

TADASHI KATO, Department of Behavioral Science, JORDAN TYLER BROWN, MAHMOOD HOSSAIN, Department of Computer Science & Mathematics, EMMA R. URBANIC, AGNES MAERTA BJOERK, SARA LAEL CAMPBELL, & JANNA B. HUGGINS, Department of Behavioral Science, Fairmont State University. Positive emotion produces higher EEG hemispheric synchronicity of the brain.

[Objective] Present study examined the association between emotional balance and EEG (electroencephalogram) hemispheric synchronicity. [Method] Twenty-three healthy volunteers ( $20.39 \pm 1.44$  yrs.) filled out Spielberger-Trait-Anxiety-Inventory, Spielberger-Trait-Anger-Scale, and Maryland-Trait-Depression-Scale. Sixteen-channel EEG electrodes were attached based on International-10-20-Method, and participants experienced five experimental conditions: (Stage 1) rest; (Stage 2) mental-arithmetic, (Stage 3) autogenic-training; (Stage 4) stroop-task; & (Stage 5) relaxation-music-listening. Four coherence analyses were applied to EEG hemispheric pairs (Fp1-Fp2, F3-F4, F7-F8, T3-T4, T6-T6, P3-P4, C3-C4, & O1-O2) from the last 90-second-file of each measurement-stage, including: (1) ordinary-coherence based on cross-power spectral density; (2) imaginary-coherence; (3) phase-locking-value; and (4) sum-of-squared-differences. Mixed-Design-ANOVAs were applied by using High-Low-Trait-Anxiety, High-Low-Trait-Anger, and High-Low-Trait-Depression as between IVs and five measurement stages as within IVs while using coherence values as DVs. Multiple regressions were applied by using Trait-Anxiety, Trait-Anger, and Trait-Depression scores as predictors and coherence values as criterions. [Results] ANOVAs for ordinary-coherence and phase-locking-values showed higher coherence at alpha frequency band (8-13Hz) in relaxing conditions (rest and music-listening) than in stressful conditions (mental-arithmetic and stroop-task) at frontal lobes (F3-F4 and F7-F8) ( $p < .05$ ). Multiple regressions for ordinary-coherence and phase-locking-values demonstrated that lower depression contributed to higher coherences at theta frequency band (4-8Hz) at parietal lobe (P3-P4) in relaxing conditions (rest and autogenic-training) ( $P < .05$ ). Finally, multiple regressions for imaginary-coherence and sum-of-squares suggested that lower depression contributed to higher coherence at occipital lobe (O1-O2) ( $p < .05$ ). [Discussion] Results suggested that higher EEG hemispheric coherences were associated with lower emotional distress, suggesting the possibility of EEG-hemispheric-synchronicity-feedback as a new form of clinical intervention.