

**Neuromagnetic signatures of
segregation
in complex acoustic scenes**

**Auditory Cognition Group
Wellcome Trust Centre for Neuroimaging**

Cocktail party problem

**Stochastic
figure-ground
stimulus**



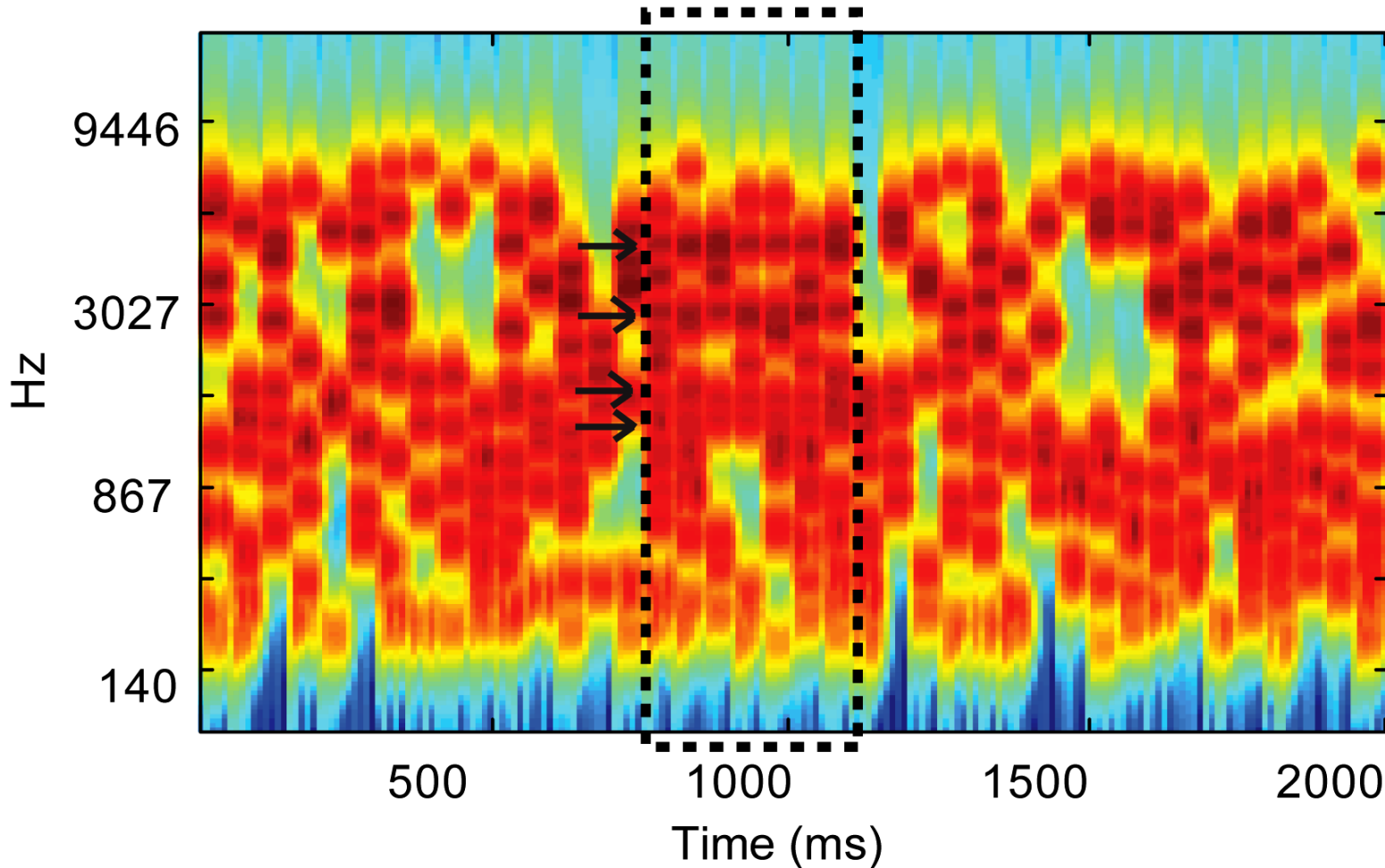
Psychophysics
Temporal coherence
modelling

fMRI

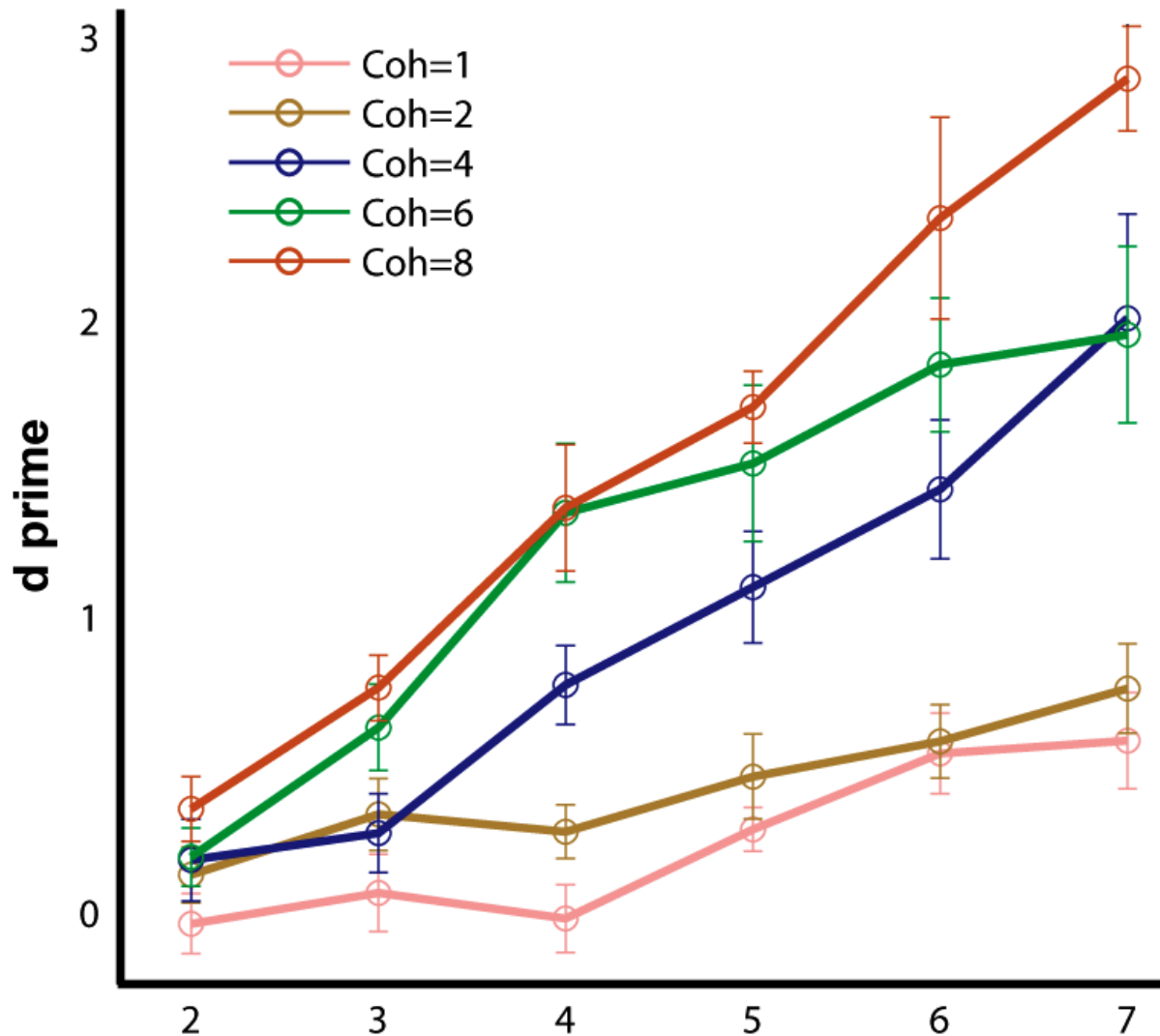
MEG

Stimulus (Basic)

Figure with 'coherence' = 4 and 'duration' = 7



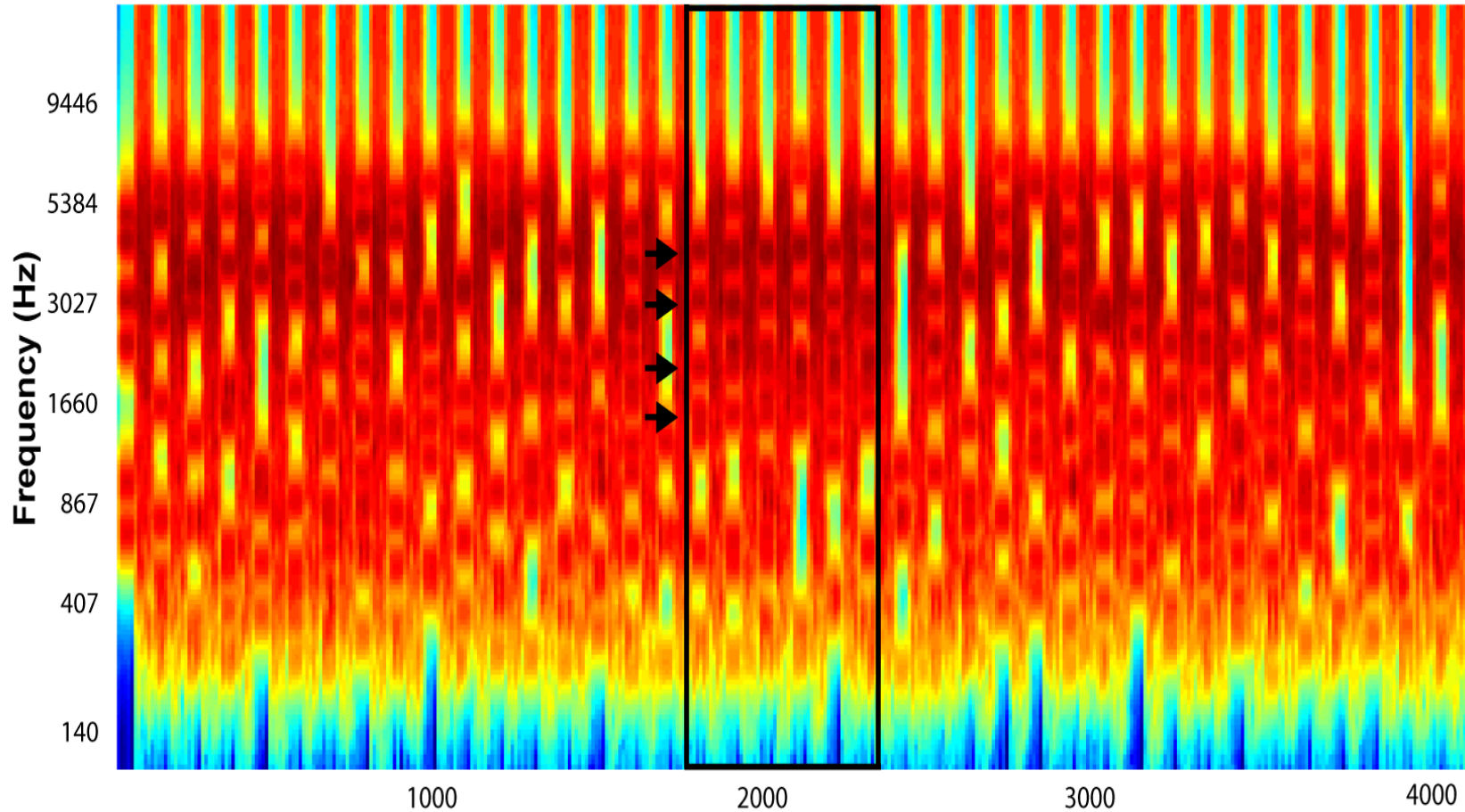
Psychophysics (Basic)



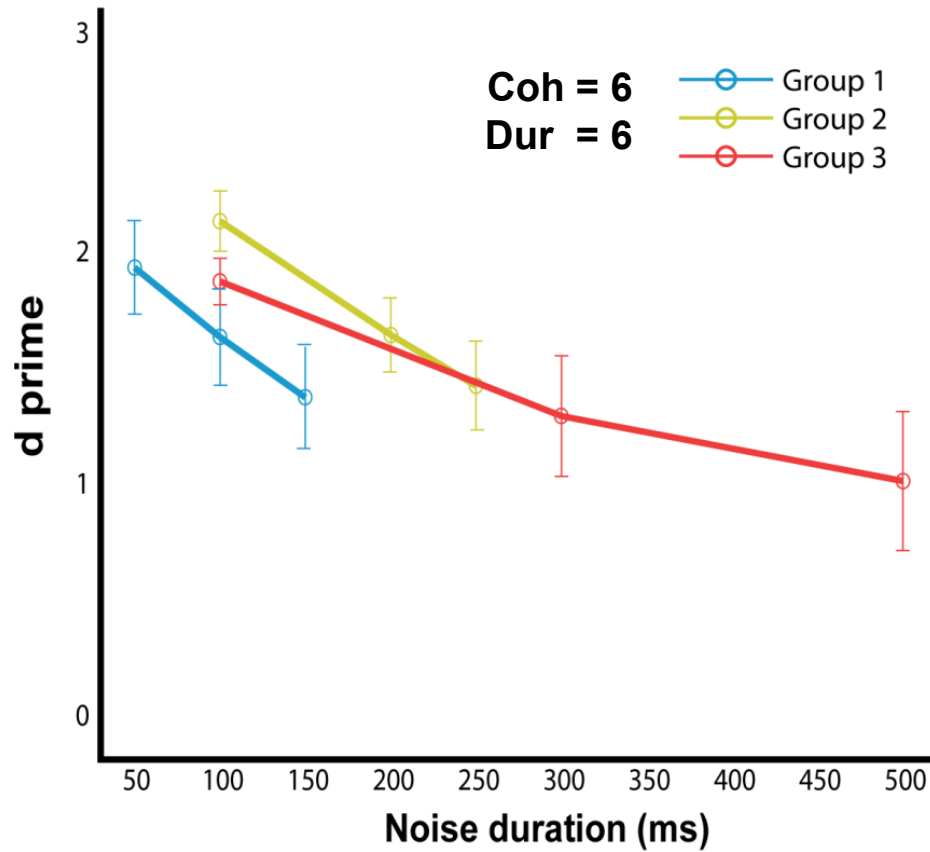
$n=10$

Stimulus (Noise)

Figure with 'coherence' = 4 and 'duration' = 6



Psychophysics (Noise)



MEG (Basic)

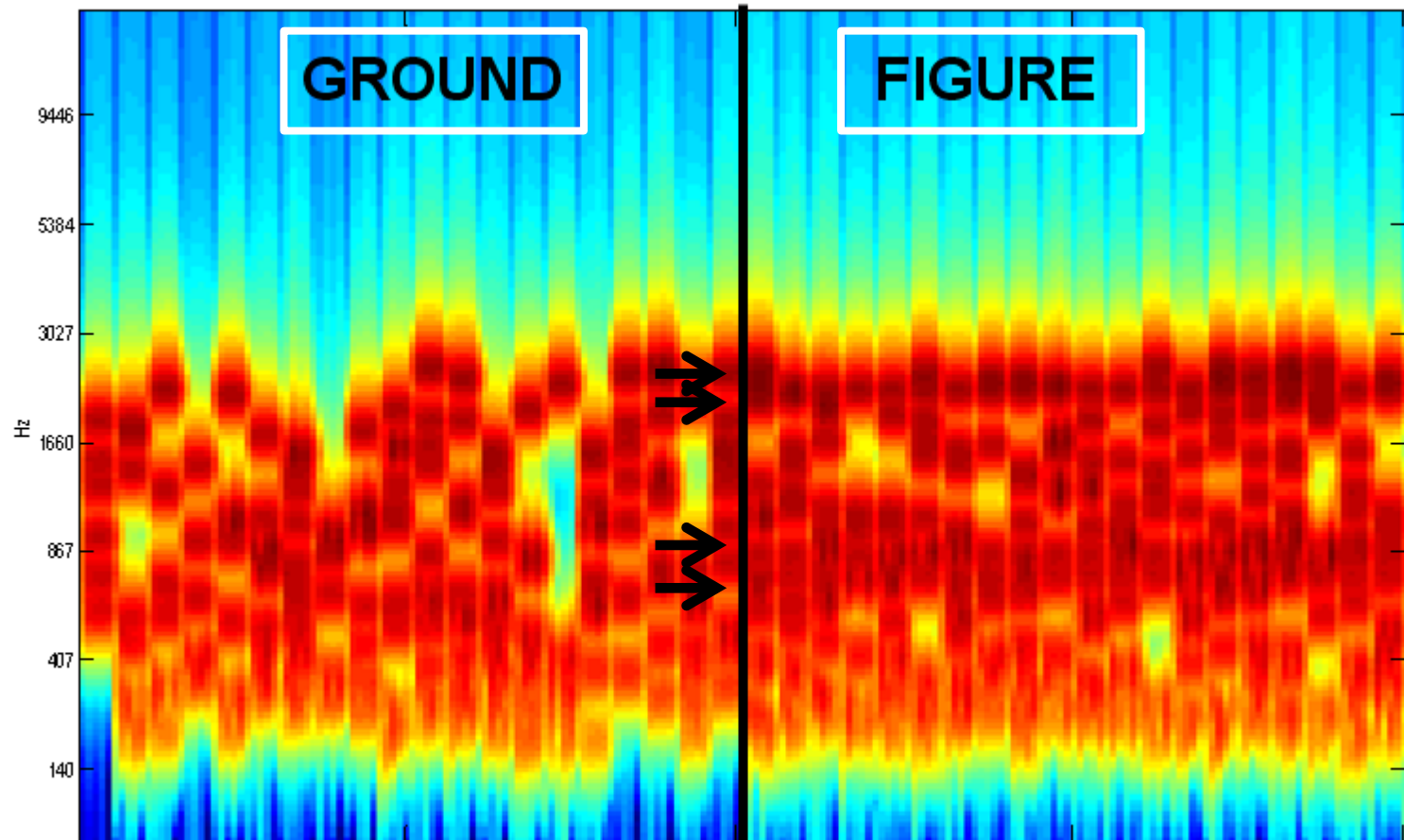
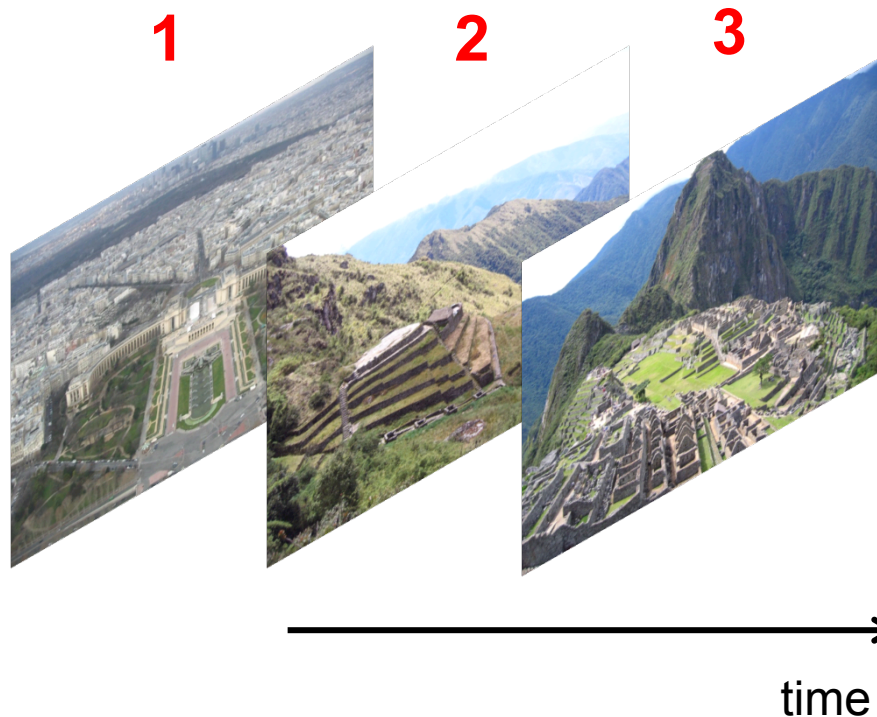


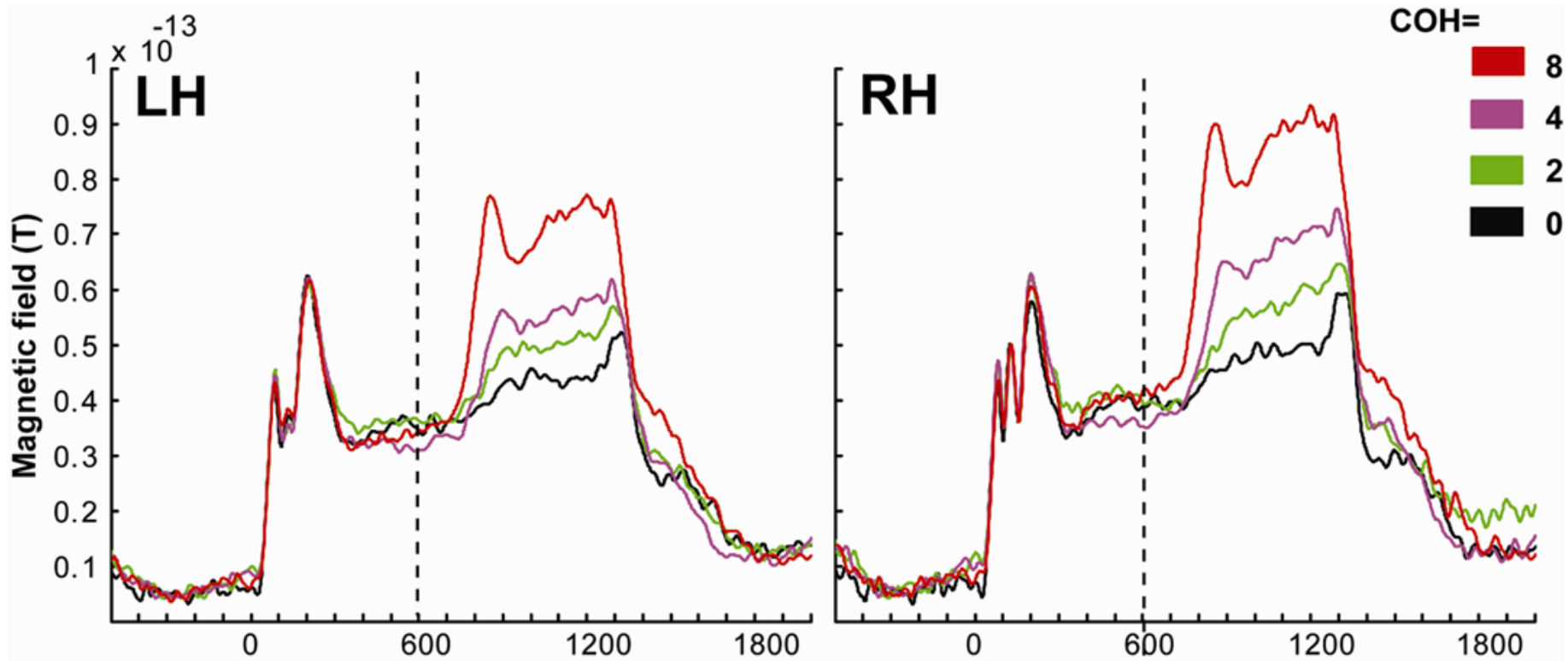
Figure with 'coherence' = 0, 2, 4 or 8.
25 ms chords
Ground/Figure duration = 600 ms

MEG Task

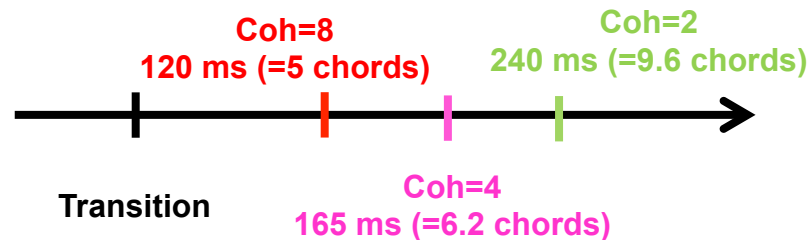
- Subjects naïve ($n=20$) to the auditory stimuli.
- Instructed to perform an irrelevant visual task:
 - > Respond if image 3 is same as 1 or 2



MEG EVOKED (Basic)



Significant difference from baseline:



Using DSS
de Cheveigne, 2010

Source analysis (Basic)

I. Sources for EARLY component (600-900ms): Priors in PT (based on fMRI)

*COH8 vs. Ground

*COH4 vs. Ground

*COH2 vs. Ground

Not significant between different COH conditions

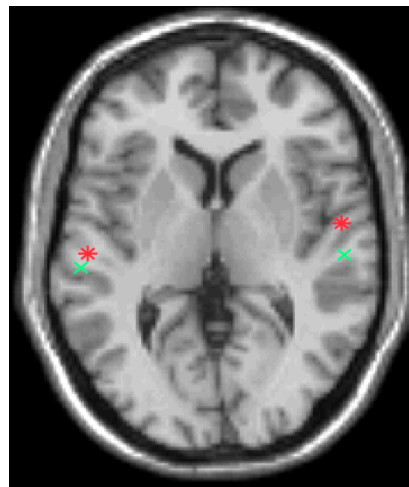
II. Sources for EARLY and LATER (900-1200ms) components: Priors in PT

*COH8

*COH4

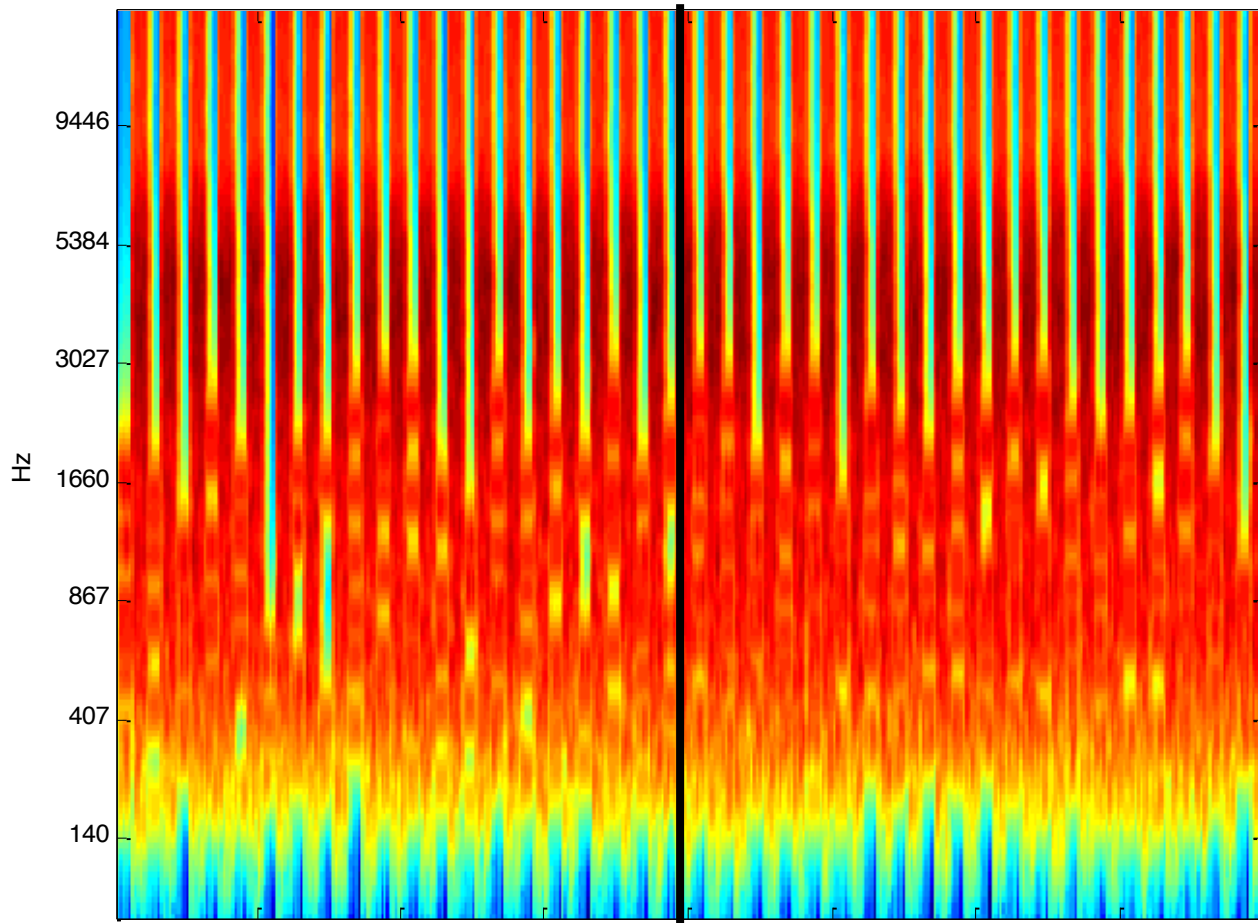
*COH2

Not significant for Ground



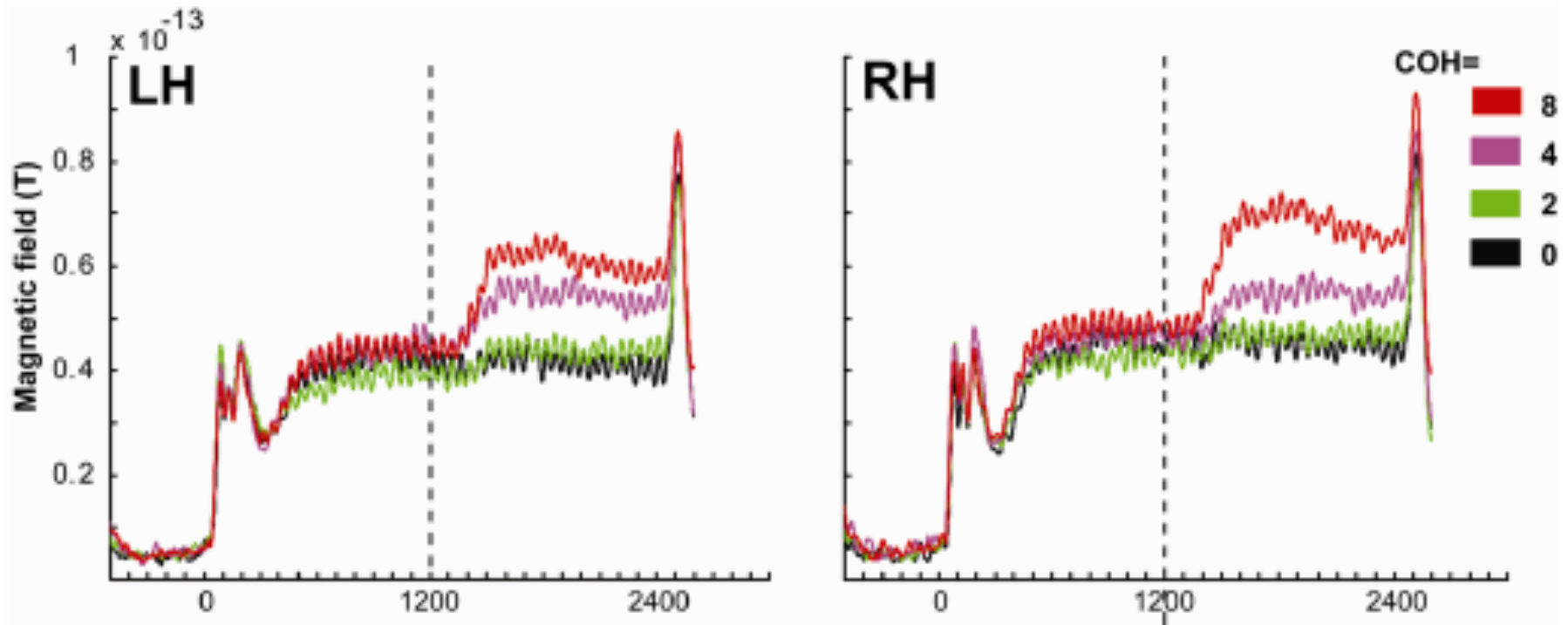
**Significantly different
 $p < 0.05$; Hotelling T2 test*

MEG (Noise)

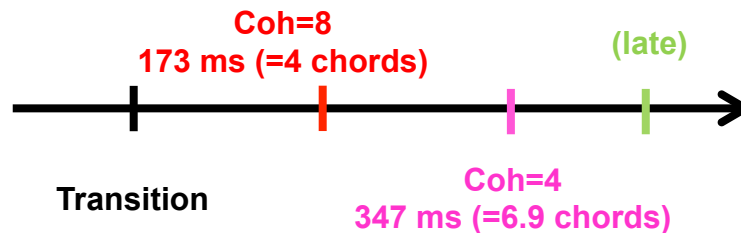


**Figure with 'coherence' = 0, 2, 4 or 8.
25 ms chords
Ground/Figure duration = 1200 ms**

MEG EVOKED (Noise)



Significant difference from baseline:



Source analysis (Noise)

I. Sources for EARLY component (1200-1500ms): Priors in PT

*COH8 vs. Ground

*COH4 vs. Ground

*COH2 vs. Ground

Not significant between different COH conditions

**Significantly different
 $p < 0.05$; Hotelling T2 test*

Summary

- Auditory system can extract salient objects in the acoustic scene in the absence of directed attention
- MEG latencies correspond with behavioural latencies for figure detection
- Sources for coherent signals localized in PT
- Ongoing MEG work:
further source analysis, time-frequency analysis, beamforming

Acknowledgments



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