while performing positive emotional and motor imagery (used as two classes) were collected and used to train the classifier using SVM with a 73% accuracy. This classifier was then associated to a real-time NF system to train healthy subjects to demonstrate that this training can aid in recreating brain states from another individual. The subject in training demonstrated a total accuracy of 57% on the first day of training. Moreover, learning was observed with the accuracy increasing consistently by each run within the session, with more training sessions scheduled. To also show that this recreation also benefits mood and depressive symptoms we plan to recruit subjects with depressive symptoms as the second stage of the project and compare pre- and post-training mood levels and clinical evaluations.

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Differential engagements of somatostatin- and parvalbumin-expressing neurons in flexible representation of task variables in rodent prefrontal cortex

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Neurons in the prefrontal cortex are selectively responsive to variables that are relevant to a task at hand. To investigate how different interneuron subtypes contribute to such flexible representation of task variables, we examined discharge characteristics and inactivation effects of somatostatin (SOM)- and parvalbumin (PV)-expressing neurons in the mouse medial prefrontal cortex during a probabilistic classical conditioning task. SOM neurons showed graded responses to sensory cues according to the value of expected outcome until outcome delivery, and their inactivation suppressed cue-related, but not outcome-related, activity of nearby pyramidal neurons. By contrast, PV neurons maintained cue-related responses even after outcome delivery so that expected and actual outcome signals converge, and their inactivation suppressed both cue- and outcome-dependent responses of pyramidal neurons. In addition, inactivation of PV, but not SOM, neurons delayed reversal of cue-related responses of neighboring pyramidal neurons when cue-outcome contingency was reversed. These results suggest more important contributions of SOM neurons to signaling values of upcoming outcomes and PV neurons to updating this information according to actually experienced outcomes.

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Auditory steady-state responses and the complex information processing

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An auditory steady-state response (ASSR) is a neurophysiological measure of the brain response to periodic auditory stimulation (1). 40 Hz ASSRs are mostly used, but the individual resonant frequency of ASSRs is ranging between 35 and 55 Hz (2). Although ASSRs were proposed to serve as biomarker of schizophrenia (3), little is known about their relationship to cognitive functions, particularly complex information processing. We aimed to explore the association between ASSRs evoked by 40 Hz stimulation and by individual resonant gamma frequency and the complex information processing.

ASSRs were recorded were recorded in two separate samples of young healthy volunteers: in a Sample 1 ($n = 29$), the classical 40 Hz click stimulation was used; in a Sample 2 ($n = 33$) 35–55 Hz chirp stimulation was used along with 40 Hz stimulation. Participants completed a variety of PEBL (The Psychology Experiment Building Language) computer administered tasks (4) to estimate their complex information processing. EEG data was recorded with 64 channels and ASSRs were analyzed from fronto-central channels. Phase-locking index (PLI, corresponding to the phase consistency over epochs) and Global Field Synchronization (GFS, corresponding to a measure of overall synchronicity across the scalp) were calculated after wavelet transform for (1) 40 Hz and (2) for individual resonant gamma frequency in response to chirp stimulation. Spearman's coefficients were calculated between PLI values at 40 Hz, at individual resonant frequency and indices of complex information processing.

It is shown that the degree of inter-trial synchronization in response to periodic auditory stimulation and the global synchronization of the activity across the cortex during stimulation may be related to the speed of complex information processing, specifically to the planning function. These findings are particularly important for interpretation of ASSR changes in neuropsychiatric disorders.

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Somatic marker influences a decision making under uncertainty

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The somatic marker hypothesis proposed that an emotive cue or event evokes an interoceptive processing called 'somatic marker' that influence the decision making. Furthermore, this somatic marker has been known to be involved in the subjective emotional feeling. However, it has rarely been investigated whether cortical interoceptive processing (somatic marker) changes during the decision making to influence a decision and its relationship with subjective feeling. In our previous study, we have shown that change in the aversive emotional context (expecting blame) induces a change of decision tendency during a decision making under uncertainty. We hypothesized that cortical interoceptive processing would be modulated by an emotional context and would influence subsequent decision under uncertainty. In this EEG study, using the heartbeat-evoked response (HER) as an index of cortical interoceptive