power spectrum within 4-8Hz from electrode Fz, and operationalized as a binary variable (present/absent). A multilevel generalized logistic regression model was run to assess the main effects of Age (Younger, Older), Difficulty (Easy, Hard), Domain (Rest, Immediate Memory, Visuospatial/Constructional, Language, Attention, Delayed Memory), and their potential interactions, on the presence of MFT.
Results: In the full sample, the Coding, Figure Recall, and Picture Naming subtests were numerically most likely to elicit MFT (71.1%, 66.7%, and 62.2%, respectively), whereas Semantic Fluency, Eyes-Closed Rest, and List Recall had the lowest likelihoods (37.7%, 31%, 28.9%). Older adults were also numerically less likely to exhibit MFT (37.50% present) compared to younger adults (62.24% present). An analysis of deviance revealed a significant effect of Age ($F(1,43) = 7.22$, $p = .01$) and a significant interaction between Difficulty and Domain ($F(5,220) = 4.78$, $p < .001$). Specifically, Hard subtests in the Visuospatial/Constructional (Figure Copy; $b = -2.63$, $p < .05$) and Language (Semantic Fluency; $b = -2.92$, $p < .01$) Domains were less likely to elicit MFT than the Easy subtests (i.e., Line Orientation and Picture Naming, respectively).
Conclusions: Results indicated that MFT can be reliably measured during neuropsychological assessment, and varies in relation to both age and task-related factors. Consistent with previous studies, older adults exhibited less MFT than younger adults in general, possibly suggesting a failure to recruit the relevant networks. Further, present findings suggest that the presence of MFT varies not only by the type of task but also by the level of difficulty. Future research with larger samples can clarify whether and how the amount of MFT elicited during specific subtests relates to objective and subjective difficulty. Overall, MFT can reliably be elicited by cognitive tasks and bears further study as a measure of real-time neural expenditure.

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Keyword 1: neuropsychological assessment
Keyword 2: electroencephalography
Keyword 3: aging (normal)
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65 Neuroscience in the Everyday World: Lateralization of Brain Activity During Dual-Task Walking

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Objective: Functional near-infrared spectroscopy (fNIRS) is a non-invasive functional neuroimaging method that takes advantage of the optical properties of hemoglobin to provide an indirect measure of brain activation via task-related relative changes in oxygenated hemoglobin (HbO). Its advantage over fMRI is that fNIRS is portable and can be used while walking and talking. In this study, we used fNIRS to measure brain activity in prefrontal and motor region of interests (ROIs) during single- and dual-task walking, with the goal of identifying neural correlates.
Participants and Methods: Nineteen healthy young adults [mean age=25.4 (SD=4.6) years; 14 female] engaged in five tasks: standing single-task cognition (serial-3 subtraction); single-task walking at a self-selected comfortable speed on a 24.5m oval-shaped course (overground walking) and on a treadmill; and dual-task cognition+walking on the same overground course and treadmill (8 trials/condition: 20 seconds standing rest, 30 seconds task). Performance on the cognitive task was quantified as the number of correct subtractions, number of incorrect subtractions, number of self-corrected errors, and percent accuracy over the 8 trials. Walking speed (m/sec) was recorded for all walking conditions. fNIRS data were collected on a system consisting of 16 sources, 15 detectors, and 8 short-separation detectors in the following ROIs: right and left lateral frontal (RLF, LLF), right and left medial frontal (RMF, LMF), right and left medial superior frontal (RMSF, LMSF), and right and left motor (RM, LM). Lateral and medial refer to ROIs' relative positions on lateral prefrontal cortex. fNIRS data were analyzed in Homer3 using a spline motion correction and the iterative weighted least squares method in the general linear model. Correlations between the

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cognitive/speed variables and ROI HbO data were applied using a Bonferroni adjustment for multiple comparisons.
Results: Subjects with missing cognitive data were excluded from analyses, resulting in sample sizes of 18 for the single-task cognition, dual-task overground walking, and dual-task treadmill walking conditions. During dual-task overground walking, there was a significant positive correlation between walking speed and relative change in HbO in RMSF [r(18)=.51, p<.05] and RM [r(18)=.53, p<.05)]. There was a significant negative correlation between total number of correct subtractions and relative change in HbO in LMSF ([r(18)=-.75, p<.05] and LM [r(18)=-.52, p<.05] during dual-task overground walking. No other significant correlations were identified.
Conclusions: These results indicate that there is lateralization of the cognitive and motor components of overground dual-task walking. The right hemisphere appears to be more active the faster people walk during the dual-task. By contrast, the left hemisphere appears to be less active when people are working faster on the cognitive task (i.e., serial-3 subtraction). The latter results suggest that automaticity of the cognitive task (i.e., more total correct subtractions) is related to decreased brain activity in the left hemisphere. Future research will investigate whether there is a change in cognitive automaticity over trials and if there are changes in lateralization patterns in neurodegenerative disorders that are known to differentially affect the hemispheres (e.g., Parkinson's disease).

Categories: Neurophysiology/EEG/ERP/fMRI
Keyword 1: neuroimaging: functional
Keyword 2: laterality
Keyword 3: movement
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66 Tolerability of HD-tDCS at Total Amplitudes of 2mA to 10mA in Older Adults

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Objective: High-definition transcranial direct current stimulation (HD-tDCS) is a non-invasive form of brain stimulation used to modulate neuronal activity in a brain region of interest. Growing research has shown that HD-tDCS is a promising treatment for cognitive decline in neurodegenerative disease. Most HD-tDCS studies have used amplitudes of 2mA or less, with little investigation into tolerability at greater intensities since anecdotal lore generally suggests them to be poorly tolerated. Therefore, we examined the tolerability of HD-tDCS and common side effect profile in older adults who received total amplitudes of 3mA to 10mA (delivered using multiple electrodes delivering 2-4mA). We developed a series of methods (e.g., participant instructions, task engagement, techniques to lower impedance) and hypothesized they would equate the experience between active and sham HD-tDCS. We also compared symptom endorsement between those receiving active stimulation at 3mA+ total versus those receiving 2mA or lower; again, hypothesizing no difference in reported symptoms.
Participants and Methods: 295 older adults (M_{age} = 71.12±9.42) (Normal Cognition = 75, Amnestic MCI [aMCI] = 172, Dementia of the Alzheimer's Type [DAT] = 27, Other = 21) were enrolled across six HD-tDCS studies. All participants received one to thirty 20- to 30-minute sessions of active or sham stimulation at total amplitudes between 2mA and 10mA. All participants completed a standardized side effect questionnaire after each session asking whether they experienced burning, tingling, itching, scalp pain, trouble concentrating, sleepiness, headache, mood changes, neck pain, skin redness, or any other symptoms. When symptoms were endorsed, participants rated the severity of the symptom (mild, moderate, severe).
Results: We used Fisher's Exact tests to compare the frequency and severity of side effects in active (3mA or higher) vs. sham stimulation. Those receiving sham were significantly more likely to report tingling than those receiving active HD-tDCS. Conversely, those receiving active stimulation more frequently endorsed mood changes and skin

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