

# The Brain Exposed To Markets

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# Question

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- What do you expect to see if you put participants in a scanner while (re-)playing markets with insiders?
- ... and markets with mis-pricing (bubbles in particular)
- (Focus on CONTRAST between sessions
  - With/without insiders
  - With/without mispricing
- (What would you ask participants to do in scanner?)

# Potential Answer

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- Link with theory of mind
- Activation in paracingulate cortex?  
Temporo-parietal junction?
- *What do the signals mean?*
  - *What are participants paying attention to?*
  - *Would finance be able to help here?*
    - *Bid-ask spread*
    - *Order arrival?*

# 1.

## Financial Markets with “Insiders”

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- Even large-scale, anonymous financial markets may be perceived as intentional, goal-oriented – or “strategic:” there may be “insiders”
- Questions:
  1. *Is this within scope of Theory of Mind?*
  2. *Does Theory of Mind help?*
  3. *What does it do?*

# Experiment:

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- ◎ Markets are re-played in scanner while subject is exposed to risk
- ◎ Subject:
  - Predicts price changes in market replay;
  - Performs Theory of Mind tests;
  - Performs (financial) mathematics test

# Market Replay

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2.29.24

24

Graphical replay of market



(i) choice

*There are insiders  
Choose X or Z?*

(iii) replay



(v) outcome

*The stock you  
picked paid \$0.45*

blank

(ii) blank

(iv) blank

blank (ITI)

10s

10s

2 min 30s

10s

3s

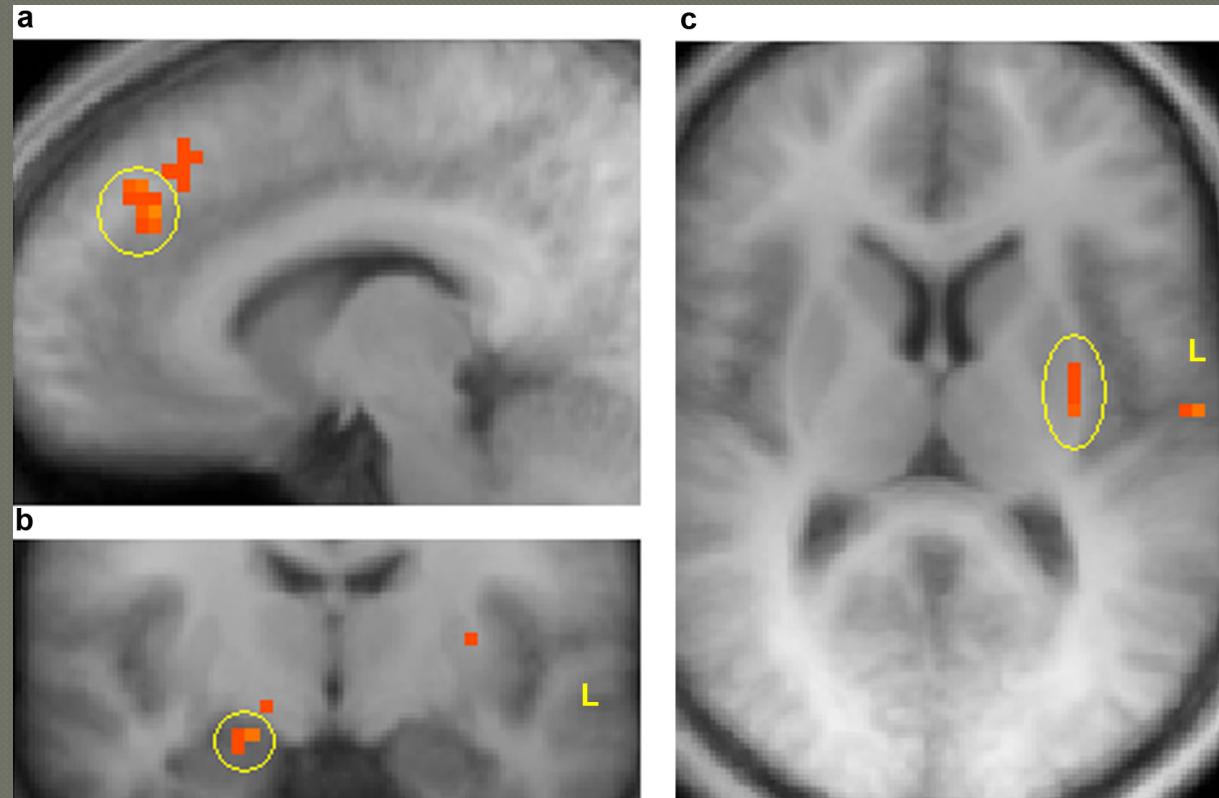
13s



repeated 13 times

# Imaging Results

**Effect of  
| price-0.25 | ,  
contrast between  
insider  
and no-insider  
treatment**

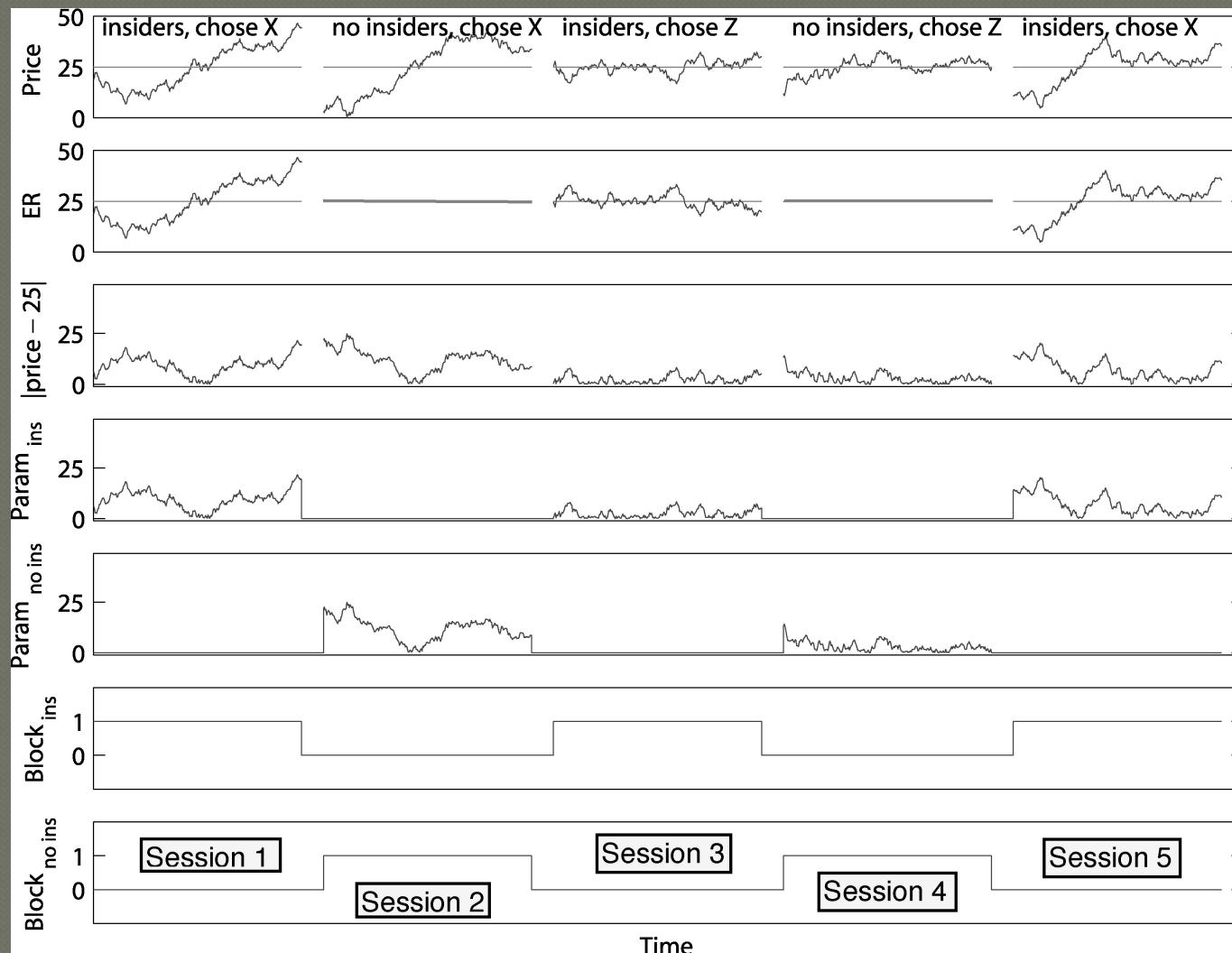


Bruguier, ea, resubmitted

8

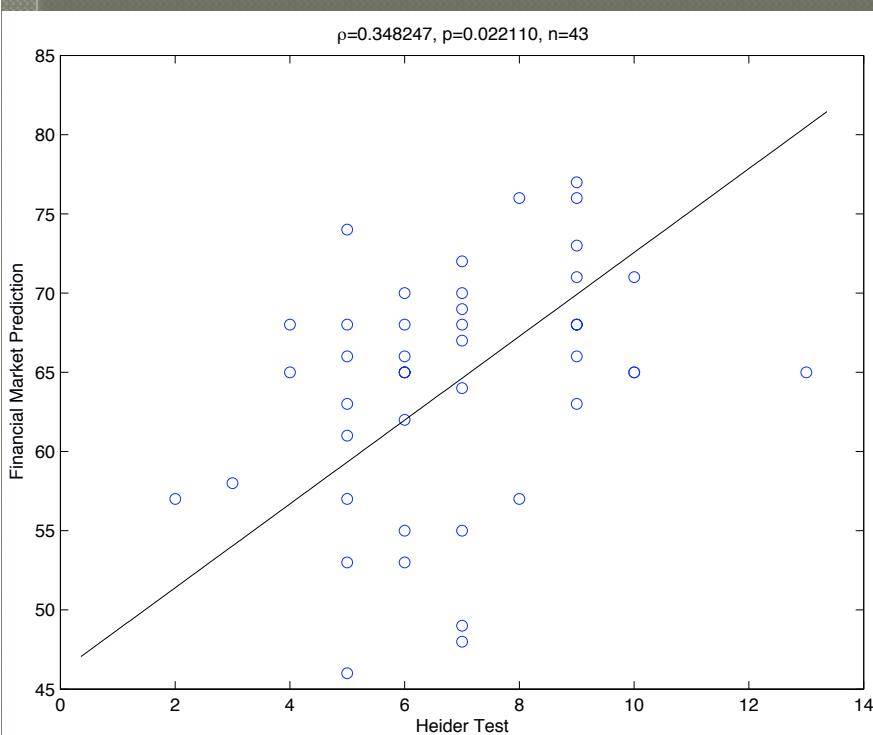
8

# Explanatory Variables For Brain Activation

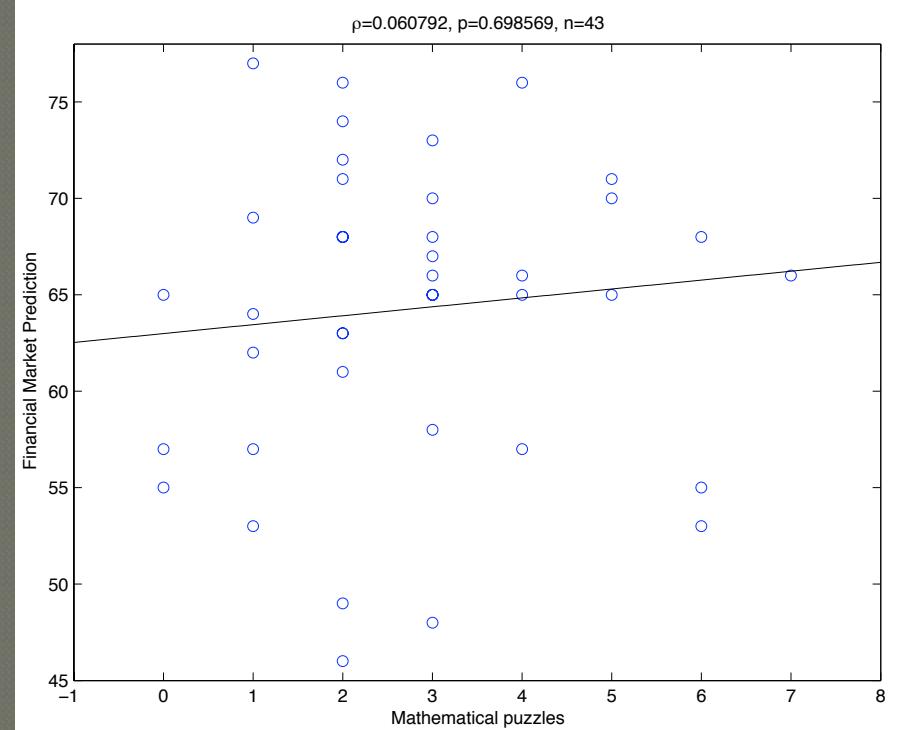


# Prediction Performance Results

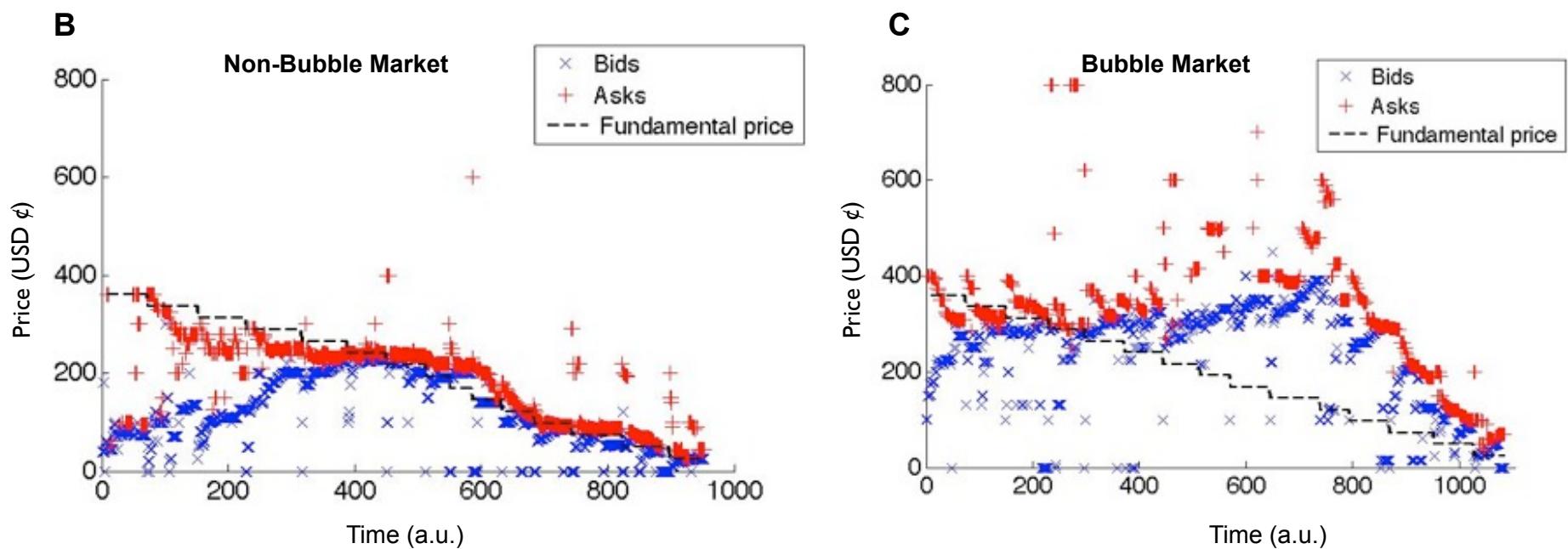
## Against Heider test



## Against Math test



## 2. Bubble Markets



# Same Idea BUT NOW ALLOW POSITION TAKING!

Period 1  
cash = 5400  
share = 2

update

REST

3 - 6 sec

...average of  
3 choices per  
period.....

End of period  
Dividend 60  
Cash 12300  
unit 8

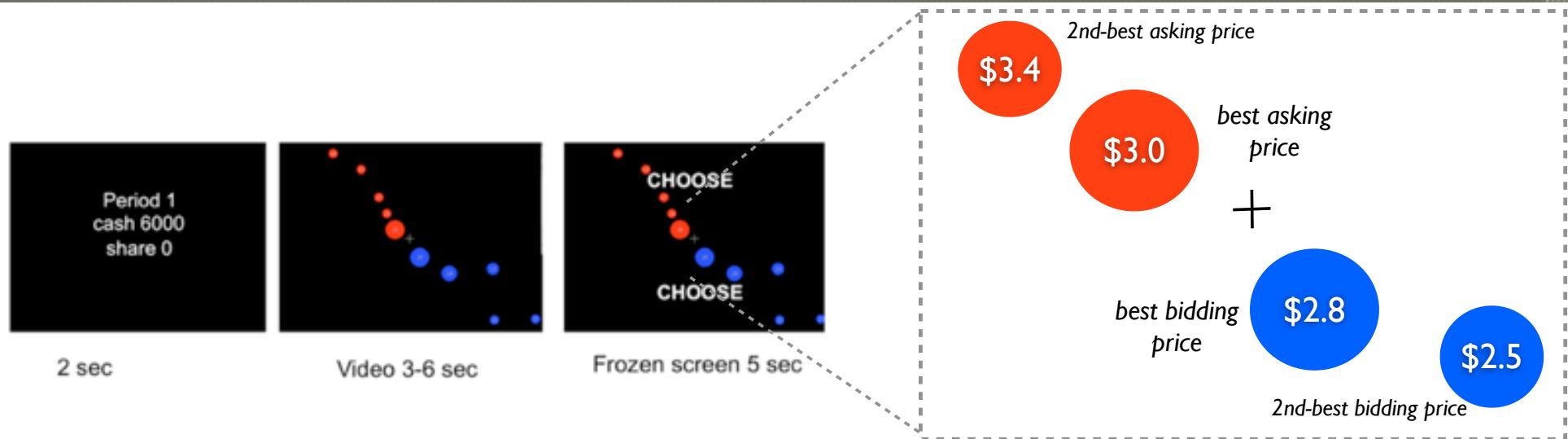
End of period update  
+ Dividend info.

Period 2  
cash 12300  
share 8

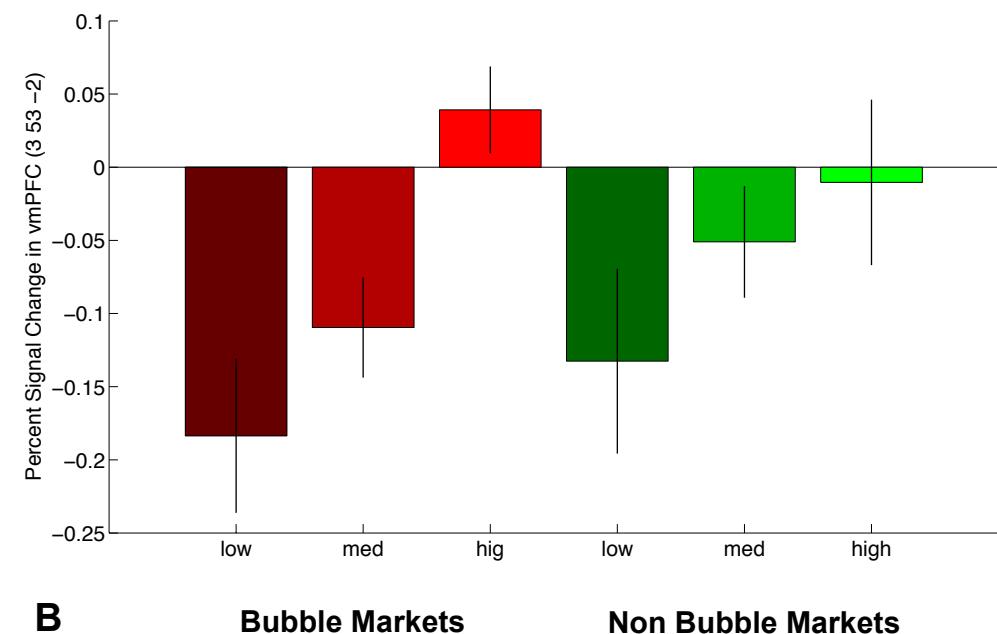
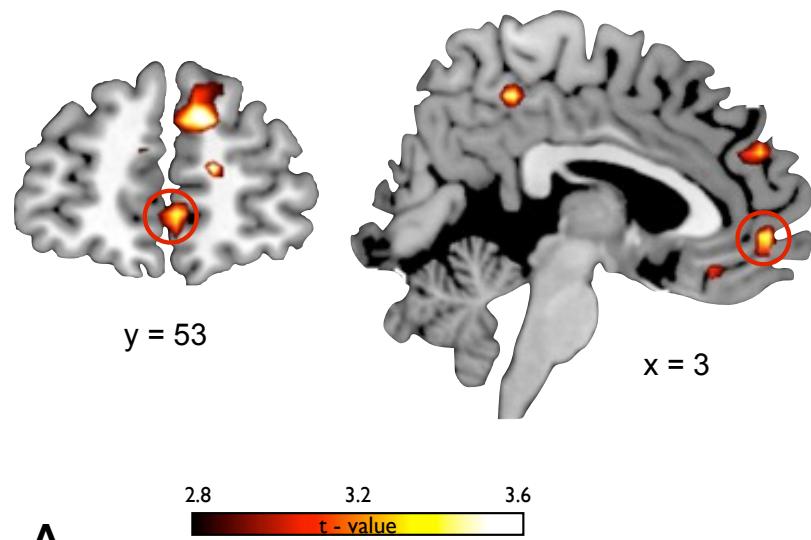
Begin new period

... session ends  
after Period 15

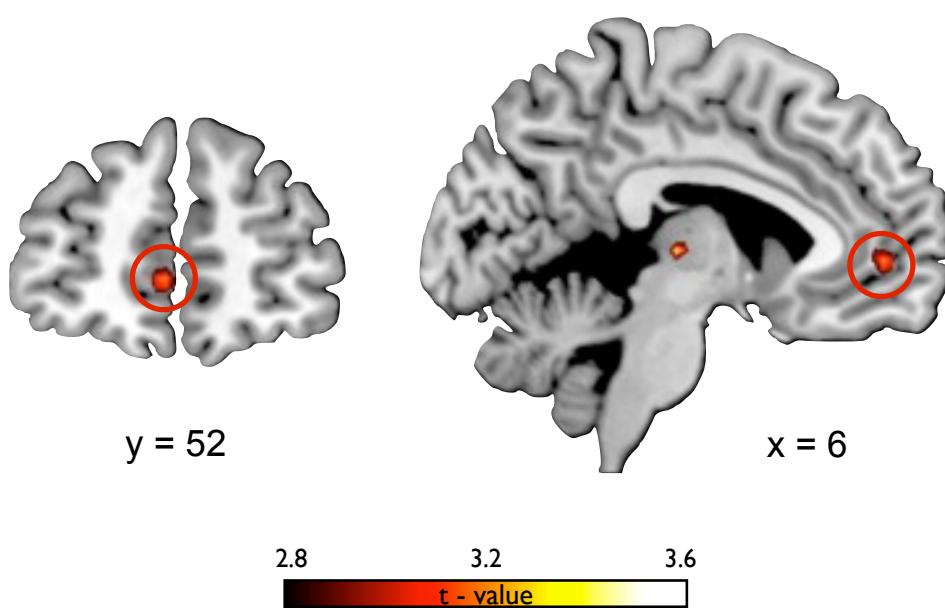
# Replay



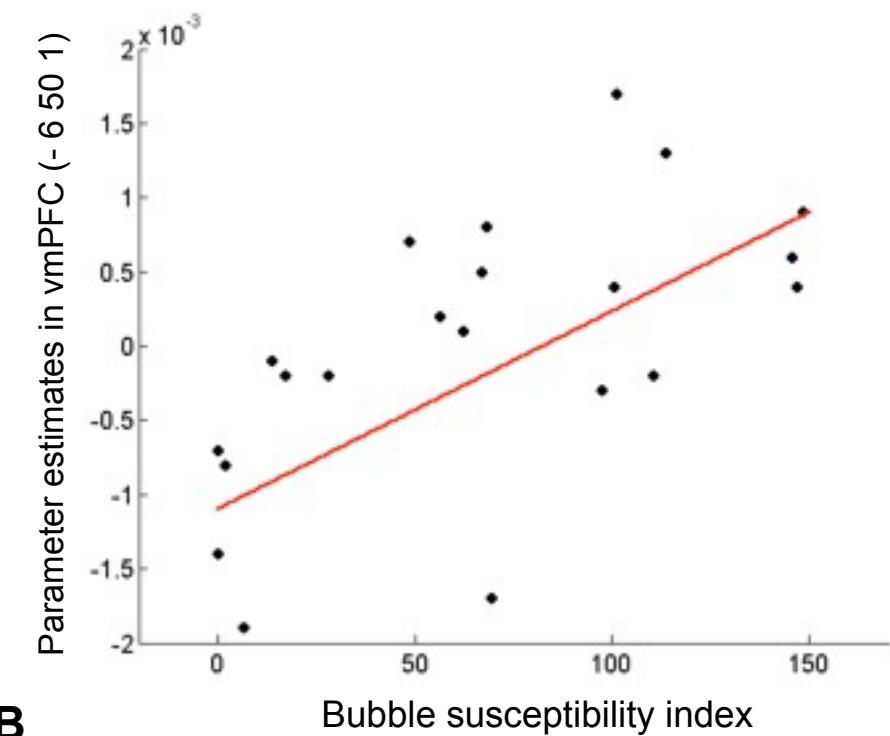
# Imaging 1



# Imaging 2

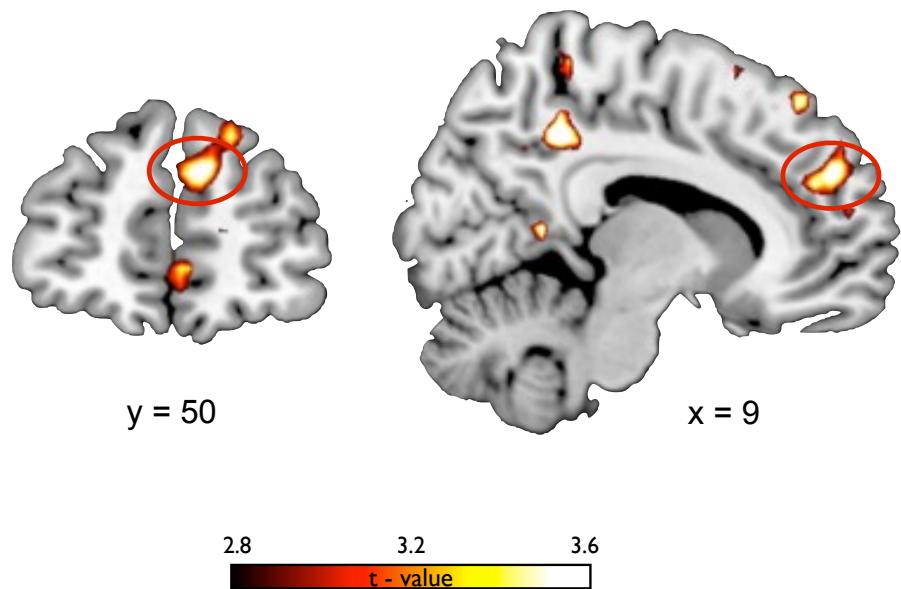


A

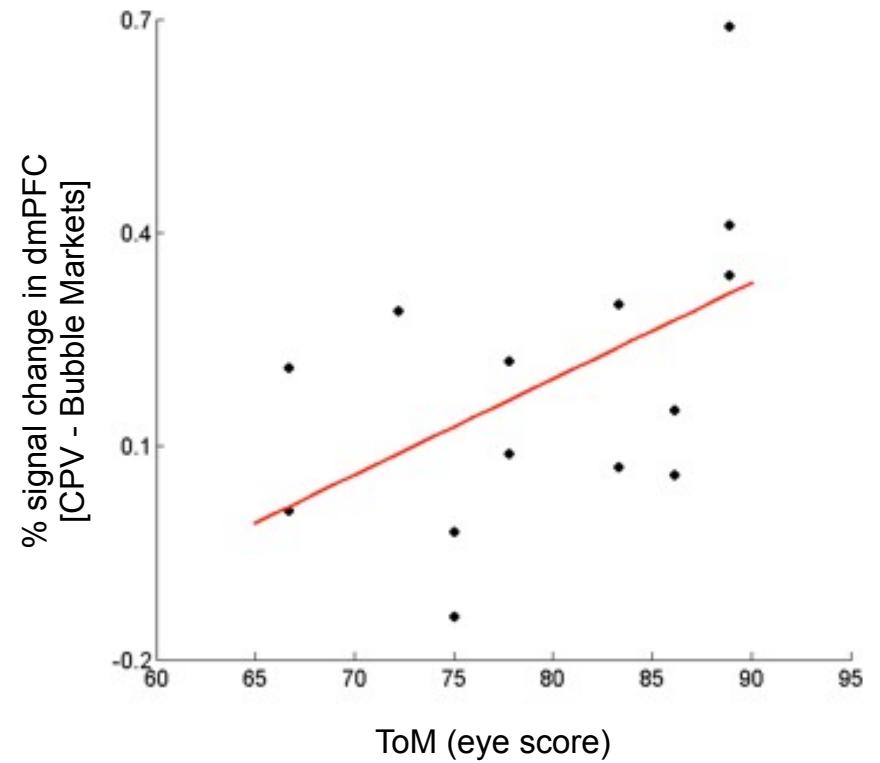


B

# ToM Tests



A

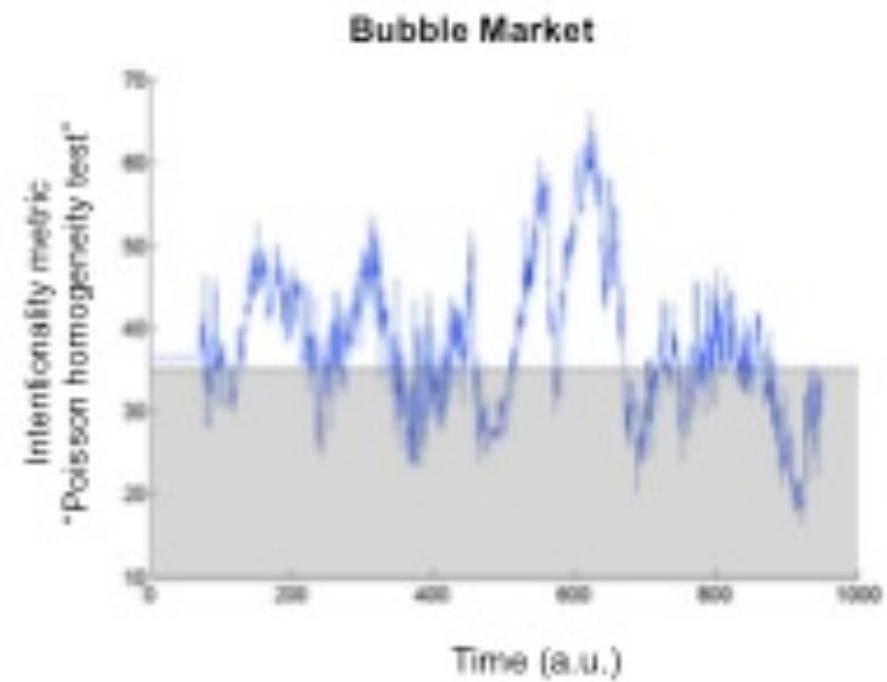
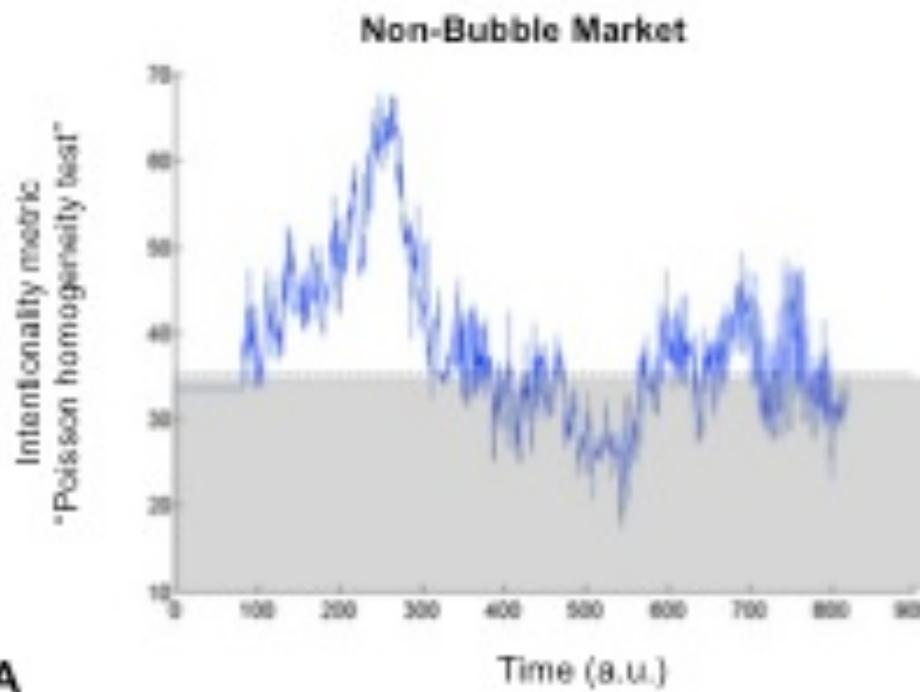


B



# What is being tracked in PCC?

- Probability of “informed” (intentional?) trading
- = test of in-homogeneity of Poisson



# PID (Poisson Inhomogeneity Detector)

