

## EEG TIME-FREQUENCY DYNAMICS ASSOCIATED WITH EYE BLINK SUPPRESSION

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The majority of individuals with Tourette's Syndrome (TS) experience fluctuating, involuntary sensations which build in intensity until tics are performed. These sensations, termed premonitory urges (PUs), are described both as general states of unease and somatotopically specific sensations like heat or pain. Blinks and the urges underlying them have been used as a model for understanding the relationship between tics and PUs in behavioral assessments and imaging studies. The neural correlates of tics and tic suppression have also been explored using EEG. However, it is unknown how PUs relate to previous EEG findings and whether tics and PUs engage common neural processes to blinks and their urges. To establish a baseline for comparison and develop the methods to better understand PUs and tic suppression, alpha task-related-power-changes (TRPCs) and intersite-phase clustering (ISPC) were explored in relation to free and suppressed blinking in 33 healthy undergraduates enrolled for psychology courses at the University of Utah (mean age = 22.4,  $SD = 12.1$ , min-max: 18-43;  $N_{\text{female}} = 22$ ). Continuous subjective urge ratings were recorded simultaneously. Although during blink suppression alpha ISPC for FCzCz decreased (see Figure 1 B) and TRPC at F3 and FC3 was positive (Figure 1 A), these significant effects did not correlate with the effect of blink suppression on individuals' urge ratings. Of note, the direction of ISPC change and the localization of TRPC did not match with previous studies of tic and other motor suppression, suggesting that how frontal and motor regions synchronize depends on various aspects of movement that future research should further specify. These and previous findings suggest that alpha ISPC and TRPC may characterize important shifts in cortical function during tic suppression relative to an analogous behavior in non-clinical individuals. Emulation of this paradigm in individuals with tic disorders could help understand neural mechanisms of tic suppression as they relate to PUs and how oscillatory dynamics relate to movement in general.

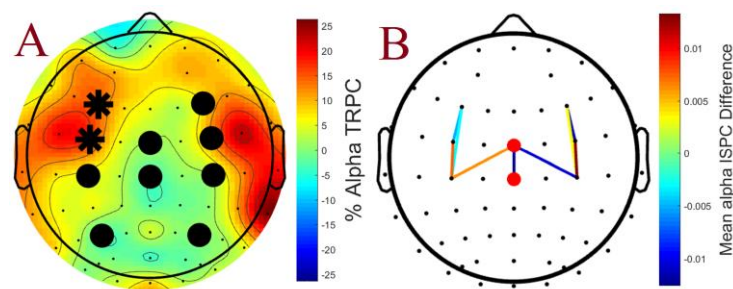


Figure 1. *T*-tests for the effects of blink suppression on mean task-related power change (TRPC) and mean alpha ISPC differences in the alpha band for selected electrodes. A) Alpha TRPC was significant at FC3 and F3 (top asterisk),  $t(24) = 3.88$ ,  $p = 0.001$ ,  $d = 0.777$ , 95% CI [7.53, 24.6] ;  $t(23) = 3.18$ ,  $p = 0.004$ ,  $d = 0.65$ , [3.58, 16.9], respectively. B) Alpha ISPC significantly decreased between FCz (top red circle) and Cz during blink suppression,  $t(21) = -3.42$ ,  $p = 0.003$ ,  $d = -0.680$ , [-0.021, -0.005].

