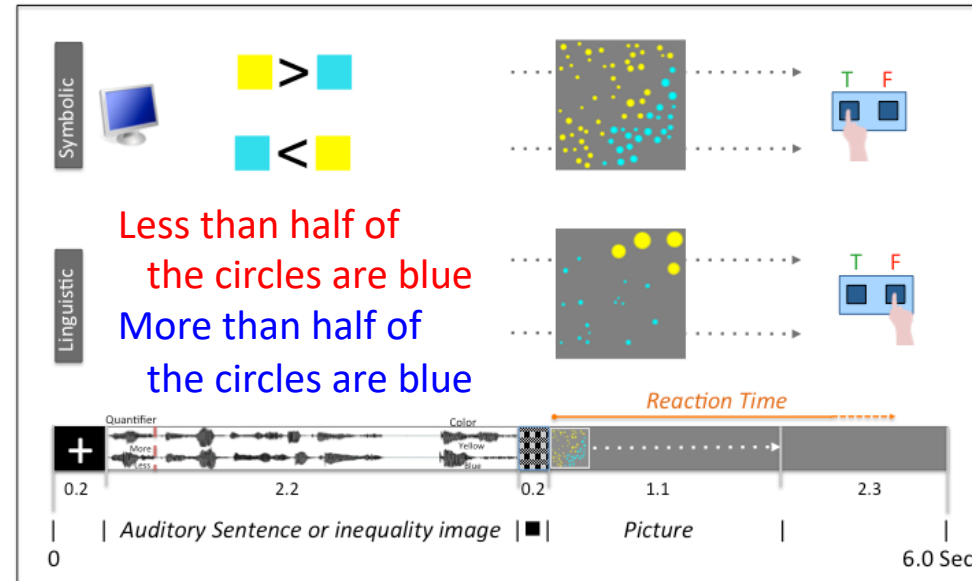
Net Negation effect

Workplan

- ❑ Appetizer: monotonicity-related experiments with a single Neg operator
 - ✓ Some relevant behavioral results
 - Some relevant fMRI results
- ❑ Main course: monotonicity-related experiments with more than one Neg operator
- ❑ Dessert: Deciding between two views of NPI licensing
 - Two different views of NPI licensing, and Flip-flop in French and Hebrew
 - A processing experiment with and without flip-flop environments
 - Ruling out alternative interpretations
- ❑ Implications

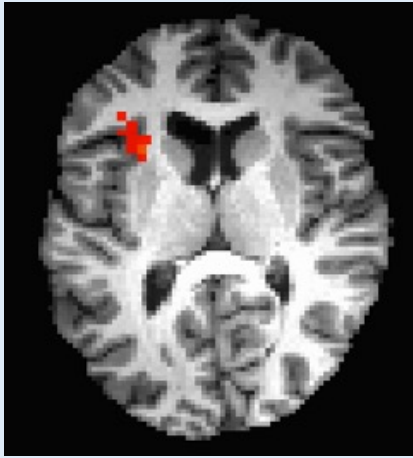
The neural cost of implicit negation

(with Isabelle Deschamps, Peter Pieperhoff, Francesca Iannilli, Galit Agmon, Yonatan Loewenstein & Katrin Amunts)



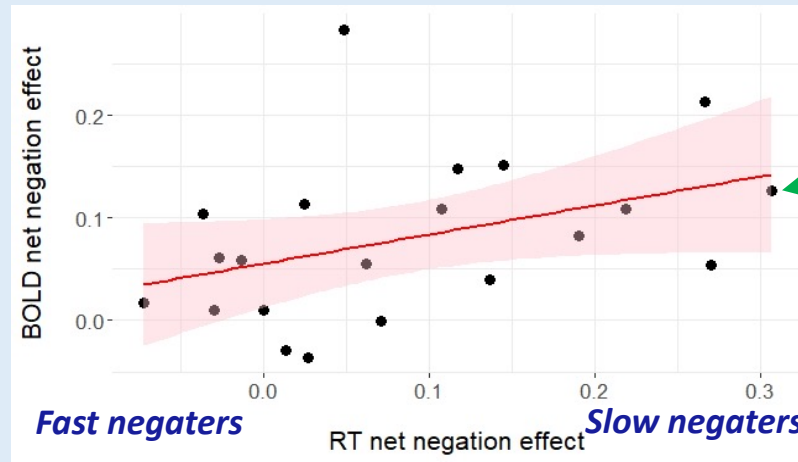
The neural cost of implicit negation

fMRI signal intensity

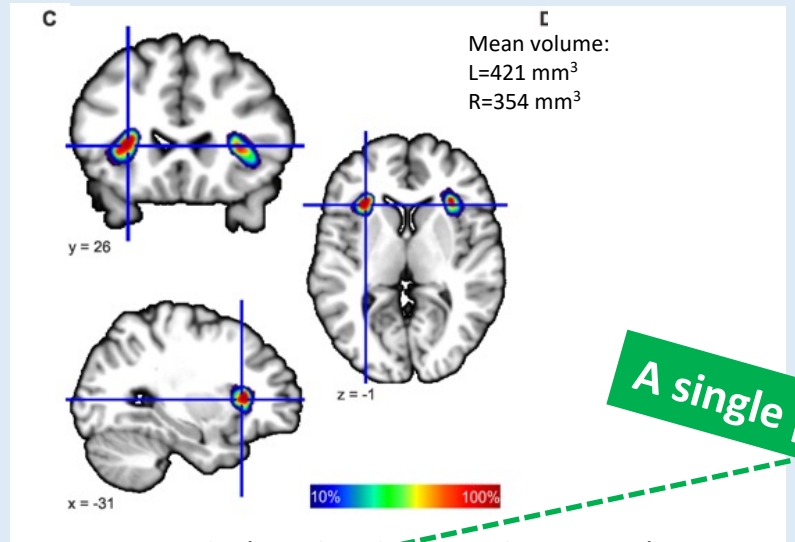


n=21

Net(RT)/Net(PSC) correlation



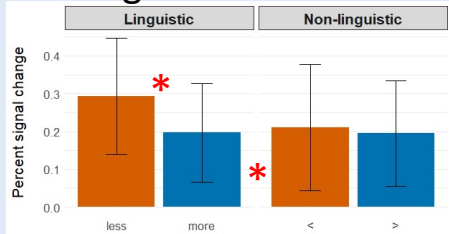
Anatomical micro-structure



A single participant

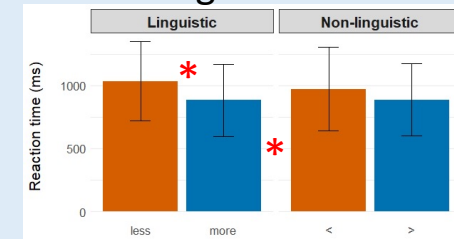
Id7 (Insular dysgranular area 7)

Net Negation effect - fMRI



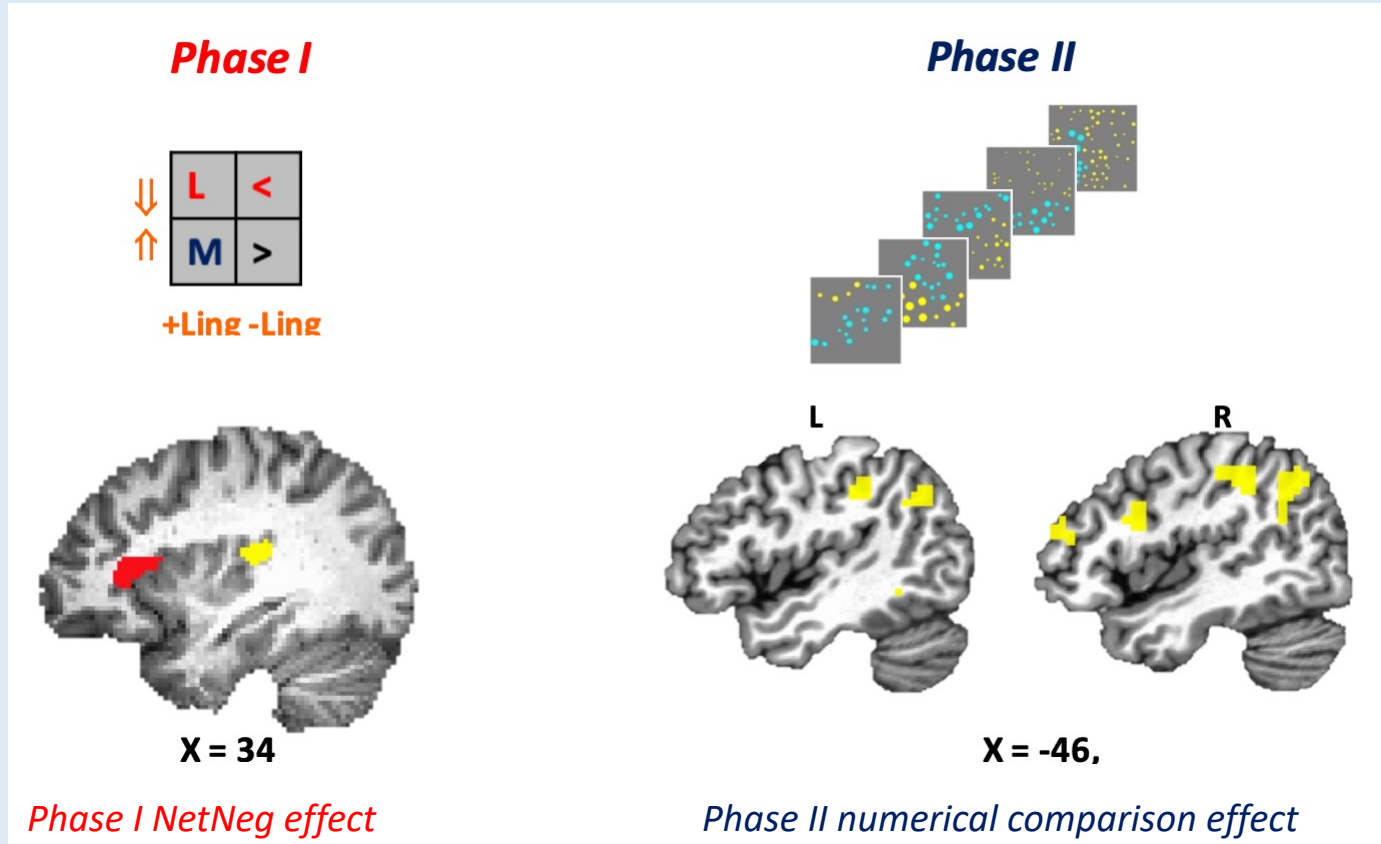
Less ½ More ½ < >

Net Negation effect - RT

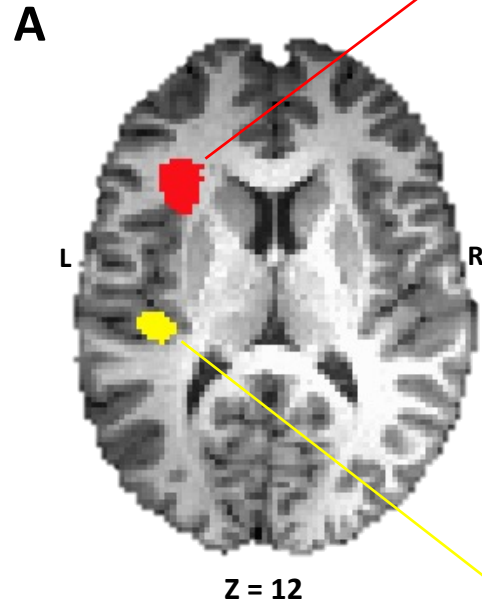


Less ½ More ½ < >

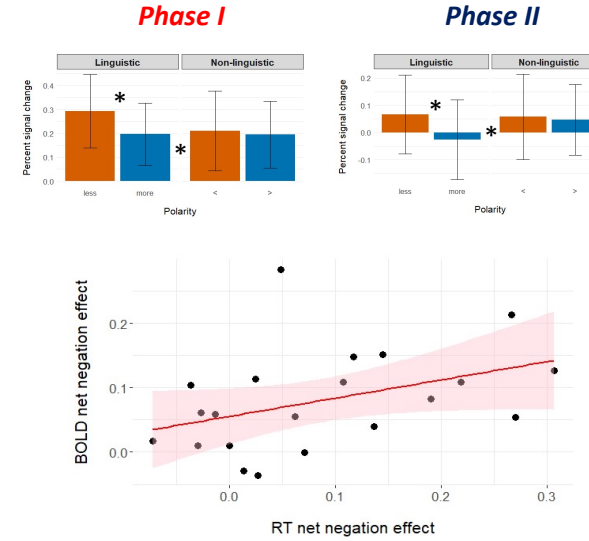
Design and basic results



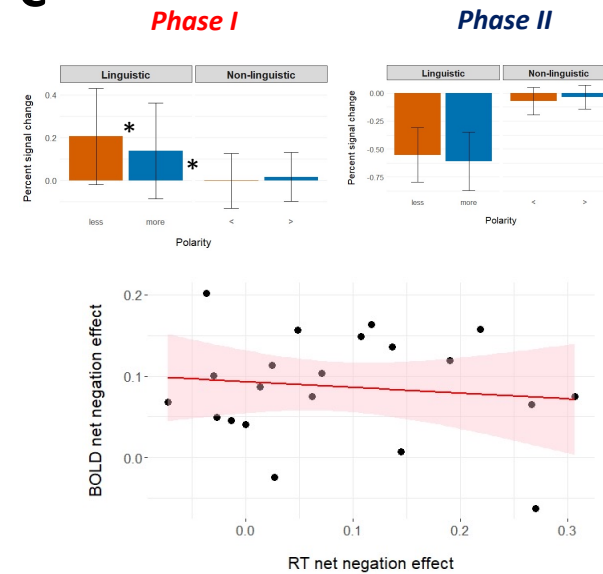
Getting rid of noise



B



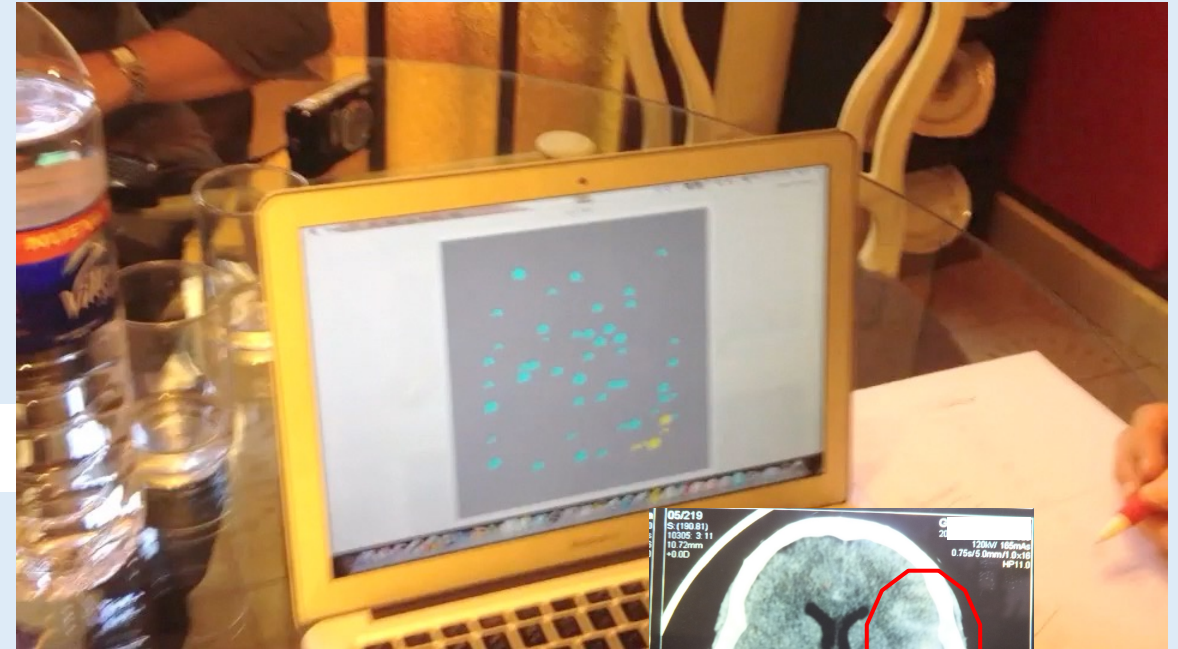
C



A hint from aphasia: Patient demo (Spanish)

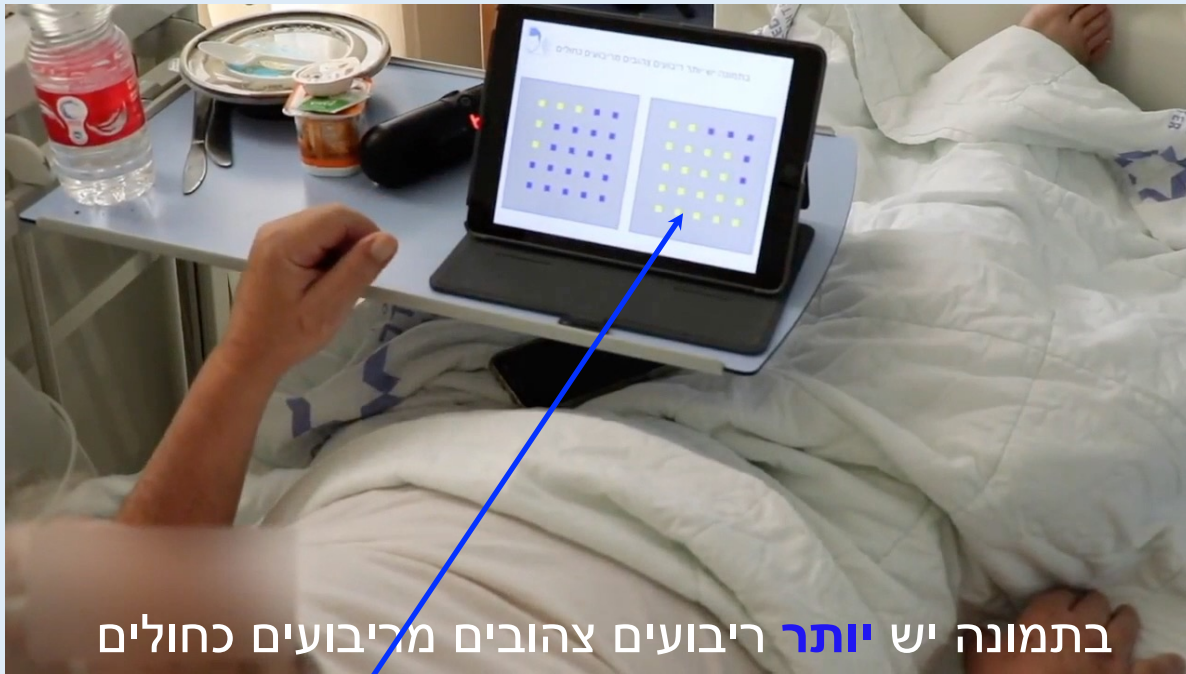


many (*muchos*) of the circles are blue



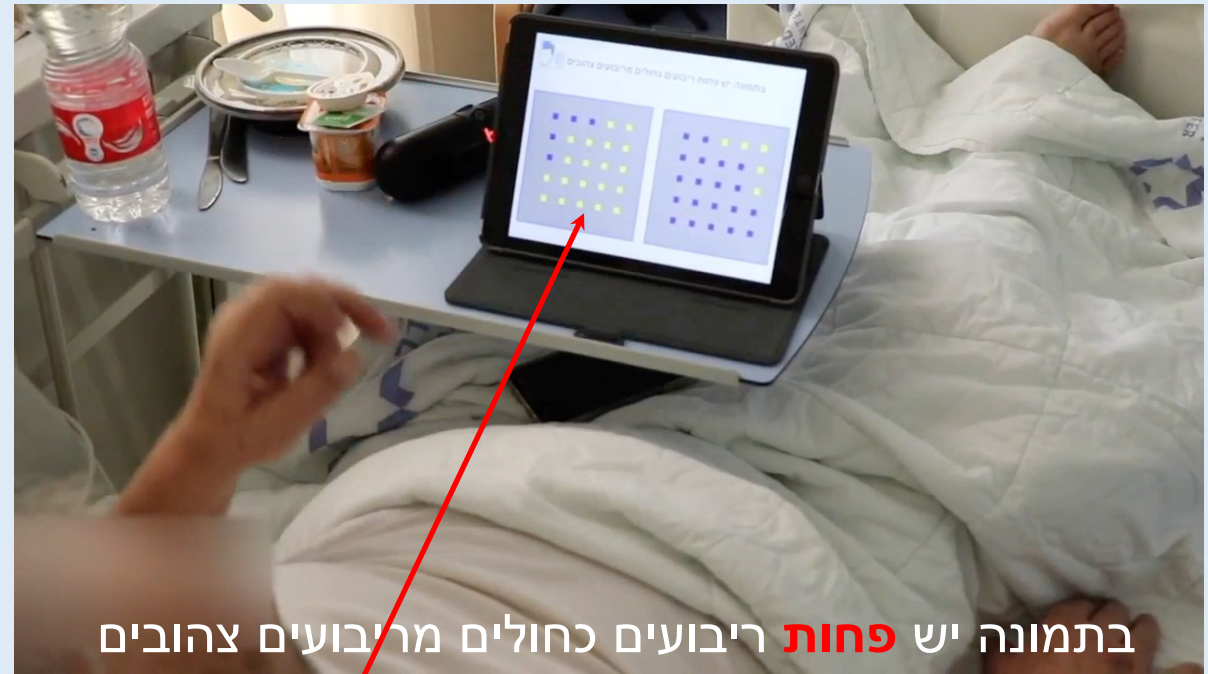
Few (*pocos*) of the circles are blue

In Hebrew, too (with our early intervention app)



בתמונה יש **יותר** ריבועים צהובים מריבועים כחולים

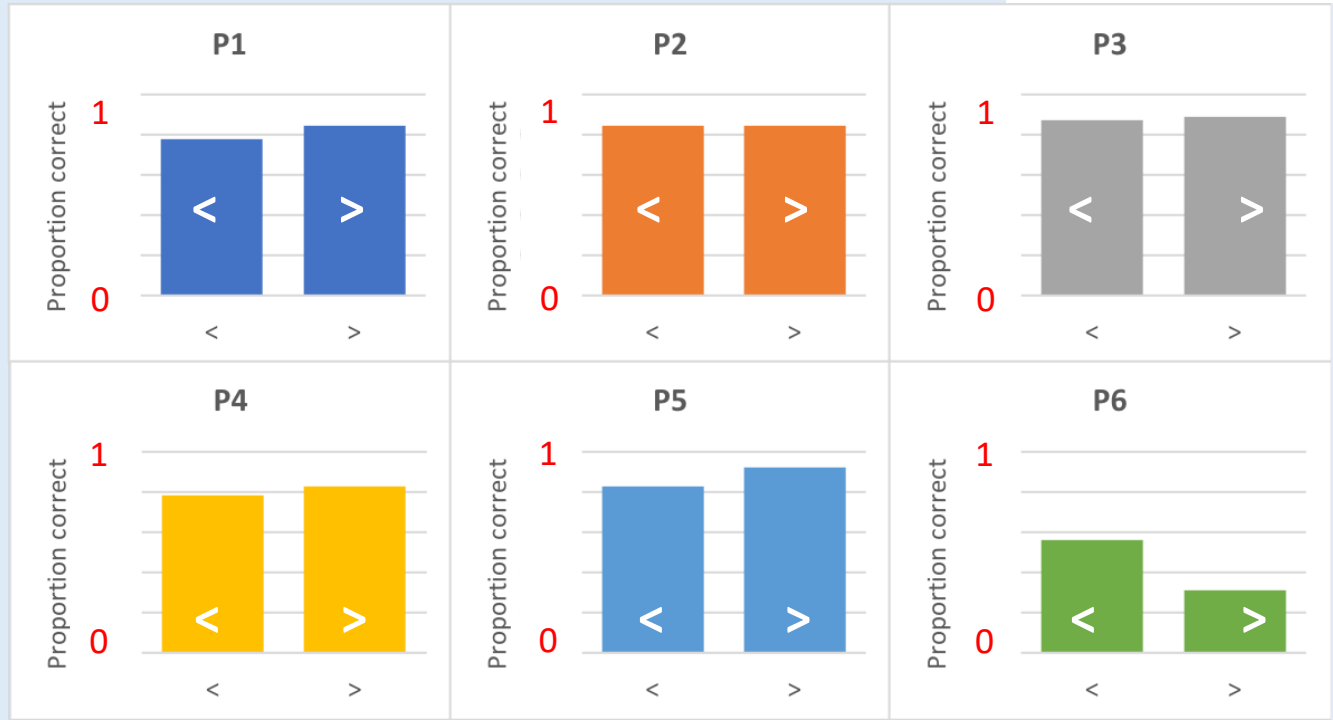
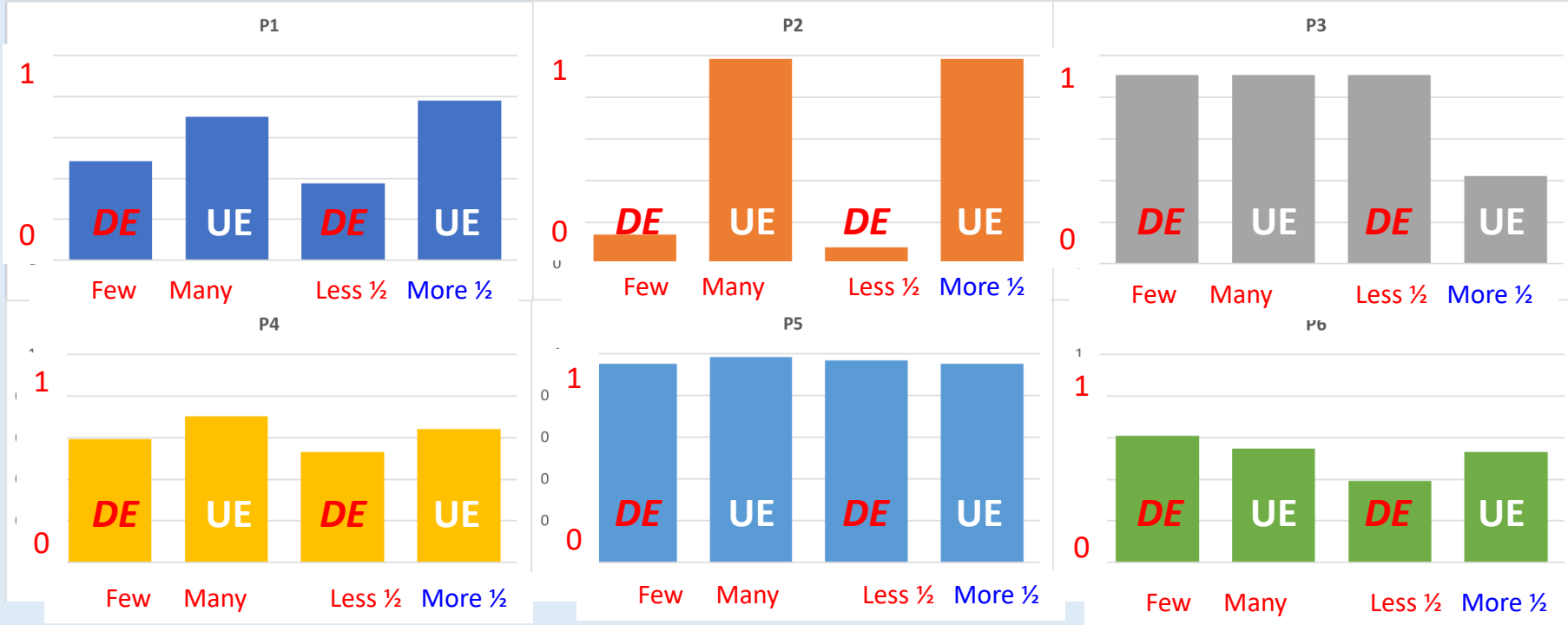
There are **more** yellow squares than blue squares



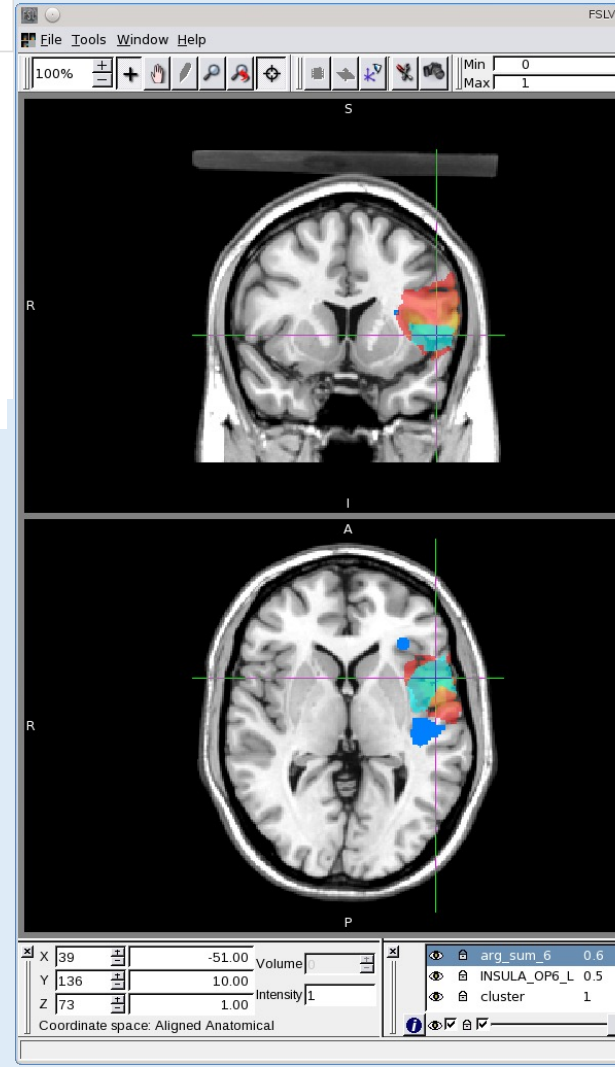
בתמונה יש **פחות** ריבועים כחולים מריבועים צהובים

There are **fewer** blue squares than yellow squares

Variability galore

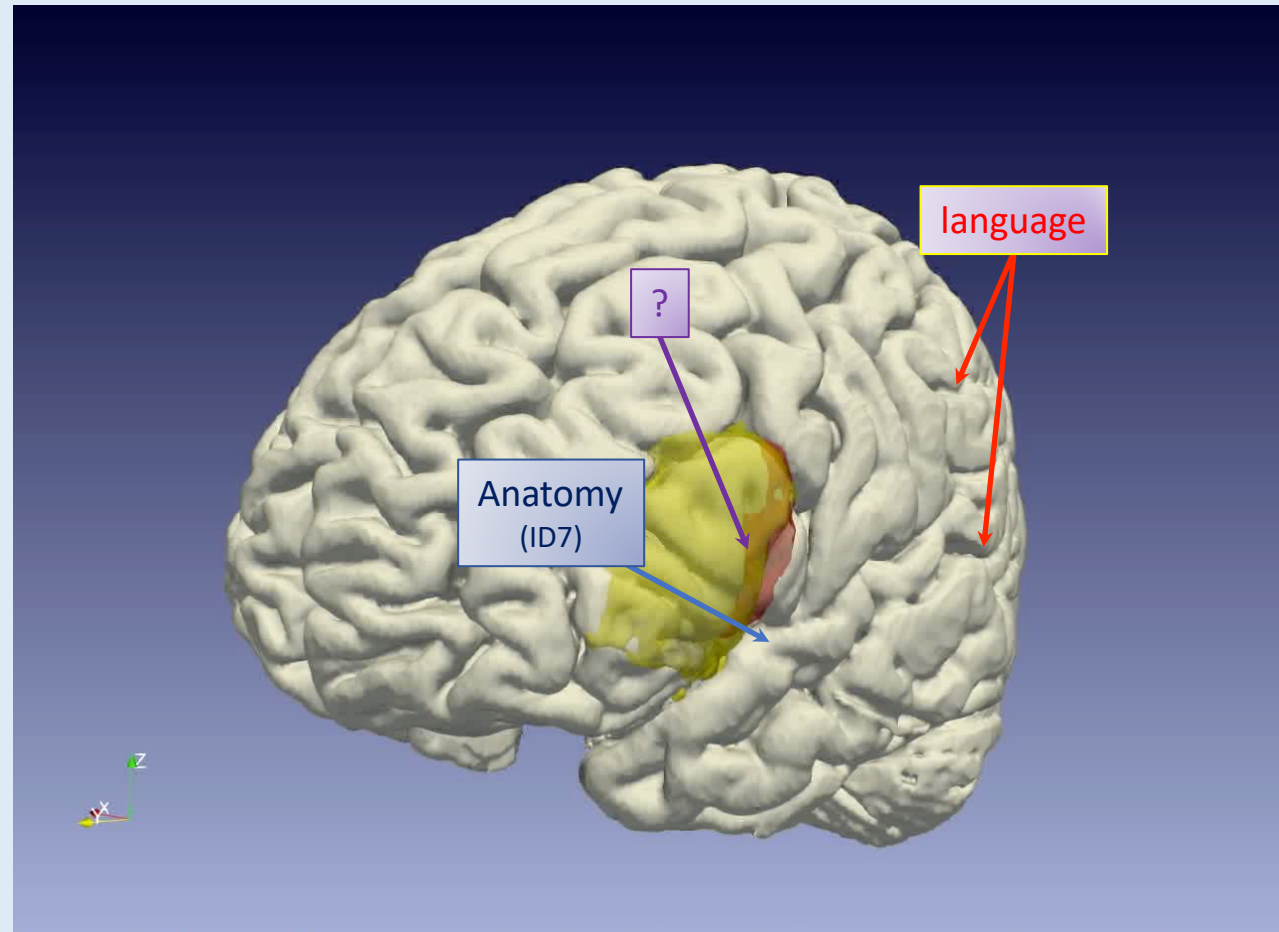


6 patients,
%correct



Mapping the anatomy and comparing to the language regions

A 3-D reconstruction



No overlap with Broca's region

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