Neural variability quenching during the planning of reaching movements

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While the reduction (quenching) of trial-by-trial variability of neural activity during repeated visual stimulus presentation determines perceptual performance, it is still unknown whether quenching occurs and has any behavioral relevance in the motor system. We investigated neural variability quenching during delayed reaching movements to targets of two different sizes (large versus small). Previous studies have shown that reaches to large targets induce more task-irrelevant variability than those too small targets, but it is unclear if this can be related to neural activity during movement planning. Using electroencephalography (EEG), the participants' level of neural variability quenching during the planning of reaching movements was assessed at two channels, one covering the occipital cortex, the other the motor cortex. The broadband signal at both of these channels did not show any signs of quenching during the movement planning phase and therefore also no relation of to variability in behavior. However, both the alpha and beta band showed general quenching during the movement preparation at both channels, but again no relation to behaviour could be observed. To our knowledge, these findings are the first indication of neural variability quenching in the motor domain, but without a relation to the behavioral performance.

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