Strategies of the anticipatory attention

Anticipatory attention is a downstream modulation of brain activity, directed towards facilitation of processing of upcoming stimuli. We studied anticipatory attention in the visual task comprising two types of cues announcing difficult (visual search of 16-element matrix) attentional task versus easy motor response. The pattern of behavioural responses revealed existence of two distinct subpopulations of subjects: working under time-pressure (77% "fast-responders") and delaying the response (23% "slow-responders"). As predicted by the speed-accuracy trade-off, fast-responders performed worse than slow ones. This worse performance characterized also such a subgroup of fast participants that matched slow ones in the time spent on providing response in attention trials. Thus, sole motivation to respond as fast as possible changed performance in our task.

Both groups were significantly better in trials preceded with longer cues indicating active preparation during this period. However, the implemented anticipation mechanisms were different in both groups. Fast-responders during anticipation period exhibited significant top-down modulation of alpha power, which was positively related to their performance. No such relation was observed in the slow-responders. In contrary, slow responders expressed significant top-down modulation of Contingent Negative Variation (CNV) potential previously described as related with subjective assessment of time flow. The power of CNV was positively correlated with the behavioural performance only in the slow-responding group. Different anticipatory mechanisms resulted with different performance in the visual search task during which slow-responders exhibited bigger P300 amplitude. The power of P300 correlated positively with performance only in the slow-responders.