



Neuronal

coherence



Pascal Fries

in man and monkey

# Acknowledgements

Multi-site recordings in anesthetized cats

Wolf Singer  
Andreas Engel  
Sergio Neuenschwander  
Rainer Goebel

MEG experiments in human subjects

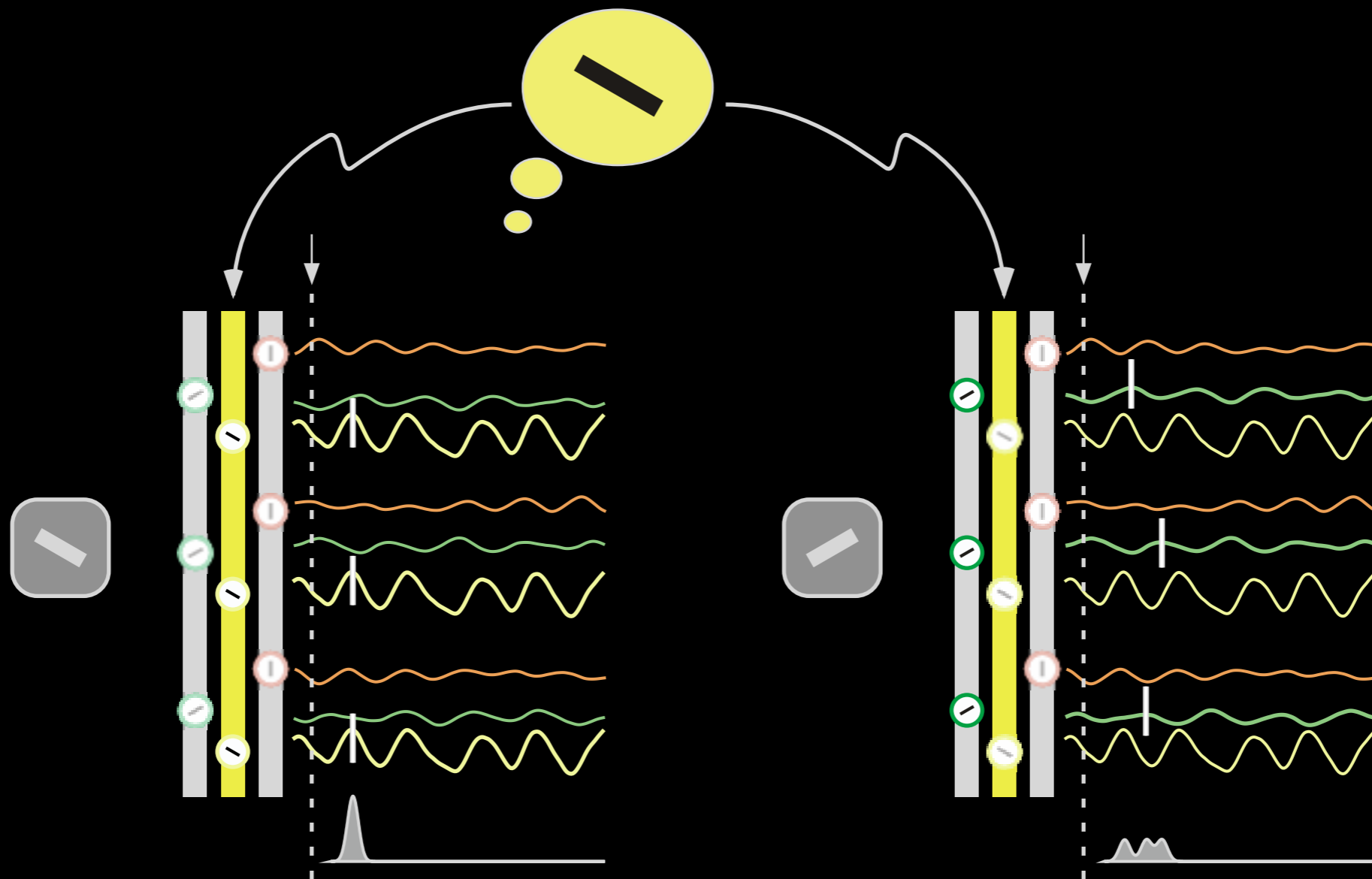
Jan Mathijs Schoffelen  
Nienke Hoogenboom  
Robert Oostenveld

Multi-site recordings in monkeys

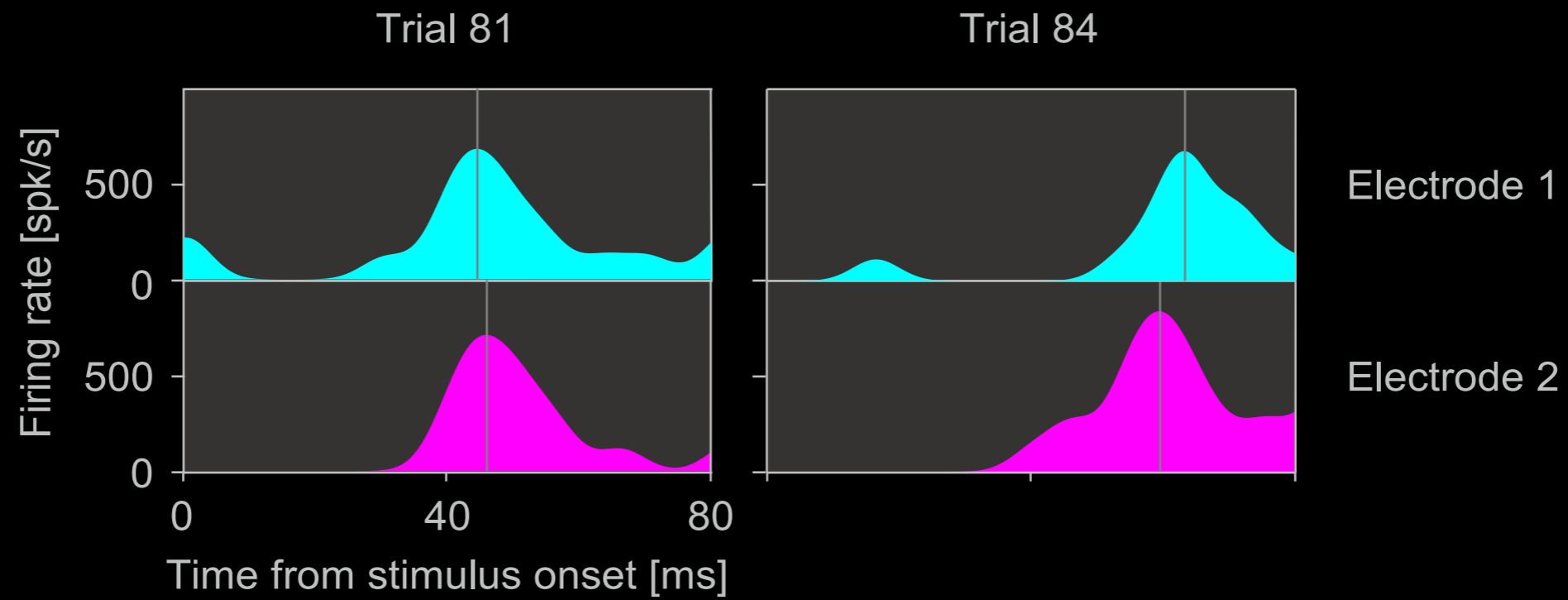
Bob Desimone  
John Reynolds  
Beth Buffalo  
Alan Rorie

Data analysis

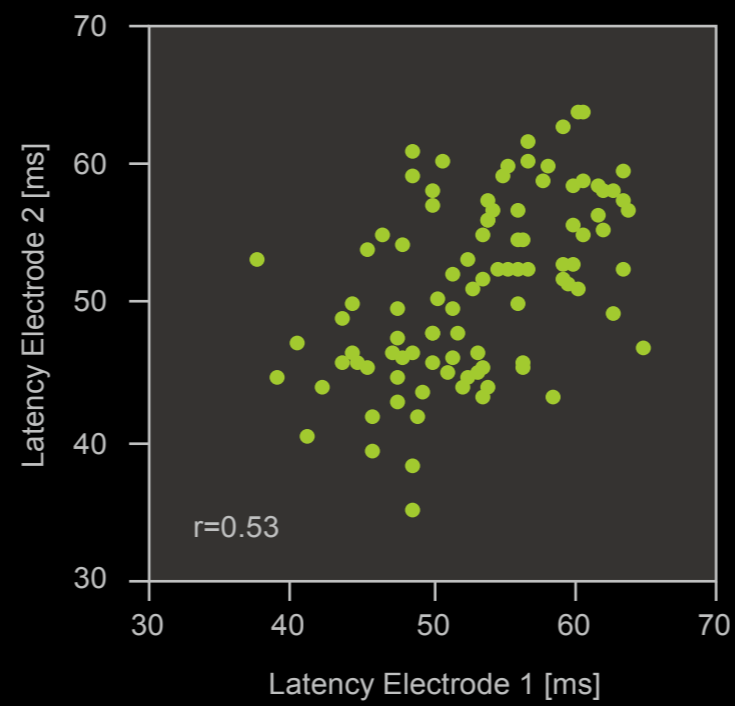
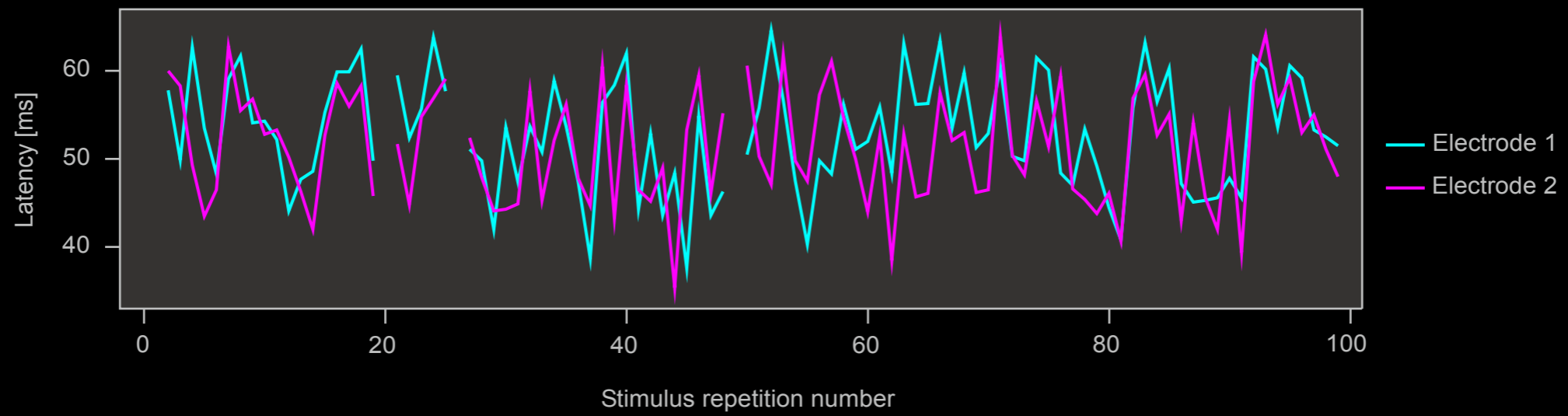
Partha Mitra  
Hualou Liang  
Steve Bressler  
Joachim Gross



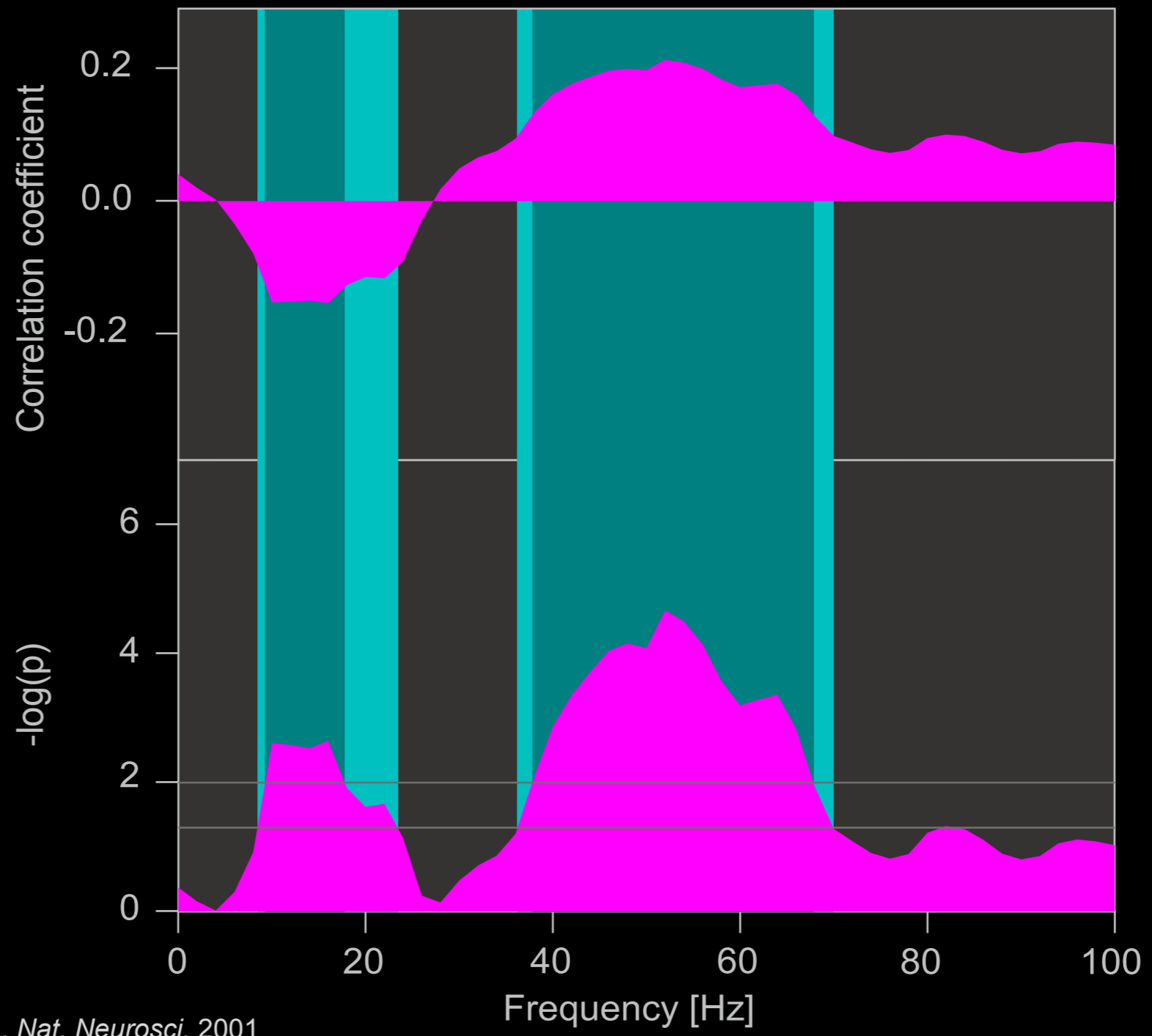
Engel et al., *Nat. Rev. Neurosci.*, 2001



Fries et al. *Nat. Neurosci.* 2001

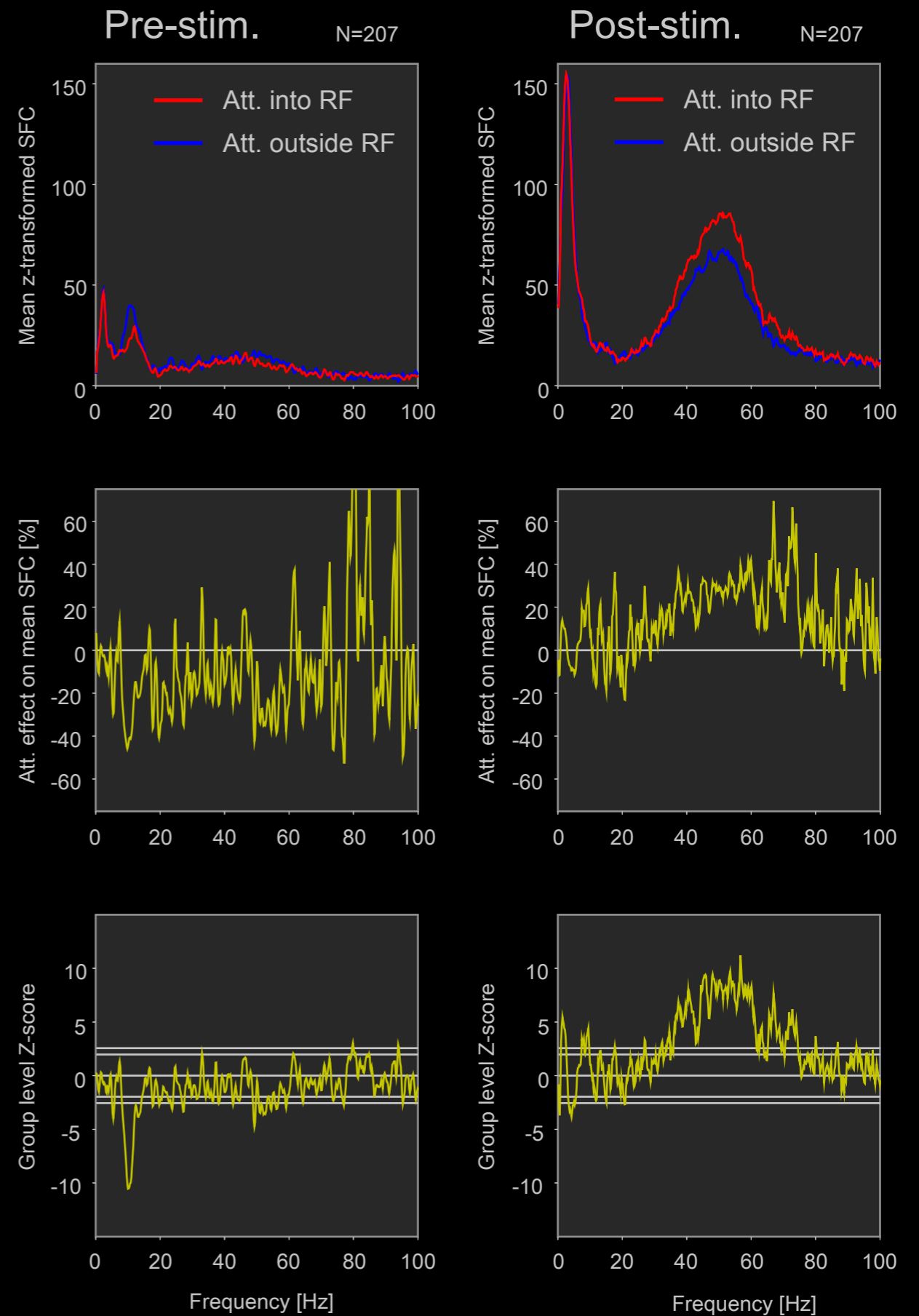
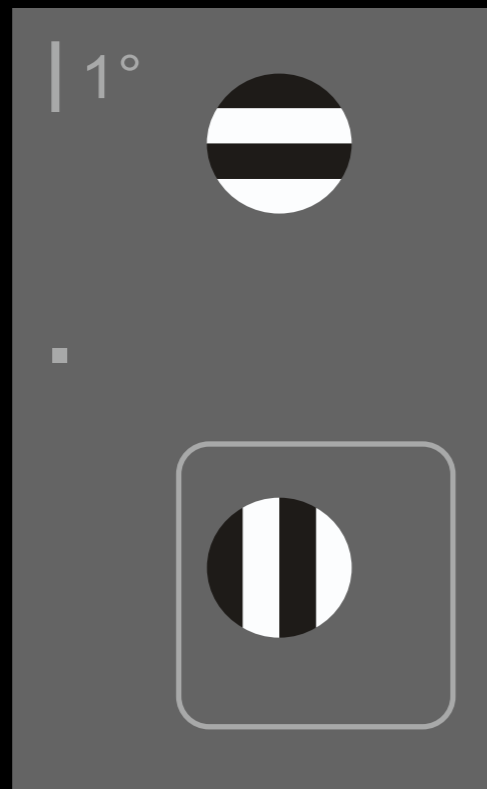


Fries et al. *Nat. Neurosci.* 2001



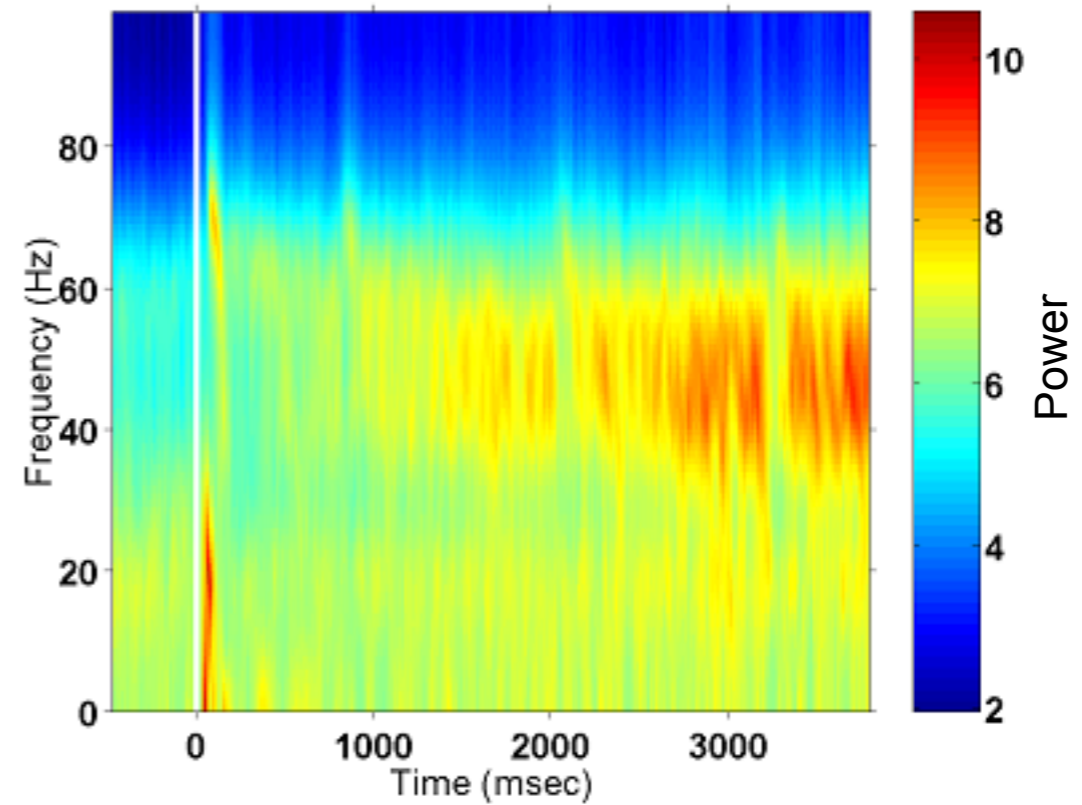
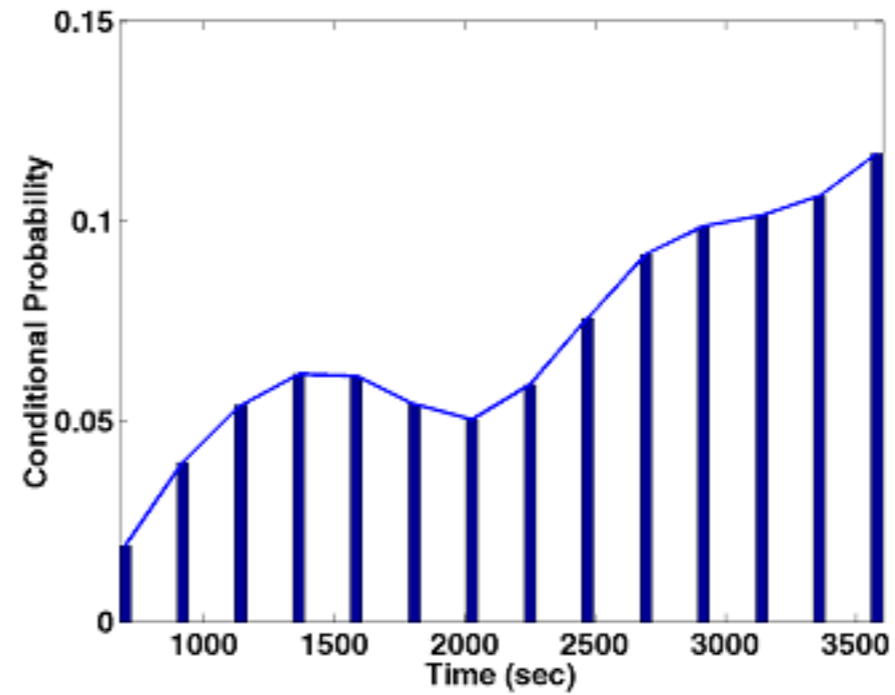
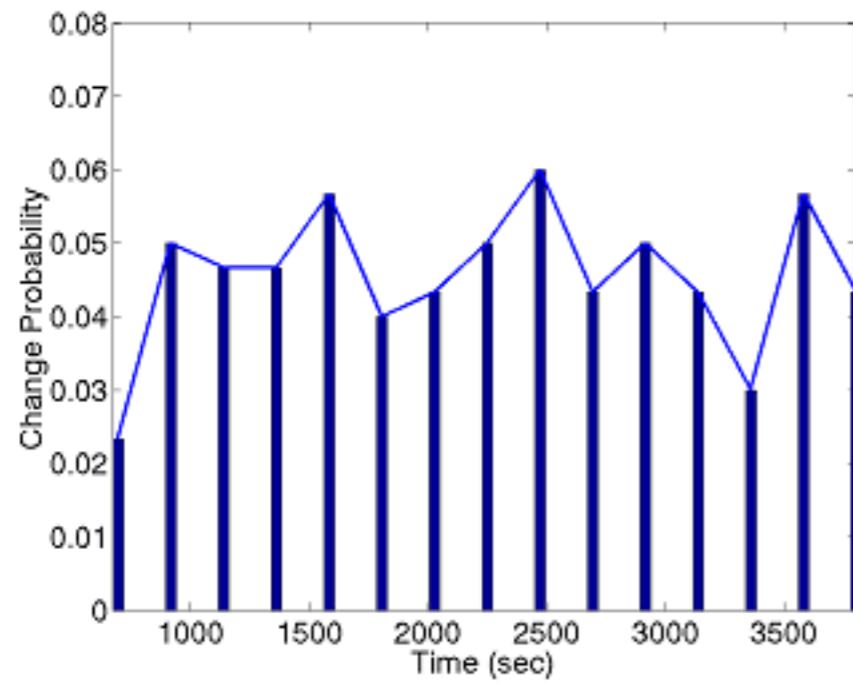
Fries et al. *Nat. Neurosci.* 2001

# Selective visual attention reduces spontaneous alpha- and enhances stimulus induced gamma-band synchronization in monkey area V4

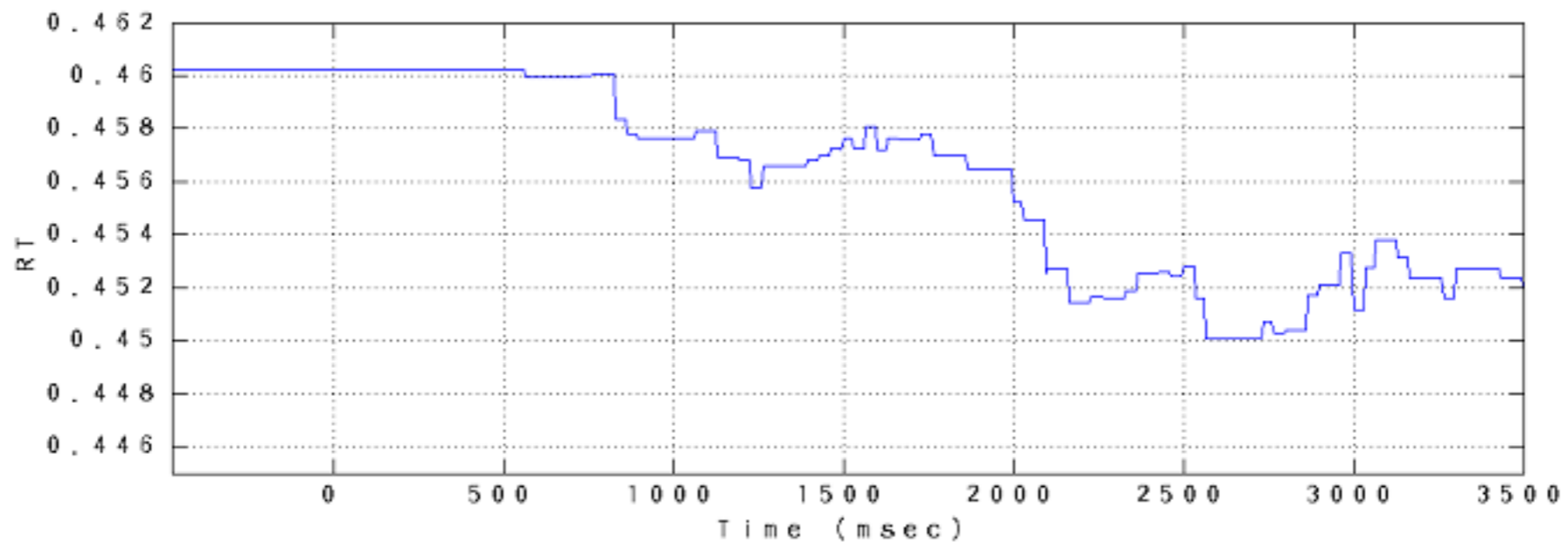
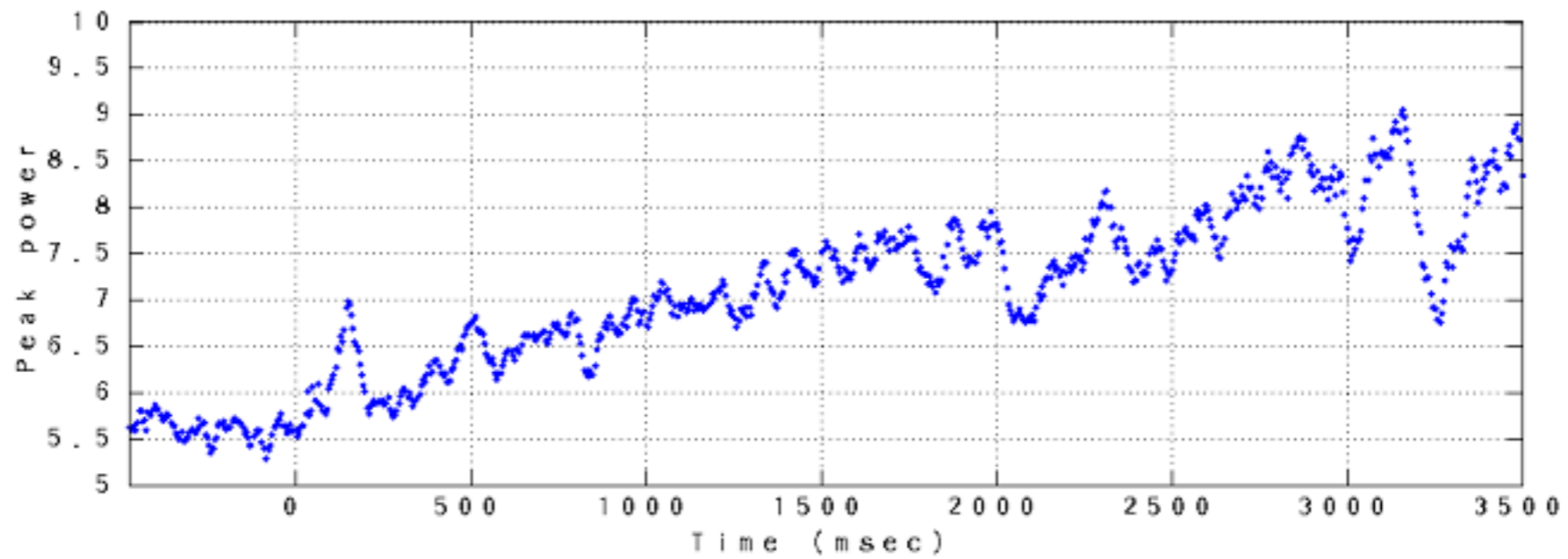


Fries et al. *Science* 2001

# Instantaneous probability determines monkey V4 gamma activity.



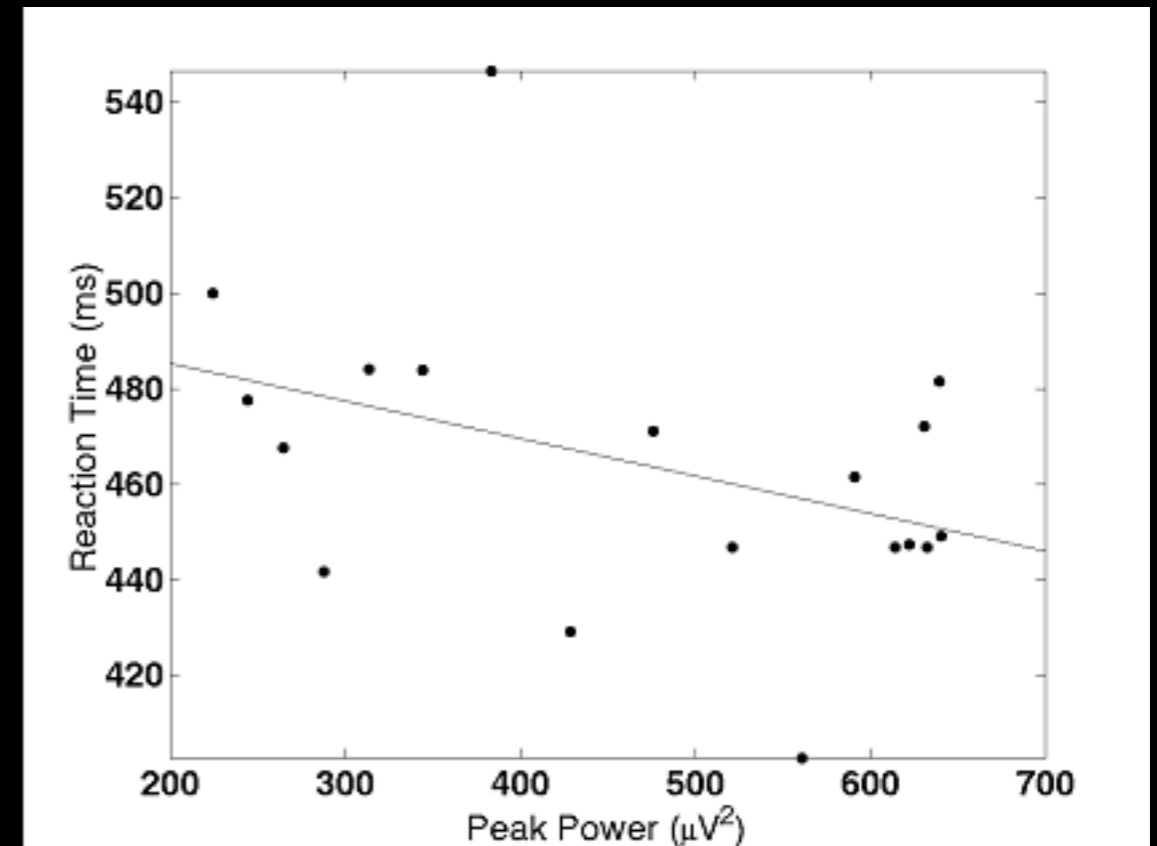
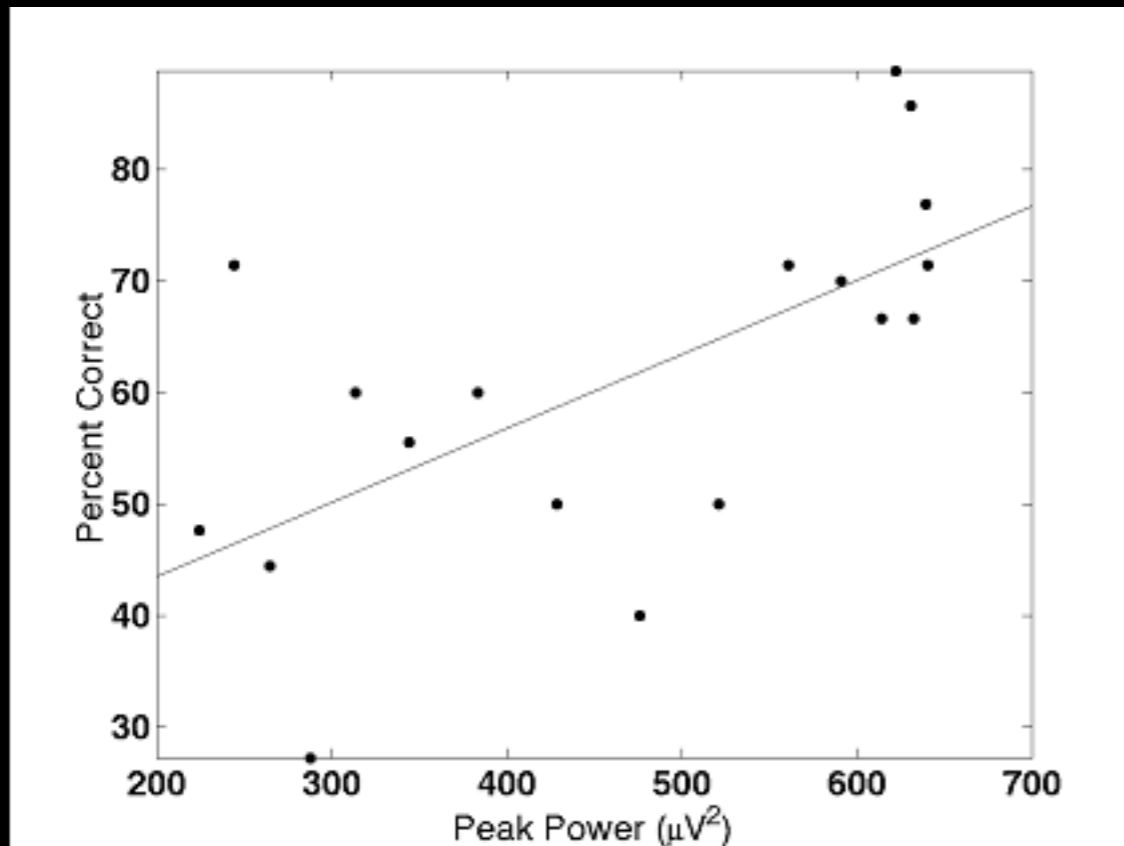
# Monkey V4 gamma activity predicts reaction times.



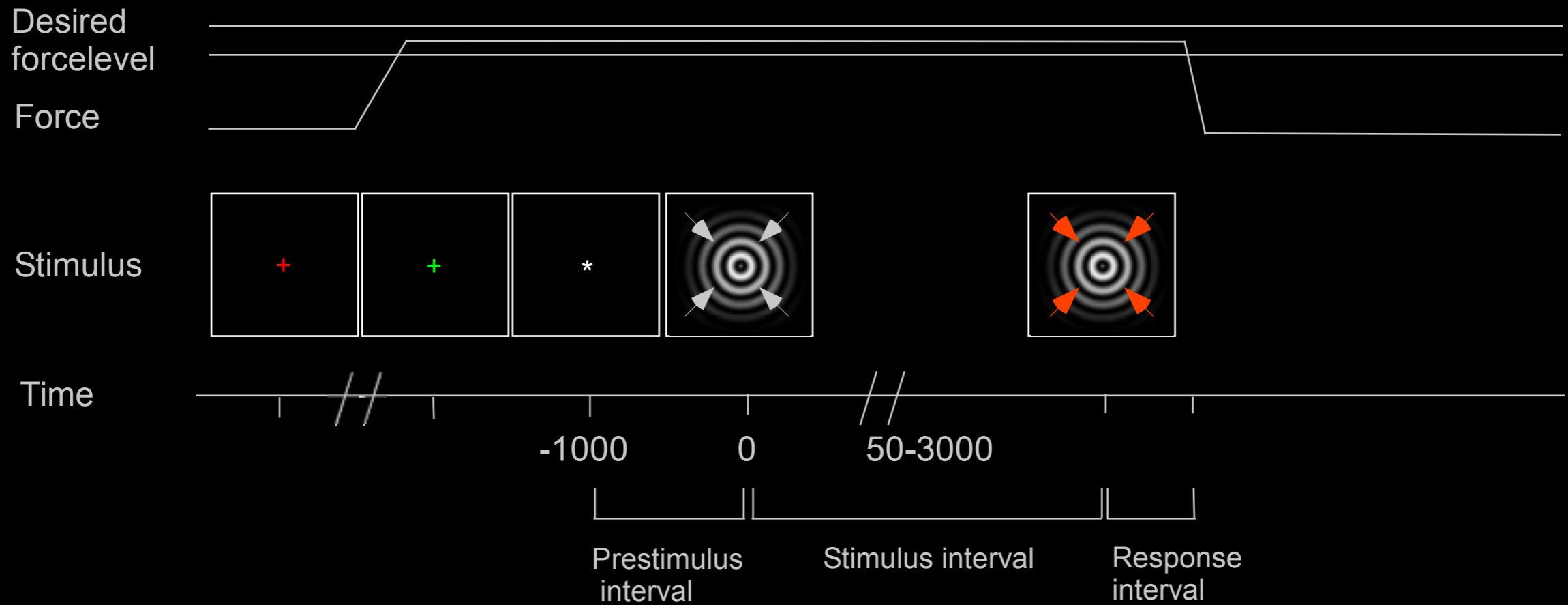
Monkey V4 gamma activity predicts reaction times and performance.

$$r = 0.65 \text{ (} p < 0.01 \text{)}$$

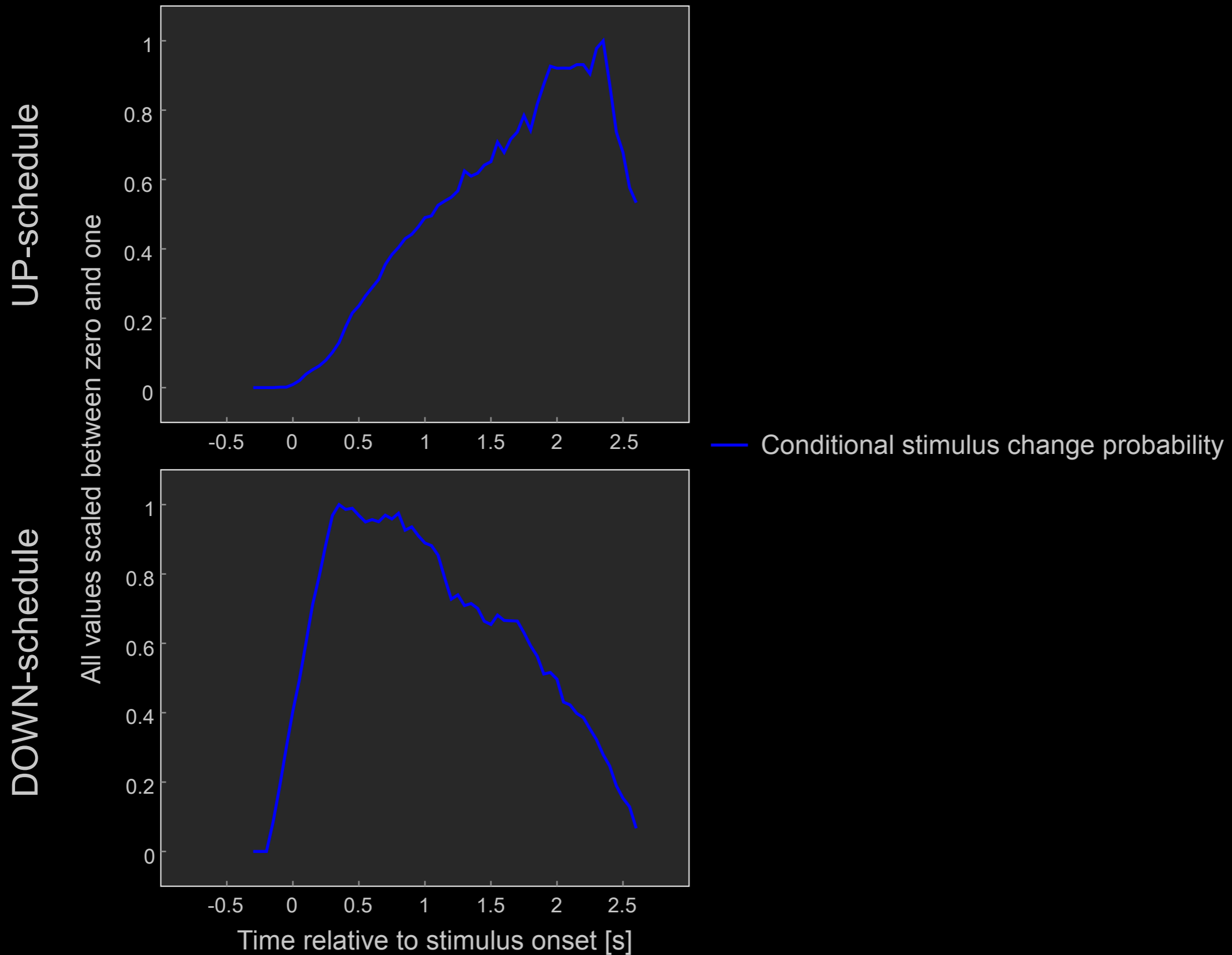
$$r = -0.4 \text{ (} p < 0.05 \text{)}$$



# The MEG/EMG paradigm



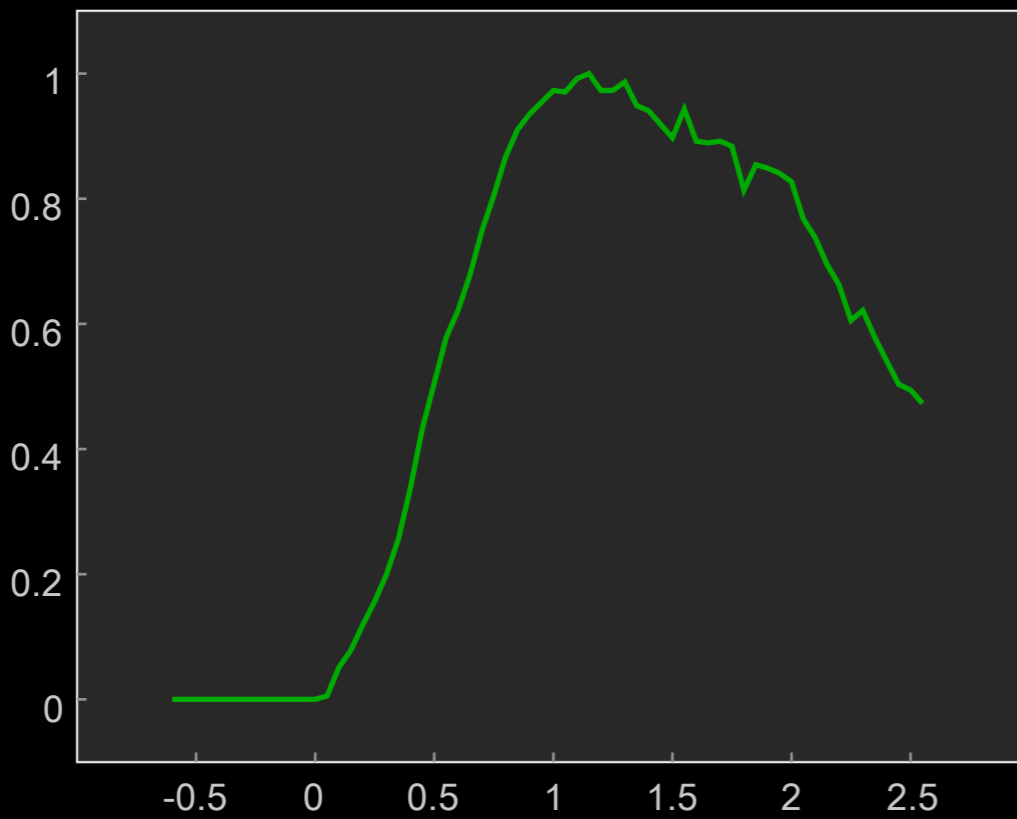
# The temporal evolution of instantaneous probability used



# The temporal evolution of probability (across trials) used

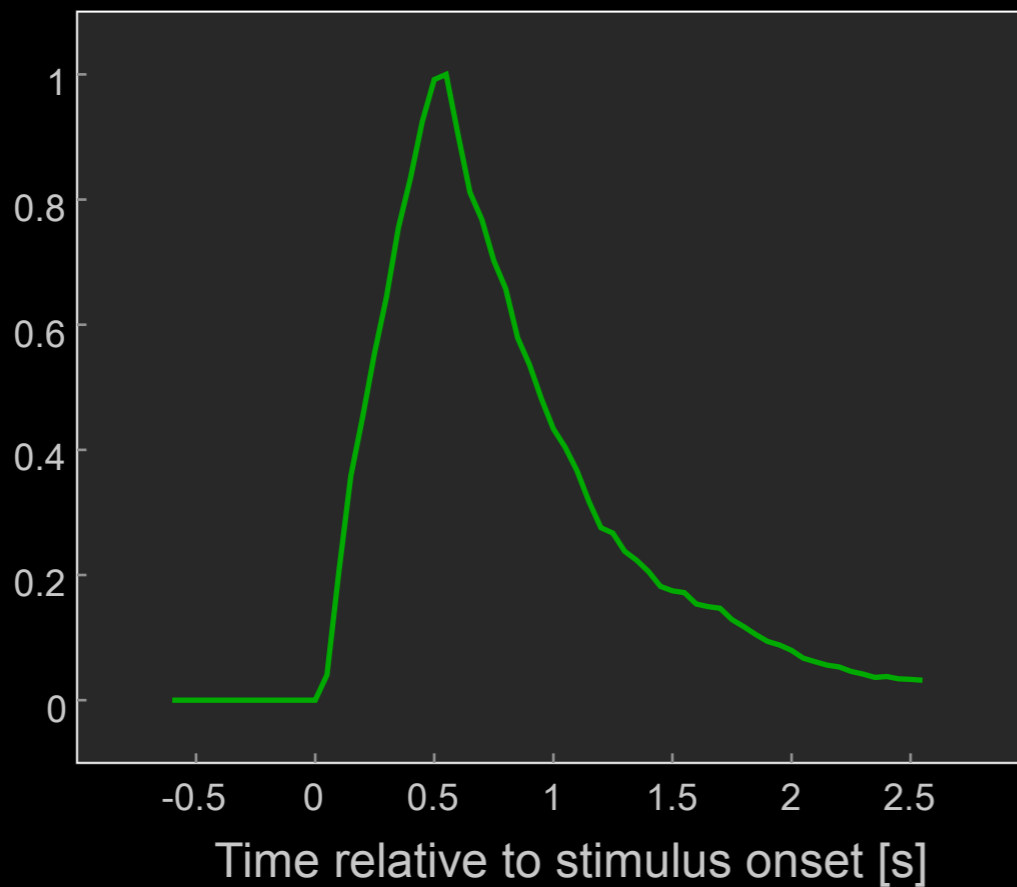
UP-schedule

All values scaled between zero and one



— Stimulus change probability

DOWN-schedule

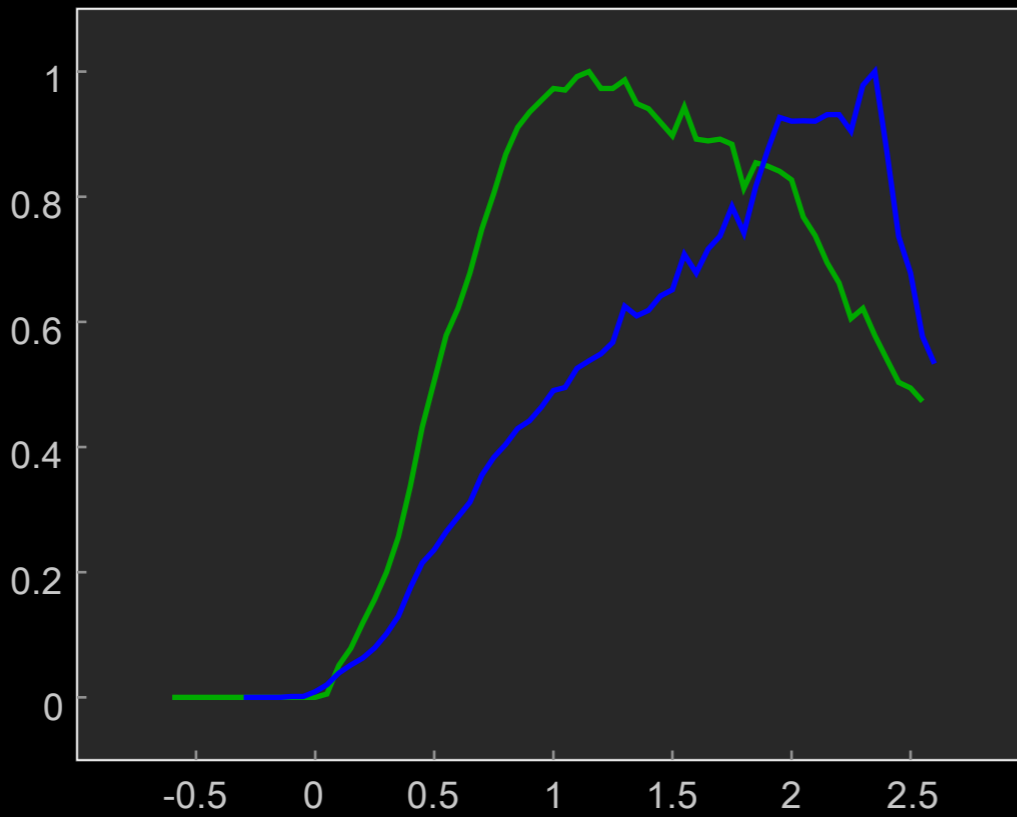


Time relative to stimulus onset [s]

# Instantaneous probability determines reaction times.

UP-schedule

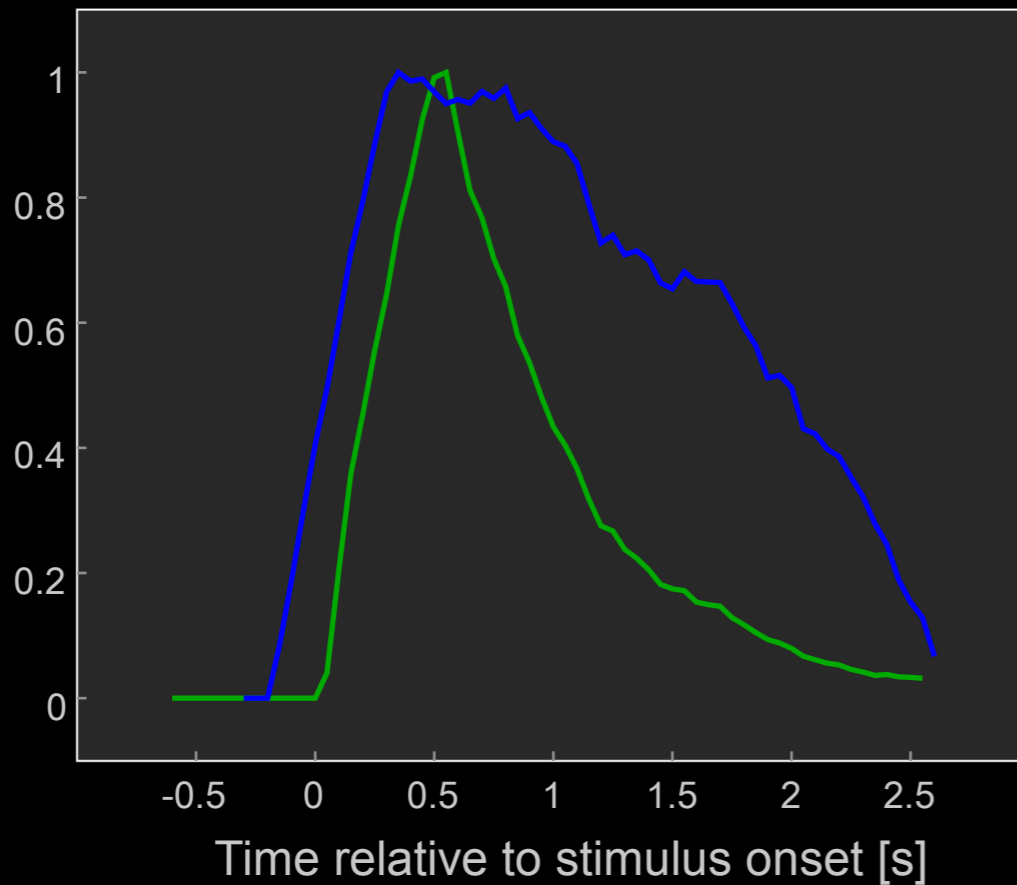
All values scaled between zero and one



- Stimulus change probability
- Conditional stimulus change probability

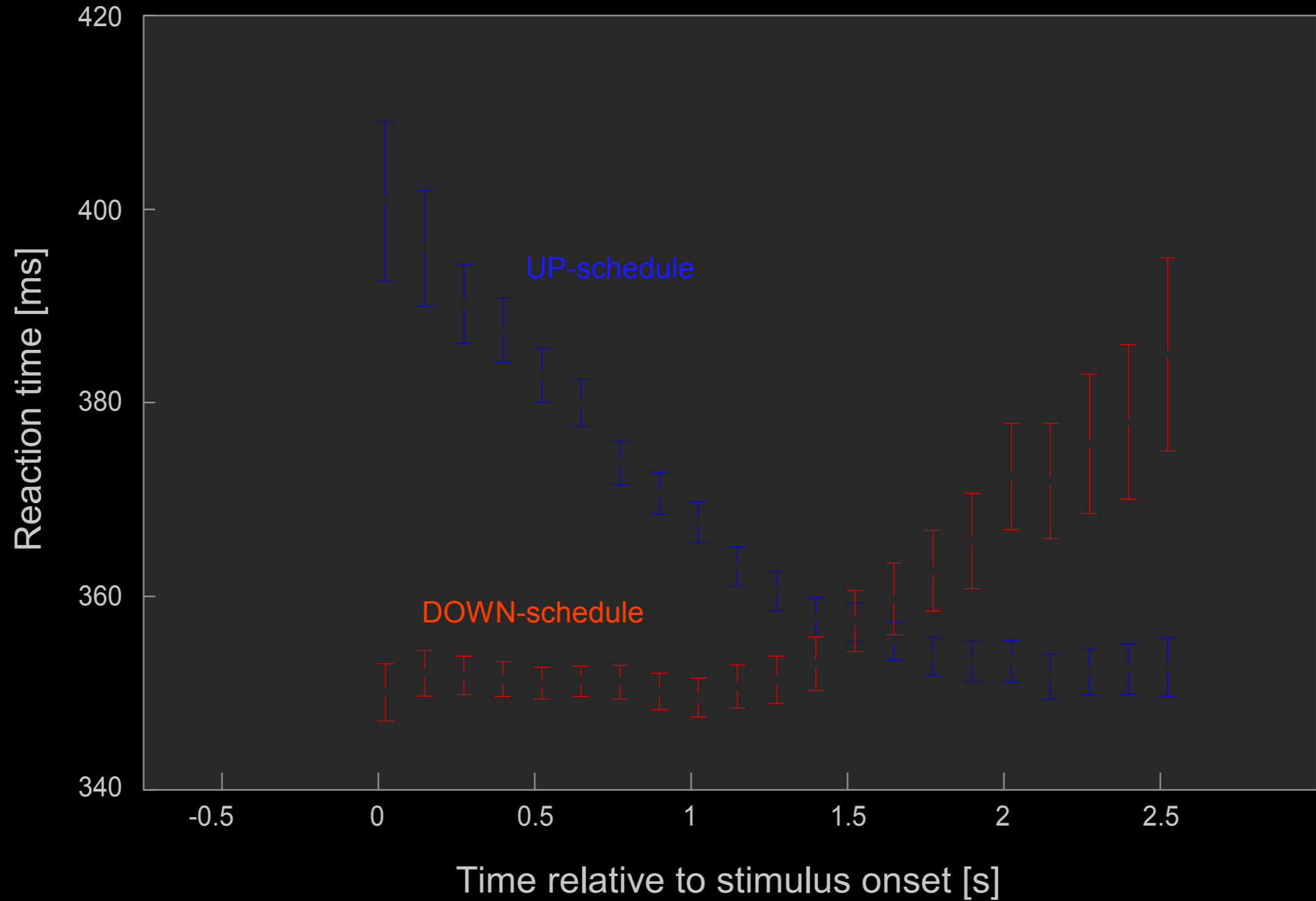
DOWN-schedule

All values scaled between zero and one



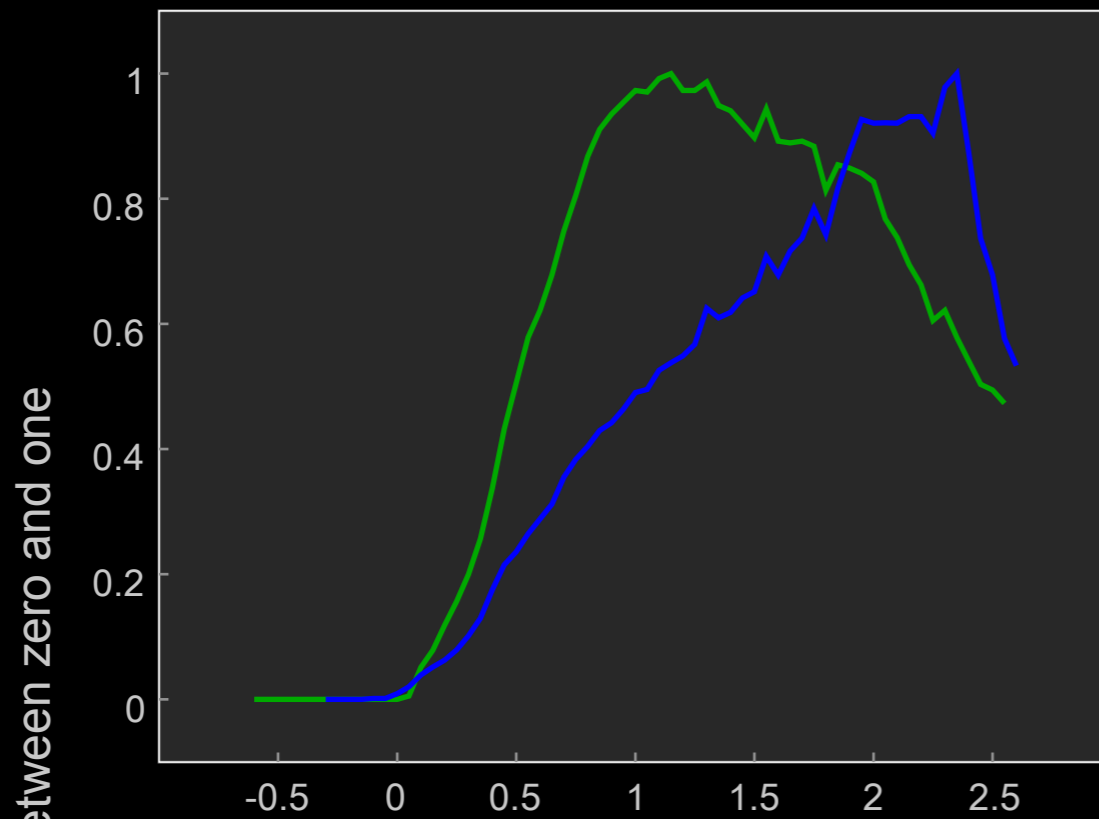
Time relative to stimulus onset [s]

Instantaneous probability determines reaction times.



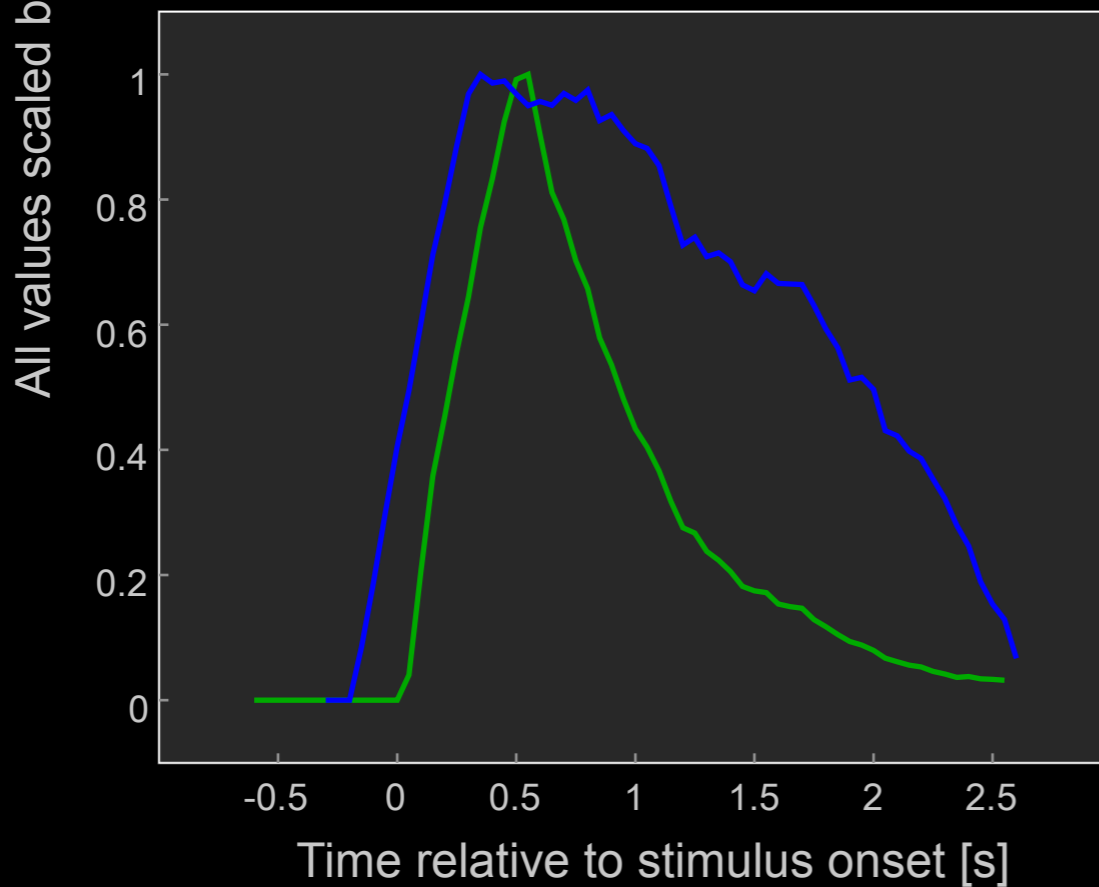
Instantaneous probability determines reaction times.

UP-schedule



— Stimulus change probability  
— Conditional stimulus change probability

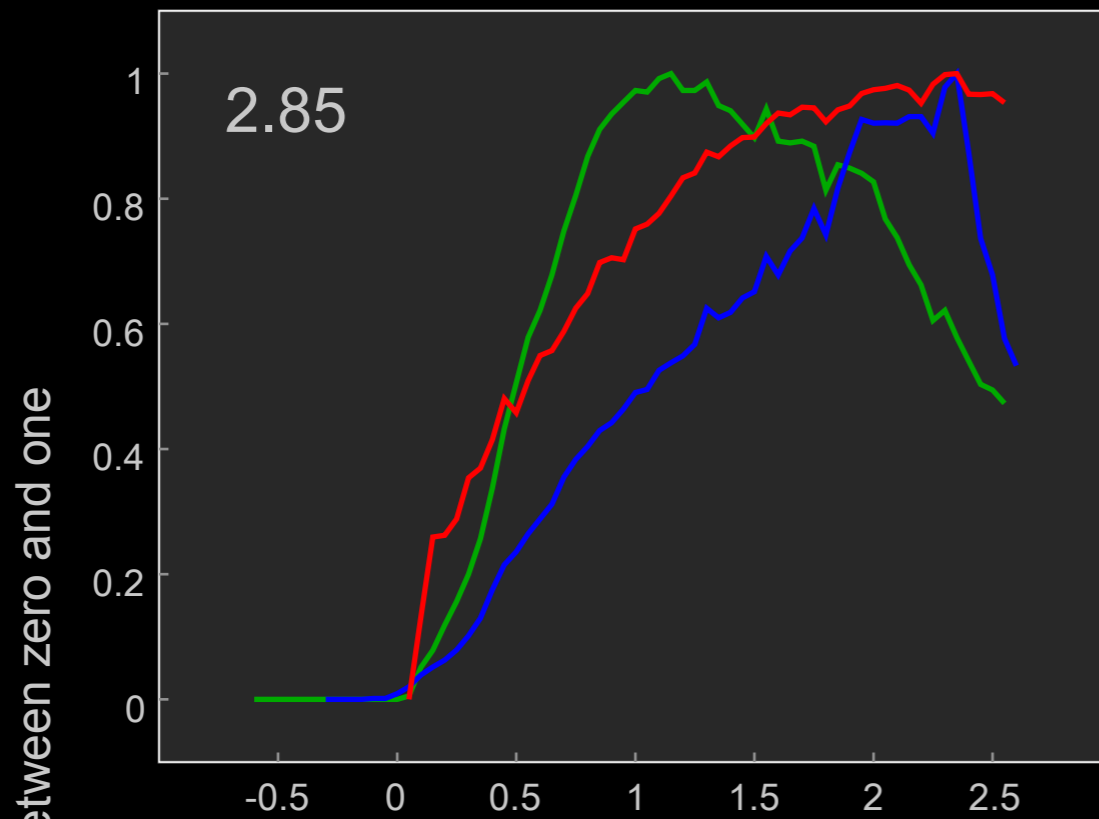
DOWN-schedule



Time relative to stimulus onset [s]

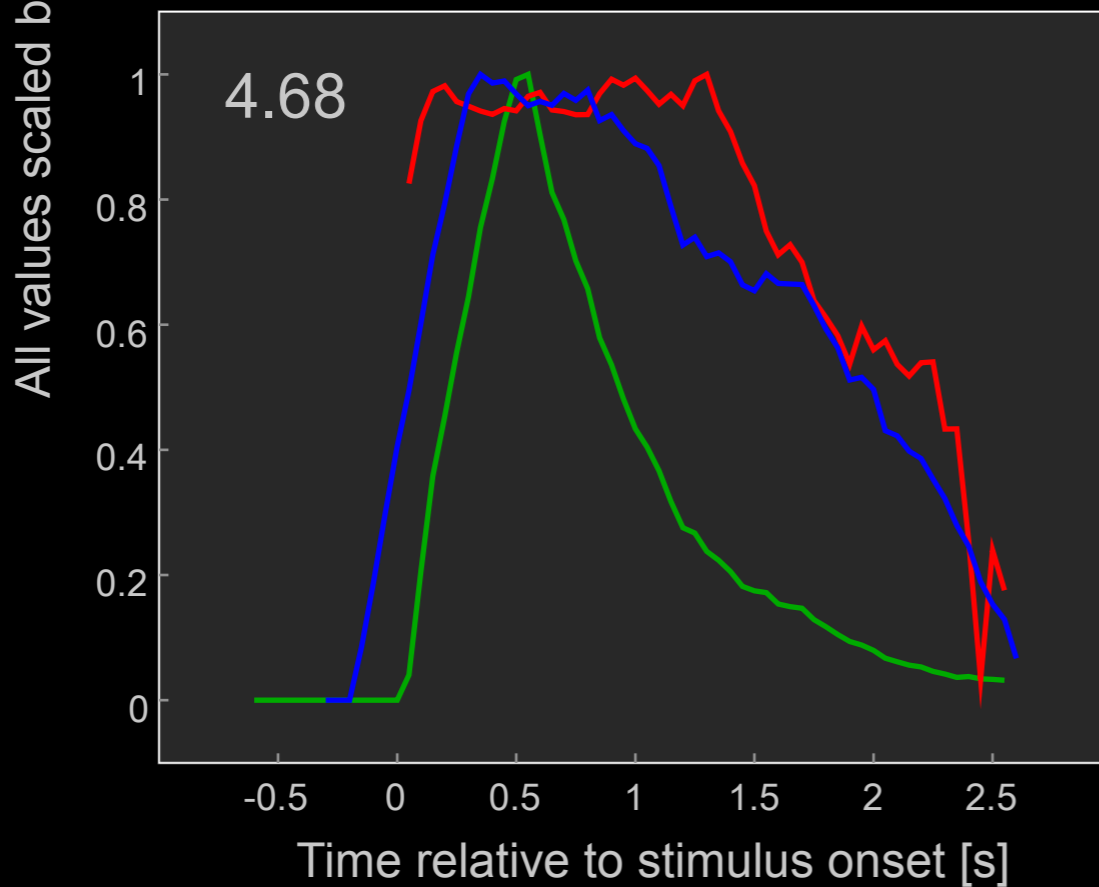
# Instantaneous probability determines reaction times.

UP-schedule



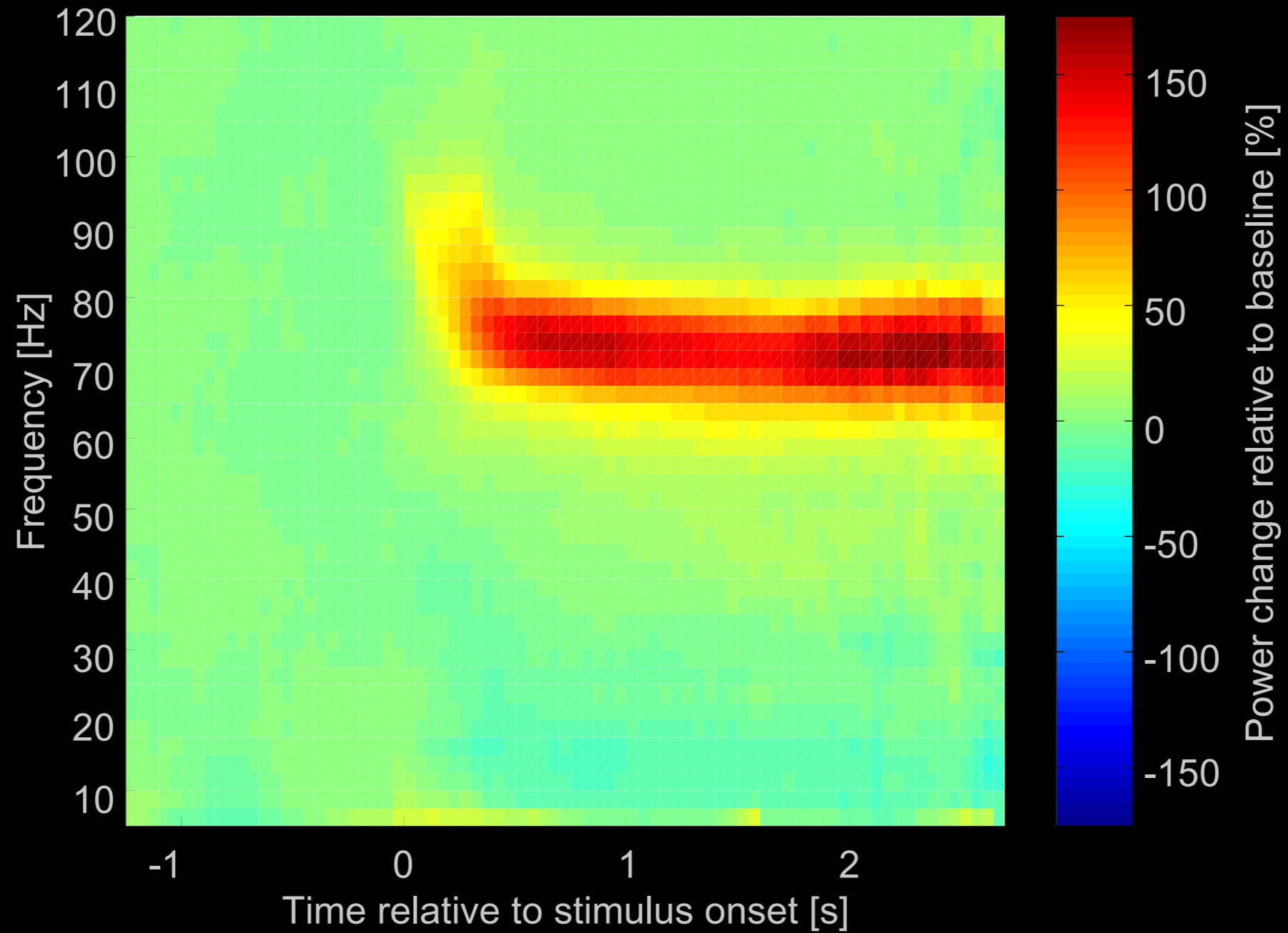
- Stimulus change probability
- Conditional stimulus change probability
- Inverted reaction times (~movement preparation)

DOWN-schedule

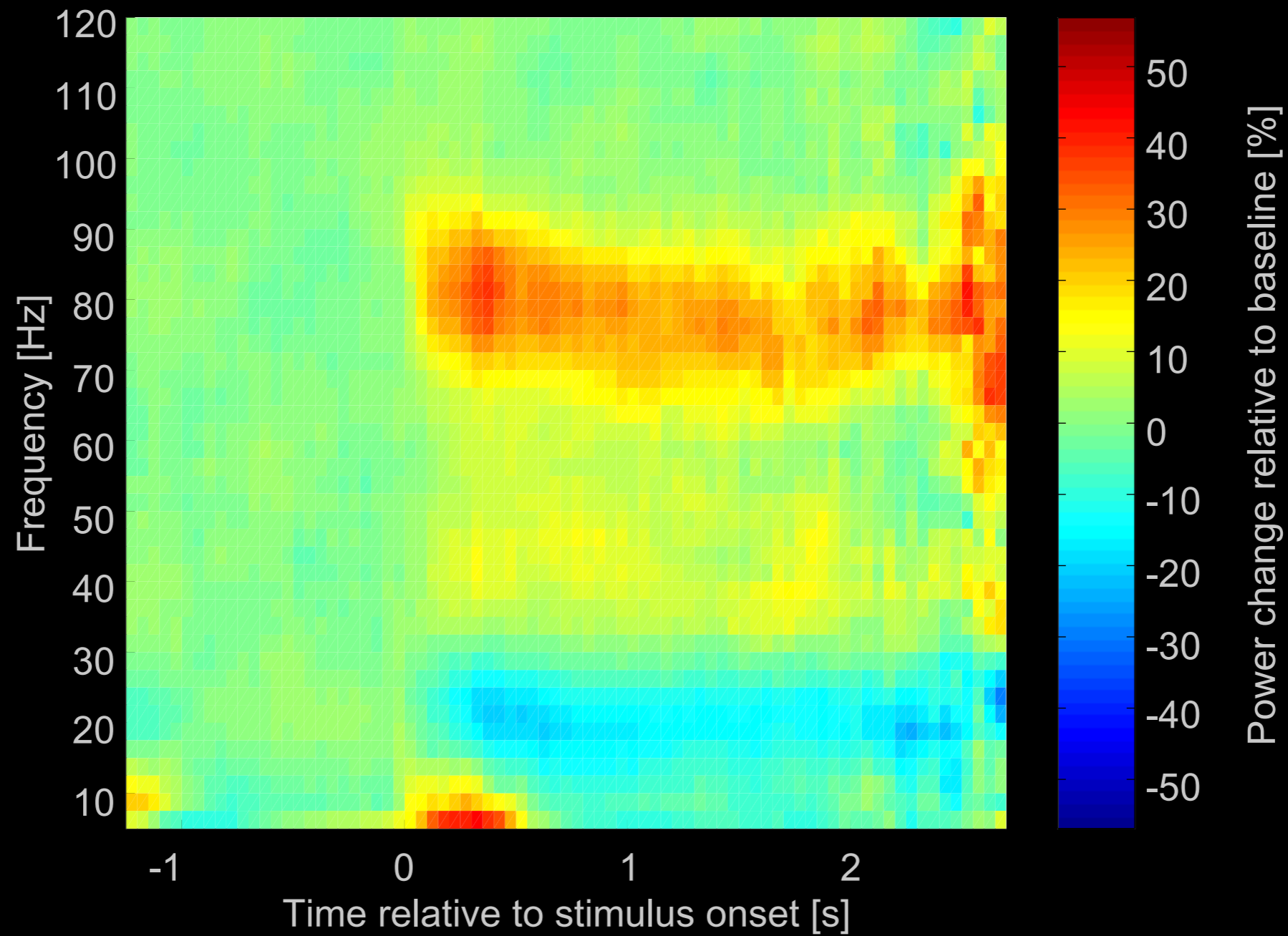


Time relative to stimulus onset [s]

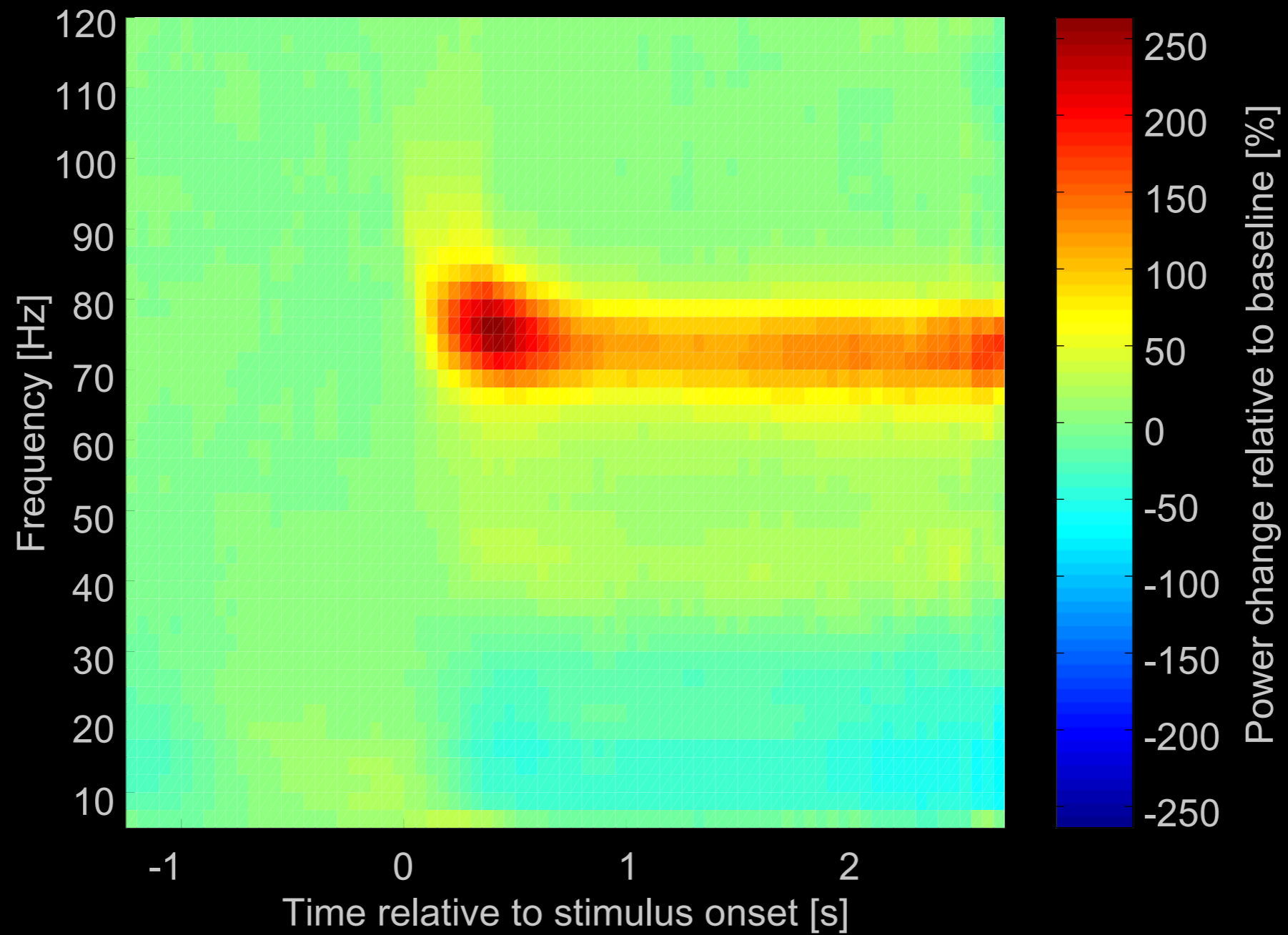
Instantaneous probability does not determine human visual cortical gamma activity  
- subject 1.



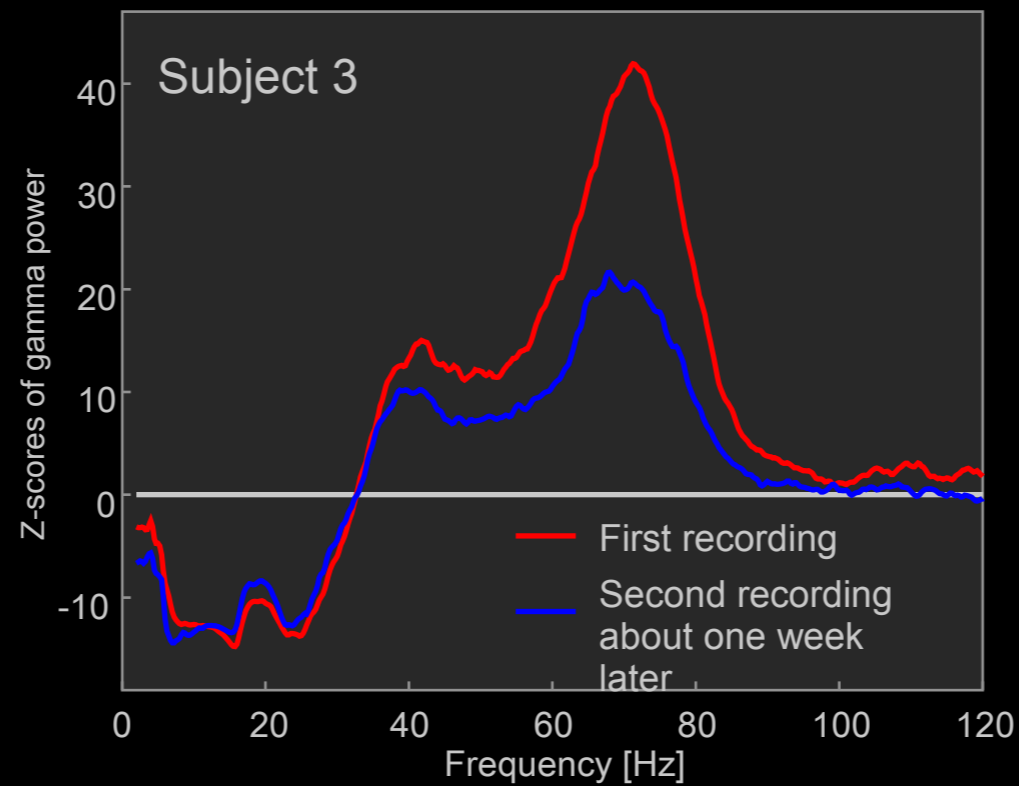
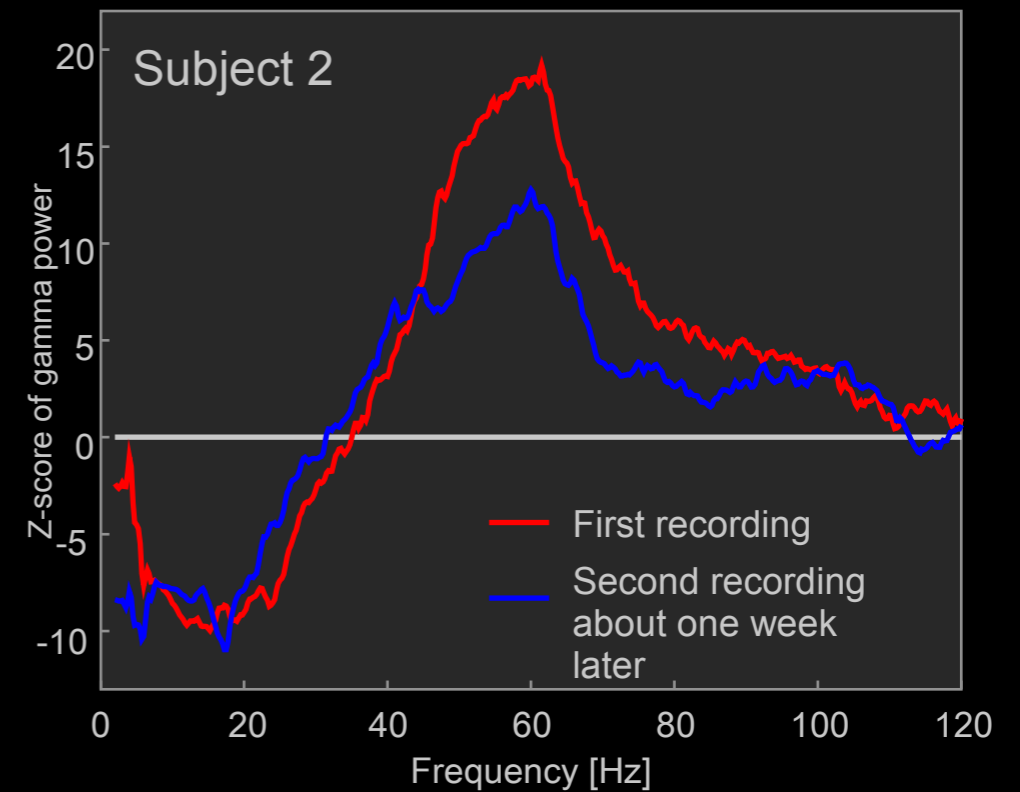
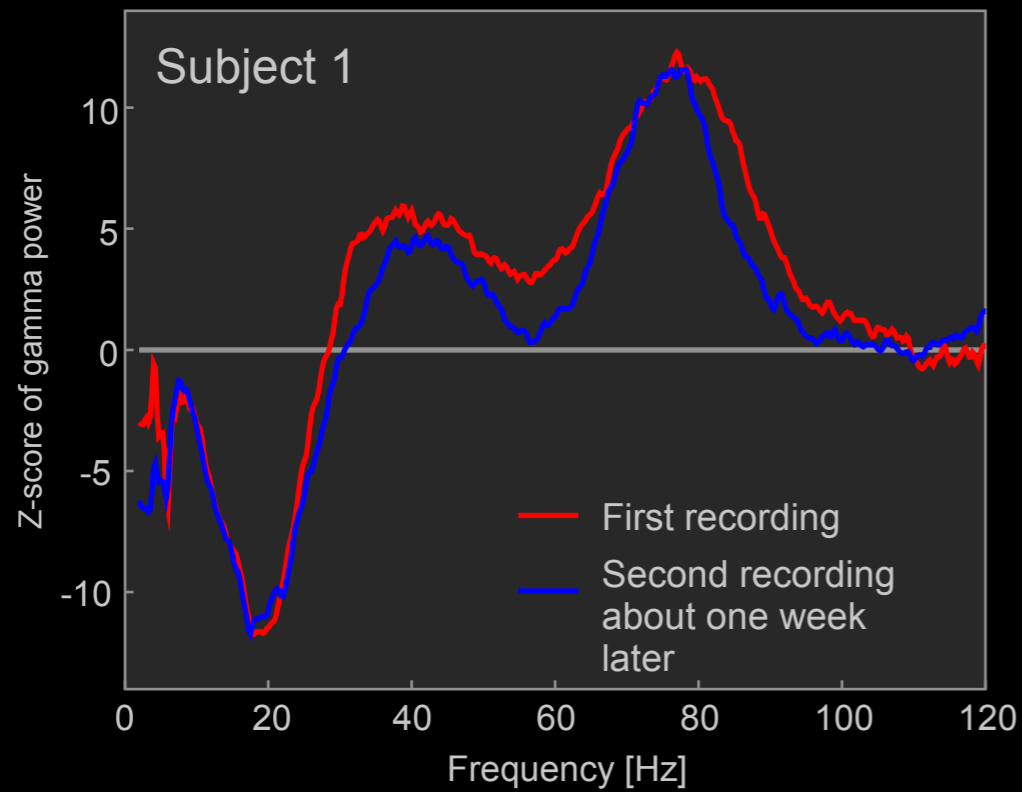
# Instantaneous probability does not determine human visual cortical gamma activity - subject 2.



# Instantaneous probability does not determine human visual cortical gamma activity - subject 3.



# The spectral signature of visual processing



# The human visual gamma network - imaged.

