gest that structural maturation within a specific portion of the left inferior parietal lobule is a strong predictor of learning in adulthood on a test that places heavy demands on reasoning.

D127

SEE THAT NUMBER? THE ROLE OF VISUOSPATIAL ABILITIES AND BRAIN STIMULATION IN SYMBOLIC NUMERICAL LEARNING

Jacqueline Thompson[1], Hannah Rafferty[1], Arwel Pritchard[1], Roi Cohen Kadosh[1]; [1]University of Oxford — Visuospatial abilities (e.g., mental rotation) have been linked to strength of basic numerical representations. However, the causality of this link is still uncertain; to what extent does the ability to recognise and visuospatially manipulate number symbols help us to learn their semantic (ordinal or magnitude) values? Therefore, this experiment tested mental rotation ability and visual symbol recognition ability in a group of 79 adults before and after they undertook intensive multi-day training paradigms to learn novel numerical symbols. 40 of these participants received transcranial random noise stimulation (TRNS), a form of noninvasive electrical neuroenhancement, to either parietal or occipital cortices during learning. Stimulation did not affect mental rotation or visual symbol recognition. However, learning rate of the symbols correlated with a pre-test of 3D (but not 2D) mental rotation, as well as with symbol recognition ability measured after, but not before, training of the symbols' relative magnitudes. Similarly, a measure of numerical representation strength (numerical distance effect) in the symbols correlated with symbol recognition after, but not before, training. Because the numerical distance effect is a measure that cancels out the contribution of visual processing to performance, these results are interpreted as suggesting that greater visual recognition of symbols may play a role in forming stronger numerical representation when learning novel numerical symbols.

D128

TRACKING THE NEURAL DYNAMICS OF HYPOTHESIS EVALUATION WITH MODEL-BASED FMRI

Nicole Marinsek[1], Benjamin O. Turner[1], Chloe Steindam[1], Michael B. Miller[1]; [1]University of California, Santa Barbara — In this study, we aimed to 1) model the component processes of hypothesis evaluation during the receipt of new evidence and 2) identify brain regions that support these processes. We used fMRI data from a previous experiment in which participants attempted to generate appropriate category labels for a series of novel word sets that were designed to either elicit repeated cycles of hypothesis formation and evaluation ("ad hoc" word sets) or minimize these processes ("control" word sets). We used a Bayesian model to estimate the strength of subjects' category hypotheses as the words in each set were presented, after first collecting behavioral data on a different group of participants to estimate latent variables in the model. We then conducted a model-based fMRI analysis of the fMRI data to identify brain regions that are sensitive to the various predictions of our Bayesian model, such as hypothesis strength, belief updating, or hypothesis acceptance. The results of this study provide insight into the psychological and neural processes of hypothesis evaluation, as well as the validity of Bayes' theorem as a model of belief updating in humans. This research was supported by the Institute for Collaborative Biotechnologies under grant W911NF-09-D-0001.

D129

EVIDENCE OF INTACT SOCIAL ANALOGICAL REASONING IN ASD

Natalie Gallagher[1], Ligia Antezana[2], Maya Mosner[2], Katerina Dudley[3], Lauren Kenworthy[3], Benjamin Yerys[2], Adam Green[1]; [1]Georgetown University, [2]The Children's Hospital of Philadelphia, [3]Children's National Medical Center — Social cognition is a weakness for children with autism spectrum disorder (ASD), but reasoning is often a strength.So what if an aspect of social cognition is approached as a reasoning problem? Analogical reasoning is a form of reasoning that supports our understanding of social interactions because novel interactions may be analogous to previously experienced interactions. Analogical reasoning with non-social stimuli appears to be well-preserved in ASD, but has not been tested in ASD with social interaction stimuli. We tested the hypothesis that when explicitly cued, children with ASD can employ analogical reasoning to understand similarities between social interactions, using photographs of real-world interactions. Age- and IQ-matched ASD and control groups performed social and nonsocial analogies. In older children with ASD (over age 10), social analogy performance rose to the level of controls, and to the level of nonsocial analogy performance. Effects of age and socialness (social analogies vs. nonsocial analogies) indicate that general analogical reasoning ability develops at a lag in ASD relative to typical development but that, once developed, this ability can be applied to counteract impairing effects of social content in ASD cognition.

D130

INFERRING REASONING STRATEGIES BASED ON THE PUPILLARY RESPONSE

Maria K. Eckstein[12], Silvia A. Bunge[1]; [1]UC Berkeley, [2]Graduate School of Systemic Neurosciences, Munich, Germany — When faced with a cognitively demanding task, the choice of strategy can make all the difference. Here, we sought to gain insight into strategies that participants adopt spontaneously when solving a task that requires integrating multiple rules. We hypothesized that strategies could be assessed using real-time measures of cognitive effort, such as the task-evoked pupillary response. To test this hypothesis, we collected eyetracking data while 37 healthy adults completed a rule integration task that could be solved in several ways. We first modeled the cognitive demands of two strategies, and made specific predictions about performance (response time, accuracy). We then compared the cognitive demand models to the pupillary responses obtained from each participant during task performance to infer which strategy the participant had used. Performance differences were successfully predicted by the pupil-based strategies. Specifically, when using a feature encoding strategy (participants encode all item features before identifying relevant rules) participants were significantly slower than when using a rule induction strategy (participants induce relevant rules while encoding the items and categorize subsequent items accordingly), $t(15.9) = -1.97$, $p = .033$, $r = .44$. In addition, error rates in detecting rule-based oddballs were reduced from 8.6% to 3.6% when using the rule induction strategy, $t(18.5) = -1.61$, $p = .063$, $r = .35$. Participants' self-reported strategies were consistent with predictions based on the pupillometry data, suggesting that our approach could also be used to study strategies in individuals with poor metacognitive skills, such as children or patient populations.

D131

CONCEPT COMBINATION WITH LOGICAL CONNECTIVES

Paolo Cherubini[1,3], Giosué Baggio[2,3], Doris Pischedda[1,3,4], Kai Görgen[4], Anna Blumenthal[2,4], John-Dylan Haynes[4], Carlo Reverberi[1,3]; [1]University of Milano-Bicocca, Milan, Italy, [2]SISSA International School for Advanced Studies, Trieste, Italy, [3]NeuroMi- Milan Center for Neuroscience, Milan, Italy, [4]Bernstein Center for Computational Neuroscience Berlin, Charité-Universitätsmedizin, Berlin, Germany — A defining trait of cognition is the capacity to combine information into compound concepts. This ability relies, among others, on the logical connectives 'and', 'or' and 'if-then'. Simple sentences, such as "there is a fork on the table" (A) or "there is a knife" (B), can be combined in different ways using different connectives. No evidence is available to date on how and where the brain represents different concept combinations produced by different connectives, and how these are evaluated against new facts. Here, participants learned associations between graphic cues and conjunctive (A and B), disjunctive (A or B) or conditional (If A then B) sentences. During fMRI scanning, a cue was presented, followed by a delay, during which participants had to represent the sentence associated to the cue; finally, a visual scene had to be evaluated for compatibility with the sentence. Two participant groups were recruited so that conditionals (If A then B) were interpreted in either of two alternative ways (thus, same form, different semantics). Multivariate decoding applied to the delay period revealed that the active sentence was encoded in left inferior frontal gyrus (BA44). During the delay, no difference was found between participant groups. During the target phase, we found higher activations in rostral regions of left inferior frontal cortex (BA47), for disjunctions and conditionals relative to conjunctions. Activation of the inferior parietal lobe only was modulated by the interpretation of conditionals.