Computational Neuroscience Symposium All Island

24th August 2026* | EQ002, East Quad, *Grangegorman, TU Dublin

Welcome

Thank you for joining us for the third All Island Computational Neuroscience Symposium on the Grangegorman Campus of TU Dublin.

The symposium brings together researchers from across Ireland to present their work using approaches ranging from differential equations to machine learning methods to model, analyse, and simulate neuroscience data.

Organisers: John Butler (TU Dublin) and Áine Byrne (UCD)

Program Schedule

10:00 – 10:30	***Registration & Opening Remarks (EQ002)***
10:30 – 11:00	**Áine T. Dineen** Awake infant fMRI and developmentally inspired deep neural networks reveal the development of coarse and fine feature tuning in infant visual cortex.
11:00 – 11:30	**KongFatt Wong-Lin** Neural Oscillations as Selective Controllers of Decision Confidence, Speed, and Accuracy
11:30 – 11:45	***Coffee Break***
11:45 – 12:20	**Lightening Talks 1** Speakers: Brendan Lenfesty, Brian Skelly, Dasharath Rathod, Geletaw Sahle Tegenaw, Indranil Ghosh, James McAllister, Maram A. Mohamed, Niamh Fennelly
12:25 – 13:00	**Lightening Talks 2** Speakers: Ondrej Zika, Paveen Phon-Amnuaisuk, Qingkai Zhu, Ruslan Kurmashev, Teo Fantacci, Tara McGuire, Umesh Mudavath, Valentina Constantin, Zahra Azizi
13:00 – 13:50	***Lunch***
13:50 – 14:20	**Mark Cunningham** TBA
14:20 – 14:50	**Xinming Shi** Memristive Dynamics for Memory and Adaptation in Neuromorphic Systems
14:50 – 15:00	***Short Break***
15:00 – 15:30	**Emer Doheny** Digital Biomarkers of speech, sleep and movement for Huntington's disease
15:30 – 16:00	**Seán Frodist-Walsh** Cortex-wide computational models of cognitive functions
16:00	***Closing Remarks***

Invited Talks

Emer Doheny (UCD)

Title:
Digital Biomarkers of speech, sleep and movement for Huntington's disease

Abstract:
Huntington's disease (HD) is a inherited neurodegenerative disease, characterised by a devastating triad of motor, cognitive and behavioural symptoms. There is currently no cure for HD, however the first disease-modifying treatment emerged in 2025. Sensor technology brings the opportunity to explore new digital biomarkers of movement, sleep and speech for Huntington's disease (HD), to monitor longitudinal changes due to disease progression or in response to treatment. This presentation will focus on longitudinal sensor data and results from a recent European consortium study, Multi-Domain Lifestyle Targets for Improving Prognosis in Huntington's Disease (DOMINO-HD).

Áine T. Dineen (TCD)

Title:
Awake infant fMRI and developmentally inspired deep neural networks reveal the development of coarse and fine feature tuning in infant visual cortex.

Abstract:
Objects can be recognised from visual features at multiple spatial scales, from coarse global shape to fine local detail. How infant visual cortex encodes these features across the developing visual hierarchy, however, remains unknown. Here, we combine awake infant fMRI with developmentally inspired deep neural networks trained and tested with different levels of image blur to probe cortical tuning to coarse and fine visual features. This revealed mature sensitivity to both coarse and fine visual features in V1 by 2 months of age. In contrast, infant extrastriate cortex (V2–V4) followed a protracted developmental trajectory and remained biased toward coarse object features relative to adults. Critically, this bias persisted at 9 months, beyond what would be predicted from infant acuity alone. Unlike DNNs, which rapidly learned high-spatial-frequency features, infant extrastriate cortex retained a prolonged coarse-feature bias, revealing distinct developmental biases in object-feature tuning in biological and artificial visual systems.

KongFatt Wong-Lin (UU)

Title:
Neural Oscillations as Selective Controllers of Decision Confidence, Speed, and Accuracy

Abstract:
Neural oscillations are ubiquitous in the brain, yet their computational role in decision-making remains unclear. In this talk, I will present a biologically inspired cortical column network model showing how oscillatory amplitude, frequency, and phase selectively regulate decision confidence, speed, and accuracy through interactions with intrinsic synaptic timescales. The model demonstrates that networks with faster excitatory than inhibitory synapses are particularly susceptible to oscillatory modulation, while anti-phase oscillations can simultaneously improve decision speed, confidence, and accuracy, effectively dissociating the classical speed–accuracy trade-off. State-space analysis further reveals how oscillatory dynamics reshape evidence accumulation and decision uncertainty. Together, these findings provide a mechanistic framework linking neural oscillations, cortical circuit dynamics, and metacognition, while generating experimentally testable predictions for future neurophysiological and neuromodulation studies.

Seán Froudist-Walsh (TCD/Oxford University)

Title:
Cortex-wide computational models of cognitive functions

Abstract:
Recent advances in neuroimaging, anatomy and physiology make it possible to probe whole-brain mechanisms of cognition in unprecedented detail. However, as yet, few models in computational neuroscience have tackled the mechanisms underlying highly distributed neural activity during cognitive tasks. In this talk I will describe our anatomy-led approach to developing multiscale models of neural activity during working memory, conscious perception and decision-making tasks, and our anatomical findings of gradients of neurotransmitter receptors in the cortex. I will highlight our investigations into how gradients of neurotransmitter receptors (NMDA, AMPA) facilitate rapid propagation of sensory information and its maintenance in distributed networks, and how serotonin may bias competition between distributed cortical networks for internally- and externally-oriented cognitive functions.

Xinming Shi (Queens University)

Title:
Memristive Dynamics for Memory and Adaptation in Neuromorphic Systems

Abstract:
Long-term memory, structural adaptation, and energy efficiency are fundamental to both biological and artificial intelligence. This talk presents a neuromorphic computing framework that connects these capabilities through three layers: memristive memory dynamics, evolutionary structure design, and low-power hardware implementation.
First, memristive neural and reservoir models exploit device dynamics to learn long-range temporal dependencies. Second, evolutionary optimization and Shapley-based attribution enable neural and circuit structures to be automatically generated, compressed, and interpreted. Finally, these models are implemented through adaptive memristive neurons and arrays that support efficient, fault-tolerant, and in-memory computation.
Together, this work offers a pathway from biologically inspired memory and adaptation mechanisms to evolvable, resource-efficient neuromorphic systems.

Lightening Talks

Lightening Talks 1

Speaker	Talk
Brendan Lenfesty	Emergent behaviour in an Excitatory-Inhibitory Recurrent Neural Network during Perceptual and Working memory tasks
Brian Skelly	Network model with biophysically based excitatory receptor dynamics
Dasharath Rathod	A unified simulation platform for predicting multi-neurotransmitter behaviour at electrochemical interfaces
Geletaw Sahle Tegenaw	NeuroBench Studio: Vibe Coding for EEG — A No-Code Platform for EEG Deep Learning, Foundation Models, and Visual Pipeline Orchestration
Indranil Ghosh	The vR-FCD framework for detecting communities of similar neural spike trains
James McAllister	Exact dynamics of linear recurrent neural networks during cognitive tasks
Maram A. Mohamed	Explainable AI for Microsleep Detection and Prediction Using EEG and EOG Signals
Niamh Fennelly	Emergent Dynamics in Neural Field Models with Synchrony-Driven Plasticity

Lightening Talks 2

Speaker	Talk
Ondrej Zika	Complexity priors in anxiety
Paveen Phon-Amnuaisuk	Rapid and Scalable Computational Phenotyping of Cognition Using Simulation-Based Inference
Qingkai Zhu	Dual Regulation of Gap Junctions: Modelling Voltage- and pH-Dependent Gating
Ruslan Kurmashev	Transfer Learning Across Heterogeneous Autism Datasets: Toward Robust Computational Models of Neurodevelopmental Risk
Tara McGuire	Analysis of the impact of electrode design and stimulation settings on network oscillations during deep brain stimulation for Parkinson’s disease
Teo Fantacci	Mechanistic computational models for cognition
Umesh Mudavath	Neural latent representation of implicit perceptual decision confidence signatures from brainwide intracranial EEG
Valentina Constantin	A multilingual composite speech index to assess passage reading in Huntington’s disease
Zahra Azizi	State and Trait: How Acute Autonomic Arousal Modulates the Temporal Dynamics of Multisensory Perception

Lightening Talks Abstracts

Lightening Talks 1 Abstracts

Brian Skelly (UU)

Title:
Emergent behaviour in an Excitatory-Inhibitory Recurrent Neural Network during Perceptual and Working memory tasks

Abstract:
The neural correlates of perceptual decision-making (that bridges sensory perception and motor action) have been well studied across different tasks, with different neurons encoding different decision characteristics, or their mixture: sensory information, choice, motor actions, decision confidence and uncertainty. However, neural activity can be difficult to interpret as individual neurons can often show high dimensional activity, despite encoding thought to reside in a lower dimension neural manifold. Using a trained biologically constrained excitatory-inhibitory recurrent neural network (EI-RNN) we investigate the emergent neurons within a network. Networks are trained on a random dot motion reaction time and working memory task, allowing us to examine any information that emerges from the network to support task performance at multiple levels. At an individual neuron level, the neurons are classified if possible given their selectivity and their contribution to the task is assessed through perturbation. At the population level we examined the structural connectivity across various trained EI-RNNs as well as their latent representations for different networks trained to perform the same tasks. Comparison of these networks with similar task(s) performance can highlight a common computational connectivity and if that is reflected through recurrent connectivity, emergent populations or in latent space? This provides an approach to assessing how different brain networks may support similar decision making behaviour and how they flexibly adapt across tasks, highlighting the adaption in latent space.

Brian Skelly (UCD)

Title:
Network model with biophysically based excitatory receptor dynamics

Abstract:
AMPA receptors are known to change their opening and closing rates with the binding of accessory proteins known as Transmembrane AMPA Receptor Regulatory Proteins (TARPs). I create a network of coupled excitatory and inhibitory Hodgkin-Huxley style neurons with biophysically based AMPA receptor dynamics. The synaptic coupling equations allow for regimes with a variable concentration of TARPs by way of a simple parameter change. This allows the study of the effect that varying levels of TARPs has on the system.

Geletaw Sahle Tegenaw and Tomas Ward (DCU)

Title:
NeuroBench Studio - Prompting the Brain: Conversational AI via Natural Language Interfaces, Visual MLOps, and Real-Time Streaming Inference for Reproducible EEG AI.

Abstract:
Electroencephalography (EEG) analysis is increasingly transformed by advances in deep learning and foundation models; however, the adoption of these technologies remains limited by complex programming requirements, fragmented workflows, and difficulties in evaluating and deploying AI models across diverse applications. We introduce NeuroBench Studio (https://neurobenchstudio.github.io/#), an interactive, no-code/low-code AI platform that enables researchers, clinicians, and non-technical users to explore, build, and evaluate EEG-based artificial intelligence workflows through conversational interaction and visual interfaces. NeuroBench Studio integrates four core capabilities: (1) a Conversational AI Assistant that allows users to query EEG datasets and interact with analysis workflows using natural language; (2) a Visual MLOps Pipeline Builder that enables users to construct EEG processing, experimentation, and model training pipelines without extensive programming; (3) Real-Time EEG Streaming and

Inference for interactive exploration of continuous brain signals using state-of-the-art foundation models, including LaBraM, SignalJEPA, EEGPT, and BIOT; and (4) EEGDash integration, providing direct access to remote EEG datasets and scalable workflow execution. By combining conversational AI, visual workflow design, real-time signal analytics, and modern EEG foundation models, NeuroBench Studio bridges the gap between advanced AI research and practical clinical and neuroscience applications. The platform supports reproducible experimentation, rapid prototyping, and transparent evaluation of EEG models while reducing technical barriers for domain experts who may not have machine learning expertise. NeuroBench Studio aims to accelerate the adoption of trustworthy EEG artificial intelligence by creating an accessible environment where clinicians, neuroscientists, and AI researchers can collaboratively analyse brain signals, evaluate emerging foundation models, and develop intelligent neurotechnology solutions.

Indranil Ghosh (UCD)

Title:

The vR-FCD framework for detecting communities of similar neural spike trains

Abstract:

Neurons communicate through patterns of spike timing, and current experimental technologies now allow simultaneous recording from ensemble of neurons. A central problem in mathematical neuroscience is therefore to identify functional assemblies from these data. Here we propose vR-FCD: a method for inferring the collective organization of the neurons from spike timing. This utilises the pairwise van Rossum distance, a spike-train similarity measure, to construct a network whose nodes correspond to neurons and edge weights relate to their spike-train similarity. The resulting network can be viewed as an embedding of neuronal activity in a latent similarity space where neurons with similar temporal firing patterns are connected edges with higher weights. We hypothesize that synchronized neuronal assemblies will appear as clustered communities in the network, and employ the popular Louvain algorithm to detect such assemblies. We validate our approach using synthetic spike train data and simulated data from a leaky integrate-and-fire network, where the ground truth is known. We then apply our approach to large-scale recordings from the Allen Institute Visual Coding: Neuropixels dataset.

James McAllister (UU)

Title:

Exact dynamics of linear recurrent neural networks during cognitive tasks

Abstract:

Recurrent neural networks (RNNs) are widely used to model neural circuit dynamics and computation, but their internal mechanisms are difficult to interpret. This is a problem, as we don't know how the geometry of the RNN's signal representations contributes to task performance, nor how to interpret network readouts found via supervised learning or optimisation. Here, we use theoretical analysis and simulation to study the dynamics of input-driven linear RNNs in settings relevant to working memory, decision-making, and fixation-response tasks. We first examine how these networks act as linear filters of past inputs, showing that temporal history is encoded geometrically in the network's activity. We then derive closed-form expressions for the steady states and covariances of network activity as functions of input statistics, demonstrating that RNNs can significantly amplify signal discriminability between noisy stimuli, which enables robust classification or decision-making. Third, for fixation-response tasks, we characterise how appropriate input and recurrent structure can enforce a clean separation between the distinct input-driven or intrinsic dynamical regimes. We verified our theoretical analysis against numerical simulations of linear RNNs, finding an excellent match. Our results provide a geometric interpretation of network responses under different input regimes. This clarifies how these neural representations facilitate computation via interpretable linear input and output layers, while the RNN itself is left untrained. Based on this, we demonstrate how readouts can be constructed in unsupervised theory-driven or data-driven ways, avoiding the obscurity of supervised learning. We further show that biologically realistic learning, in the form of generalised Hebbian algorithms, can be used to train the relevant output layers.

Maram A. Mohamed (DCU)

Title:

Explainable AI for Microsleep Detection and Prediction Using EEG and EOG Signals

Abstract:

Microsleep episodes (MSEs) are brief, involuntary periods of sleep that can occur during wakefulness and pose significant risks in safety-critical activities such as driving and operating machinery. My PhD research investigates the use of electroencephalography (EEG) and electrooculography (EOG) signals to detect and predict microsleep episodes using machine learning and deep learning techniques. The research evaluates multiple feature representations, including time-domain, frequency-domain, and time-frequency features, and explores both traditional machine learning and deep learning approaches for microsleep identification. In addition, the work examines physiological interactions between EEG and EOG signals through Transfer Entropy analysis and employs explainable AI methods to improve understanding of model predictions. Results demonstrate that EEG and EOG signals contain informative biomarkers for both microsleep detection and early prediction. The findings contribute toward the development of interpretable AI-based monitoring systems that could enhance safety in transportation and other fatigue-sensitive environments.

Niamh Fennelly (UCD)

Title:

Emergent Dynamics in Neural Field Models with Synchrony-Driven Plasticity

Abstract:

Synaptic plasticity, the mechanism underlying learning and memory, enables the brain to dynamically rewire in response to activity, reshaping synaptic landscapes and influencing the emergence of spatial patterns in neural activity. Neural field models are powerful tools for understanding how spatially organised patterns, such as bumps and waves of activity, develop and evolve in the brain. However, traditional neural field models typically assume spatially homogeneous interactions through the use of translationally invariant kernels. In contrast, synaptic plasticity is inherently nonlocal, as interactions between pre- and post-synaptic populations require a consistent description across distinct spatial locations. In this work, we address this fundamental challenge by introducing a novel mathematical framework for analysing neural field models with non-local Hebbian learning, using an adapted Amari model as a baseline. This leads to a coupled system with non-local, mixed-dimensional interactions, which would typically preclude standard analytical treatment. Despite this, our framework enables a tractable Turing instability analysis, revealing the onset of pattern-forming instabilities. Numerical simulations are in agreement with the analytical predictions. This framework also provides a foundation for incorporating more biologically realistic mechanisms of plasticity. In previous work, we introduced Kuramoto-based, synchrony-driven adaptive coupling in a network of theta-neurons, and derived a mean-field approximation for this spatially clamped system [1]. Applying the present framework to extend this next-generation model enables us to explore biophysically realistic plasticity in a spatial structure that captures population-level changes in synchrony. This work advances our understanding of the interplay between plasticity, synchrony, and pattern formation, providing a more comprehensive framework for modelling neural self-organisation and its role in cognitive function.

Lightening Talks 2 Abstracts

Ondrej Zika (UCD)

Title:

Complexity priors in anxiety

Abstract:

Previous work has linked anxiety to aberrant structural inference - a tendency to to conceptualize and abstract away external world. However, whether anxiety drives us to infer too simple (underfit) or too complex (overfit) models of the world remains unclear. Here, we investigate whether anxiety variation in healthy population maps onto this complexity continuum, answering the question whether high trait anxiety calibrates our inference just right or whether it drives us into overthinking. We designed a novel contextual inference task in which participants have to infer relevant and irrelevant contextual features from continuous observations. This allows us to benchmark over- and under-inference. We analyzed this online behavioural task (N=78) using a hierarchical Bayesian learning model to to determine individual inferential biases. We show that participants are able to infer the correct number of contextual features. Additionally, we find that anxious traits are positively correlated with inferential complexity - more anxious individuals infer more complex contextual models. Finally, these results are not specific to anxiety and, instead, apply to most internalizing symptoms including obsessive-compulsive symptoms and depression.

Paveen Phon-Amnuaisuk (TCD)

Title:

Rapid and Scalable Computational Phenotyping of Cognition Using Simulation-Based Inference

Abstract:

Background: The backbone of computational psychiatry are mathematical and generative models that can infer latent mechanistic processes driving mental health symptoms. However, the field has had limited clinical impact. One reason is that conventional computational analyses are time- and cost-intensive and are poorly suited to rapid N=1 inference for clinical use. Methods: We addressed this limitation using simulation-based inference (SBI) via neural posterior estimation (NPE) to enable rapid N=1 parameter inference across two tasks. First, we fitted data from N=548 participants who completed a two-step task using a Bayesian mixed-effects model and a hybrid reinforcement-learning model to derive informed priors for NPE training. We then evaluated NPE against hierarchical Bayesian and maximum-a-posteriori approaches in independent general-population (N=1,545), clinical (N=106), and smartphone-assessed (N=4,575) cohorts completing the same task, evaluating the two models separately. We similarly applied NPE to a perceptual metacognition task in an 8-week EMA dataset (N=238), analysed using a post-decisional evidence-accumulation model, and additionally compared NPE estimates against those obtained using differential evolution (DEoptim). Results: For the two-step task, one-time NPE training took 8 min for the binomial mixed-effects model and 4 h for the hybrid reinforcement-learning model. Once trained, NPE enabled N=1 inference 6–30× faster than the hierarchical Bayesian approach for the mixed-effects model and 172× faster for the hybrid reinforcement-learning model. For the perceptual metacognition task, one-time NPE training took 6 h, while subsequent inference was 4,080× faster than DEoptim (0.14 s vs 591 s per participant) and additionally provided posterior uncertainty rather than point estimates alone. NPE-inferred parameters closely matched hierarchical Bayesian estimates (r=0.78–0.99), recovered symptom–parameter associations well, and produced well-calibrated posteriors, with posterior predictive checks closely matching simulated data. Conclusion: SBI enables rapid and scalable N=1 cognitive-computational phenotyping. This approach could facilitate the translation of computational psychiatry into clinical settings, with further applications to idiographic assessment and longitudinal monitoring of cognition.

Qingkai Zhu (UCD)

Title:
Dual Regulation of Gap Junctions: Modelling Voltage- and pH-Dependent Gating

Abstract:
Electrical coupling between neurons is fundamental to brain function, yet gap junction mediated electrical coupling has received limited attention, particularly within the mathematical modelling community. Current neuronal network models typically impose a fixed gap junction conductance. However, experiments show that gap junction permeability fluctuates in a junctional voltage-dependent manner. To address this, we study and simplify the four-state model of Snipas et al. [1] to a two-state model to account for both steady-state and kinetic properties of voltage-gated gap junctions. Beyond voltage-gating, pH also plays a vital role in gap junction modulation[2, 3]. While recent atomic-level structural analysis suggests several mechanisms for how pH regulates gap junction conductance, the precise dynamics remain complex. Understanding both pH- and voltage-gating is critical, as they are heavily implicated in the pathological network oscillations seen during epileptic seizures. Therefore, to clarify these processes, we performed a parameter analysis to determine which gating mechanisms are modulated by pH. Ultimately, our long-term objective is to incorporate this model into a neuronal network simulation to investigate how pH-driven gap junction changes affect seizure-like dynamics. We plan to validate these in-silico predictions against experimental data, using our preliminary electrophysiological recordings in mouse brain slices.

Ruslan Kurmashev (MTU)

Title:
Transfer Learning Across Heterogeneous Autism Datasets: Toward Robust Computational Models of Neurodevelopmental Risk

Abstract:
Autism research datasets often contain partially overlapping behavioural, clinical, and biological features, making it difficult to train robust machine learning models across studies. This lightning talk presents a transfer learning approach for autism spectrum disorder detection using datasets with unshared features, with the aim of improving model generalisation across heterogeneous neurodevelopmental data sources. The work addresses a common challenge in computational neuroscience and clinical AI: how to reuse fragmented datasets when feature spaces, sample characteristics, and measurement protocols differ. I will briefly describe the modelling strategy, the relevance of cross-dataset learning for autism research, and the potential value of such approaches for developing more scalable and interpretable tools for early neurodevelopmental risk assessment.

Tara McGuire (UCD)

Title:
Analysis of the impact of electrode design and stimulation settings on network oscillations during deep brain stimulation for Parkinson’s disease

Abstract:
Beta oscillations are widely recorded in the local field potentials (LFPs) of the cortico-basal ganglia-thalamic network (CBGT) in Parkinson’s disease patients. Suppression of these oscillations is correlated with symptom relief during deep brain stimulation (DBS). However, the mechanisms by which DBS modulates these oscillations remain unclear, with effects dependent on stimulation parameters and electrode design. In this study, we coupled a network model of the CBGT with finite element (FE) simulations of electric fields generated by different electrode geometries to investigate the influence of DBS electrode design and stimulation parameters on beta oscillations. Extracellular potentials were simulated using FE models before being applied to cortical collaterals in the CBGT network. Afterward, subthalamic nucleus synaptic currents recorded in the CBGT network were coupled to the FE models to simulate LFP signals recorded at the DBS electrode. Using this model, we demonstrated that different contact configurations non-linearly decreased the beta-band power with increasing DBS amplitude, analogous to the relationship observed in clinical data from parkinsonian patients. Overall, we have built a physiologically realistic computational model that will

enable us to gain insights into the mechanisms underlying DBS-induced modulation of network dynamics. Funded by Taighde Éireann – Research Ireland.

Teo Fantacci (TCD)

Title:
Mechanistic computational models for cognition

Abstract:
How does the brain hold a thought in mind, weigh evidence to reach a decision, or bring a stimulus into conscious awareness? A powerful idea in computational neuroscience is that a single canonical cortical circuit — recurrently connected excitatory populations balanced by feedback inhibition, with AMPA-, NMDA- and GABA-mediated synapses — can be reconfigured to produce all three. I will show one firing-rate module that yields winner-take-all competition, self-sustaining persistent activity, and all-or-none ignition depending on a few interpretable parameters. Since those same parameters — recurrent excitation, NMDA/AMPA balance, neuromodulatory gain — are among those thought to be altered in psychiatric conditions, this approach may offer a route from molecular change towards hypotheses about cognitive symptoms.

Umesh Mudavath (UU)

Title:
Neural latent representation of implicit perceptual decision confidence signatures from brainwide intracranial EEG

Abstract:
Human perceptual decision confidence has indicated brain-wide decision signalling, albeit inconsistencies across studies. It is unclear whether there exists more robust and explainable representations within neural latent space, especially for implicit confidence. Here, we address this by using complementary machine learning approaches on heterogeneous intracranial electroencephalography (iEEG) data. Through explainable machine learning feature selection of time-compressed iEEG activities, we identified key iEEG contacts, especially in frontal cortex, that readily distinguished various decision confidence characteristics (correctness, reaction time and sensory evidence), and were transferable across motor modalities. Despite the diversity and inconsistency of the identified features across methods and conditions, spatial dimensional reductions uncovered very low-dimensional and robust neural latent spaces. Further, we found one-dimensional neural trajectories could substantially enhance the distinguishability of these decision characteristics. Overall, our results uncover low-dimensional spatial and temporal neural latent representations underlying human implicit perceptual decision confidence that are robust to decision conditions.

Valentina Constantin (UCD)

Title:
A multilingual composite speech index to assess passage reading in Huntington's disease

Abstract:
Digital speech measures are a promising approach for assessing progression in Huntington's disease (HD). In this study, speech during reading from 89 patients with HD and 82 matched controls in three languages (English, Polish, and Spanish) was automatically analyzed by detecting bursts of voiced activity and extracting differences in temporal speech features. Features that differed significantly between groups were standardized to the language-matched controls to yield a composite temporal speech index (CTSI). Strong correlations were found between CTSI and composite, cognitive, and motor scores from the Unified Huntington's Disease Rating Scale.

Zahra Azizi (DCU)

Title:
State and Trait: How Acute Autonomic Arousal Modulates the Temporal Dynamics of Multisensory Perception

Abstract:
Although visceral states are known to influence perception, their moment-to-moment impact on multisensory integration remains unclear. This study investigated how acute physiological arousal and stable individual traits interact to shape perceptual decision-making. Twenty-four participants completed the Sound-Induced Flash Illusion under both baseline and acute physical stress conditions (Cold Pressor Task). Multilevel modeling of 2,931 trials revealed that trial-by-trial autonomic fluctuations—tracked via continuous ECG and skin conductance—predicted behavior far better than overarching session-level stress. Momentary arousal altered processing speed, the speed-accuracy trade-off (SAT), and metacognitive monitoring, with the effects heavily dependent on temporal uncertainty. Crucially, a double dissociation emerged based on individual differences. Participants with high interoceptive awareness (MAIA) leveraged cardiac fluctuations to improve metacognition and resist sympathetic noise. In contrast, Highly Sensitive Persons (HSP) exhibited a state-dependent shift tied specifically to sympathetic dynamics, allowing them to rapidly resolve multisensory conflict without an accuracy penalty at long stimulus intervals. Ultimately, autonomic arousal dynamically governs multisensory decisions, but its behavioral impact is strictly gated by task timing and the individual's unique interoceptive profile.

Practical Information

Transport:

The Symposium will be head in Room EQ002 in the East Quad on the Grangegorman campus. It is the building nearest the Broadstone Luas stop.

For more travel details click [here](#).

[Website](#)

Symposium Code of Conduct:

Be respectful, even in disagreement, critique ideas, not people. Make room for others; don't dominate Q&A or corner people afterward. Credit others' work and don't share unpublished material without permission. Everyone belongs here, regardless of career stage or background.

Harassment, discrimination, personal attacks, talking over people and unauthorized recording are not okay.

If something's off, tell an organisers, we'll handle it confidentially. Repeated or serious issues may lead to a warning, removal from the event, or exclusion from future symposiums.

With Support from

School of Mathematics and Statistics, TU Dublin and *Research Ireland*