orienting network. ERP results: The cue-locked P1-orienting (valid vs. invalid) was generally larger to valid- than invalid-cues, but the robustness across sessions was variable (significant in only sessions 1 and 4 [t(14)s>2.13,ps<.04], as reflected in a significant main effect of session [p=.0042]. Next, target-locked EC P3s were generally smaller to congruent than incongruent targets [F(1,14)=9.40,p=.0084] , showing robust effects only in sessions 3 and 4 [ps<.005].
Conclusions: The EC network RT and ER scores were consistently robust across all sessions, suggesting that this network may be less vulnerable to practice effects across session than the other networks and may be the most reliable probe of attentional rehabilitation. ERP measures were more variable across attention networks with respect to robustness. Behavioral measures of EC-network may be most reliable for assessing progress related to attentional-rehabilitation efforts.

Categories: Neurophysiology/EEG/ERP/fMRI
Keyword 1: brain plasticity
Keyword 2: attention
Keyword 3: traumatic brain injury
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62 Neural Correlates of Cognitive Function in the Basal Ganglia

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Objective: Timing, or the decision of when to act, is essential to mammalian behaviors from escaping predators to driving a car. It requires cognitive functions such as working memory for time-based rules and attention to the passing of time. Thus, it can be used as a proxy for higher order executive functions that are difficult to measure but are impaired in many neurological disorders. Therefore, insights from studies of interval timing, tasks which require estimating time intervals of several seconds, have great value for our understanding of human disease. Crucial to timing is the basal ganglia, which integrates cortical activity with midbrain dopamine signals and sends out signals to the spinal cord that regulate movement, motivation, and other behaviors. We have previously found that within the basal ganglia, medium spiny neurons of the striatum exhibit ramping activity in time-related tasks. In other words, they gradually increase or decrease firing frequency across a timed interval, and this is thought to encode time. Yet it is still unknown how the encoding of time is translated into time-based motor responses. To answer this question, we turned to the external globus pallidus (GPe) because it is a regulatory hub within the basal ganglia and is thus well positioned to regulate timing behavior. We sought to examine how the GPe functions in response to time-based demands.
Participants and Methods: We recorded from neuronal ensembles using 16 channel electrode arrays implanted in the GPe of five mice while they performed an interval timing task called the switch interval timing task. Spike sorting was then used to identify signal from individual neurons.
Results: Data were compiled from 43 neurons over several trials. Principal component analysis of neural firing activity was then conducted and revealed a downward ramping pattern in GPe neurons during interval timing trials. Data were then separated based on trials in which mice made correct decisions and those in which mice made a mistake. We found that when mice make correct timing decisions, there is downward ramping activity in the GPe, yet when mice make timing mistakes, this ramping pattern is lost.
Conclusions: Our findings suggest that the GPe processes timing signals through ramping activity, before projecting to the output nuclei of the basal ganglia. This is a novel finding and contributes to a growing understanding of the temporal code of the basal ganglia. The full extent of this code is still unknown, but this insight contributes to a better understanding of how the globus pallidus represents cognition. If we can better explain the neural correlates of timing, we can use this knowledge to inform therapeutic interventions for basal ganglia dysfunction, which could have profound implications for diseases like Parkinson’s disease, which affects millions around the world.

Categories: Neurophysiology/EEG/ERP/fMRI
Keyword 1: basal ganglia
Keyword 2: movement disorders
Keyword 3: movement

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63 A Literature Review of Cortical Mapping, fMRI, and Standards of Care in Pediatric Epilepsy Surgical Workup

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Objective: Epilepsy includes recurrent, unprovoked seizures and affects 470,000 children in the US, of which 7% have drug-resistant epilepsy due to failing two or more antiseizure medication trials. For some patients with drug-resistant epilepsy, surgery has been successful in reducing seizure burden. Functional MRI (fMRI) and intracranial mapping of neurocognitive functions, especially language, are increasingly done to assess potential functional loss from epilepsy surgery. However, these procedures vary by medical institute. The purpose of this review was to examine published literature on fMRI and intracranial mapping procedures for pediatric epilepsy surgery workup toward development of a standardized protocol that can be used across institutes as a guide to standard-of-care best practices for predicting loss of function associated with epilepsy surgery.
Participants and Methods: Our literature review includes information from 8 electronic databases for peer-reviewed, English language studies of evaluation for pediatric epilepsy surgery candidacy. Thirty-one studies were selected based on inclusion criteria. Only studies including fMRI and intracranial mapping conducted with pediatric patients being worked up for epilepsy surgery were selected.
Results: Our review revealed that the most common task used in fMRI and intracranial mapping procedures is visual-object naming, but type of naming tasks and the way they are administered varies widely across medical institutes and includes published measures and those created on site. Variability makes examining findings across studies and designing best practice for these procedures challenging.
Conclusions: Creating gold-standard procedures for fMRI and intracranial mapping administration for epilepsy surgery evaluations is critical in optimizing treatment and functional outcomes for our pediatric patients. Our review is an initial step in this process.

Categories: Neurophysiology/EEG/ERP/fMRI
Keyword 1: epilepsy / seizure disorders
Keyword 2: neuroimaging: functional
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64 Effects of Age and Task Difficulty on the Presence of EEG Midline-Frontal Theta Power During Administration of the Repeatable Battery for the Assessment of Neuropsychological Status-Update (RBANS)

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Objective: Concurrent electroencephalography (EEG) during neuropsychological assessment offers a promising method to understand real-time neural and cognitive processes during task performance. For example, previous studies using experimental tasks suggest that midline-frontal theta power (MFT) could serve as a measure of mental exertion and subjective difficulty. The RBANS provides an opportunity to examine this issue in neuropsychological assessment, as a widely-used screening battery that was explicitly developed with subtests that vary according to difficulty within its five domains. This study investigated the effects of task difficulty, cognitive domain, and age on elicitation of MFT during rest and RBANS administration.
Participants and Methods: EEG was recorded during eyes-closed and eyes-open resting periods and RBANS administration in a sample of 45 healthy younger adults (n = 21; mean age = 23.29, SD = 3.27, range = 19-33; 48% female) and older adults (n = 24; mean age = 70.58, SD = 5.77, range = 59-83; 83% female). MFT was defined as the highest peak above the overall