25TH ANNUAL NEUROPSYCHOLOGY DAY

and

BRENDA MILNER LECTURE

May 6, 2024 | Program Booklet

Jeanne Timmins Amphitheatre
3801 University Street, The Neuro

neuro
Institut-Hôpital neurologique de Montréal
Montreal Neurological Institute-Hospital

McGill

Centre universitaire de santé McGill
McGill University Health Centre

25TH ANNUAL NEUROPSYCHOLOGY DAY

Table of Contents

MESSAGE FROM THE CHAIR

It is with great pleasure that I extend a warm welcome to each and every one of you to the 25th Annual Neuropsychology Day and Brenda Milner Lecture.

This year marks a quarter-century of fostering dialogue and progress in neuropsychology through this annual event. It also serves as a continued tribute to the remarkable career and contributions of Professor Brenda Milner.

We are honoured to welcome Dr. Mark D'Esposito from the University of California, Berkeley as our keynote speaker. His expertise in neurology promises an engaging and informative session during the Brenda Milner Lecture, exploring the 'The Neural Architecture of Cognitive Control.'

The program also includes 37 poster presentations and 8 oral presentations from talented trainees of diverse academic backgrounds. These presentations provide an excellent opportunity to learn about and celebrate the latest research in neuropsychology.

I wish everyone a day of productive exchanges and lasting memories.

Warmly,

Nathan Spreng
Director, The Laboratory of Brain and Cognition
Professor, Department of Neurology and Neurosurgery
James McGill Professor

BRENDA MILNER

Brenda Milner, CC, GOQ, DSc, PhD, is Canada's preeminent neuropsychologist, having pioneered research into the human brain; many consider her a founder of the field of clinical neuropsychology and cognitive neuroscience. She is the Dorothy J. Killam Professor at the Montreal Neurological Institute-Hospital, and a professor in the Department of Neurology and Neurosurgery. Her contributions revolutionized our understanding of how brain structures govern different learning, memory, and speech functions, and she has received numerous major awards and honours. Her career spans more than 70 years – 60 of those years as a member of the McGill/Neuro community, where she directed the neuropsychology laboratory at The Neuro and taught in the Department of Neurology and Neurosurgery.

PROGRAM

12:30-13:45 **Poster Session #1**

Refreshments will be provided

14:00 **Oral Presentations**

8 minutes each, with two minutes for questions

Welcome and Introduction

Talk 1: Integrating brainstem and cortical functional architectures
Justine Hansen
Talk 2: Is the affective response to performance feedback related to motor learning?
Dimitri Palidis
Talk 3: Dissociable cognitive deficits associated with substantia nigra and locus coeruleus degeneration in Parkinson's disease
Sophie Sun
Talk 4: Listening While Playing the Organ: How Auditory-Motor Integration May Influence the Frequency-Following Response
Isabelle Arseneau-Bruneau

5 minute pause

Talk 5: Focal epilepsy reduces widespread coupling of sleep spindles and sleep slow waves as potential mechanism for poor memory performance
Katharina Schiller
Talk 6: Neural mechanisms of sensorimotor integration in speech perception
Olivia Bizimungu
Talk 7: No Evidence for a Generalized Construct of Cognitive Effort Aversion
Ziqi Fu
Talk 8: Automatic, Ad-Libitum Cognitive Touchscreen Testing in the Common Marmoset
Tyler Cook

Closing remarks

15:25 **Refreshment Pause**

16:00 **Brenda Milner Lecture**
The Neural Architecture of Cognitive Control: From Bench to Bedside

Welcome and Speaker Introduction: Nathan Spreng, The Neuro

Dr. Mark D'Esposito
Distinguished Professor of Neuroscience and Psychology, UC Berkeley
Neurologist, Northern California VA Health Care System
Founding Director, Henry H. Wheeler, Jr. Brain Imaging Center, UC Berkeley

17:15 **Cocktail Reception & Poster Session #2**

BRENDA MILNER LECTURE

Dr. Mark D'Esposito

Distinguished Professor of Neuroscience and Psychology, UC Berkeley
Neurologist, Northern California VA Health Care System
Founding Director, Henry H. Wheeler, Jr. Brain Imaging Center, UC Berkeley

THE NEURAL ARCHITECTURE OF COGNITIVE CONTROL: FROM BENCH TO BEDSIDE

Talk Abstract

A fundamental question in cognitive neuroscience is how we can flexibly guide our behaviour. Cognitive control involves the interplay between top-down and bottom-up processes. Bottom-up processes are responsible for guiding automatic behaviour and are influenced by sensory input, whereas top-down processes are shaped by internal states like knowledge from previous experiences, intentions, and goals. In this talk, Dr. D'Esposito will share a series of human studies that utilize diverse approaches to explore the neural mechanisms responsible for cognitive control. Furthermore, Dr. D'Esposito will discuss potential strategies for remediating cognitive control deficits that are observed in a wide range of clinical conditions.

Biography

Mark D'Esposito is a Distinguished Professor of Neuroscience and Psychology at the Helen Wills Neuroscience Institute, and director of the Cognitive Neuroscience and Neurology Lab at the University of California, Berkeley. His research focuses on investigating the neural bases of high-level cognitive processes such as working memory, achieved through neuroimaging and neurostimulation in healthy human participants and patient populations with frontal lobe dysfunction. He has been awarded the Fred Kavli Distinguished Career Contributions Award from the Cognitive Neuroscience Society and is an elected fellow to the American Association for the Advancement of Science, American Academy of Neurology, and the American Academy of Arts and Sciences.

ORAL PRESENTERS

ISABELLE ARSENEAU-BRUNEAU

Listening While Playing the Organ: How Auditory-Motor Integration May Influence the Frequency-Following Response

Isabelle Arseneau-Bruneau is a PhD Candidate in Neuroscience at McGill University. She works under Robert Zatorre's supervision and investigates how music training may enhance brain functions, from the fundamental level of auditory processing. Her previous research training includes a Master's in Music & Human Learning at the University of Texas at Austin, as well as a research assistantship at the SoundBrain Lab, supervised by Bharath Chandrasekaran. Previously, Isabelle was a professional trumpet player, with two undergraduate degrees in music and a master's in performance. Although, these days, her interests focus on finishing her thesis, preparing lectures, and long-covid research.

OLIVIA BIZIMUNGU

Neural mechanisms of sensorimotor integration in speech perception

Olivia Bizimungu is a Neuroscience PhD Candidate at McGill University. Working in Sylvain Baillet's laboratory, she uses neuroimaging (EEG + MEG) to investigate how the brain's speech production and perception networks are intertwined. She previously completed her BSc and honours thesis in Cognitive Science at Mount Allison University, where she researched age-related differences in visuospatial perception. She has also completed an internship with a BCI start-up, leveraging computational neuroscience, machine learning and signal processing towards the analysis of brain activity.

TYLER COOK

Automatic, Ad-Libitum Cognitive Touchscreen Testing in the Common Marmoset

Tyler Cook is a McGill master's student working to uncover the functional and behavioural properties of multisensory integration. He completed his Bachelor of Cognitive Science with a concentration in the Biological Foundations of Cognition minoring in Linguistics at Carleton University in 2022. Tyler is interested in how multiple types of sensory information are integrated in the brain, starting as sensory information and becoming perceptual experience. What influences integration, and how does integration affect language and social development. Outside of the lab, Tyler enjoys the iterative process of brewing espresso, Judo throws, and taking walks with his goldendoodle, Leo.

ZIQI FU

No Evidence for a Generalized Construct of Cognitive Effort Aversion

Ziqi is the lab manager for Professor Ross Otto's Lab at the Department of Psychology, McGill University. She received her Bachelor of Arts and Science degree from the Honours Cognitive Science Program at McGill University last year, concentrating in neuroscience with a minor in psychology. Her research focuses on understanding human cognitive effort, decision-making, and cognitive control, employing a combination of computational, behavioral, and psychophysiological techniques.

ORAL PRESENTERS

JUSTINE HANSEN

Integrating brainstem and cortical functional architectures

Justine Hansen is a PhD candidate in the Network Neuroscience Laboratory with Dr. Bratislav Misic. She uses multimodal, multiscale neuroimaging data to study the relationship between the brain's microscale and macroscale.

DIMITRI PALIDIS

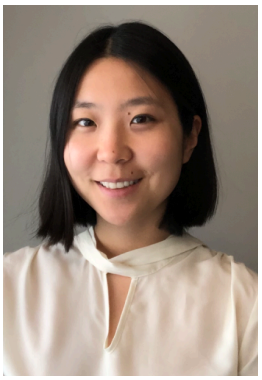
Is the affective response to performance feedback related to motor learning?

Dimitri Palidis is a postdoctoral researcher in Lesley Fellows' lab at the Neuro. He studies the neural basis of motor learning in humans using a variety of techniques including human lesion methods, electrophysiology, and robotics. Dimitri is particularly interested in how motor skill acquisition is influenced by feedback about success, errors, and rewards during practice, and how these kinds of feedback might be delivered through technology to improve the relearning of motor skills during stroke rehabilitation.

KATHARINA SCHILLER

Focal epilepsy reduces widespread coupling of sleep spindles and sleep slow waves as potential mechanism for poor memory performance

Dr. Katharina Schiller is a Neuropsychologist with an interest in the interaction of epilepsy, sleep and cognition. She is currently holding the position of a Postdoctoral Fellow in the labs of Prof. Jean Gotman and Prof. Birgit Frauscher. After having completed her PhD at the Ludwig-Maximilians-University of Munich in Germany, she started her Postdoctoral Fellowship at the Montreal Neurological Hospital funded by the German Research Foundation to broaden her understanding of the impact of epilepsy on cognition using novel electrophysiological markers. Her current project focuses on mapping sleep oscillations in patients with focal epilepsy using high-density EEG.



SOPHIE SUN

Dissociable cognitive deficits associated with substantia nigra and locus coeruleus degeneration in Parkinson's disease

Sophie is a PhD student in Dr. Madeleine Sharp's lab at The Neuro studying the relationships between cognitive deficits in Parkinson's disease and 1) neural underpinnings within the dopaminergic and noradrenergic systems and 2) severity of mood and other neuropsychiatric symptoms.

POSTER SESSION 1

Hearing with hands: Vibrotactile stimulation generates a frequency-following response

Emily Coffey | The Neuro, Concordia University

We explored the encoding of frequency information in auditory and tactile perception by measuring the frequency-following response (FFR) to auditory and vibrotactile stimulation. The FFR is an evoked brain response that reflects the accuracy of periodicity encoding in the brain; but it has never been measured to vibration. 41 normal-hearing participants were presented with a speech syllable through earphones, and via vibrotactile stimulation using a haptic glove. FFR was collected for auditory, vibrotactile and audio+tactile conditions using 64 electrode EEG. Results show a clear vibrotactile FFR with amplitude peaking at the fundamental frequency. Topographies suggest separate generators for auditory and tactile FFR, which is further supported by the lack of correlation between both FFR amplitudes. No modulation of FFR was observed in the auditory+tactile condition. Periodicity encoding in the tactile system has never been documented previously, but its existence has implications for using tactile input for hearing augmentation.

A data- driven MRI study of neurobehavioral comorbidities in temporal lobe epilepsy

Fatemeh Fadaie | The Neuro, McGill University

Objective. Temporal lobe epilepsy (TLE) presents with neurobehavioral comorbidities, necessitating comprehensive analytical methods to understand network organization's role. This study explored associations between neurobehavioral measures and functional connectivity strength (FCS).
Methods. We studied 42 drug-resistant TLE and 41 controls using multimodal MRI and neurobehavioral assessments. Partial least squares (PLS) analysis examined multivariate associations between FCS and affective scores. Linear models assessed relationships between PLS-related features, cognitive measures, and structural alterations.
Results. PLS revealed significant associations between affective symptoms and FCS, in temporo-frontal cortices, medial temporal lobe, and basal ganglia (caudate nucleus, globus pallidus). Positive correlations were noted between verbal memory and FCS in bi-temporal and limbic regions. Neocortical atrophy correlated positively with weaker FCS. Amygdalar pathology correlated negatively with FCS and affective scores, with FCS mediating these effects.
Significance. Altered functional connectivity in TLE corresponds to affective symptoms and cognitive impairments, suggesting potential interventions for enhanced patient care.

The neurobehavioural correlates of pro-social reward-effort decision making in cognitively unimpaired older adults at risk of Alzheimer's disease

Garance Barnoin | The Neuro, McGill University

Motivational processes and decision-making change across the lifespan and in early Alzheimer's disease (AD). This study investigates the neural and behavioural basis of pro-social reward-effort decision making in 44 cognitively unimpaired older adults at risk for AD (mean age =72years, SD= 5.23). Participants completed a computerized paradigm that we developed and modified from the Effort Expenditure for Rewards Task. Our primary measure of interest was a free parameter called 'bias' (the amount of reward needed for effort initiation), derived from a sigmoid function fitted to a participant's behavioural data and reflecting the left-right translation of the sigmoid function. We showed that bias towards effort expenditure was greater in a social compared to a monetary condition, and bias was also associated with neuropsychiatric symptoms. All participants underwent resting-state functional connectivity (RSFC) MRI data acquisition. Using seed-to-voxel analyses we identified an antagonistic association between social reward-effort bias and RSFC between anterior cingulate cortex and left temporoparietal junction, a heteromodal association area. This study represents an important first step in establishing the brain-behaviour correlates of decision making in older adults at risk for AD.

Cross Species Investigation of the Neurocognitive Dynamics of Explore/Exploit Decision-Making: Insights from Macaque and Marmoset Models

Hildelith Leyser | The Neuro, McGill University, RIKEN Center for Brain Science (Japan)

Understanding sensorimotor integration and body schema perception is crucial for interventions in neurological conditions, particularly in autism and schizophrenia. This project aims at investigating explore/exploit decision-making from a multisensory perspective, by combining behavioural tasks and functional magnetic resonance imaging (fMRI) to understand the related neural mechanisms. We hypothesize that frontoparietal networks play a key role in this mechanism. As potential preclinical primate models for studying social impairments, we use a translational approach with both macaques and marmosets to first unravel this mechanism in healthy animals. Using a explore/exploitation paradigm, we assessed monkey's movement data and decision-making and its link with social hierarchy, with Deep Learning algorithms. Now, we plan to perform fMRI while monkeys are viewing recorded scenarios of this behavioural paradigm, probing frontoparietal network activation. This multifaceted approach aims to elucidate the intricate neural processes underlying decision-making, informing therapeutic strategies for conditions like autism where these mechanisms are disrupted.

POSTER SESSION 1

How We Learn to Optimize Blink Timing in Structured Tasks

Isabell Pitigoi | Centre for Neuroscience Studies, Queen's University

Spontaneous blinking is crucial for lubricating and protecting the cornea. However, humans blink at a much higher rate than necessary for physiological purposes alone, suggesting that other mental or environmental factors are involved. For example, blinks occur at implicit task breakpoints and are sensitive to internal states related to attention and cognitive demand. Here we will characterize how blink timing is optimized as subjects learn the constraints of an interleaved pro-/anti-saccade task. Data was collected from 608 (390F) healthy participants aged 5-93 years. Blinks quickly became strategically organized, with a clear pattern emerging rapidly during the first 40 trials and strengthening overtime. This suggests that blinks are unconsciously timed to optimize task performance. Further, females had higher blink probability yet appeared to learn the task contingencies quicker. Overall, these findings are crucial to understand blink behaviour and may eventually inform the development of ocular markers of cognitive decline.

DeepLabCut-based behavioral features extraction for recognizing movement patterns in the common marmoset

Jiayue Yang | McGill University

Movement is a fundamental behavioral feature, reflecting an animal's well-being and potential disease status. However, traditional behavioral observation is not always reproducible among experimenters and may introduce bias. Thus, to minimize this bias, we aim to identify movement components within animals' home cages via automatic tools (no human interaction). In this study, behaviors of marmoset families were recorded by a Webcam-based system. We utilized DeepLabCut, a deep-learning program for non-invasive behavior tracking, to construct a skeleton model with labeled body parts. Using custom Python scripts, we then extracted marmosets' speed, inter-individual distance, and head angles. Our results show that DeepLabCut-based analysis enables quantitative predictions of movement patterns with high accuracy. We found that marmosets exhibit various speed intensity, types of social interaction (e.g. play-fighting, friendship), and head posture. We hope to compare these results with a marmoset synucleinopathy model (Parkinson's disease, dementia) for detection of potential behavioral deficits.

Neurophysiological changes related to amyloid and tau pathology are associated with longitudinal cognition and Mild Cognitive Impairment progression

Jonathan Gallego | The Neuro, McGill University

Regional accumulation of Aβ and tau during preclinical Alzheimer's disease (AD) is associated with changes in neurophysiological activity. We used PET to measure Aβ and tau deposition and resting-state MEG to capture neurophysiological activity in cognitively unimpaired older adults with family history of AD (PREVENT-AD cohort; n=103). We implemented a partial least squares (PLS) analysis to test whether neurophysiological alterations linked to AD pathology were associated with participants' demographics and longitudinal cognition and used logistic regression models to test whether neurophysiological features improved the accuracy for predicting Mild Cognitive Impairment (MCI) progression. The PLS analysis linked proteinopathy-related neural slowing to APOE ε4 status and longitudinal cognitive decline across multiple domains. MEG features improved the accuracy for predicting MCI progression, matching the accuracy gained with Aβ/tau PET. Neurophysiological changes related to AD proteinopathy are directly associated with longitudinal cognitive impairments and are useful for identifying subjects at risk of developing MCI.

Cognitive change 5+ years after the onset of psychosis: a systematic review and meta-analysis

Joseph Ghanem | McGill University

Psychotic disorders are characterized by cognitive deficits that are apparent before illness onset and persistent thereafter. Whether they decline, stabilize, or improve in the long-term remains contentious. Previous reviews were focused on the first 5 years following psychosis onset and identified small improvements in cognition. Recent studies with follow-ups of a decade identified cognitive decline in some cognitive domains, but others found stability. Here, we quantitatively synthesized the evidence of studies with follow-ups of 5+ years. Twenty studies (N=2412) evaluating 7 cognitive domains were included. Global cognition remained stable over time (g = .06), and so did the individual cognitive domains of verbal memory (g = .07), visual memory (g = -.08), working memory (g = .03), speed of processing (g = .19), reasoning and problem-solving (g = .13), and verbal fluency (g = .09). Cognition is stable after the onset of psychosis and does not progress over time.

Stress and Quality of Life of Parents of Children with POLR3-related Leukodystrophy

Laura Lentini | Research Institute of the McGill University Health Centre

POLR3-related leukodystrophy (4H) is a rare, genetic, childhood disease with hypomyelination, hypodontia and hypogonadotropic hypogonadism presentation. It follows a debilitating progressive and often fatal course for patients. However, studies investigating parental stress and quality of life (QoL) of these patients are lacking. The aims of this study were to determine parental stress and QoL compared to normative samples, and to identify which modifiable factors negatively impacted these scores. Questionnaires and clinical assessments were collected cross-sectionally to assess parents' well-being, stress factors, and perceptions of injustice. These parents had lower QoL compared to normative samples, yet 80% had normal stress scores. Parents' perceived injustice scores were high. Correlations were found between and within mothers' and fathers' scores. Relationships were found between mothers' stress scores, years since disease onset and certain life circumstances. These results show the importance of implementing services and social support to improve the quality of life of parents.

POSTER SESSION 1

Olfactory Function and Advanced Brain Age in Clinical High Risk and First-episode Psychosis

Lejia Fan | McGill University

Background: Schizophrenia is an illness where both aberrant olfactory function and accelerated brain aging are seen. We require further exploration, particularly in the context of pre-psychotic clinical high risk (CHR) state for psychosis before the onset of the first psychotic episode. This study aims to investigate olfactory identification function and brain age in individuals with first episode schizophrenia (FES) and those at CHR, examining the interplay between these factors.
Methods: A total of 215 participants, comprising 77 drug-naive individuals with FES, 71 CHR, and 67 healthy controls (HC), underwent assessment of olfactory identification function using the odor stick identification test. T1-weighted anatomical images were obtained, and the XGboost method was employed to estimate individual brain age. Brain age, corrected by chronological age, was quantified as the brain age gap (BAG), representing the difference between predicted brain age and chronological age. A General Linear Model was applied, with olfactory function and BAG as independent variables, considering education levels and gender as covariates for BAG, and education levels and age as covariates for olfactory function. The relationship between olfactory function and BAG was also explored.
Results: Individuals with FES exhibited lower olfactory function ($F(2,210) = 5.66$, $p = 0.014$, partial $\eta 2 = 0.036$; mean(SD) in FES = 6.06(2.20); CHR = 6.88(2.35); HC = 7.69(1.83)) and higher BAG ($F(2,210) = 3.86$, $p = 0.022$, partial $\eta 2 = 0.051$; mean(SD) in FES = 3.17(8.88); CHR = 1.46(7.76); HC = 0.001(7.38)) compared to HC, with CHR showing no significant difference from the other two groups. Lower olfactory function was associated with higher BAG for HC ($r = -0.37$, $p = 0.002$), CHR ($r = -0.26$, $p = 0.031$), and CHR plus HC ($r = -0.31$, $p < 0.001$), but not for FES ($r = 0.04$, $p = 0.711$) or FES plus CHR ($r = -0.13$, $p = 0.116$).
Discussion: Impaired olfactory functions and advanced brain aging are characteristic of schizophrenia, distinguishing it from CHR. The observed association between lower olfactory function and higher BAG remains consistent in individuals with normal olfactory function and brain age. However, this relationship is disrupted once abnormalities emerge.

Magnetic resonance imaging of brain myelination in the developing common marmoset

Maeva Gacoin | The Neuro, ACAR, McGill University

The common marmoset (Callithrix jacchus) shows promise as a non-human primate model for studying neurodevelopmental disorders and social behaviors. However, baseline studies on neurotypical subjects are still needed to understand this species better. Research using magnetic resonance imaging (MRI) and histology has revealed high myelin content in primary sensory areas and extrastriate visual areas. Yet, little is known about brain myelination during marmoset development. Here, we scanned 13 marmosets from infancy to adulthood using a 3 Tesla MRI scanner. We measured T1- and T2-weighted images to compute the T1w/T2w ratio, which correlates with cortical myelin content. Our findings indicate a higher T1w/T2w ratio in sensory areas compared to prefrontal areas at 4 months, suggesting lower myelin content in the latter. This aligns with observed myelination patterns in primates during critical periods. This research lays the groundwork for investigating how diseases like autism spectrum disorders affect this trajectory during critical periods.

fMRI Signal Complexity on the Effect of Repetitive Transcranial Magnetic Stimulation for Negative Symptoms in Schizophrenia

Mengdi Zhu | McGill University

A consistent challenge in the management of schizophrenia is the treatment of negative symptoms due to its lower responsiveness to antipsychotics. Repetitive Transcranial Magnetic Stimulation (rTMS) is a promising neuromodulation technique for alleviating negative symptoms of schizophrenia. Yet, specific changes in neural mechanism remains unclear. This study explored complexity and randomness of the brain signal and their relationship to symptoms of schizophrenia by analyzing Resting-state Functional Magnetic Imaging (fMRI) time-series data from 31 participants before and after the rTMS targeting the left dorsolateral prefrontal cortex. We assessed changes in clinical symptoms using Positive and Negative Syndrome Scale (PANSS) and extracted signal complexity metrics such as Hurst exponent (HE) and Shannon entropy (ShEn). Results showed greater r-TMS symptom improvement correlated with lesser decrease in signal complexity. Additionally, patients with greater negative symptom severity exhibited more complexity of the time-series at baseline, suggesting E/I imbalance in Schizophrenia.

Investigating the effects of birth weight and sex differences on resting-state functional connectivity and impulsive behaviour

Olivia Ruge | McGill University

Individuals born small for gestational age (SGA) display impulsivity towards palatable foods, contributing to their increased risk for metabolic disease and psychopathology in adulthood. SGA is also linked to altered orbito-frontal cortex resting-state functional connectivity (rs-FC). It remains unclear the behavioral phenotype is explained by neurofunctional alteration, and if these alterations display a sex difference. Children from the ABCD cohort (N=11,752) were classified in the SGA group if their birth weight centile was below 10. Impulsivity was measured using Stroop Emotional Task, UPPS-P Impulsive Behavior Scale, Flanker Inhibitory Control and Attention Test, and the BIS/BAS Scale. We report that SGA females display increased impulsivity. Our results strongly suggest a relationship between rs-FC and impulsive behaviour, as well as noticeable sex differences. Impulsivity is related to altered prefrontal cortex rs-FC. Moderation models will be focused on understanding the role of SGA in the relationship between rs-FC and the behavioral findings.

POSTER SESSION 1

The Impact of Screening for Anxious and Depressive Symptoms on the Outcome of Patients with a Mild Traumatic Brain Injury

Paolo Bastone | Mcgill University

Approximately 27-69 million individuals worldwide sustain a mild Traumatic Brain Injury (mTBI) annually, making it an important public health concern. Many victims experience post-injury anxiety and/or depression, which are associated with more post-concussive symptoms and worse functional outcomes. We thus administered the GAD-7 and CESDR-10 questionnaires, no more than three months after injury, to screen for symptoms of anxiety and depression, respectively. We performed a retrospective chart review of 328 patients from the Montreal General Hospital mTBI Clinic who either received these questionnaires (N=143) or did not (N=185). The number of interventions received between groups were compared using ANOVA. Patients who received questionnaires (M=1.34, SD=0.978) were referred to significantly more interventions than those who did not (M=0.90, SD=0.876, $p<0.001$) and referral rates positively correlated with GAD-7 and CESDR-10 scores. Therefore, screening for symptoms of anxiety and depression post mTBI helps clinicians refer patients to various resources, which should improve outcome.

The relationship between EEG functional connectivity during sleep and cognitive function in Parkinson's disease

Soraya Lahlou | The Neuro

Changes to sleep are common in Parkinson's disease (PD) and have been associated with worse cognitive performance. Much of this work has focused on either global measures of sleep architecture or on specific oscillations (e.g., sleep spindles). More recently, EEG-derived functional connectivity has also emerged as a possible predictor of cognitive function but little is known about the degree to which patterns of EEG connectivity during sleep can be associated to cognitive function in PD. PD patients (n=47) and healthy older adults (n=23) underwent a neuropsychological evaluation of five cognitive domains (attention, executive function, learning and memory, visuospatial abilities and language) and overnight polysomnography. EEG functional connectivity was measured using imaginary coherence in NREM2 and NREM3 across the delta, theta, alpha, low sigma and high sigma frequency bands. We used partial least squares correlational analysis to investigate the patterns of associations between sleep EEG functional connectivity and cognition. In NREM3, we identified a significant latent variable that explained 57% of the covariance and was associated with worse memory and with increased connectivity across all frequency bands. These preliminary results suggests that connectivity during NREM3 might be particularly important for memory function.

Cognitive and behavioral assessment using an in-cage touchscreen apparatus in the common marmoset

Tyler Cook | The Neuro

Neurological disorders impact cognition and increase adversity through social biases and diminished autonomy. The common marmoset (Callithrix Jacchus) boasts behavioral and genetic homology to humans, quick maturation, and fast reproductive cycle, making them strong preclinical models for translatable neurological research. To assess the viability of performing cognitive testing on marmosets, we conducted non-invasive tasks using an in-cage touchscreen system (SmartChair from Rogue Research) and NIMH MonkeyLogic software, limiting human interaction, enabling subject specific task presentation and autonomous, ad-libitum participation in tasks including pair-wise visual discrimination / reversal learning, socio-semantic categorization, and visuo-motor conditional learning (4 marmosets, 2M, 2F, average age 15 months old). Reaction time, hits/misses and perseveration were collected to assess learning. We observed that marmosets can perform human/ rodent validated tasks, strengthening marmosets as a translational research model. We demonstrate a powerful tool for researching cognition in the marmoset by measuring sensation, perception, attention, memory, and executive function.

Investigating factors underlying gender selection bias in observational neurocognitive aging research using fuzzy cognitive mapping

Vasvi Dhir | The Neuro, McGill University

Neurocognitive aging research is largely subject to the gender selection bias. This study aims to identify gender-related barriers and facilitating factors which may explain the bias. A participatory research methodology, called fuzzy cognitive mapping, is employed, whereby researchers discuss with participants from diverse groups and record their thoughts on what they think may be factors that increase or decrease research participation. Overall, this study addresses the lack of diversity and poor representativeness, particularly of older males in neurocognitive aging research samples, to generate meaningful sampling strategies and ultimately knowledge that is suited to generalizable application, thus advancing toward unbiased science.

POSTER SESSION 1

Regional Excitatory-Inhibitory Balance Affects Self-Reference Effect on Recollection via the Precuneus-Prefrontal Connectivity

Ying He | McGill University

Self-reference effect (SRE) facilitates memory recollection. The balance between excitation and inhibition (EI) of neurons is critical to memory. However, it remains unclear whether EI balance affects SRE on memory through neural activity. 54 healthy participants aged 7-35, underwent MRS to measure glutamate, glutamine (Glx) and GABA levels in the posterior cingulate cortex and precuneus and participated in an encoding fMRI task involving self-related and semantic judgements. We found that, compared to the semantic condition, the self-related condition exhibited greater activation in the precuneus, positively correlating with Glx/GABA ratio. Task-dependent functional connectivity analysis revealed connectivity between precuneus and medial prefrontal cortex (mPFC) was positively associated with the Glx/GABA ratio and SRE effect on recollection accuracy. Furthermore, a mediation analysis revealed higher Glx/GABA ratio enhanced SRE on memory recollection through greater precuneus-mPFC connectivity. Our study provides valuable insights into how neurochemical substrates shape cognition.

High-resolution diffusion MRI of the connections between lower visual areas reveals retinotopically organized connections and dense connectivity of the central visual field representation

Ziqi Hao | McConnell Brain Imaging Centre, The Neuro, McGill University

Our study aims to quantify and model the cortico-cortical connections between lower visual areas V1, V2, and V3. To this end, we have employed an advanced diffusion MRI (dMRI) technique - gSlider-SMS implemented on a 3 Tesla scanner – that provides high-resolution isotropic (1 mm voxels) and high signal-to-noise ratio. Our data analysis from 40 healthy subjects shows that the inter-areal connections between areas V1, V2, and V3 are retinotopically organized, with denser connectivity between the central visual field representations compared to the periphery. Additionally, we observed an approximate Gaussian distribution of the projection eccentricities, indicating a retinotopic divergence of the connections, as was previously demonstrated by invasive anatomical tracer injections in animal studies. Our findings underscore the extensive resources used for central visual field processing and hierarchical organization in the visual cortex with implications for understanding the function of the visual cortex and vision-related disorders.

Auditory learning and the representation of cognitive maps

Jade Carriere | Concordia University

When learning a new language, we intuitively know which sounds follow one another and which sounds tend to be paired together. But how does such knowledge come about? Participants were asked to listen to ecological sounds played in pairs, and were instructed to map out where these sounds would be located in an abstract space of high dimensionality, and they received feedback (how far apart sounds are from one another). The task is repeated over three blocks of 66 trials each. In a fourth block, a different map is presented, made of Shepard tones (pitches forming a never-ending staircase) to offer a comparison with an "intuitive" map coded tonotopically within the auditory cortex. Although the task seems extremely difficult, preliminary findings hint at subtle signs of learning at least on the third block. Individual differences in learning efficiency are noticeable and likely hindered by inherent clusters among certain sound identities.

Can you finish the end of my...?

Lily Medvick | Concordia University

In environments where the signal-to-noise ratio (SNR) is negative (the target speaker is quieter than the background noise) understanding speech is difficult. Individuals employ cognitive strategies to 'fill in' missing speech segments. This process is referred to as phonemic restoration, and its ability is influenced by various factors. One factor is the semantic similarity, referring to the closeness in meaning, of the heard speech and missing speech. With advances in GPT-powered language processing models, we can assess the semantic similarity between words and generate numeric values which tell us the predictability of a given word within its semantic context. In the present study, past data was reanalyzed using this model. These values were compared to recognition performance and SNR level. Results demonstrated that higher semantic similarity aided speech recognition performance, but that the benefit was greater at more favorable SNRs.

POSTER SESSION 2

Will your fNIRS be for here or to go?

Andrew Caza | Concordia University

Functional near-infrared spectroscopy (fNIRS) is a brain imaging technique that measures oxygenation levels of blood vessels in response to neural activity. This technique captures oxy (HbO) and deoxy (HbR) hemoglobin and is supposedly resistant to motion artifacts, but this later assumption remains to be tested carefully. The company NIRx has developed a portable system that opens the possibility of conducting ambulatory studies where participants could walk outdoors while listening to speech, perhaps experiencing a cost associated with speech processing (e.g. relevant to aging research). Here, we asked 10 participants to watch a circular checkerboard in two conditions: sitting or walking. We observed HbO and HbR fluctuations in the visual cortex during checkerboard compared to rest periods, but they were largely destroyed by motion artifacts (in fact contaminating the clean periods too as they were part of the same recordings).

Identifying biological heterogeneity to childhood adversity through biomarkers of stress activation

Andrew Rosenblatt | McGill University

Early-life adversity has been linked to increased susceptibility to cardiometabolic and neuropsychiatric conditions in adulthood, but not all exposed individuals develop these conditions. This study aimed to characterize heterogeneous responses to adversity among children using stress-activation biomarkers (salivary cytokines, hair steroids and endocannabinoids), potentially enabling the earlier identification of individuals more sensitive to adversity. In a sample of 129 children 0-17y exposed to adversity (defined by a cumulative variable including caregiver education < high school, lowest income group, highest social risk group), we identified 2 age and sex adjusted clusters of children with different patterns of biomarker responsiveness (higher or lower responsiveness). Children with higher responsiveness also demonstrate poorer physical functioning measured by PEDsQL in comparison to the lowest responsiveness group. Our set of biomarkers collectively identify children exposed to adversity who have more problems in childhood, and this has implications for targeting interventions and preventive measures.

What can you tell in the blink of an eye?

Penelope Coupal | Concordia University

Pupillometry is a tool used as an index for listening effort and cognitive load. Generally, as a speech-recognition task becomes more demanding, listeners show a greater dilation. Typical analyses remove blinks completely from the data and interpolate throughout their duration. But, blinks could be of primary interest if they somehow reflect an intentional behavior. We hypothesize that as listening conditions require more attention, blinking behaviour might increase, but not at random times. This was investigated in sustained listening conditions with 80 sentences presented in quiet and speech-shaped noise at different signal-to-noise ratios (SNR): 0dB, 7dB, 14dB and quiet. Twenty-one participants were instructed to repeat verbally the sentences to the experimenter who typed for them, while keeping control for gaze. Re-analysis of the pupil traces suggests that blinks during sentence presentation were progressively suppressed as SNR decreased. As such, they contain information that researchers should focus on, rather than discard.

Improving Quantification of Aperiodic (1/f) Dynamics: Bayesian Model Selection in SPRiNT

Benjamin Lévesque Kinder | The Neuro, McGill University

Neural oscillations are central to the study of neurophysiology (Buzsáki, 2006). These oscillatory dynamics are composed of rhythmic and arrhythmic components. Although the rhythmic components of these signals have been studied extensively, the arrhythmic components have largely been disregarded as noise despite being behaviourally (Albouy et al., 2017) and pathologically (Molina et al., 2020) meaningful. SPRiNT (Spectral Parametrization Resolved in Time; Wilson et al., 2021) characterizes the rhythmic and arrhythmic dynamics of neural oscillations. This method allows users to quantify the evolution of the spectral parameters through time. But SPRiNT is prone to fitting far more spurious peaks than regular specparam. To remedy this shortcoming, we implemented Bayesian model selection into SPRiNT (ms-SPRiNT). We found that ms-SPRiNT has a meaningfully higher peak positive predictive value with relatively small loss in peak sensitivity. Independent of processing applied, the absolute error of the aperiodic exponent and aperiodic offset did not vary.

Physiological measures of vocal emotion processing

Cassandra Neumann | Concordia University, Centre for Research on Brain, Language, and Music

When detecting vocal emotions, cochlear implant users typically rely on what people say (semantics) and not on how they say it (prosody) when these cues conflict, resulting in an impaired ability to detect vocal emotions. The current project aims to find objective markers of these difficulties using pupillometry (pupil), heart rate variability (HRV), and skin conductance response (SCR) to measure the autonomic sympathetic nervous system processing of vocal emotions. In the current validation study, 48 undergraduate students were presented with recordings of sentences with either matched or mismatched semantic and prosodic cues to emotions and were asked to choose the expressed emotion while recording their pupil, HRV, and SCR. We expected larger pupil dilation, lower HRV, and larger SCR for mismatched trials than matched trials. Results show that the pupil and SCR could be used to predict when mistakes could occur depending on the prosodic and semantic content of sentences.

Sociality and Functional Brain Networks Among Older Adults at Risk of Alzheimer's Disease

Corina Lazarenco | The Neuro, McGill University

Sociability is fundamental to health and buffers against cognitive decline. Loneliness and social network size (i.e., social isolation), exert dissociable impacts on brain function, but their effect on brain function in presympotmatic Alzheimer's disease is unknown. We examined how sociality were related to resting-state functional connectivity among older adults at familial risk for Alzheimer's disease (ages 57-80y, n=133). Using multivariate analyses, we observed that loneliness, not social isolation, was related to a distributed pattern of connectivity across networks ($r=.49$, $p<.05$). Being more lonely was associated with higher functional connectivity between default and dorsal attention networks, somatomotor and frontoparietal networks, as well as greater connectivity within the frontoparietal control network. This expression of loneliness extends prior reports of associations between loneliness and connectivity in healthy aging cohorts. We did not observe associations between the loneliness brain pattern and Alzheimer's pathology. Longitudinal associations between loneliness and disease progression will continue to be tracked.

POSTER SESSION 2

Listening While Playing the Organ: How Auditory-Motor Integration May Influence the Frequency-Following Response

Isabelle Arseneau-Bruneau | McGill University

This study compared the frequency-following responses (FFRs) generated by sounds actively played on a digital organ to FFRs to the same tones perceived passively. FFRs are recorded with electroencephalography (EEG) and can provide a measure of the quality of auditory encoding. To discriminate between motor and perceptual factors, the listening/playing tasks included conditions in which the auditory feedback was either predictable or unpredictable (2x2 design). We analyzed FFR amplitudes, latencies, and frequency tracking. Among the most salient findings, we observed significantly reduced FFR amplitudes in unpredictable conditions ($p = 0.0009$). As well, results showed an interaction of auditory-motor x predictability effect ($p = 0.0016$). These effects could be explained by predictive coding and top-down mechanisms. This research will inform models of sensory-motor integration and perception, revealing how the auditory system functions in an integrated manner with other systems rather than as a purely sensory modality.

From Functional Hippocampal Centrality to Functional Outcomes of Psychosis: An Extended Multimodal Neurocognitive Model

Jana F. Totzek | Douglas Research Centre, McGill University

In the framework of multiscale neuroscience, psychosis arises from altered interactions across multiple scales. Our novel machine-learning findings identified a disease progression from reduced morphometric hippocampal connectivity to episodic memory, social cognition, functional outcomes, and higher negative symptoms in a subtype of psychosis. We aimed to replicate this model across neuroimaging modalities. We sampled data from 54 patients and 52 non-clinical controls and derived resting-state functional hippocampal connectivity through the graph-theoretical participation coefficient. We applied SuStaIn, a machine-learning algorithm which merges disease progression modeling and clustering, to the patient data. SuStaIn identified 3 subtypes, with Subtype 0 being characterized by normal-range performance on all variables. Hippocampal dysconnectivity preceded reduced episodic memory, social cognition, higher negative symptoms, and poorer functional outcome in Subtype 1, while it followed those deviations in Subtype 2. These findings replicate and extend the morphometric neurocognitive model of psychosis to resting-state functional connectivity.

Neuromelanin-sensitive MRI in cannabis use disorder and first episode schizophrenia

Jessica Ahrens | Douglas Research Centre, McGill University

Cannabis use has been associated with increased risk of schizophrenia, with changes in dopamine turnover suspected to play a role. We investigated this relationship using neuromelanin-sensitive MRI (neuromelanin-MRI), a putative measure of dopamine function that has previously shown alterations in schizophrenia and substance use disorders. Twenty-five participants with cannabis use disorder (CUD) and 36 participants without CUD (nCUD) participated in the study. 28 of these participants had been diagnosed with first episode schizophrenia (FES). We collected a neuromelanin-MRI scan and tested the association of CUD and FES diagnoses with neuromelanin-MRI signal. Within a subregion previously shown to be associated with severity of untreated schizophrenia, CUD participants showed elevated signal. This indicates increased dopamine turnover in subregions relevant to schizophrenia risk in individuals with cannabis use disorder. Cannabis-associated elevation of dopamine turnover may contribute to the risk of schizophrenia in long-term users of cannabis.

Integrating brainstem and cortical functional architectures

Justine Hansen | The Neuro

The brainstem is a fundamental component of the central nervous system yet it is typically excluded from in vivo human brain mapping efforts, precluding a complete understanding of how the brainstem influences cortical function. Here we use high-resolution 7 Tesla fMRI to derive a functional connectome encompassing cortex as well as 58 brainstem nuclei spanning the midbrain, pons and medulla. We identify a compact set of integrative hubs in the brainstem with widespread connectivity with cerebral cortex. Patterns of connectivity between brainstem and cerebral cortex manifest as multiple emergent phenomena including neurophysiological oscillatory rhythms, patterns of cognitive functional specialization, and the unimodal-transmodal functional hierarchy. This persistent alignment between cortical functional topographies and brainstem nuclei is shaped by the spatial arrangement of multiple neurotransmitter receptors and transporters. We replicate all findings using 3 Tesla data from the same participants. Collectively, we find that multiple organizational features of cortical activity can be traced back to the brainstem.

Effects of Sustained Cannabis Abstinence on Depressive Symptoms in People with Cannabis Use Disorder: A Pilot Study

Lyne Baaj | The Neuro

Previous studies in adults with psychiatric comorbidities found that depressive symptoms improved with 28 days of cannabis abstinence. To study if findings extend to adults without psychiatric comorbidities, we investigated the effects of 28 days of cannabis abstinence on depressive symptoms in adults with cannabis use disorder (CUD) and no psychiatric comorbidities. Adults (N=25) were randomized to an abstinence group (n=16) or a cannabis-as-usual control group (n=9). Depression was assessed weekly. Cannabis abstinence was verified with a self-report interview. Fourteen participants (88%) sustained 28 days of abstinence. A repeated-measures ANOVA revealed no change in depressive symptoms over time ($F(4,84)=1.83$, $p=.15$). However, a pattern emerged where depressive symptoms peaked at 7-days post-abstinence before returning to baseline levels, which may be attributable to cannabis withdrawal. Our findings indicate that affective symptoms do not get worse after 28 days of cannabis abstinence which provides evidence that cannabis use does not benefit depressive symptoms.

POSTER SESSION 2

Probing embodied cognition and cognitive-motor interference during walking while listening to words

Mengwan Xu | University of Montreal, International Laboratory for Brain, Music and Sound Research, Centre for Research on Brain, Language and Music

Embodied Cognition suggests that language processing interacts with actual body movement. For instance, manual motor execution is facilitated when matched the meaning of linguistic stimuli. We report here a proof-of-concept study to probe the idea that language-movement interactions extend to whole-body movements such as gait. We developed a walking-while-listening-to-language paradigm (WLL), featuring motion capture with concurrent optical imaging (fNIRS). In the first part of the study, sixteen French-speaking adults were walking while listening to either city names or action verbs. The results showed a semantic effect on gait compatible with embodied cognition approach. In the second part (data collection ongoing), we aimed to test whether WLL constitutes a dual task leading to cognitive-motor interference. Another 16 adults walked with and without verbal and non-verbal stimuli, and under classical dual-task conditions. Exposure to action verbs while walking is hypothesized to increase cognitive load but remaining lower than a classic dual task.

The role of corticostriatal projections in modulating flexible decision making

Niharika Dighe | McGill University

Flexible, value-based decision-making is critical for navigating and adapting to a changing environment, which is often disrupted with drug misuse and neuropsychiatric disorders. While considerable progress has been made in identifying neural correlates of decision processes, there is still great uncertainty about the distinct contributions of corticostriatal projections in reversal-based learning. To study this, I am examining flexible choice behaviour in head-fixed mice as I transiently manipulate inputs from the prelimbic cortex to the dorsomedial striatum, which is important for executing action-outcome decisions. Mice are trained to lick from two spouts positioned directly in front of them that have different probabilities of delivering water. Every 20-40 trials, lick spout reward probabilities silently reverse. Mice stably and flexibly choose the highly rewarded spout even at an 80-20 probability ratio. I hypothesize that inhibiting corticostriatal pathways will attenuate value updating, making choice behaviour seem more habitual.

Progesterone and allopregnanolone facilitate excitatory postsynaptic potentials in layers I/II of the rat infralimbic cortex in vitro

Nima Rahaei | Center for Studies in Behavioral Neurobiology, Concordia University

Reproductive hormones can alter neuronal excitability and synaptic function in multiple brain areas, and impact cognition in humans and animals. Previous studies have shown that estrogen and progesterone can modify cognitive strategies via rapid actions in the hippocampus and prefrontal cortex. However, little is known about the effects of these hormones on synaptic transmission in the prefrontal cortex. Here, we assessed the effects of 17β-estradiol (E2), progesterone, and allopregnanolone on evoked field excitatory postsynaptic potentials (fEPSP) in layer I/II of the infralimbic prefrontal cortex. We observed a lasting increase in fEPSP amplitude after a 20-minute application of progesterone and allopregnanolone, but not E2. Progesterone is an antagonist of the sigma-1 receptor, a multi-functional chaperone protein, but the antagonist BD 1063 did not mimic the effect of progesterone. Current experiments are testing whether ORG OD-O2, an agonist of membrane progesterone receptors, can mimic or occlude the effects of progesterone.

Neural mechanisms of sensorimotor integration in speech perception

Olivia Bizimungu | The Neuro, McGill University

To better understand how mental articulatory representations contribute to speech perception, we applied a somatosensory perturbation to participants' lip shape while they categorized a continuum of vowels varying in their degree of lip constriction (/ʊ/ to /œ/). Behaviourally, we observed that the articulatory perturbation caused a small shift in the perceptual boundary between the phonetic categories of the auditory presentations. Auditory brain responses were also altered, as detected by data-driven decoders of magnetoencephalographic (MEG) brain activity. We found that ongoing brain dynamics were altered by the articulatory perturbation, with changes of alpha (8-12 Hz) and beta (13-30Hz) brain rhythms. We conclude that even in the absence of any speech production requirements, a simple change in articulatory configuration is sufficient to alter speech perception and neurophysiological ongoing and task-related brain activity. These early findings highlight the role of sensorimotor brain systems in the active perception of speech.

Impact of F-0 Segregation on Short-Term Memory

Rebekah Adams | McGill University

When two simultaneous voices differ in fundamental frequency (F0), listeners find it easier to understand them than when they have the same F0. Our study examines the potential benefit of this F0 cue on short-term memory. When task difficulty increases, cognitive resources are often redirected to lower-level aspects (e.g. word decoding), leading to poorer performance on higher-level tasks (e.g. retention of information). We hypothesized that a difference in F0 will not only increase the intelligibility of the target voice but also spare cognitive resources, available for recall. Participants were given 50 blocks of ten words each, with/without F0 cues and at five different target-to-masker ratios (TMRs). We observed a 6-dB benefit due to the F0 cue in intelligibility, but whether it translated into recall benefit depended on the criterion of TMR used to make a proper comparison.

POSTER SESSION 2

Association between grey matter volume and social network size among older people living with HIV

Vinaya Hari | McGill University

Background: The social brain hypothesis suggests that primates developed a larger brain to meet the social complexities of living in a group. Social group size has been shown to correlate with volumetric changes in several brain regions among both macaques and healthy humans. Here, we tested for a relationship between grey matter volume and social network size in a sample of older people living with HIV in Canada.
Methods: Fifty-eight HIV-positive participants drawn from the Positive Brain Health Now cohort underwent structural brain MRI as part of a pilot neuroimaging study. Social network size was measured using Dunbar's Social Network Questionnaire. Grey matter volumes were assessed with Voxel Based Morphometry, focusing on 7 regions of interest based on a prior study in our group using the same social network size questionnaire in healthy older people.
Results: We observed a correlation between social network size and grey matter volume in the regions of interest, with statistically significant effects in left anterior cingulate cortex and left anterior temporal cortex, controlling for gender, age, and education. However, the direction of the correlation was in the opposite direction to that predicted: those with larger social networks had smaller grey matter volumes. We sought to explain this effect by considering additional variables, including chronic stress, and current and nadir CD4 counts. The negative correlation was more striking in those with CD4 counts < 500, whereas current self-reported stress was not related to grey matter volumes in these regions.
Conclusion: This preliminary study found a negative relationship between social network size and grey matter volume among older people with chronic HIV infection, most striking in those with low CD4 cell counts. Further work is needed to replicate this effect and explore the underlying mechanisms.

Cortical folding and layering support local-to-global functional properties at 7T

Yigu Zhou | The Neuro

Activity of the cerebral cortex can be abstracted as dynamical coordination between networks, overlaid onto the cortical mantle with its organized folding patterns and layered microstructure. Macroscopic folding geometry and layered microstructure constrain global functional organization while heterogeneity within cortical regions, or network "nodes", is crucial for local functional specification. We investigated the relative contribution of folding and microstructure to nodal function using ultra-high field MRI from 12 healthy young adults (age 25±4.42; 50% females) via quantitative T1 and multi-echo fMRI. We assessed folding and nodal function using local, regional, and global metrics (curvature, sulcal depth, gyrification; BOLD variability, regional homogeneity, node degree), and microstructure using statistical moments of quantitative T1 intensities. We showed that folding metrics predicted nodal function following a local-to-global gradation. Microstructure contributed most to predicting local (BOLD variability) and regional (regional homogeneity) functional metrics but was overtaken by gyrification for global functional metric (node degree).

No Evidence for a Generalized Construct of Cognitive Effort Aversion

Ziqi Fu | The Neuro

Individuals often avoid mentally demanding tasks unless the benefits outweigh the costs of exerting cognitive effort. However, it remains unclear whether this aversion uniformly applies across mental tasks. In the current investigation, we employed a large-scale repeated-measures design involving 240 participants who completed four distinct cognitive tasks designed to measure their aversion to cognitive effort: the Demand-Selection Task, an Effort-Discounting Task, an Effort Foraging Task, and an incentivized Simon task with manipulated opportunity costs of time. Employing a multilevel, multivariate Bayesian computational model, our findings fully replicated previous research by demonstrating that participants avoided effortful actions within each task. Yet, no consistent relationship was found between participants' performance or effort preferences across tasks. These results prompt inquiries into the concept of a generalized, trait-like construct of cognitive effort aversion and underscore the insufficiency of evaluating effort processing within a single paradigm for drawing conclusions about an individual's overall motivational disposition.

But you don't look like a tenor! Voice classification accuracy by trans and cis listeners.

Lea Raymond-Marshall | Concordia University

When judging an actor's voice, listeners will unfortunately be biased by the physical appearance of the actor. Marchand et al. (2023) recently asked both trans and cis participants to rate 18 actor's voices along a continuum of bass/baritone/tenor/alto/mezzo/soprano. This was done with audio stimuli, visual stimuli, then both together to track how their ratings changed across modalities. They found that trans participants were less biased by visual cues and are consequently better judges of voices in multimodal contexts. Here, we ask whether they could also be better judges of voices exclusively in the auditory modality (perhaps due to a better exploration of the limits of the voice). We turned the continuous ratings into categorical classifications and generated confusion matrices and d-prime values. Results failed to show a trans advantage in Audio-alone stimuli. The advantage observed earlier is about resisting AV integration, not a perceptual advantage in detecting voice qualities.

Falling through the cracks of auditory masking

Raffaela Iuliano | Concordia University

Research on psychoacoustics has contributed to the development of noise-cancellation headphones and automatic speech recognition systems. Harmonic cancellation – the auditory brain's ability to inhibit information emitted by a harmonic source – is one example which we fail to implement in electronic devices because we do not yet understand how it operates. This project explores this mechanism that we all possess to some extent. A first task presents a narrow band of noise (the target sound) embedded in a buzz-like complex tone (the masker) that was either harmonic/inharmonic. By placing the target at different center frequencies, we measure the masked detection threshold at different places along the cochlea. This allows capturing precisely the width of the comb-filtering impact of this mechanism. We then correlate this metric with performance with a pitch discrimination task and a speech-in-buzz intelligibility task. Possible links would support the critical role of harmonic cancellation in auditory scene analysis.

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