Poster 1-77

AN INVESTIGATION OF FULLY AUTOMATED APPROACHES FOR THE SELECTION OF EYE BLINK ICA COMPONENTS

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Descriptors: eye blink artifacts, ICA components, EEG

A growing number of investigators are utilizing independent component analysis (ICA) to remove eye blink artifacts from EEG signals. However, the reliance upon subjective human judgments for the identification of eye blink-related components is labor intensive and potentially fallible. Accordingly, the present investigation sought to address the critical question of whether fully automated approaches for selecting eye blink related ICA components (i.e., ADJUST, EyeCatch, icablinkmetrics) can and should be employed to replace manual selection of the eye artifact. Utilizing a total of 3,072 simulated EEG datasets, we first assessed how robust these automated approaches were to variation in the magnitude of the eye blink artifact amid increasing levels of noise in the signal. We then utilized 92 real EEG datasets collected with varying electrode densities, to assess the generalizability of these automated approaches. For comparison, we also assessed the accuracy of trained observers visually selecting ICA components. Our findings revealed that each of the automated component selection approaches were able to accurately identify eye blink related ICA components at or above the level of trained human observers. EyeCatch appears better suited towards narrowing down potential candidate eye blink components prior to human inspection given the potential for false positive component identification. Whereas, icablinkmetrics avoided falsely identifying components suggesting it may be better suited towards a fully automated implementation.

Poster 1-78

PUPIL DILATION AND AFFECTIVE MEANING: EFFECTS OF GOAL RELEVANCE, TYPE, AND CONGRUENCE

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Descriptors: motivation, pupil dilation, attention

Illumination-independent pupil dilation has been associated with attention dynamics driven by locus coeruleus norepinephrine. We investigated the sensitivity of this system to three conceptually relevant motivational contrasts that have often been confounded in prior studies - pre- and post-goal stages (phase) of succeeding or failing (outcome) to obtain approach or avoidance goals (direction). Forty four students completed a modified monetary incentive delay (MID) task where the outcome of each trial counted towards an amount of chocolate received ($M = 100$ g). Each trial began with a pre-goal cue indicating the potential outcome of the trial (may win, may lose, no change). After a binary choice, a post-goal cue announced the realized outcome (won, didn't win, lost, didn't lose, no change). All cues were simple Landot circles broken at different angles. Pupil size dynamics recorded with Eyelink1000 were analyzed in relation to each type of cue. We found that the pupil response to potential as well as realized wins did not differ from responses to neutral cues announcing no change in accumulated chocolate. By contrast, not winning, losing, and also not losing increased pupil diameter by at least 0.5 SD ($p < .001$). Anticipating to lose remained between the two levels ($p < .05$). These effects grew stronger throughout the experiment suggesting the pupil response was magnified by automatic associations. These results suggest that pupil dilation is sensitive to the goal-obstructiveness of all outcomes as well as to the motivational direction towards avoidance.

Poster 1-79

DISENTANGLING THE EFFECTS OF STIMULUS NOVELTY AND AFFECTIVE VALENCE IN THE AMYGDALA, HIPPOCAMPUS, AND BED NUCLEUS OF THE STRIA TERMINALIS

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Descriptors: bed nucleus of the stria terminalis, amygdala, novelty

The amygdala responds to stimulus novelty, which may correspond to an evaluation of novel stimuli for potential threat (Balderston, Schultz & Helmstetter, 2013). The bed nucleus of the stria terminalis (BNST) may also be sensitive to novelty as it responds to both uncertainty (Somerville et al., 2013) and threat (Alvarez et al., 2011). To test this, we presented participants with novel and repeated negative and neutral images while measuring brain activity via fMRI. Stimulus valence was also manipulated to determine whether valence interacts with novelty. We expected to replicate past findings of hippocampal and amygdalar novelty responses that are independent of valence. We also hypothesized that the BNST would exhibit novelty sensitivity. We found evidence for novelty sensitivity in the hippocampus, amygdala and BNST. This novelty response was dependent on stimulus valence only in the BNST. These findings suggest that the BNST may play a role in the detection of novelty that is distinct from that of the amygdala, in that it responds selectively to stimuli that are both novel and negatively-valenced.

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Poster 1-80

DISSOCIATING DISPOSITIONAL TRAITS USING ELECTROCORTICAL INDICATORS: THE HEADS-AND-FACES ODDBALL TASK

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Descriptors: event-related potential, inhibitory control, dysaffiliative tendencies

Infrequent, task-relevant stimuli in a 'rotated-heads' visual oddball paradigm elicit a robust P300 brain response, and this response shows a reliable negative association with inhibitory control deficits (INH-) common across externalizing psychopathology (Patrick et al., 2006). In emotion recognition tasks, fearful faces elicit augmented N170 and P200 brain responses relative to neutral faces, and both face effects correlate negatively with dysaffiliative tendencies (AFF-; Brislin et al., 2016). This study evaluated the utility of a novel visual-processing paradigm, the heads-and-faces oddball task, in eliciting P300, N170, and P200 electrocortical responses that were selectively associated with INH- and AFF-. Dispositional tendencies were measured using the Disinhibition and Meanness subscales of the Triarchic Psychopathy Measure. Task stimuli included frequent non-targets (ovals), rare targets (stylized heads), and rare novel stimuli (fearful and neutral faces). Analyses of currently available data ($N = 41$) revealed that fearful faces elicited increased P300 and P200 responses relative to neutral faces, in line with evidence that these components reflect attentional and affective processing, respectively. Contrary to prediction, fear-neutral differentiation was not significant for N170, which is associated with face detection and categorization more so than affective processing. Implications for the heads-and-faces oddball task's use in research on transdiagnostic biobehavioral traits are discussed.

Poster 1-81

DISTINCT BEHAVIORAL PERFORMANCE CORRELATES OF THE ERN AND PE IN THE FLANKER TASK

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Descriptors: error-related negativity (ERN), error positivity (Pe), behavioral performance effects

The error-related negativity (ERN), a negative deflection in the event-related brain potential peaking approximately 50ms after commission of task-performance errors, has been widely studied as an index of response monitoring. In addition to eliciting an ERN, the commission of errors also evokes an error positivity (Pe) that peaks around 200ms following their occurrence. Extant research has provided evidence that these two ERP components index separable error monitoring processes (Falkenstein et al., 2000). The current study sought to delineate performance correlates of ERN and Pe in a sample of 200 community adults. Analyses revealed that Pe amplitude was associated more strongly than ERN with reaction time and response efficiency (speed versus accuracy trade off) across the task as a whole. By contrast, ERN was found to be more predictive of post-error inefficiency, such that increased inefficiency on task trials following erroneous responses was associated with larger ERN amplitude. Additionally, ERN was associated with post-error slowing, such that larger ERN amplitude predicted slower responding on task trials that followed commission of an error. Taken together, findings from this work support the notion that the ERN and Pe index distinct error monitoring processes with differing impact on behavior. Implications for understanding mechanisms of adaptive performance and individual differences in recognizing and remedying errors will be discussed.

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