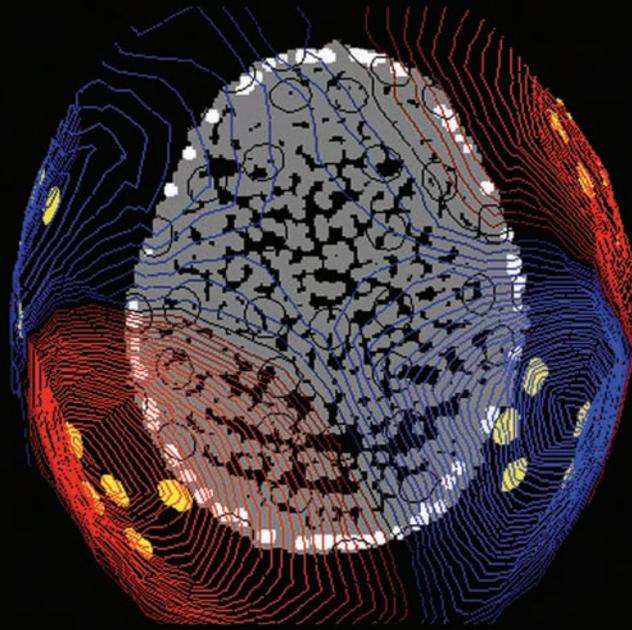
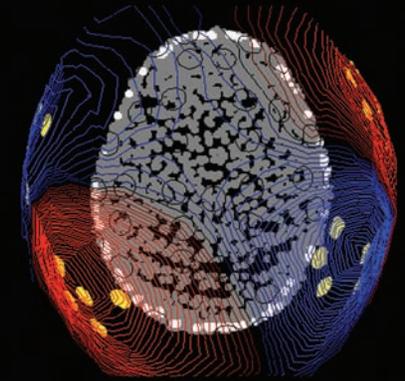


# Human auditory cortical processing of transitions between 'order' and 'disorder'



Maria Chait, David Poeppel and Jonathan Z Simon  
University of Maryland, USA

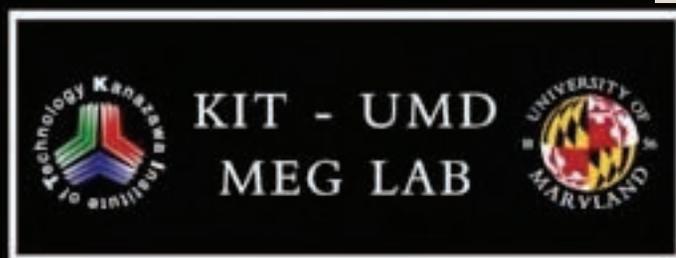
# Detection of change

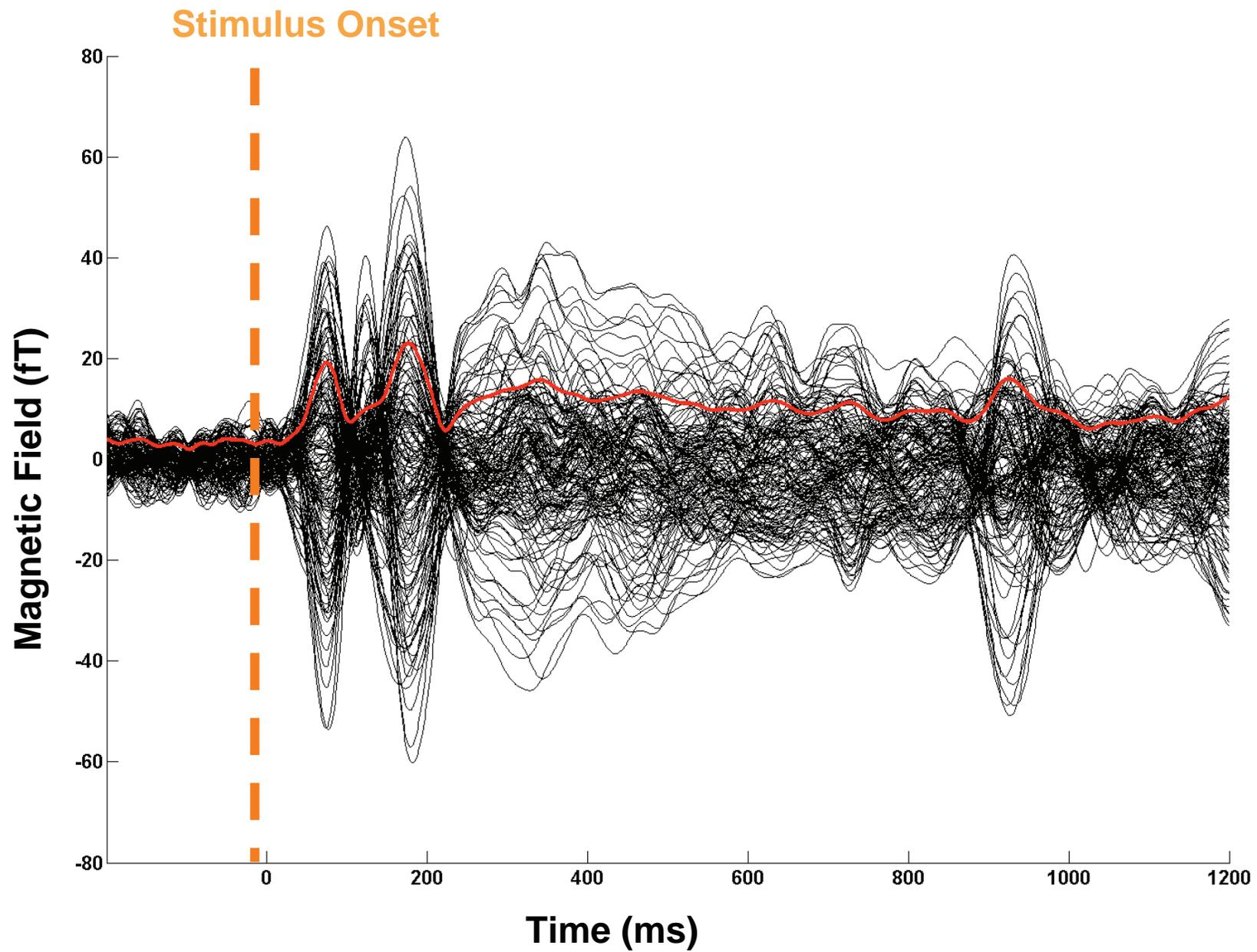


transition

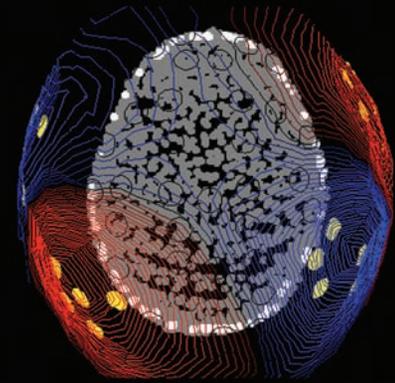


time →



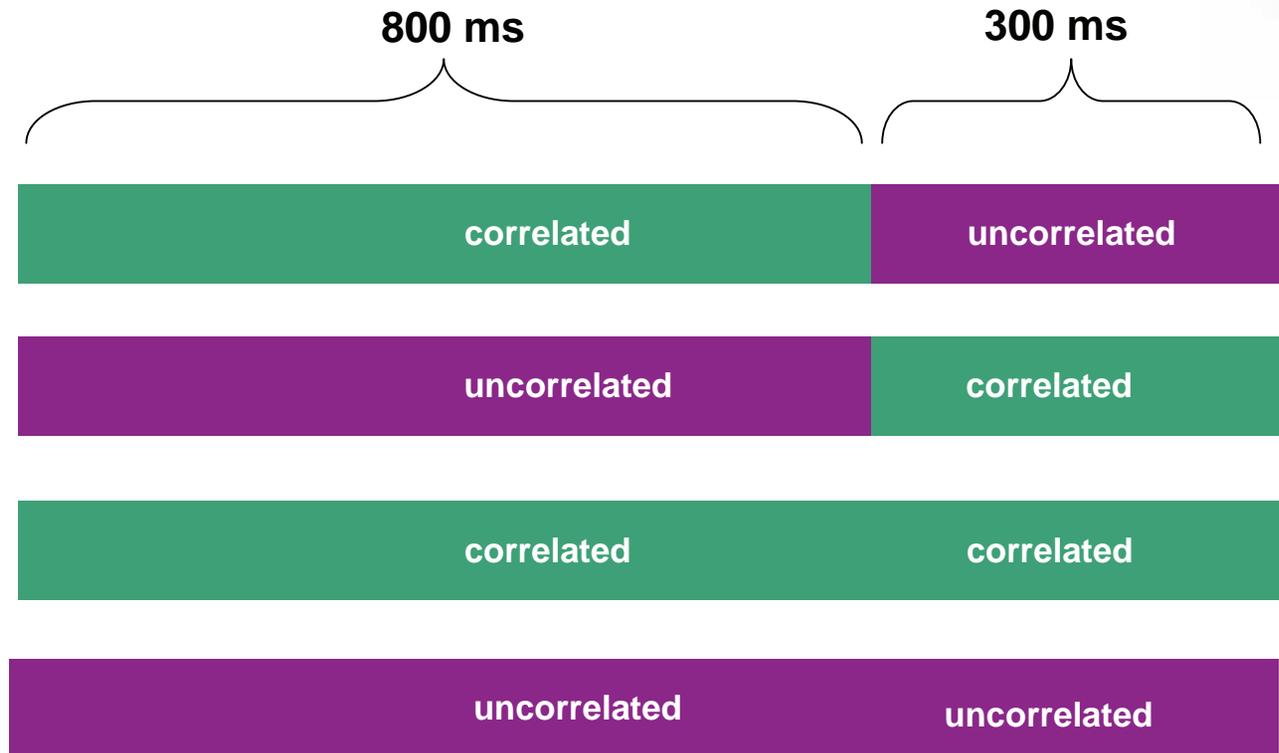
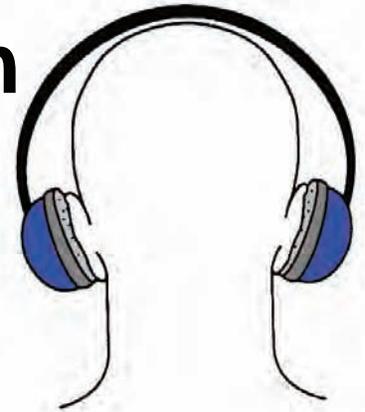


# Issues



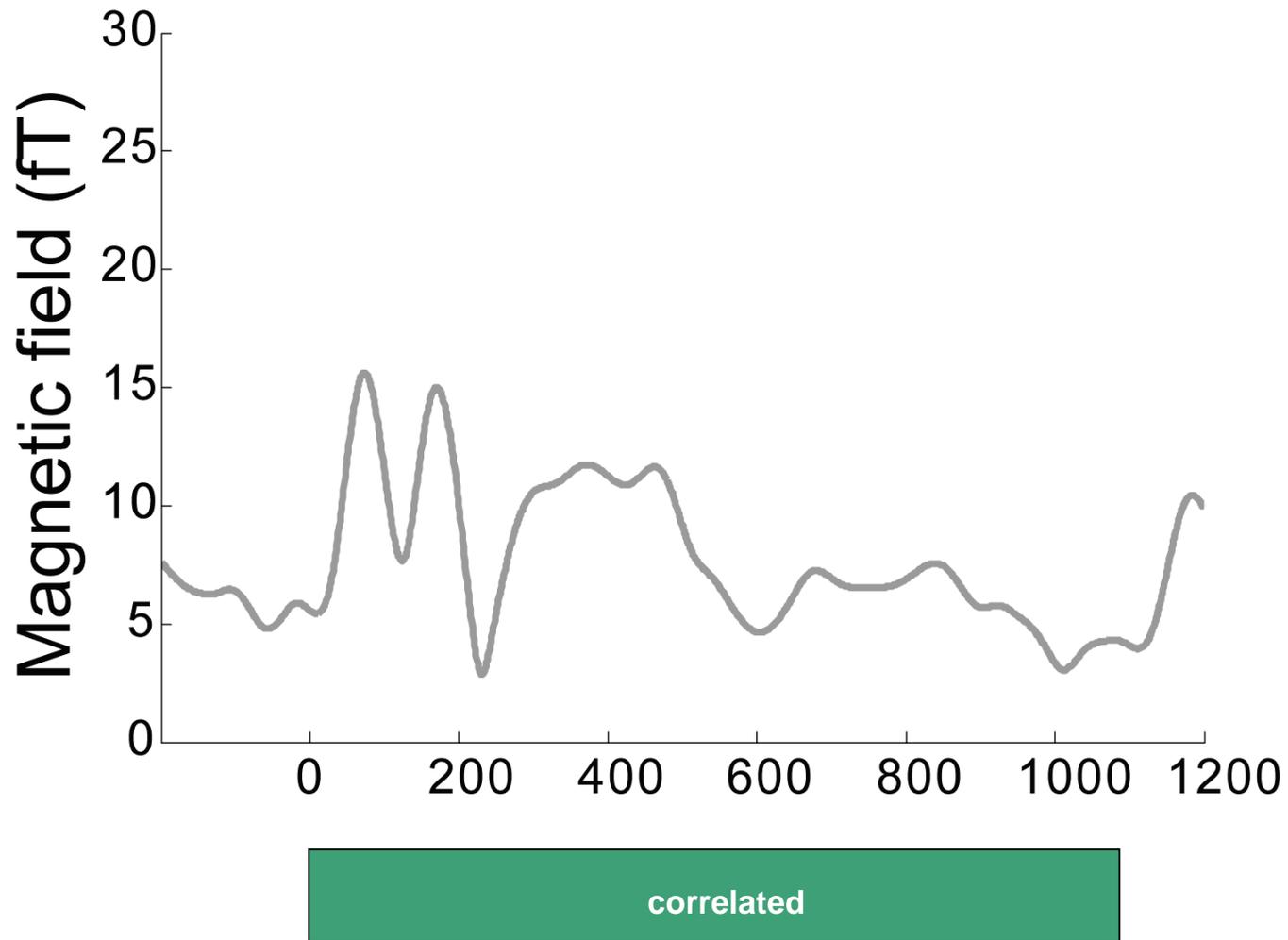
- **Properties of the computations that subserve ‘change detection’ in auditory cortex**
- **Functional significance of commonly observed auditory evoked responses (M50, M100, POR)**

# Change in the Interaural correlation of wide-band noise (N=21)

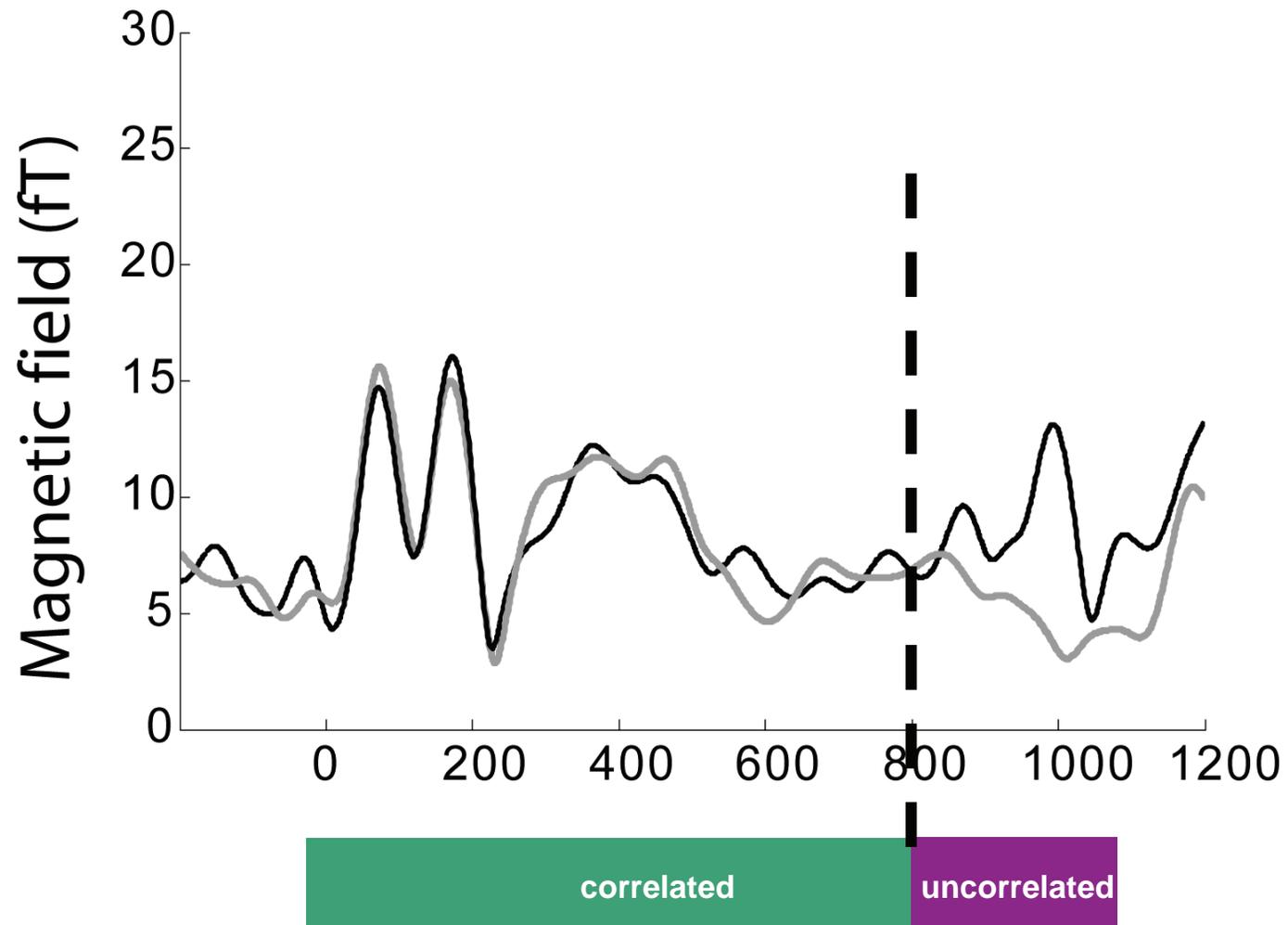


Chait et al., (2005) *J Neurosci*

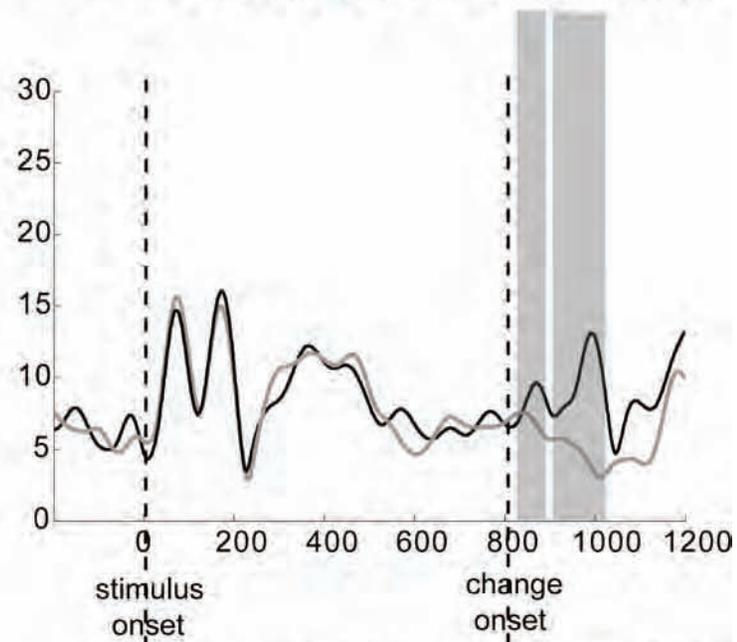
# Auditory cortical evoked response to a correlated noise



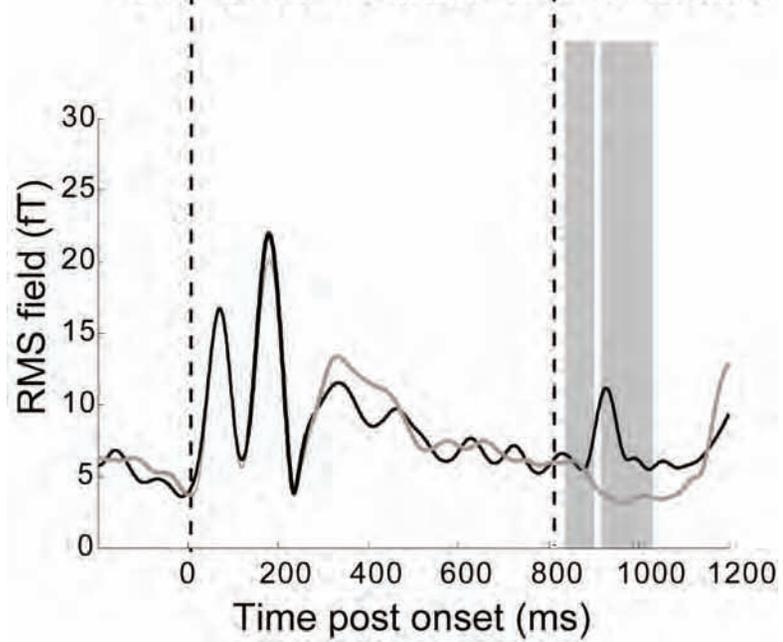
# Auditory cortical evoked response to a transition from IAC=1 to IAC=0



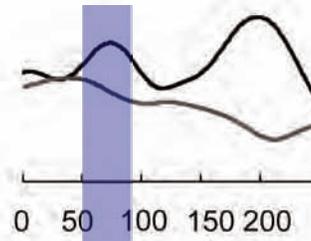
### IAC correlated-to-uncorrelated



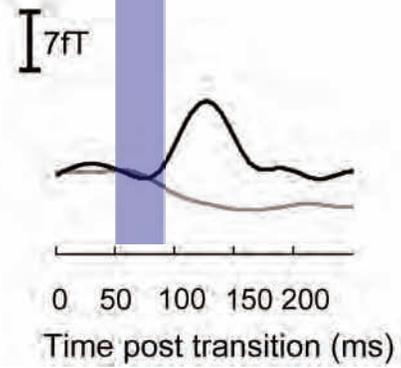
### IAC uncorrelated-to-correlated

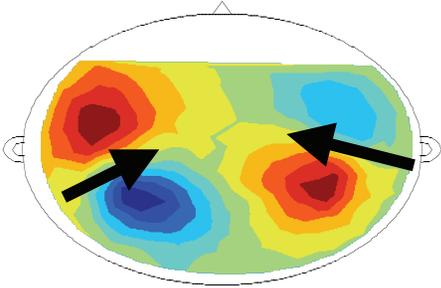


**A** IAC correlated-to-uncorrelated

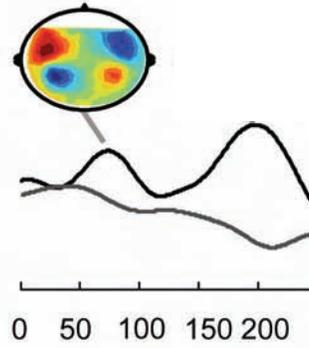


**B** IAC uncorrelated-to-correlated

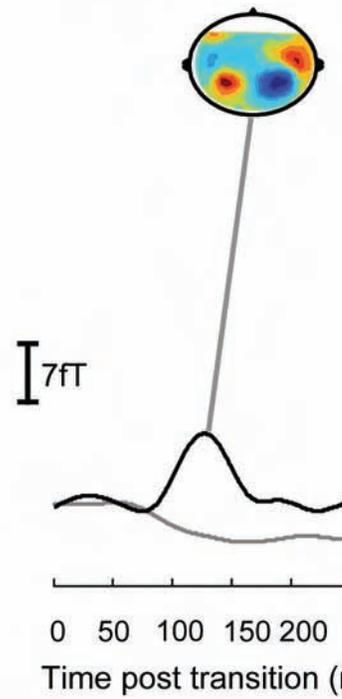
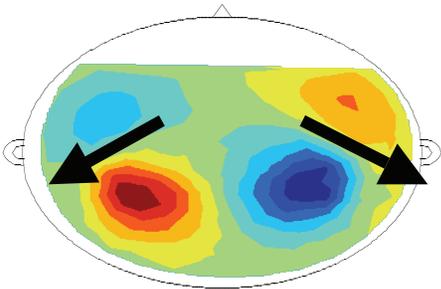




**A** IAC correlated-to-uncorrelated

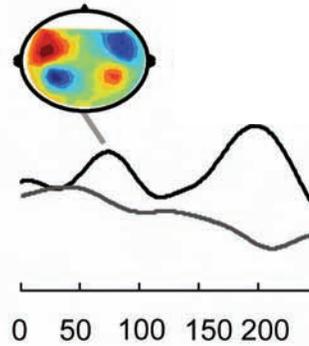


**B** IAC uncorrelated-to-correlated

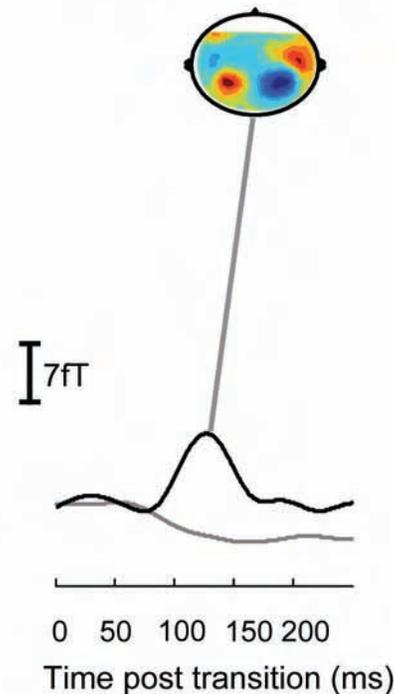


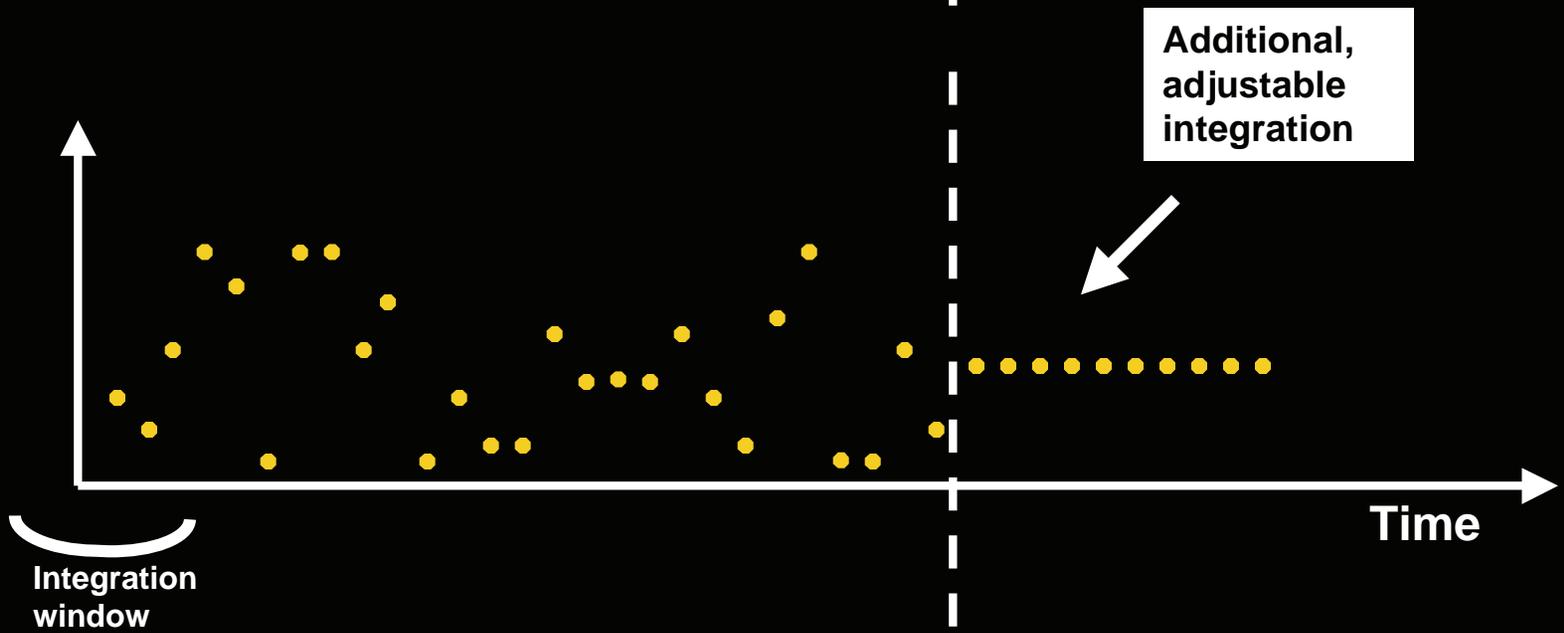
Transitions from IAC=1 to IAC=0 are processed **faster** and by **different neural mechanisms** than transitions from IAC=0 to IAC=1

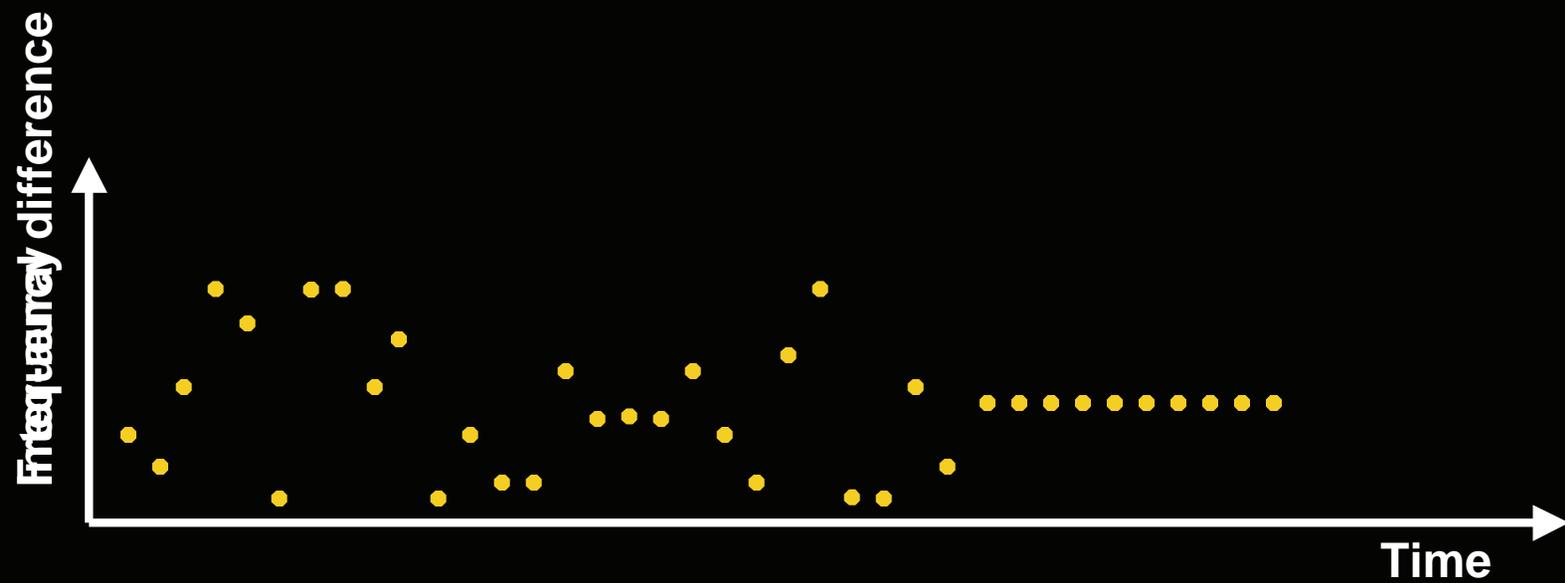
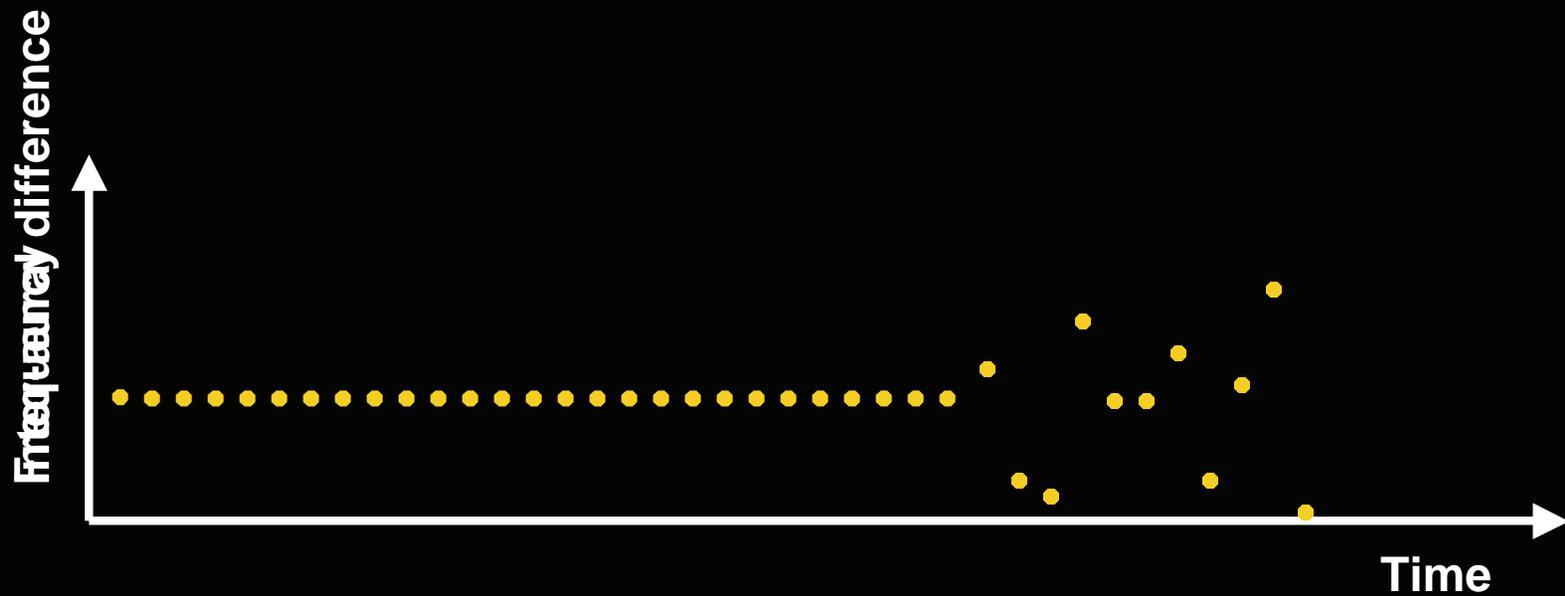
A IAC correlated-to-uncorrelated



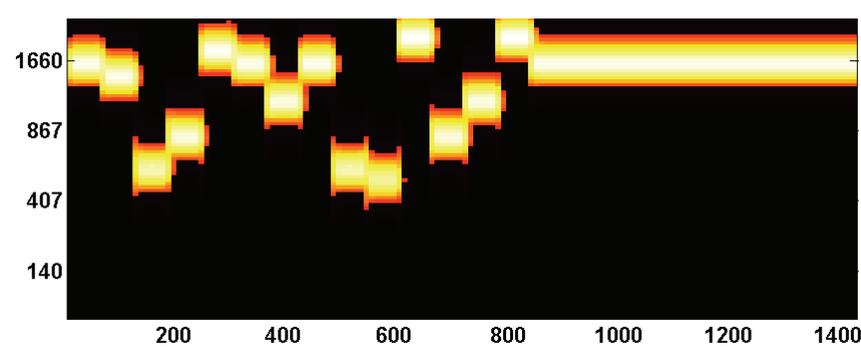
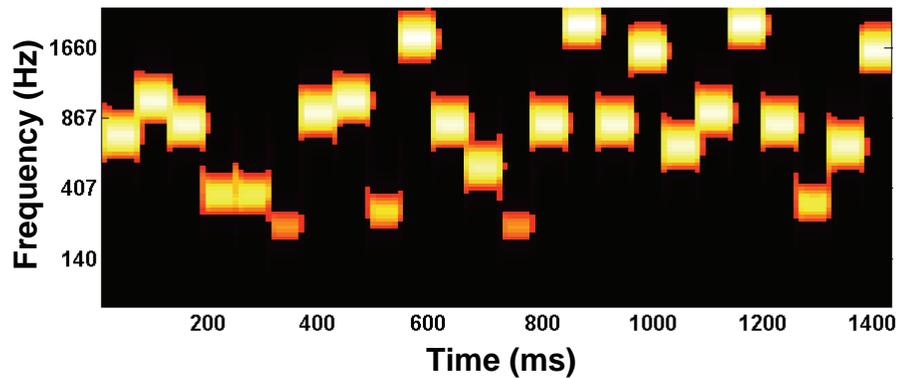
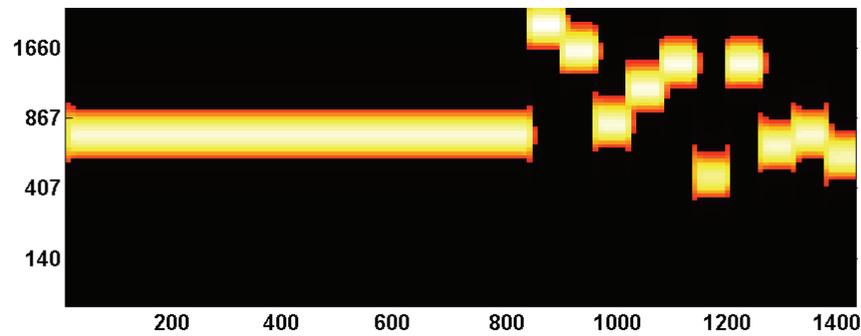
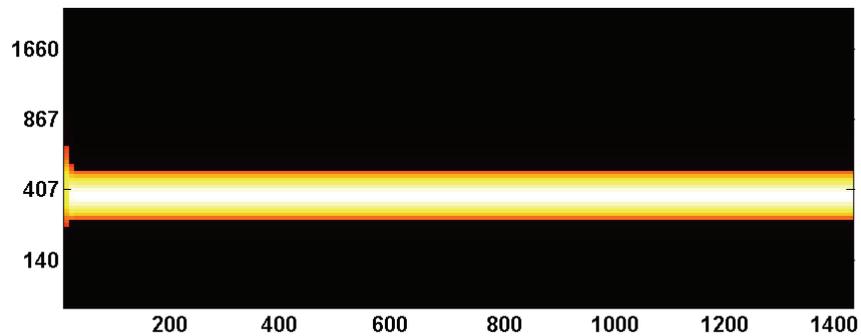
B IAC uncorrelated-to-correlated



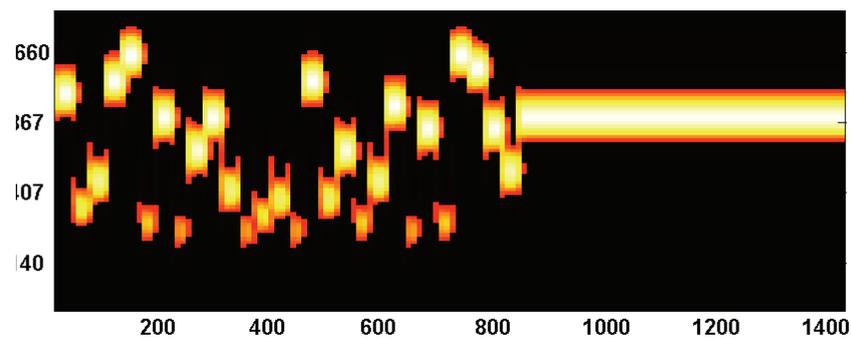
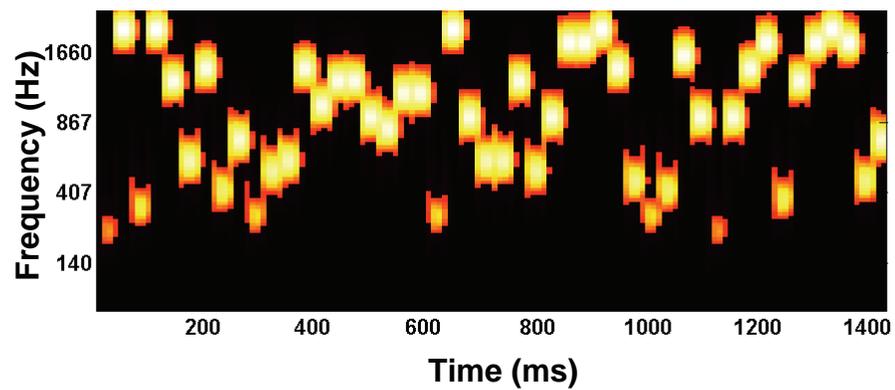
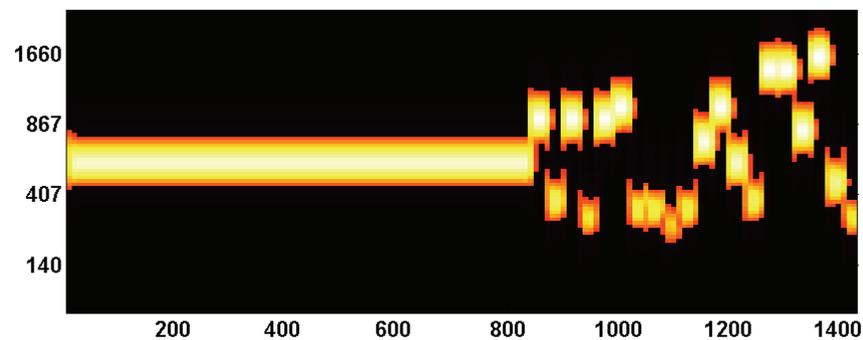
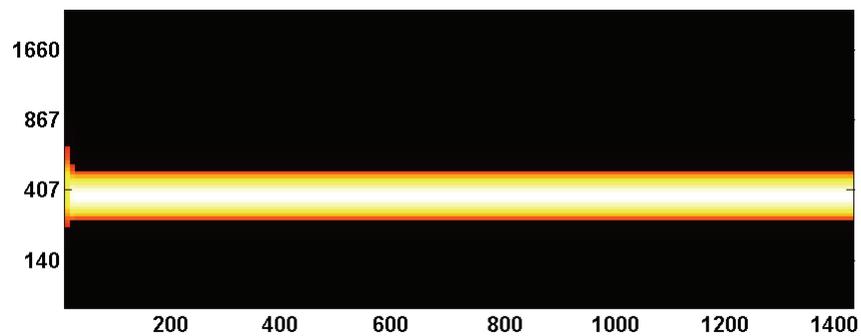




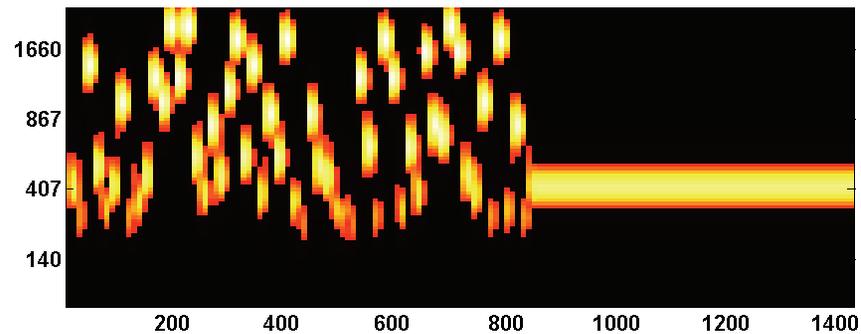
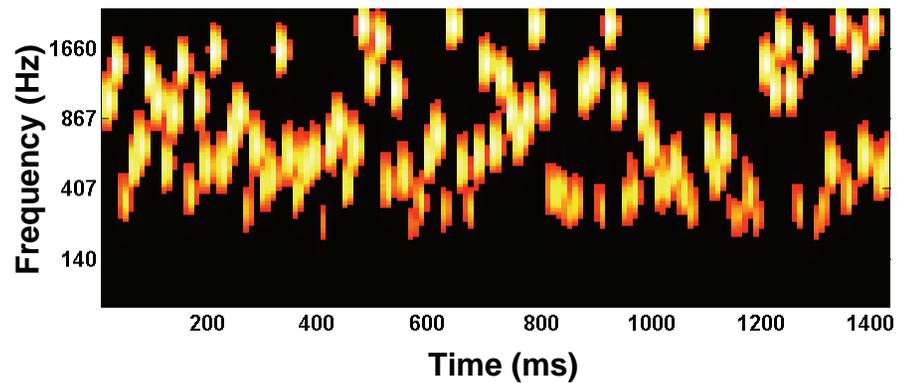
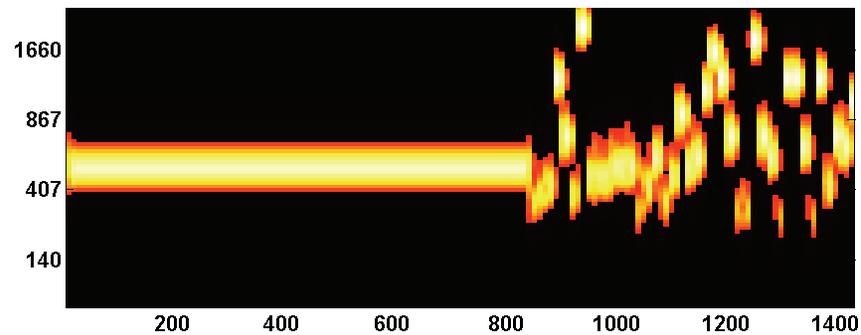
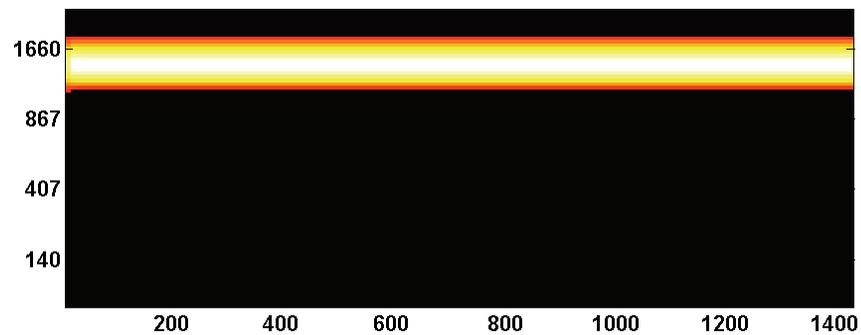
# Change in tone sequences (N=24):



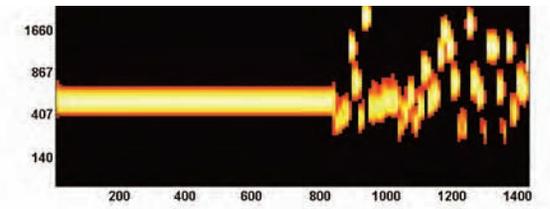
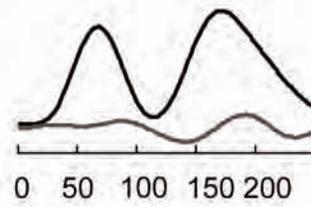
# 30ms intervals:



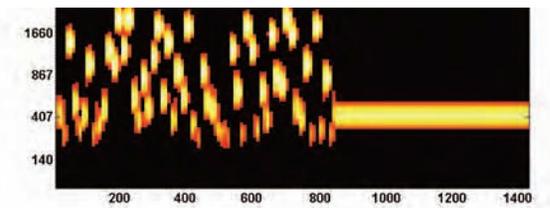
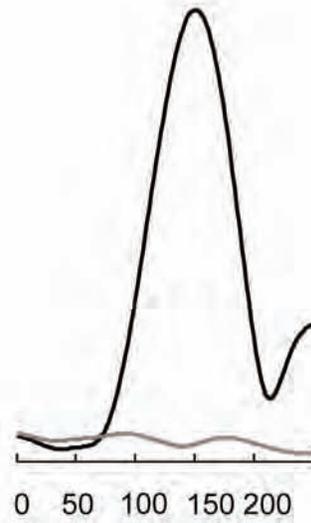
# 15ms intervals:



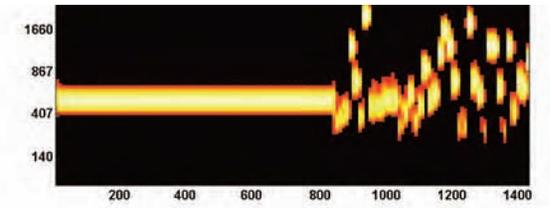
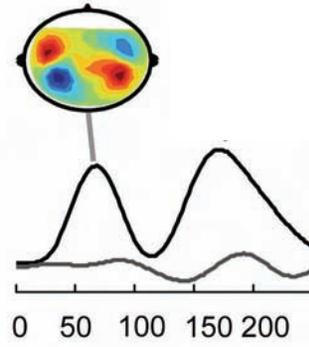
Tones constant-to-random



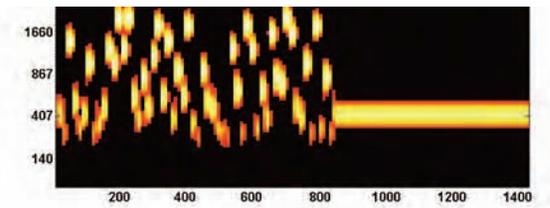
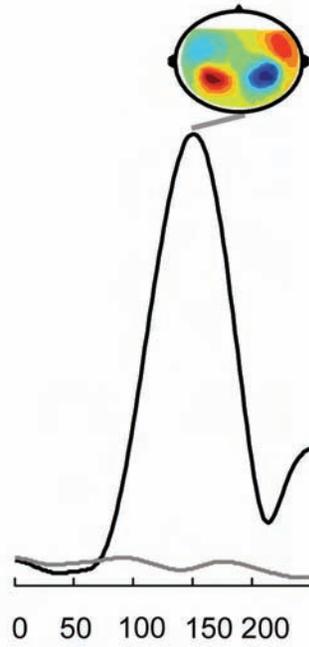
Tones random-to-constant



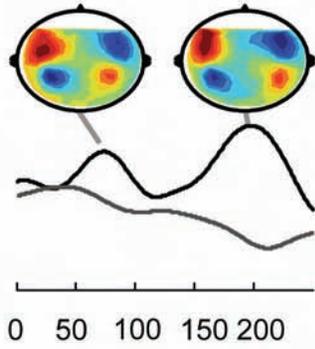
Tones constant-to-random



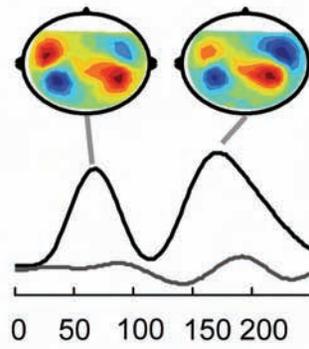
Tones random-to-constant



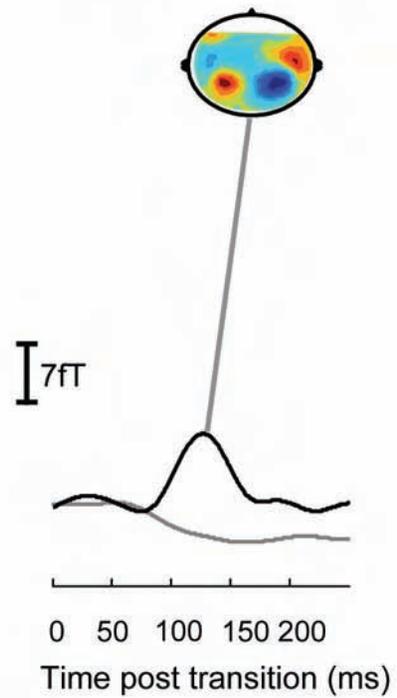
**A** IAC correlated-to-uncorrelated



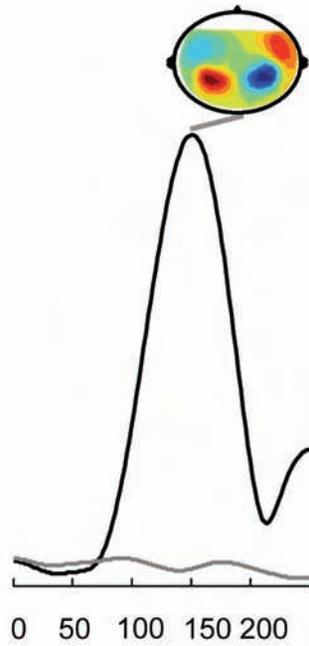
**C** Tones constant-to-random



**B** IAC uncorrelated-to-correlated



**D** Tones random-to-constant



# **A *general* change-detection mechanism**

**Based on parallel integration-windows that operate on the signal simultaneously**

**Adjusts accurately even when not (directly) behaviorally relevant**

- **Binaural Sluggishness?**

**May not be 'Binaural' per se but result from the statistics of stimulus change relevant properties.**

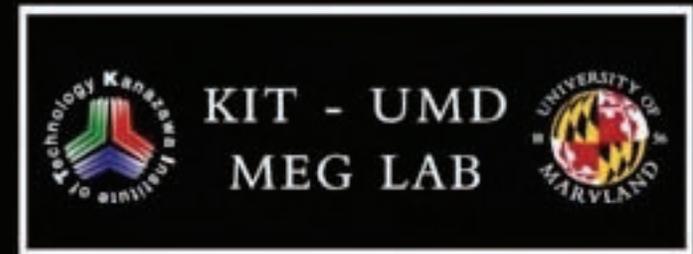
# Acknowledgements



MC and DP are supported by NIH R01DC0566

Alain de Cheveigne  
Daniel Pressnitzer

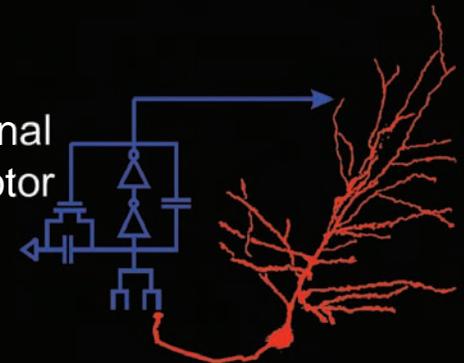
Technical Support:  
Jeff Walker  
Shantanu Ray  
Nayef Ahmar



Cognitive  
Neuroscience of  
Language  
laboratory



Computational  
Sensory Motor  
Systems  
laboratory



Audition Group,  
DEC-ENS

