PERIODIC NOXIOUS HEAT, INNOCUOUS COLD AND INNOCUOUS VIBROTACTILE STIMULATION INDUCE SIMILAR MODULATIONS OF THETA, ALPHA AND BETA BAND EEG OSCILLATIONS

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BACKGROUND AND AIMS

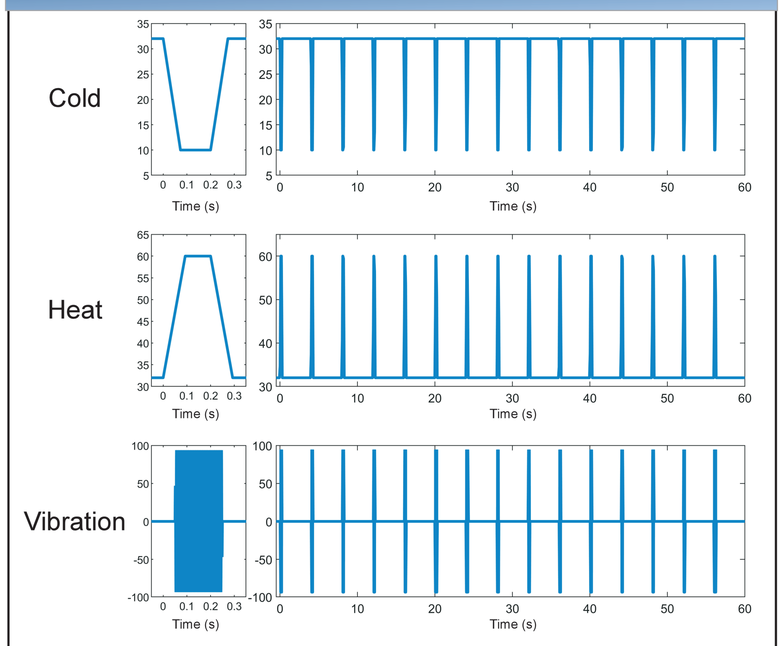
Previous frequency tagging experiment found that sustained periodic noxious heat stimuli elicit periodic modulations of the magnitude of ongoing EEG oscillations in theta, alpha and beta frequency bands.

Our study aimed to assess whether these responses are specific for heat pain by comparing heat-evoked responses to the responses elicited by innocuous cold and mechanical vibrations.

METHODS

20 Healthy young volunteers
2 experimental sessions (1 week apart)
Volar forearm during 1 session and foot dorsum during the other
14 stimuli per modality (cold, hot,vibration) and per session
Thermal stimuli were delivered using a contact thermode (TCS II, probe T03).
Vibrotactile stimulation (200Hz) were delivered using a round-tipped piezo-electric actuator (VTS 1).
64 channels EEG (SR: 1024 Hz)
Hilbert transforms were used to assess the envelope of theta-, alpha- and beta-band oscillations.
Frequency tagging was used to reconstruct the amplitude of the periodic response.
Multi-sensor cluster-based permutation Wilcoxon one-sample t-tests were used to assess whether these amplitudes were larger than 0.

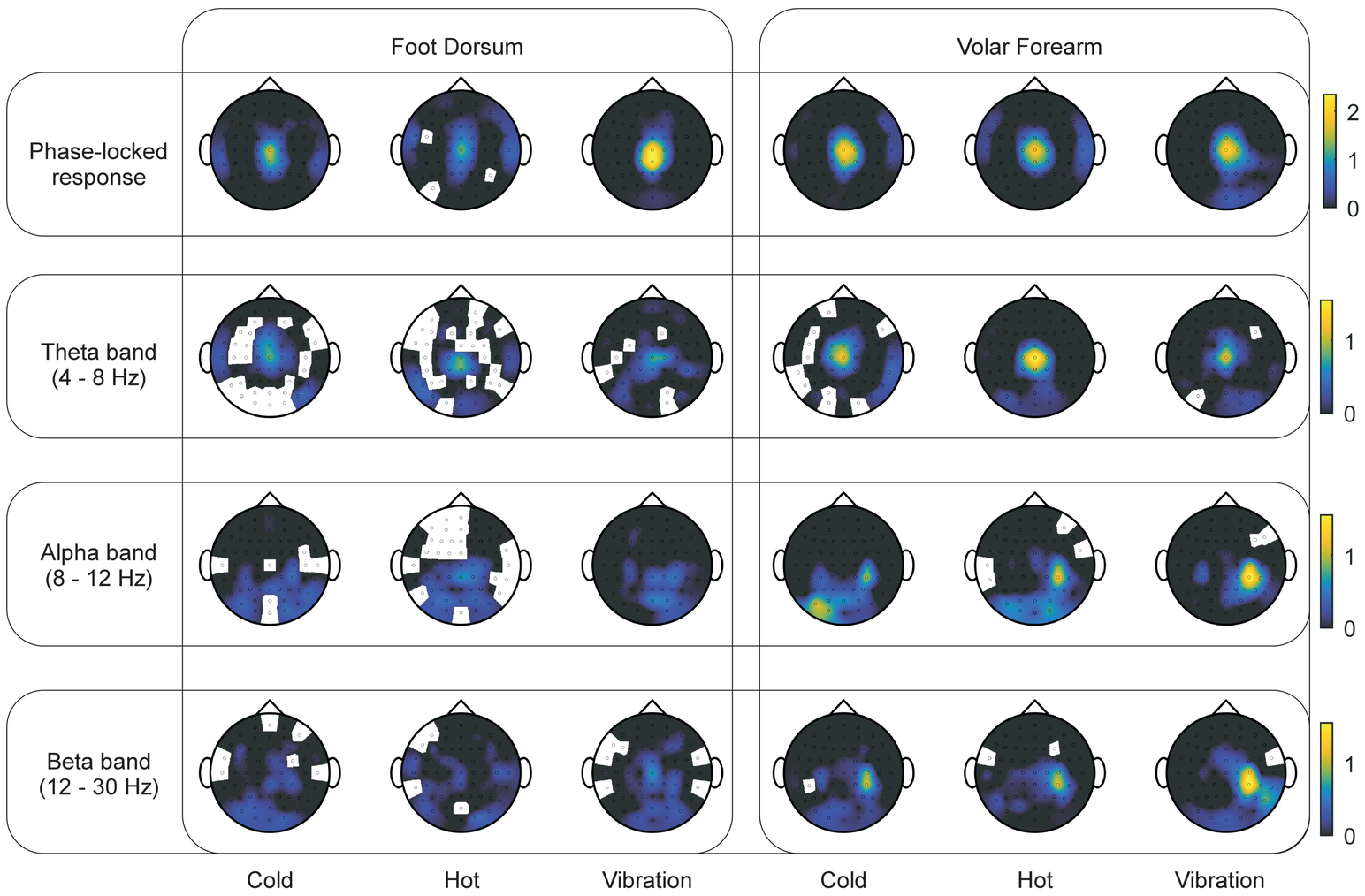
STIMULI



RESULTS

Periodic modulations of the theta, alpha and beta bands were observed for all modalities and limbs.
For a given limb, the topographies of these modulations were similar for all modalities.
Modulations observed during upper limb stimulation had similar topographies to those reported by previous frequency tagging experiments using slowly modulated sustained noxious heat stimuli.
These modulations likely reflect somatosensory processes or modality non-specific activity associated with perception.

STIMULI



The topoplots represent the group level averages of normalized topographies.

The topographies are plotted only for electrodes which showed a significant periodic activity during the multisensor cluster based permutation t-test.

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