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The role of gamma activity in affinity to statistical learning

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Statistical learning (SL) is described as a general, implicit phenomenon to segment continuous information. Although it is claimed to be essential for our perception, the behavioral results of SL studies vary greatly. In the present study, we examined the EEG correlates of implicit, visual SL and investigated the results according to performance.

Twenty-nine subjects (16 female, mean age: 26.38y) were shown an image sequence, where unbeknownst to them, certain pictures formed stimulus pairs that always followed each other. The second images of the pairs became predictable compared to the preceding ones and the unpaired control pictures. After acquiring 64-channel EEG data during the task, participants were divided into two groups based on their results of a familiarity test (above-chance (n=14) or chance (n=15)). We examined the time-frequency data between the groups and the conditions (predictable & unpredictable) and used permutation statistics with cluster-based correction.

We found a great difference between above-chance performers and chance-performers in the gamma band (45-70 Hz), 500-800 ms after stimulus onset. The analysis shows a significant cluster in the left frontoparietal region. We pursued this difference in the above-chance performers and the same gamma difference was traceable between the preceding and the control conditions. Gamma power was higher in the preceding condition with the same scalp distribution.

In literature, the gamma activity of the frontoparietal network has been linked to visual attention. Our findings might reflect a top-down modulation of visual attention before the predictable stimuli, which can contribute to interpersonal affinity differences.

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