AUTUMN MEETING OF THE BRITISH NEUROPSYCHOLOGICAL SOCIETY

MEETING ABSTRACTS (OPEN PAPERS)

Thursday 1st November 2018

Clinical Neurosciences Centre, 33 Queen Square, London, WC1N 3BG

ABSTRACTS OF OPEN PAPERS - ORAL PRESENTATIONS (in order of presentation)

The importance of the ventromedial prefrontal cortex for memory for life-like events

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Episodic memory recruits a large network of brain regions. In particular, the ventromedial prefrontal cortex (vmPFC) has been associated with linking incoming information with prior knowledge in order to comprehend and remember events. We collected MRI data and tested memory for short films in 73 patients attending Memory Assessment Clinics and 20 age-matched healthy controls. Memory for short films was strongly associated with clinical diagnoses of Alzheimer's disease, Mild Cognitive Impairment and "no impairment" in the patient cohort. Voxel-based morphometry revealed grey-matter volume correlations with memory performance throughout the "core episodic retrieval network". grey matter volume in the vmPFC was specifically correlated with ability to remember the films, after controlling for performance on the Doors and People Test. Furthermore, when watching the films, brain activity in the vmPFC was synchronised across individuals with high memory performance but not across low-performing individuals. These findings implicate the vmPFC in memory for life-like events, particularly during memory encoding.

Core regions for syntactic processing? A tDCS study on the language network

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tDCS was adopted to inhibit Broca's (BA 44/45) or the LT area (BA22) in two groups of adults, during a sentences comprehension task, with the aim of investigating the role of these language hubs in syntactic processing.

During both stimulation and sham conditions, participants performed a comprehension task, comprising 40 sentences divided in 4 syntactic structures.

All participants performed accordingly to the syntactic complexity of the task, as shown by the main effect of Type of Sentence (p < .001). Importantly, we also found a significant interaction between Group and Stimulation (p = .033), driven by the effect of cathodal stimulation in Broca's area, which worsen performance.

The findings of our study support Broca's area core functional engagement for syntactic processing.

The Sex Factor: Is the assessor equitable to male and female infants during developmental assessments?

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Using FaceReader, the assessor's facial expressions were measured during a full developmental assessment. The aim was to compare possible differences in the assessor's responses towards male and female toddlers. 29 video-recordings of assessor's face were analysed (12 for male; 17 for female infants). Six basic facial expressions were measured: happiness, sadness, anger, surprise, fear, disgust. 'Neutral' denotes when no distinct facial expression was detected. The most commonly detected facial expression was neutral (mean 42%), followed by happiness (29.1%), sadness (13.0%), and surprise (7.4%). Analysis of facial expression showed no difference when assessing male or female infants, except for sadness (14.5% male, 12.0% females, T-Test, p=0.013); this frequency difference is small and significance could be due to small sample size.

The fate of 1st and 2nd languages in bilingual patients with semantic dementia

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Objectives: A large proportion of the world's population is bilingual, yet almost nothing is known about the nature of the deterioration in the different languages of bilingual patients with neurodegenerative diseases that compromise language.

Methods: Following clinical diagnosis and confirmation with structural MRI, 13 bilingual patients with semantic dementia (SD) were assessed over several sessions on the same tests of naming and word comprehension in their first (L1) and second (L2) languages . Their results were compared to test scores from 21 matched healthy controls. L1 in all participants was one of the main languages spoken in southern India. L2 encompassed a variety of languages, including English for 7 patients.

Results: As expected in well-established SD, all patients had significantly impaired naming and comprehension abilities even in their L1; but performance was dramatically lower in L2, even for the patients with high ratings of premorbid proficiency in both languages. Furthermore, the specific items yielding correct naming responses in a patient's L2 were a virtually perfect subset of correct responses to the same items in his or her L1, and the same was true for the test of word comprehension.

Conclusions: The striking disadvantage for L2 in SD indicates that a bilingual's less-preferred language is more vulnerable to neurodegeneration. The dramatic item-specific correspondence between L2 and L1 suggests that the two languages in a bilingual share a common semantic network in the brain.

The influence of aetiology and cognitive reserve on cognitive performance in patients with focal frontal and non-frontal lesions

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The Cognitive Reserve (CR) hypothesis suggests that premorbid efficacy, aptitude and flexibility of cognitive processing can aid the brain's ability to cope with change or damage. Our previous work demonstrates that age and literacy attainment predict the cognitive performance of frontal patients on frontal-executive measures. However, it remains unknown whether CR can also predict the cognitive performance of non-frontal patients. In the current study, we examined the independent effects of two CR proxies, education and NART IQ, as well as age and lesion group (non-frontal versus frontal) on measures of executive function, intelligence, speed of information processing and naming. One hundred and twenty-two patients with unilateral lesions in the frontal lobes and 168 patients with unilateral lesions in nonfrontal, posterior brain regions were retrospectively recruited for the study. We fitted multiple linear regression models for each of the cognitive measures and found that NART IQ predicted executive, intelligence and naming performance. Education did not independently predict performance on any of our cognitive tests. We also found that age significantly predicted performance on the executive tests and speed of processing. Lesion group only predicted intelligence. These results suggest that age and literacy attainment play independent roles in predicting cognitive performance. However, the relationship between CR proxies and focal brain damage does not differ in the context of frontal and non-frontal lesions.

Neglect Dyslexia as a Word-Centred Impairment: A Single Case Study

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Neglect dyslexia is a neuropsychological syndrome characterised by consistently lateralised errors when reading. This case study investigates patient AB who demonstrated right neglect dyslexia in the

absence of visuospatial neglect. AB completed the Oxford Cognitive Screen and an original assessment designed to investigate the effects of orientation and content manipulations on reading.

AB was found to commit neglect dyslexic errors affecting the terminal letters of individual words when reading normal, vertical, and mirror-reflected words, regardless of where these terminal letters were presented in space. AB was unimpaired when reading numbers and demonstrated a qualitatively different error pattern when reading pseudo-words. These results both replicate and extend previous findings supporting a content-specific, word-centred explanation of neglect dyslexia.

Neuropsychological Assessment and Amyotrophic Lateral Sclerosis: A Systems Approach Clinic to Controlled Trial

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Cognitive impairment and behavioural dysfunction is an integral part of Amyotrophic Lateral Sclerosis (ALS) for many patients. This presentation reports a series of studies which investigated cognition, behavioural features and phenotypes, service engagement, and clinico-demographics of patients with ALS, to assess the relationship with caregiver burden. This research employed a cross-sectional population based design with longitudinal components, where patients with ALS underwent neuropsychological assessment and behavioural profiling (n=317), and their primary caregiver completed a semi-structure interview (n=100). This work outlines distinct cognitive and behavioural phenotypes associated with ALS, and how first attendance at a clinic can predict caregiver burden in a population based cohort of patients, which has led to the development of a randomised controlled trial investigating clinical interventions stratified by cognitive and behavioural phenotypes.

Age-related changes in semantic cognition and their effects on coherent speech production

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Effective semantic cognition requires conceptual representations as well as control processes that regulate access to this information. We investigated age-related changes in these systems in three studies. In the first, we found that older people had more detailed semantic knowledge than young people but were less skilled at selecting the most relevant aspects of their knowledge for the current task. Second, this semantic selection deficit could account for older people's increased tendency to produce off-topic information during conversational speech. Finally, fMRI indicated that when older adults produced off-topic speech, they displayed reduced activation in inferior prefrontal regions implicated in semantic selection. Our results indicate that the effects of ageing on semantic cognition have measurable and significant consequences in everyday life.

Aiming for generalisation in language rehabilitation

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Numerous studies have shown that impairment based approaches do not produce consistent or reliable generalisation for people with aphasia. That is, individuals can be trained on particular tasks (e.g. picture naming, word or sentence judgements) and show improvements for the particular items and/or the particular tasks they have been trained on. Generalisation to untreated items or untreated tasks – particularly everyday communication - is rare, inconsistent and unpredictable. We argue that this is because communication involves a set of very different processes compared to the decontextualized tasks that are traditionally used to measure linguistic function. We present a preliminary framework for moving beyond 'language in vacuo' tasks and towards a structured understanding of how language is used 'in situ'.

ABSTRACTS OF OPEN PAPERS - POSTER PRESENTATIONS (alphabetical order)

Combining action observation and motor imagery to increase functional independence in Parkinson's disease

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Action observation (AO) and motor imagery (MI) engage the motor system, facilitating movement, particularly when combined. We tested the feasibility of a personalised AO+MI intervention for Parkinson's disease (PD).

A tablet-based app was used to observe videos of everyday actions while simultaneously engaging in kinaesthetic MI, followed by physical practice. Preliminary testing involved 4 individuals with mild/moderate PD training at home for 6 weeks.

Average adherence was 78% (117 minutes/week). Interviews highlighted acceptability and ease of use, but greater variety of actions was desired. Some improvements in trained and untrained actions, and unexpected psychosocial benefits, were reported. Numerical improvements in MI and dexterity were identified.

Home-based AO+MI therapy is thus feasible in mild/moderate PD, offering a flexible and individualised approach.

Show me the way: Gesturing about space in Parkinson's

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Visuospatial processing is affected in Parkinson's with reduced performance on tasks involving spatial working memory. Visuospatial cognition is critical for gesture production and people gesture more when describing spatial information, however little is known about changes to spatial gesturing in Parkinson's. 37 people with mild-to-moderate Parkinson's and 33 age matched controls were video-recorded as they described their house layout to a listener. Gesture rate did not differ between groups, but the Parkinson's group gestured significantly more about 'direction' information, whereas controls gestured significantly more about 'shape' and 'size'. This suggests that the control group adopted a bird's eye view, creating a shared perspective between speaker and listener, while the Parkinson's group gestured mainly from their own perspective.

Healthy ageing reduces the precision of episodic memory retrieval

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In two experiments, we investigated whether age-related declines in episodic memory reflect a reduced probability of successful memory retrieval, or decreased precision of the retrieved information. Young and older participants encoded object displays, and later recreated features of studied objects using a continuous response dial. Across all task conditions, we observed significant age-related declines in memory precision, whereas age differences in retrieval success were limited to the most challenging task condition. Decreases in episodic memory precision persisted after controlling for age-related reductions in the fidelity of perception and working memory, suggesting that this deficit was primarily attributable to long-term memory processes. The results indicate impoverished precision of memory representations as one factor contributing to episodic memory decline in older age.

An investigation into emotional lability in Limbic Encephalitis: comparing a novel and an established measure

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Emotional lability is a neurological condition causing uncontrollable emotional outbursts out of proportion to the stimulus and often incongruent with mood. The present study investigates whether emotional lability occurs in Limbic Encephalitis (LE) patients, and if so which emotions are affected. The established Centre for Neurologic Study-Lability Scale (CNS-LS) and the newly developed Emotionality Questionnaire were administered to LE patients and controls (N = 27). Fifty-eight percent of patients scored at or above the clinical cut-off on the CNS-LS. The Emotionality Questionnaire revealed significant differences between patients and controls in the general, sadness, anger, and fear subscales, but not the happiness subscale. Results suggest LE patients are at risk of emotional lability, and expression of negative emotions is more affected than expressions of happiness.

Eye Movements in Developmental Prosopagnosia and Autism-Spectrum Conditions in Adulthood

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Developmental prosopagnosia (DP) has been reported to be misdiagnosed as autism-spectrum conditions (ASC). Here, eye movement patterns of adults with DP, adults with ASC, and typically developing individuals were compared. Participants watched audio-visual clips which varied in interactivity. They showed a woman reading either straight down to a book (passive), reading to another person in the scene (passive-interactive), or reading straight to the viewer (interactive). Dwell times on the internal features of the face of the reader, external features including the hair and clothing, and the background, were analysed. Group differences in eye movement patterns were identified, and these became more apparent as the videos became more interactive. Findings indicate that eye-tracking methodology may successfully partition DP and ASC.

Shared contextual knowledge strengthens inter-subject synchrony and pattern similarity in the semantic network

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Events are understood with reference to what has happened before. However, the effects of previously acquired knowledge on the processes supporting event cognition are poorly understood. Here, we selectively manipulated knowledge about the narrative content of events. Narrative knowledge boosted memory for the events and had two effects on fMRI markers of neural processing: (1) it strengthened temporal inter-subject correlations in ventromedial prefrontal (vmPFC) cortex, left angular (AG) and inferior frontal gyri (IFG), and (2) it increased spatial inter-subject pattern similarity in the bilateral anterior temporal lobes (ATL). We argue that shared narrative knowledge constrains participants' interpretation of the videos, resulting in greater alignment of neural processing of the events. We propose a division of labour between semantic control brain regions (VMPFC, IFG and AG), which coordinate the moment-by-moment activation of relevant semantic concepts, and the ATL, which represents the overarching narrative gist of an event.

Feature-Weighted Retrieval of Memories with Affective Content

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While it is well documented that autobiographical memory and empathy rely on common brain networks, only a small number of studies have considered the effect of this relationship on empathic behaviour. To investigate how encoding and retrieval strategies are mediated by dispositional empathy, two studies were conducted, making use of a novel text-based paradigm. Both studies found that high empathy individuals remembered more emotional details than low empathy individuals. Additionally, these studies found that high empathy individuals were more likely to remember emotional details from

vignettes that had a positive outcome for the protagonist. These findings may reflect a mnemonic strategy that supports perspective taking by encoding these items so they are accessible for the simulation of hypothetical events.

What Makes for a Successful Word-Finding Therapy? A Meta-Analysis of Single-Word Naming Intervention Studies

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For clinicians committed to evidence-based practice when treating adult patients with aphasia post-stroke, the cacophony in published research can be confusing. In this meta-analysis, we combined neuropsychology data published within the last decade (including small-N design studies) that focus on single-word anomia therapy, and identified the key components driving successful word-finding rehabilitation. Using machine learning statistical methods, incorporation of orthographic cues and provision of feedback emerged as important variables for successful rehabilitation of treated items shortly (within three weeks) post-therapy and during maintenance (beyond three weeks). For generalization to untreated items, total number of sessions appeared important. This meta-analysis demonstrates the crucial insights that can be obtained when relevant data from small-N design studies in neuropsychology are pooled together.

Randomized trial of iReadMore word reading training and brain stimulation in central alexia

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Central alexia is an acquired reading disorder co-occurring with aphasia. We tested the impact of a training app ('iReadMore') and anodal tDCS to left IFG, on word reading ability in 21 chronic stroke patients with central alexia. A crossover design was used, with two 4-week iReadMore training blocks, one with concurrent anodal tDCS and one with sham.

iReadMore training in post-stroke central alexia improved reading ability for trained words by 8.7% on average (d = 1.38), but did not generalise to untrained words. Therapy gains were maintained three-months after training cessation. Semantic word-matching also improved, but not sentence or text reading.

Anodal tDCS resulted in a 2.6% (d = 0.37) facilitation in reading accuracy, and generalised to untrained items.