Irrelevant Predictions:
Distractor Rhythmicity Modulates Neural Encoding in Auditory Cortex

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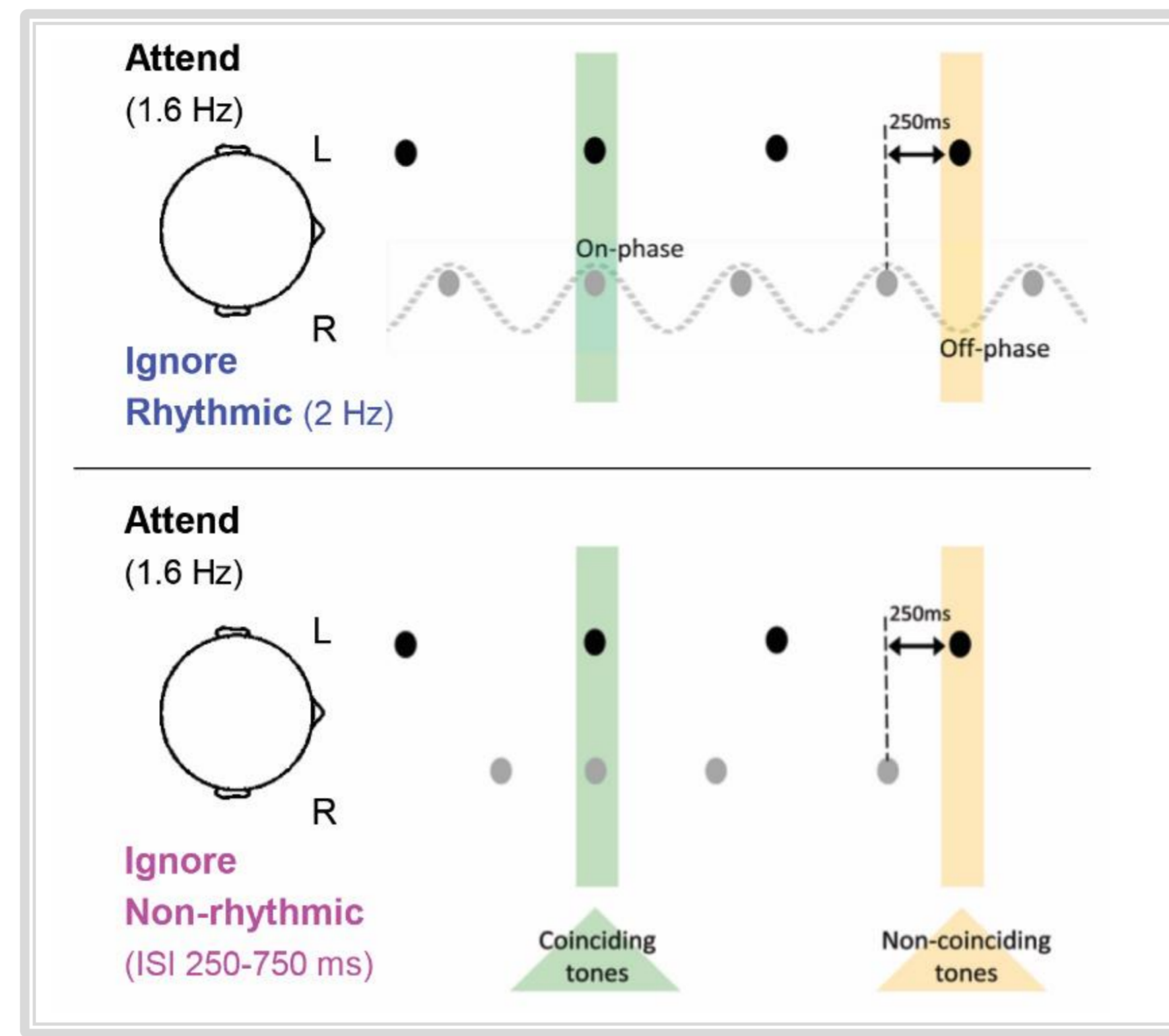Gonda Multidisciplinary Brain Research Center, Bar Ilan University

BACKGROUND

A key question in the field of attention is whether task-irrelevant stimuli that should be ignored, nonetheless influence performance on an attended task.
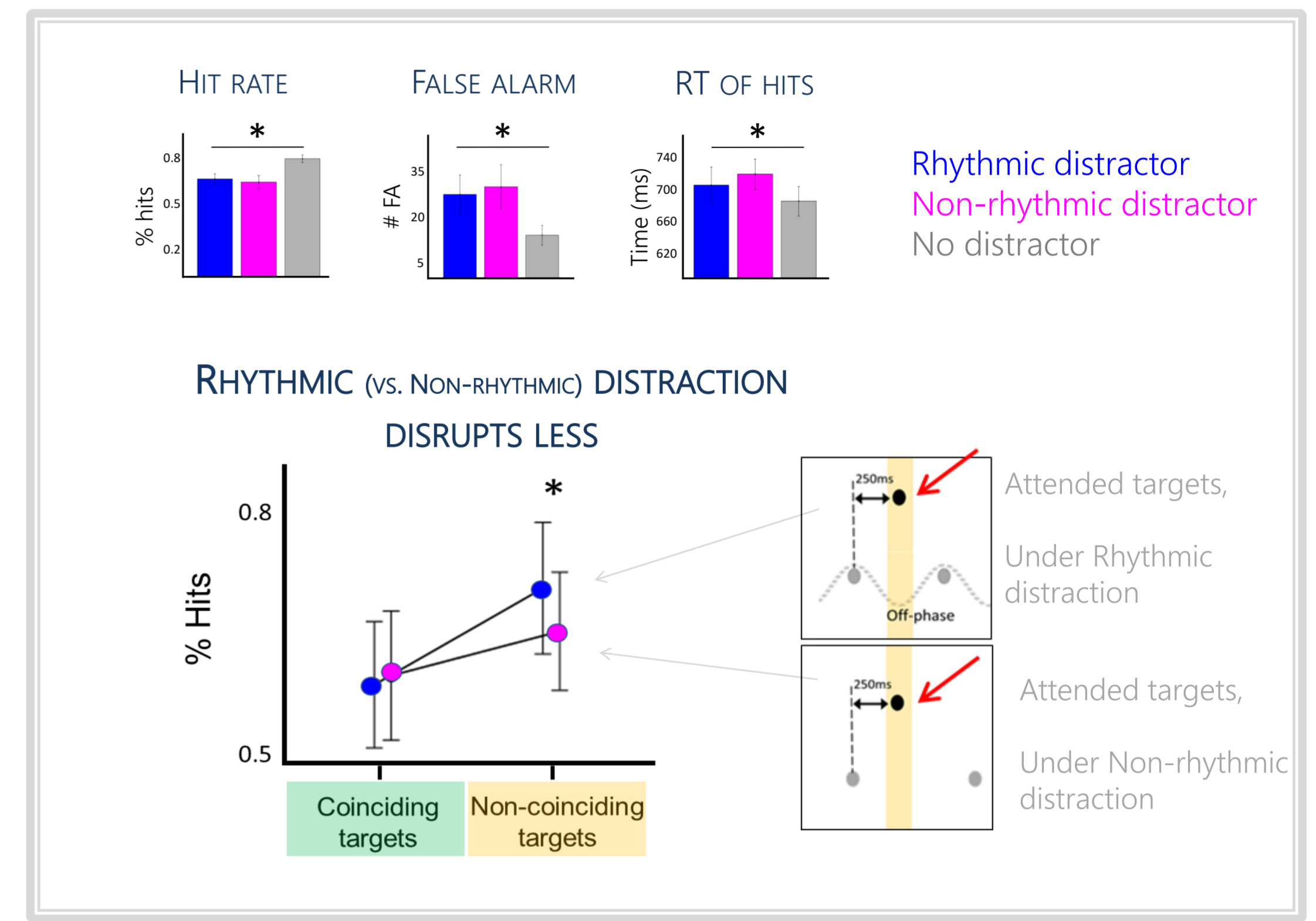
Here we tested a specific facet of this question: Are the principles of Dynamic Attending Theory applied to task-irrelevant sounds?

Specifically we ask whether temporal predictions are formed for distractor sounds and do they influence perceptual sensitivity and neural encoding of attended sounds?
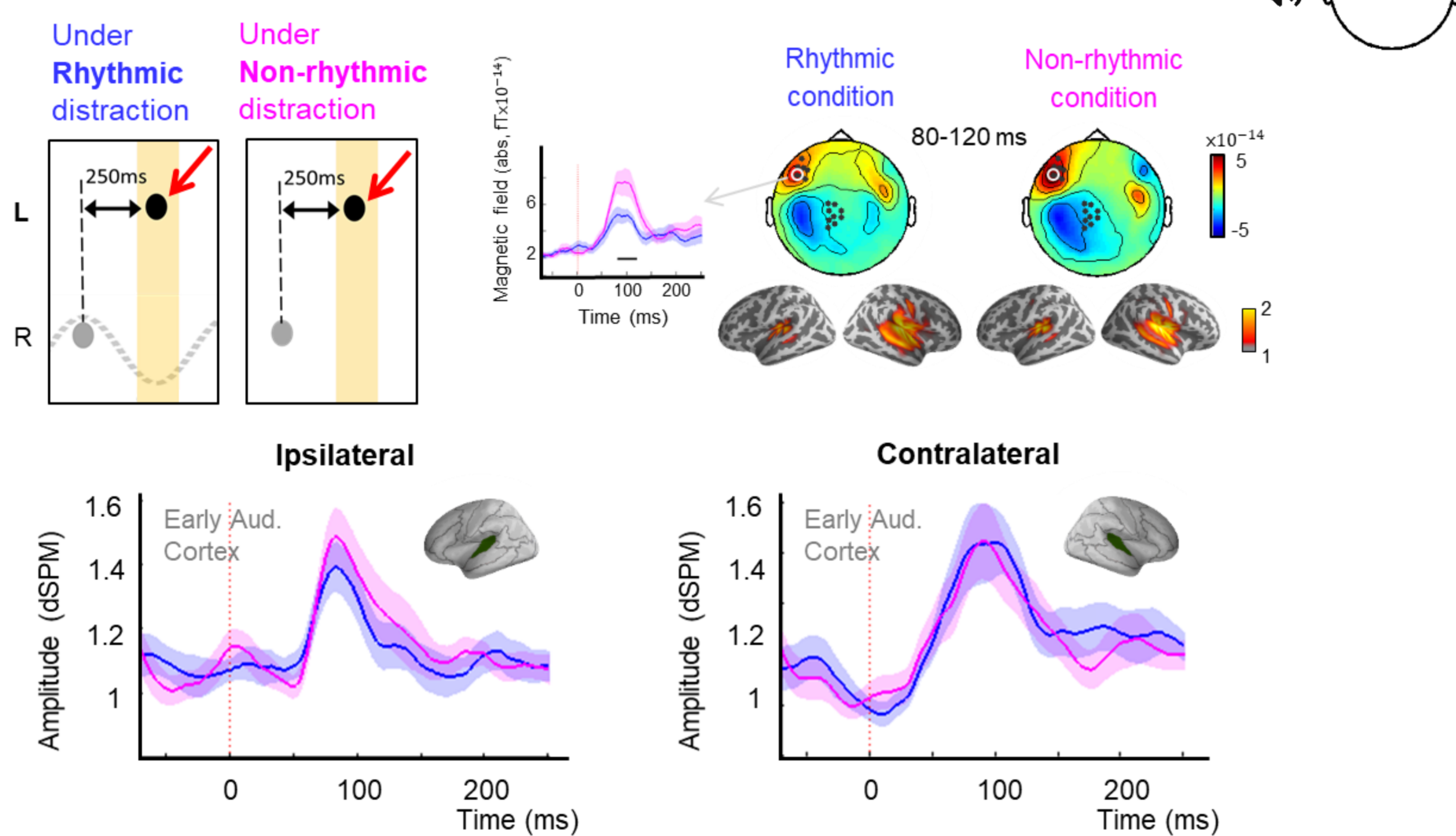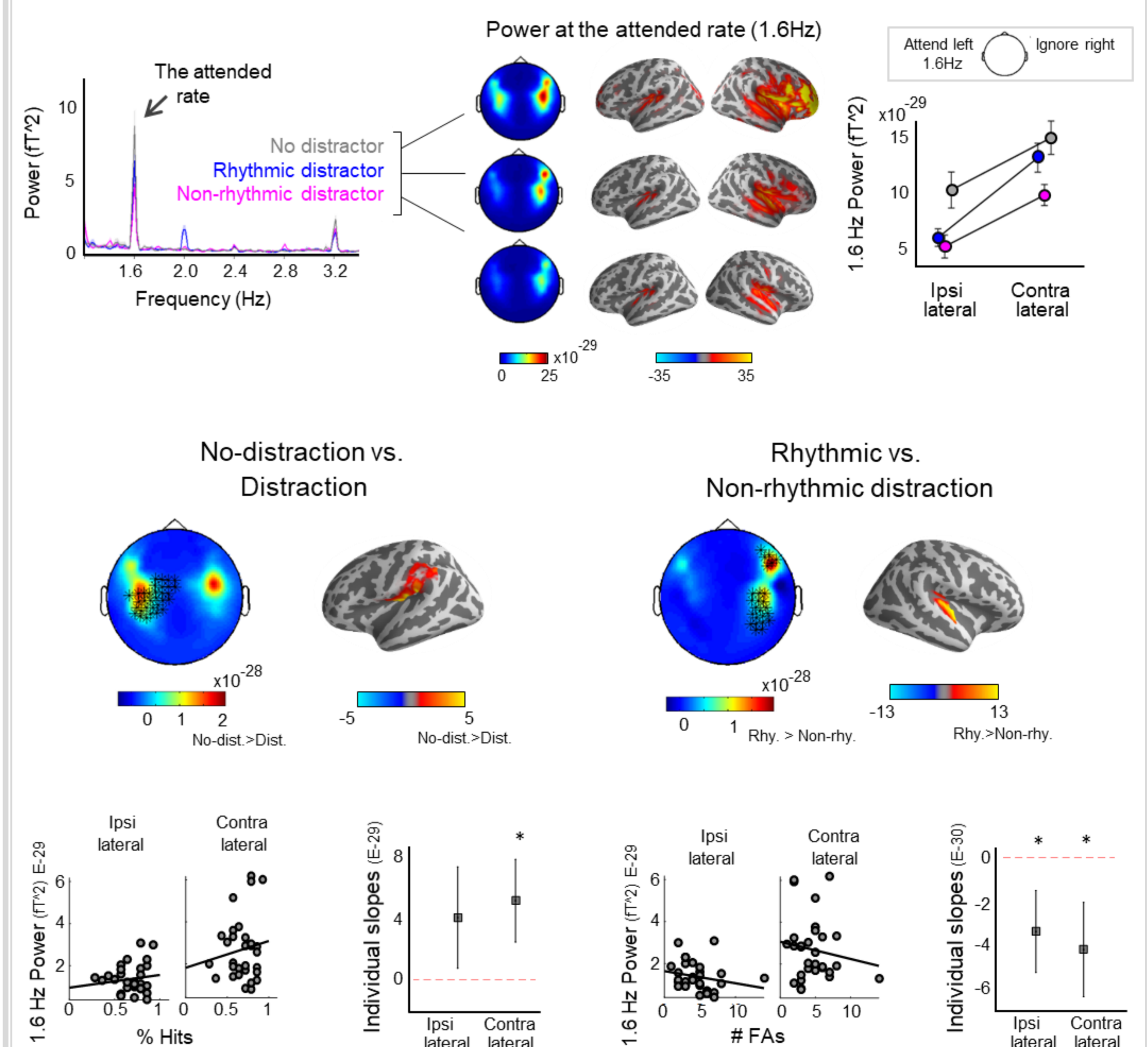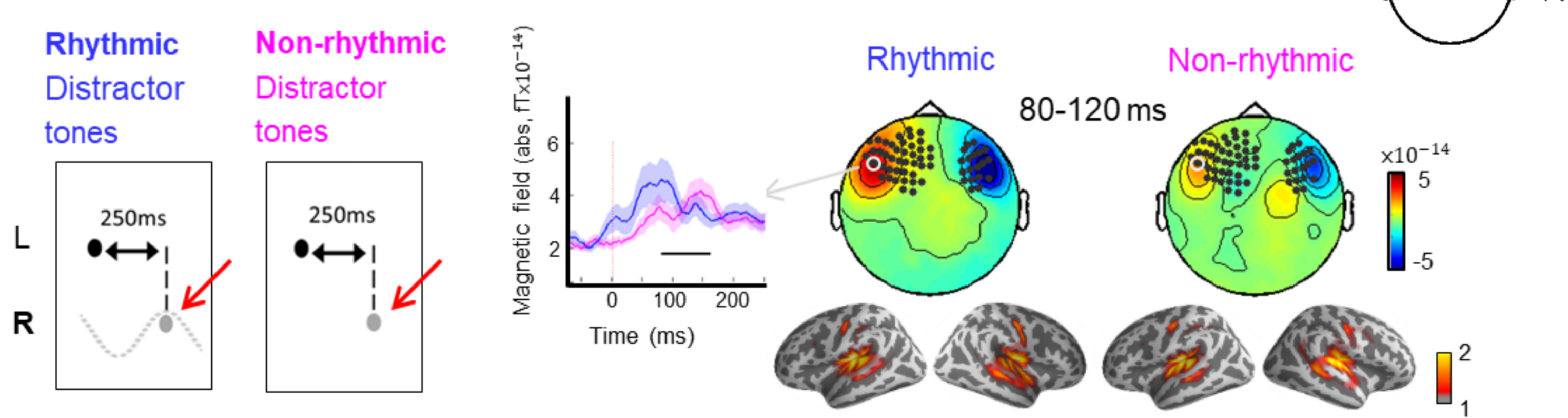
DESIGN

BEHAVIORAL RESULTS

Hit rate | False alarm | RT of hits

Rhythmic distractor
Non-rhythmic distractor
No distractor

RHYTHMIC (vs. Non-rhythmic) DISTRACTION DISRUPTS LESS

Attended targets, Under Rhythmic distraction
Attended targets, Under Non-rhythmic distraction

MEG RESULTS

RESPONSE TO ATTENDED TONES (LEFT EAR)

Under Rhythmic distraction | Under Non-rhythmic distraction

Rhythmic condition | Non-rhythmic condition
80-120 ms

Ipsilateral | Contralateral
Early Aud. Cortex

RESPONSE TO DISTRACTOR TONES (RIGHT EAR)

Rhythmic Distractor tones | Non-rhythmic Distractor tones

Rhythmic | Non-rhythmic
80-120 ms

Response in the Contralateral hemisphere | Response in the Ipsilateral hemisphere

Posterior-Opercular | Early Aud. | TPJ | Insular & Frontal-Opercular | Aud. Association

p<0.05
p=0.067
cluster corrected

UNPREDICTABLE DISTRACTORS REDUCE THE REPRESENTATION OF ATTENDED SOUNDS

The attended rate

No distractor
Rhythmic distractor
Non-rhythmic distractor

Power at the attended rate (1.6Hz)

Attend left 1.6Hz | Ignore right

No-distraction vs. Distraction | Rhythmic vs. Non-rhythmic distraction

No-dist.>Dist. | Rhy. > Non-rhy.

Ipsilateral | Contralateral | Individual slopes

DISCUSSION

These findings suggest that temporal predictability not only serves to enhance processing of attended stimuli, as suggested by **Dynamic Attending Theory,** but that temporal predictions are also utilized for more effectively ignoring task-irrelevant stimuli.