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FreeSurfer vs. Manual Tracing: Distinguishing Stable from Cognitively Declining Elders Using Prospectively Measured Hippocampal Volume

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Assessment of Neuropsychological Status (RBANS) and the F-scales of the Minnesota Multiphasic Personality Inventory – 2 (MMPI-2) and the Restructured Form (MMPI-2-RF) in a mixed clinical sample. Shared variance of these two separate outcomes and the potential relationship between psychiatric and neurocognitive exaggeration was examined.

Participants and Methods: Participants included 38 individuals who completed the MMPI-2 or MMPI-RF and were also administered the RBANS as part of a more comprehensive neuropsychological evaluation. The RBANS Effort Index (EI) was calculated based on the methodology proposed by Silverberg and colleagues (2007). Correlations between outcome variables were run.

Results: No significant relationship between elevations on the RBANS EI and outcomes on the F-scale calculations of the MMPI-2 or MMPI-RF. Correlations with RBANS EI were as follows: MMPI-2 F ($r=.152$; $p=.068$), MMPI-RF Fr ($r=.147$; $p=.189$), MMPI-RF Fp-r ($r=.171$; $p=.152$), MMPI-RF Fs ($r=.098$; $p=.283$), MMPI-RF FBS-r ($r=.195$; $p=.120$), MMPI-RF NUC ($r=.049$; $p=.388$), MMPI-RF COG ($r=.236$; $p=.084$).

Conclusions: Results suggest that there is not an inherent link between effort on the RBANS as measured by the EI and exaggerated responding on the MMPI or MMPI-2RF as measured by F-scale outcomes. This suggests that within clinical practice, individuals may over state psychiatric concerns or neurocognitive concerns, but they may not endorse symptoms across both psychiatric and neurocognitive domains simultaneously. Such independence of variance is important to note from a clinical standpoint. Further implications will be discussed.

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N. WISDOM, W.L. BROWN, D.K. CHEN & R.L. COLLINS. Empirical Support for Abbreviating the Administration of the Test of Memory Malingering (TOMM).

Objective: Assessment of effort level is an essential step in establishing the internal validity of any neuropsychological evaluation. However, the amount of time needed to administer these tests decreases the frequency of their use. Recent studies have started publishing normative information for abbreviated versions of several response bias tests. The purpose of this study was to examine early discontinue criteria for the TOMM. It was hypothesized that all individuals passing TOMM Trial 1 would continue to pass the remaining trials. It was also hypothesized that the administration of the optional Retention trial would help identify suboptimal effort in some patients that had previously exerted adequate effort on Trial 2. Finally, this study presents the diagnostic accuracy of TOMM Trial 1 in the detection of suboptimal effort using various cut scores.

Participants and Methods: Data were collected from 213 inpatients (184 men; 29 women), all referred for a neuropsychological screening at a Veterans Affairs hospital. All of the patients were undergoing week-long observation on an epilepsy monitoring unit to establish the presence of genuine or psychogenic seizures. All 3 trials of the TOMM were administered to the patients and their level of effort was classified based on their performance on TOMM Trial 2 and/or the Retention trial. Once the sample was divided, the diagnostic classification statistics for TOMM Trial 1 were calculated.

Results: 99.3% of those patients that passed Trial 1 went on to pass the remaining trials. Only 3 patients that passed Trial 2 later failed the Retention Trial. Finally, this study found that using a Trial 1 cut-score of < 39 was very likely to result in failure of later TOMM trials.

Conclusions: TOMM Trial 1 demonstrated impressive diagnostic accuracy for determining adequate or suboptimal levels of effort on remaining trials. Administration of the Retention Trial resulted in a 16% increase in the TOMM's hit rate for poor effort. Limitations and directions for future research are discussed.

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Showcase of Outstanding Student Research:

Chair: Sommer Thorgusen

11:45 a.m.–1:15 p.m.

S.R. THORGUSEN. Showcase of Outstanding Student Research.

The Student INS (SINS) Committee is proud to host its 2nd Annual Student Research Symposium designed to highlight outstanding student research that provides a novel contribution to the field of neuropsychology. The following titles were selected from among all student abstract submissions for their exceptional quality.

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T. GEFEN, K. GASHO, A. RADEMAKER, M. LALEHZARI, J. ORTIZ, S. WEINTRAUB, E. ROGALSKI, C. WIENEKE, E. BIGIO, C. GEULA & M. MESULAM. Quantitative and Clinically Concordant Regional Variations of Alzheimer's disease Pathology in Aphasic versus Amnesic Dementia Phenotypes.

Objective: Concordance between neuroanatomic distribution of pathological inclusions and disease phenotype is not well established in atypical dementias such as primary progressive aphasia (PPA). Unlike typical dementia of the Alzheimer type (DAT) where amnesia is the primary symptom, PPA is marked by progressive language impairment. Various neuropathologies have been shown to underlie PPA, including Alzheimer's disease (AD). One purpose of this study was to determine whether AD pathology in PPA follows a clinically concordant, and hence different, distribution from the DAT phenotype.

Participants and Methods: Brain specimens from seven PPA and five DAT patients with clinical evaluations and neuropathologically confirmed AD were analyzed. Methods included thioflavin-S staining to visualize neurofibrillary tangles (NFTs) and compact plaques. Unbiased stereological counting was used in five bilateral brain regions, typically associated with language or memory, per case.

Results: Results revealed greater leftward asymmetry of NFTs, but not of plaques, in PPA/AD vs. DAT/AD ($p<0.05$). Only one PPA/AD case displayed greater right-sided NFT density in neocortices. Although there were more NFTs in the memory-related entorhinal cortex than in neocortices in both phenotypes ($p<0.001$), the ratio of neocortical-to-entorhinal NFTs tended to be higher in PPA/AD.

Conclusions: The presence of left-sided NFT asymmetry in PPA/AD but not DAT/AD, and the higher neocortical-to-entorhinal ratio of NFTs in PPA/AD, establishes concordance of AD pathology with the aphasic phenotype. The case with reversed asymmetry suggests that this relationship may be inconsistent. The conundrum of greater NFT density in memory-related entorhinal cortex than in language-related neocortices in PPA patients, who lack early amnesia, remains to be resolved.

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A.M. BUTTS, K. NIELSON, N. HANTKE, M. LANCASTER, M. SEIDENBERG, J. WOODARD, J. SMITH, M. MATTHEWS, S. DURGERIAN & S. RAO. FreeSurfer vs. Manual Tracing: Distinguishing Stable from Cognitively Declining Elders Using Prospectively Measured Hippocampal Volume.

Objective: Alzheimer's disease (AD) pathology is thought to begin years before symptom onset. Hippocampal volume is sensitive to age-related

cognitive decline and conversion from MCI to AD. Measurement of hippocampal volumes has used either automated methods such as FreeSurfer (FS) or manual tracing (MT). We compared the ability of FS and MT in detecting baseline volume differences in cognitively intact older individuals who subsequently showed significant cognitive decline.

Participants and Methods: Seventy-five cognitively intact elders underwent baseline and 18-month follow-up structural MRI scan and neuropsychological testing. Participants were classified as Declining (n=27) or Stable (n=48) based on the baseline to 18-month changes on a list-learning task and a measure of general cognitive functioning. A 2 (left, right) x 2 (anterior, posterior) x 2 (Declining, Stable) repeated measures ANOVA was conducted for both the MT and FS hippocampal volumes derived at baseline.

Results: MT identified significantly smaller left and right hippocampal volumes and smaller anterior than posterior hippocampal volumes in Declining compared to Stable subjects. In contrast, no group differences in hippocampal volumes were observed using FS. Notably, MT included more subiculum and entorhinal cortex, while FS included more of the amygdala and the CA region of the hippocampus.

Conclusions: MT was superior to FS for detecting prospective volumetric differences associated with cognitive decline in cognitively intact older participants. MT afforded more unique coverage of the anterior hippocampus than FS. The differences in regional coverage of the mesial temporal lobe between MT and FS may account for the different findings in discriminating Stable and Declining groups.

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S. SORG, M.W. BONDI, N. LUC, E. LANNI, D.M. SCHIEHSER, D.C. DELIS, L.R. FRANK & L. DELANO-WOOD. Loss of Consciousness is Associated with Disrupted Frontal White Matter and Impaired Executive Functions in Veterans with Mild Traumatic Brain Injury.

Objective: Many Afghanistan and Iraq war veterans continue to struggle years after withstanding a mild traumatic brain injury (mTBI). The range of severity from being dazed to experiencing formal losses of consciousness (LOC) may partly account for variable long-term cognitive and functional outcomes post-mTBI. As reduced white matter integrity and impaired executive functioning (EF) are associated with TBI, we used diffusion tensor imaging (DTI) to investigate whether injury severity (LOC) was related to executive dysfunction and white matter integrity.

Participants and Methods: Thirty-six combat military veterans with mTBI completed neurocognitive assessment and were scanned using DTI. EF impairment was defined as 1 SD below the mean on one or more of three EF tests. Fractional anisotropy (FA) was extracted from known TBI predilection sites identified on diffusion images.

Results: After removing 10 participants due to suboptimal effort, 11 of 26 participants evidenced executive dysfunction. Of participants reporting LOC (n=14), 57% were impaired on EF, compared with just 25% of the non-LOC group (n=12, $p<.10$). DTI analysis found lower FA within the ventral ($p<.01$) and dorsal ($p<.04$) prefrontal white matter, and splenium ($p<.05$) in the LOC group. Groups did not differ on demographic characteristics or psychiatric measures.

Conclusions: Within our sample of combat veterans, LOC was associated with poorer white matter integrity in frontal and posterior regions, and the LOC group demonstrated a higher proportion of EF impairment than the non-LOC group. Findings highlight the heterogeneity of cognitive outcomes following mTBI and suggest that identifying the severity level within mTBI may aid prognosis and guide treatment.

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L.M. JENKINS, D.G. ANDREWES, C.L. NICHOLAS, K. DRUMMOND, B. MOFFAT, P. PHAL & P. DESMOND. Perception of Emotion in Patients Following Surgery to the Prefrontal Cortex.

Objective: We aimed to investigate which anatomical locations are important for perception of emotional and social information by examining a group of brain surgery patients with discrete lesions to the prefrontal cortex (PFC). It was hypothesised that patients with PFC lesions would be more impaired on these tasks than a control group of non-cerebral neurosurgical patients.

Participants and Methods: Brain surgery patients were divided into groups using Brodmann areas, as determined by post-surgical MRI registered to MNI space. Patients had lesions to the anterior cingulate (n=4), orbitofrontal (n= 7), ventromedial (VM, n= 5) or dorsolateral (n=12) PFC. The control group comprised 26 extra-cerebral neurosurgical patients. Participants completed a forced-choice computerised facial morphing task, a questionnaire that assessed theory of mind and empathy, and measures of the perception of emotion in still facial expressions, vocal expressions, and music from film clips.

Results: VM lesioned patients were impaired at identifying morphed facial expressions overall, and fear expressions in particular, and were additionally impaired on the theory of mind scale. They also rated the still facial expressions, vocal expressions, and music clips as more intensely emotional compared to the control group for both congruent (e.g. positive ratings of positive items), and incongruent (e.g. negative ratings of positive items) ratings.

Conclusions: Patients with VM lesions have both an impaired perception of the emotional value of stimuli, and a tendency to be disinhibited in responses when the task allows. The VM cortex is responsible for emotional evaluation and the inhibitory control of other structures involved in emotional processing.

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L.M. MORAN, E. BIGLER, M. DENNIS, C.A. GERHARDT, K.H. RUBIN, T. STANCIN, H. TAYLOR, K.A. VANNATTA & K.O. YEATES. Relationship between Social Information Processing and Perceived Social Competence in Pediatric Traumatic Brain Injury.

Objective: Previous research suggests that children with traumatic brain injury (TBI) demonstrate deficits in social information processing. This study aims to evaluate whether performance on a laboratory measure of social information processing predicts ratings of perceived social competence.

Participants and Methods: Participants included 8 to 12 year old children, 23 with severe TBI, 56 with complicated mild-to-moderate TBI and 61 with orthopedic injuries (OI). For each of five scenarios involving a negative event with an unclear cause, children selected from a fixed set of choices the attribution for the cause of the event, their emotional reaction to the event, and how they would behave in response. Children completed the five scenarios twice, with the antagonist being an unfamiliar peer in one instance and the child's best friend in the other. Social competence was assessed using parent ratings on the Social scale of the Adaptive Behavior Assessment System.

Results: Overall, children with severe TBI were less likely than children with OI to make attributions of external blame, choose anger as their emotional reaction, and respond by avoiding the antagonist; they were more likely to respond by requesting adult intervention. Among children with severe TBI, feelings of anger in situations with friends were negatively related to ratings of social competence on the ABAS. Among children with complicated mild-to-moderate TBI, avoidant responses towards unfamiliar peers were negatively related to social competence and requests for adult intervention in situations with friends were positively related to social competence.

Conclusions: The results provide evidence for effects of TBI on social information processing that may help account for social difficulties as perceived by parents.

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