

stimulation (0.0211) was markedly elevated than during auditory stimulation (0.0152). Under visual and auditory stimuli, the functional connections between prefrontal-parietal and parietal-central regions are strong. In visual stimuli, the functional connections between prefrontal-occipital and temporal-occipital regions are much stronger than in auditory stimuli. This suggests that in the process of visual information processing, the brain activities of two people are more likely to achieve a state of synchronization, thus promoting cognitive and emotional communication and understanding between the two parties.

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Stand 60

Brain Correlates of Cognitive Function in Elite Judokas★

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Cognitive abilities such as spatial reasoning, cognitive flexibility, and perceptual processing are essential for high-level performance in combat sports. In judo, these cognitive functions contribute to technical execution, strategic decision-making, and adaptability during matches. This study aims to examine the neural correlates of cognitive styles and spatial abilities in elite judokas using EEG-based analysis. A total of 30 elite judokas aged 16 to 23 years from the "Zeytun" Judo School participated in this study. Each athlete had an average training experience of 11 years and was classified as a high performer based on two criteria: (1) competitive achievements (at least national championship titles) and (2) situational performance (technical execution quality). Cognitive styles were assessed using Herman Witkin's Embedded Figures Test, while spatial abilities were evaluated using the Mental Rotation Test (Pallety, 2002). Neural activity was recorded using the FLEX 2 Saline-32 Channel Wireless EEG Head Cap System, allowing for high-resolution monitoring of cortical activation patterns. Analysis revealed significant correlations between apical cortical activity and mental rotation performance, as well as between frontal cortical activity and cognitive styles. Furthermore, a strong relationship was identified between technical performance levels and both mental rotation abilities and cognitive styles, indicating that cognitive processing plays a crucial role in judo-specific skill execution. The findings highlight the neurocognitive basis of elite judo performance, demonstrating that mental rotation abilities and cognitive styles are not only linked to distinct cortical activation patterns but also to technical execution proficiency. These insights emphasize the potential benefits of cognitive training in athlete development, suggesting that enhancing specific cognitive functions could contribute to improved performance in competitive judo.

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Stand 61

Neuralsync: A Pipeline to Predict Romantic Relationships based on Interbrain Functional Connectivity and ViT★

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Romantic relationships are characterized by their distinctiveness and a high level of collaborative proficiency. Utilizing inter-brain synchronization to predict romantic relationships facilitates the comprehension and assessment of the neural underpinnings of intimate relationships, elucidating the manner in which the brain manifests emotional cooperation at an unconscious level. This study implemented an automated pipeline for dyadic EEG connectivity analysis via MNE-Python. Continuous recordings from 40 paired subjects were segmented into 20 non-overlapping epochs, with segment lengths dynamically adjusted to preserve proper frequency resolution. Intra-subject connectivity matrices were computed using Pearson correlations (`numpy.corrcoef`), while inter-subject synchronization was quantified by aligning segments via min-length resizing to address temporal mismatches. Combined matrices, integrating intra- and inter-subject blocks, were normalized to [0, 1] using `MinMaxScaler` and visualized as annotated heatmaps (`matplotlib`). This pipeline implemented with `NumPy` and `SciPy`, generated connectivity images (224×224 pixels) for downstream Vision Transformer (ViT) analysis, fine-tuned via `PyTorch` with SGD and cosine learning rate scheduling. This framework supports scalable exploration of neural synchrony in social neuroscience. `Neuralsync` achieved 98%±0.13% accuracy with 10-fold cross-validation in predicting romantic vs. stranger relationships from dyadic EEG data, outperforming SVM (85%) and CNN (90%) ($p<0.001$). Romantic couples exhibited distinct cross-hemispheric synchronization patterns, with stronger frontoparietal connectivity (F3-P4: $r=0.82$ vs. strangers=0.51) and enhanced C3-C4 coherence ($r=0.75$ vs. strangers=0.38, $p<0.001$). Strangers showed fragmented inter-hemispheric frontal correlations (F3-F4: 0.65), contrasting with couples' structured networks. ViT attention maps localized discriminative hubs (F3-P4 weights >0.8), explaining high specificity (99%) and sensitivity (97%). Inter-segment reliability was exceptional with faster convergence than CNN, demonstrating neural synchrony as a potential biomarker for social intimacy. This study developed an automated pipeline to predict interpersonal intimacy through interpersonal neural synchrony based on dyadic EEG data. `Neuralsync` enables the visualization of the interbrain functional connectivity and offers a quantitative and predictive tool to assess intimacy relationship between dual persons.

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Stand 62

The Role of Interoceptive Processing in Prenatal Depression and Anxiety★

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Pregnancy is a complex biological phenomenon that can modify several interoception domains (ability to perceive and subjectively experience inner bodily states). These changes in interoceptive processing may also play a role in the emergence of prenatal psychopathology, namely anxiety and depression. Aim: To examine the association between interoceptive processing and psychopathology (depression and anxiety) in first-time pregnant women (3rd trimester). 17 first-time expectant mothers (mean age = 32.71 years) completed data collection at 28-32 gestational age. Interoception was evaluated using self-report measures (Interoceptive Accuracy and Attention Scales), a performance-based interoceptive accuracy task (Heartbeat Tapping Task; participants are required to tap a key whenever they feel a heartbeat), and neural markers of infant-specific interoceptive processing (heartbeat-evoked potentials - HEP - during the Infant Face Repetition-Suppression Task). A cluster mass permutation test was employed to identify the electrodes and time-windows where HEP amplitude was effectively modulated (right frontal-central; 308 - 600 ms). The Edinburgh Postnatal Depression Scale was used to evaluate depressive symptoms, while the State Anxiety Inventory (STAI-S) measured current anxiety levels. Significant positive correlations were found between interoceptive attention and anxiety ($r = .645$; $p = .017$), as well as between interoceptive attention and depression ($r = .749$; $p = .003$). Interoceptive accuracy was neither correlated with anxiety nor depression. A large (albeit non-significant) negative correlation ($r = -.301$, $p = .368$) was found between depressive scores and HEP emotional modulation in the infant condition, suggesting that infant-specific emotional modulation of HEP may be reduced in prenatal depression. These preliminary findings suggest that interoceptive processing is associated with prenatal psychopathology across several levels. Self-perceived beliefs about interoceptive attention were positively associated with both anxiety and depression. Furthermore, infant-specific neural markers of interoceptive processing may also play an important role in prenatal depressive symptomatology.

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Stand 63

A Study of Interpersonal Relationship Prediction Based on Two-person EEG Synchronization★

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Neural synchronization indicates relationship quality. While hyperscanning reveals interaction-related neural signatures, resting-state coupling mechanisms and their predictive potential for relationship types remain unexplored. Current research lacks automated resting-state neural signal-based methods for identifying couples as unique social bonds. We

innovatively developed a resting-state diencephalic EEG synchronization paradigm and convolutional neural network to decode couple relationships from neural coupling features. Our lab-collected EEG data included 210 participants (50 couples & 55 non-couples, aged 18-26). Neurosynchrony was evaluated using inter subject correlation (ISC), and significant frequency bands. Extracting phase based on Hilbert transform, constructing dynamic PLV matrix. The proposed CNN architecture processes θ -band PLV matrices through three innovations: (1) spatial conversion of 32-channel EEG into grayscale images, (2) 4D tensor transformation (batch_size, channels, height, width), and (3) dual cascaded convolution modules for multiscale connectivity pattern recognition. Inter-subject correlation(ISC) analysis between subjects showed significant group differences in functional connectivity in the θ -band (4-8 Hz) between couples and non-couples (independent t-test: $t(101.54) = 44.36$, $p < 0.001$, Cohen's $d = 0.85$), with significant effects in the frontal midline theta generators (Fz, FCz) and parietal association areas (P7/P8). The CNN model achieved 90.1% classification accuracy in distinguishing couples from non-couples, demonstrating the integration of resting-state θ oscillations with deep learning-driven PLV neural coupling frameworks enable quantitative characterization of emotional connectivity transcending traditional subjective metrics. These findings deepen our understanding of the neurophysiological basis of intimate relationships and pioneer a machine learning approach for marital counseling applications. The model offers a new method to evaluate relationship dynamics and predict developmental trajectories, potentially revolutionizing couples therapy through neurocomputational biomarkers.

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Stand 64

The impact of different periods of social isolation on mood disorders and cardiovascular disease risk in rats★

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Social isolation is a risk factor for cardiovascular disease development. During the COVID-19 pandemic, widespread social isolation raised concerns about its long-term effects on cardiovascular health. Limited data exists regarding the mechanisms involved between social isolation and vascular endothelial dysfunction and their potential connection to the development of further cardiovascular diseases. Therefore, the aim of our study was to verify how different durations of social isolation in rats contribute to mood disorders and the activation of mechanisms related to vascular endothelial dysfunction. Young adult rats (6 months) were socially isolated for 3, 5, or 8 weeks, and subsequent anxiety and anhedonia