Poster Abstract Booklet

Poster Sessions

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Distributed neural dynamics during flexible decision-making

Poster #1, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Distributed neural dynamics, large, scale neural recordings, context, dependent decision, making, serial dependence

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Flexible decision-making requires integrating current sensory information with recent behavioral history (Urai & Donner, 2022). However, how these signals are represented and coordinated across distributed neural circuits remains poorly understood (Tschiersch et al., 2022). In my research, I analyze multi-area electrophysiological recordings from monkeys performing a context-dependent color and motion discrimination task (Siegel et al., 2015), focusing on activity across several cortical regions: FEF, PFC, LIP, IT, MT, V4, and parietal cortex. Using GLMs, neural decoding, and population-level analyses, I examine how current task variables, previous trial information, and response-related signals are encoded across seven cortical areas. Behaviorally, animals exhibit history-dependent biases consistent with serial dependence. At the neural level, we observe a clear dissociation across cortical regions: early visual areas primarily encode current sensory stimuli, whereas frontal regions encode both current and previous trial information, including past responses. Population analyses reveal that response-related activity unfolds within a low-dimensional neural space shared across cortical areas, suggesting coordinated dynamics during decision formation, while persistent response representations are largely confined to frontal regions. Moreover, models combining neural population activity with task variables predict behavior more accurately than task variables alone, indicating that neural dynamics capture additional information relevant for behavior. Together, these results suggest that sensory information is widely represented across cortical circuits, while behavioral history and response-related signals are preferentially maintained in frontal regions. More broadly, this work aims to link distributed neural population dynamics with computational principles underlying flexible decision-making.

Learning Reinforces Curiosity

Poster #2, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: reinforcement learning, curiosity, intrinsic motivation, motivation, optimal arousal theory

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Human curiosity is dynamic, yet the principles governing its fluctuations remain debated. We tested two competing accounts of how learning shapes subsequent curiosity: optimal arousal theory, which predicts that satisfying curiosity reduces future curiosity, and a reinforcement learning (RL) account, which predicts that satisfying curiosity strengthens it. Across two large-scale experiments (N = 5,831), participants made trial-by-trial decisions about whether to wait to receive answers to trivia questions spanning discrete categories or continuous semantic space. We quantified learning using two orthogonal components: information prediction errors (deviations between expected and experienced satisfaction) and overall engagement (combined expectation and satisfaction). Consistent with the RL account, we found a robust reinforcing effect of learning on curiosity. Reading surprisingly satisfying answers increased subsequent information seeking, whereas surprisingly dissatisfying answers reduced it. Critically, these effects were selective: reinforcement generalized primarily to semantically similar content, showing that curiosity is shaped by structured learning over semantic space rather than a global drive for stimulation. These findings directly contradict optimal arousal predictions of compensatory, domain-general effects. Our results support the view that curiosity is an adaptive information-seeking policy learned through experience. Accordingly, the purpose of information-seeking motivations is not only to guide future instrumental decisions, but also to learn what to be curious about. Under this framework, intrinsic motivation is not a separate drive but follows the same learning principles as reward-based behavior.

Age Differences in State Curiosity: The Role of Retrieval Failures

Poster #3, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: State Curiosity, Aging, Retrieval Failures, Trivia Questions

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Epistemic curiosity is considered an important factor in healthy aging, yet uncertainties persist about the mechanisms underlying curiosity in later life. For instance, experimental studies using epistemic stimuli demonstrate greater curiosity in older adults compared to younger adults, but the factors explaining this age difference remain not fully understood. Since retrieval failures are associated with increased curiosity and occur more frequently with increasing age, we hypothesized that retrieval failures partially mediate the effect of age on curiosity. In our preregistered study, 169 older and 169 younger adults were presented with trivia questions; they were asked to guess the answer, indicate whether they experienced a retrieval failure, and report their curiosity about the answer. As hypothesized, our results showed that retrieval failures partially explain the effect of age on curiosity. These findings replicate the previously observed positive age effect on curiosity and extend it by identifying retrieval failures as a partial underlying mechanism. Given that curiosity supports cognitive engagement and well-being in later life, future research should identify additional contributing factors, with the aim of informing curiosity-supporting interventions for older adults.

EEG Evidence for Theta"Gamma Coding in Human Working Memory

Poster #4, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Cognitive load, phase and amplitude coupling, working memory, Nback task

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Working memory is key for adapting and getting by in our complex and volatile world. However, how is working memory mechanistically implemented? Empirical work has demonstrated that neural oscillations are causally involved, but their contributing mechanisms have remained unclear. An influential model based on single-cell neurophysiology was presented by Lisman and Idiart (1995). They proposed the theta-gamma coding model, according to which single items' representations are aligned to different phases of a theta oscillation. Considering that the representation of each item is tied to a gamma cycle, implies that if more than one item is presented, theta-gamma phase amplitude coupling should increase. Here, we tested this prediction while implementing a standardized and reproducible EEG data analysis framework. Participants carried out a visual working memory N-back task with two different cognitive loads while EEG was measured. To test the difference between the two cognitive loads we implemented a cluster based permutation approach combined with a generalized linear mixed model. We report that increased cognitive load is associated with significantly stronger cross-frequency coupling between the phase of midfrontal theta oscillations (4-8Hz) and the amplitude of occipital gamma activity (30-90 Hz). Importantly, this effect appears only in correct responses and not in incorrect responses. These findings provide neurophysiological support for the theta-gamma coding model of working memory. To promote open science and reproducibility, the dataset is available organized according to the BIDS standard.

Impact of Focal Glioma Location on Free Choice Preference

Poster #5, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Intrinsic motivation, free choice, glioma, prefrontal cortex, basal ganglia, decision making

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Motivation comprises extrinsic rewards (ER; e.g. food, money) and intrinsic rewards (IR; e.g. free choice opportunity). Standard neuroeconomic models predict that preference for free choice decreases as ER loss risk increases. Yet humans sometimes favor IR even at an ER cost (Munuera et al., 2023). The hyperdirect pathway (prefrontal cortex, PFC â†' basal ganglia) is thought to arbitrate between these reward types (Bendetowicz et al., 2025), suggesting that PFC lesions may alter this balance. We examined how focal cortical gliomas affect IR preference when free choice carries a risk of ER loss. Thirty-four patients with high- or low-grade gliomas located in the frontal, temporal, parietal, or occipital lobes completed a two-stage task designed to dissociate intrinsic and extrinsic reward preferences. Patients with frontal and temporal lobe gliomas a strong preference for free choice, unlike parietal and occipital patients. Importantly, only the frontal group displayed a paradoxical increase in IR preference as a function of ER loss risk, meaning their drive toward free choice grew stronger when it had the highest associated risk. These effects were maximized in patients with high-grade (i.e., fast-growing) glioma. These findings suggest a PFC-mediated trade-off mechanism between ER and IR, operating via the hyperdirect pathway. Together, our results highlight the role of frontal deficits in shaping motivation, inhibitory control, and reward-based decision-making, with implications for understanding behavioral changes in glioma patients.

Semantic dimensions of teaching that guide human reinforcement learning

Poster #6, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Teaching, Reinforcement Learning, Natural Language Processing, Policy, Automation

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Language is central to teaching, yet we lack principled ways to characterise which aspects of instructional text make explanations effective, particularly in cases where people are simultaneously learning from experience while being taught. We combined a two-stage human behavioural paradigm with a large language model"based analysis pipeline. "Teacherâ€ participants first learned probabilistic two-armed bandit tasks through trial and error, then wrote free-text lessons for future "Pupilâ€ participants, who received one such lesson (or none) before performing the same tasks. Lessons judged as high quality by external experts improved pupils' reinforcement learning performance relative to low-quality lessons and no-instruction controls. To understand why, we introduced LLM-DISC, an inferential use of multi-step large language model processing to uncover the latent semantic dimensions in instructional text. Four dimensions (Memorization, Pattern Recognition, Option Ranking, and Randomness) predicted both expert judges' rankings of lessons and pupils' behavioural outcomes. Finally, by manipulating these dimensions in LLM-generated "Goodâ€ and "Badâ€ lessons, we causally altered pupils' learning in a manner that replicated the original "human teacherâ€ effects. These results show that a low-dimensional semantic structure of teaching language measurably shapes experiential reinforcement learning, and that it can be systematically discovered, interpreted, and used to probe the cognitive mechanisms underlying teaching and learning.

Neural adaptation of the sense of confidence

Poster #7, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Confidence metacognition fmri adaptation

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When we make a decision, we can feel more or less confident in our choice. It has been proposed that a general metacognitive mechanism serves to evaluate confidence across all forms of decision-making. Here, we aimed to provide causal evidence of this general metacognitive mechanism, and examine its neural basis. We developed a confidence adaptation technique where prolonged exposure to high (or low) confidence decisions altered how humans evaluate their confidence in a different decision-making task. We could then examine neural activity that predicts this change in confidence. We found such activity in the dorsal anterior cingulate cortex, and the insula (commonly correlated with confidence in previous studies), changed according to the alteration in confidence evaluation. The change in the insula strongly predicted the change in behaviour, suggesting this region is critically engaged in evaluating confidence.

The metacognitive control of decisions predicts whether and how mice override their default policy

Poster #8, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Cognitive Control, Metacognition, Optimal Control, Effort, Perceptual Decision, Making, Default, Interferences
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Decisions permeate every aspect of our lives (what to eat, where to live, etc) but decision-making policies seem to vary tremendously across time and across individuals. Rather than processing all decision-relevant information, we often rely on fast habitual and/or intuitive decision policies, which can lead to irrational biases and errors. Yet, we don’t always follow the fast and negligent lead of habits or intuitions. So what determines whether we engage cognitive control and override our default responses? A possibility is that engagement of cognitive control optimizes a cost-benefit trade-off. In this work, we rely on Markov Decision Processes to derive the optimal control allocation policy in standard decision-making tasks, under arbitrary default preferences. Our working hypothesis is that decision confidence serves as the benefit term of this allocation problem, hence the "metacognitiveâ€ nature of decision control. Importantly, we provide behavioural evidence that the ensuing model accurately predicts whether and how mice override their default policy in the context of a repeated perceptual decision-making task. This opens an alleyway for assessing the brain circuits that operate the arbitration between default and controlled decision processes, in rodent models of both healthy and neuropsychiatric conditions.

Spontaneous Arousal Fluctuations Differentially Shape Stimulus-Driven and Goal-Directed Visuospatial Attention

Poster #9, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: arousal, attention, perceptual decision making, pupillometry

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Arousal plays a key role in shaping decision performance, typically following a U-shaped relationship with optimal decisions at intermediate levels. While this effect is well established for general performance and sustained attention, less is known about how arousal influences rapid perceptual decisions during attentional orienting. We examined this in two spatial cueing experiments (N = 182). In both, participants made speeded orientation judgments of a target grating preceded by a predictive spatial cue. Experiment 1 (N = 50) used predictive exogenous cues, whereas Experiment 2 (N = 132) used predictive endogenous cues. Spontaneous fluctuations in arousal were indexed by pre-stimulus pupil size and analysed using linear and quadratic models across five arousal bins. Across both experiments, reaction times were best captured by quadratic fits, with fastest responses at intermediate arousal. For cue-guided decisions, the cueing effect showed a clear quadratic pattern in the exogenous task: cue influence was reduced at moderate arousal and stronger at low and high arousal. In the endogenous task, this relationship was not observed, with cueing remaining largely unaffected by arousal. These findings suggest that arousal shapes the dynamics of perceptual decision-making, with intermediate arousal reducing the impact of stimulus-driven capture on response speed, while goal-directed orienting remains relatively stable.

The modulatory role of emotions on creativity through the lens of individual preferences.

Poster #10, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: decision, emotions, creativity, modelling

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Although creativity is widely assumed to be influenced by emotional states, the nature of this relationship remains unclear. Research suggests that positive affect enhances creative performance, while findings on negative affect remain sparse and the direction of the effect is ambiguous. To address this gap, the present study investigates the within-subject relationship between emotional states and creative thinking by examining how individual preferences shift under different affective conditions. For this purpose, we collected behavioral data from participants engaging in a modified Free Generation of Associates Task (FGAT), in which they generated word-to-word associations in response to cue words while instructed to be creative. During the task, participants were exposed to audiovisual emotional inductions, while subjective reports of affective states were recorded into a 2-dimension grid for valence and arousal. For each word association they produced, participants had to rate how much they liked their response, both during the generation task (online ratings) and after the task (offline). Preliminary findings reveal that emotional valence and intensity variations influence both online preference and performance during creative ideation. Specifically, more extreme emotional reports (both positively and negatively valenced) correlate with the rarity of semantic associations and with response online likeability. Furthermore, model-based analyses will assess how preferences are modulated by emotional context and whether there is a mediation effect of the relationship between emotional experience and creative performance by the shift of individual preferences. Altogether, this study will shed light on the mechanisms underlying the relationship between emotional state and creative idea production.

Probing self-beliefs at different hierarchical levels

Poster #11, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: metacognition, confidence, self, beliefs, self, evaluation

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While metacognition, our ability to evaluate our own cognitive processes, has been extensively studied by measuring trial-by-trial self-assessments of task performance (local confidence), real-world decisions often require a broader perspective, drawing on evaluations of performance over wider timespans (global confidence). Despite its pervasive influence on decision-making and mental health, it remains unknown whether global confidence is formed through similar or distinct processes across cognitive domains. Here we employ a novel gamified approach to compare how global confidence is formed in the domains of memory and perception. In memory, we found that both local accuracy and confidence contributed to global confidence, whereas in perception, global confidence was predicted by local confidence alone. By comparing the formation of global confidence across domains, our study provides new insights into the mechanisms underpinning self-evaluation. Building on these findings, we next aim to provide a computational account of how self-beliefs at the level of tasks and domains are intertwined through a novel experimental paradigm and computational modeling approach, paving the way for the development of metacognitive interventions in education and psychiatry.

Flexible representational formats underlying adaptive behavior

Poster #12, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: computational modeling, bayesian inference, cognitive flexibility, learning

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Adaptability in changing and uncertain environments requires adjustments to meaningful changes while ignoring irrelevant noise. However the way agents adjust their behavior critically relies on the format of the representations they use. So far, two classical non-mutually exclusive representational formats (RF) have been described: the "associative formatâ€, in which learning occurs on state-action pairs, and the "strategy formatâ€ in which sets of state-action links are inferred directly. While the former is efficient in contexts where no information is available about the causal structure of the environment, agents can discover and exploit hidden structures, up to using a strategy RF accounting for faster learning after task changes, and memorization of recurring rules. Although the existence of each of these RFs has been demonstrated in independent experimental contexts, the underlying learning mechanisms have been associated with similar brain circuits, raising two questions: (1) how do such distinct RFs co-exist and interact? And (2) how can they be implemented in the same neural circuits? In this work, we propose a novel computational perspective on behavioral adaptation in non-stationary probabilistic environments, building upon the specificity and benefits of both types of RFs, and proposing a unifying perspective. Our model uses information-theoretic principles to convert the information from one RF to the other, accounting for their synergy and their alternating takeover over time. Using simulations in diverse probabilistic environments we describe the relative benefits and costs of each RF and show how representational flexibility accounts for key features of behavioral adaptability.

The influence of effort on mood

Poster #13, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Mood, effort, computational psychiatry, decision making

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Mood is central to mental life and health, and its dysregulation in conditions such as depression and bipolar disorder can impair everyday functioning. While the influence of mood on effort is well established, the reverse relationship has received less attention. Yet this question is important as it may explain motivation impairment in depressed patients. To investigate the influence of effort on mood, we conducted three experiments. In Experiment 1, 128 participants performed a reasoning task in which feedback was manipulated to induce episodes of low and high mood. Mood was collected at each trial, while effort ratings were collected one every other. Results surprisingly revealed a positive influence of mental effort on mood, while we expected the opposite effect as effort is by definition a cost. To test whether it was due to the form of effort, in Experiment 2 we substituted mental efforts for physical ones, asking 67 participants to freely squeeze a handgrip dynamometer. Effects were replicated. To control for the level of effort exertion, we conducted Experiment 3. 68 participants completed a gamified task in which reward and physical effort were fixed on every trial, while still asking for mood ratings at every trial. This experiment revealed a significant effect of effort on mood in the opposite direction. Experiment 4, identical to Experiment 3 but with smaller effort levels to be closer to the one from Experiment 2 revealed smaller but still negative effects. These findings suggest that whether effort is freely deployed or externally imposed lead to an opposite effect of effort on mood.

Sensory integration, temporal prediction, and rule discovery reflect interdependent inference processes

Poster #14, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: human learning, rule learning, inference, cognitive modeling, artificial neural networks

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Deciphering the structure of variable sensory input is key to building an accurate model of one's environment. Humans can accumulate evidence from sequences of stimuli to estimate their sensory statistics, predict the timing of upcoming stimuli, but also discover rules governing sequence generation. However, whether these three forms of inference operate independently or synergistically remains untested. Here, we report selective interactions between sensory integration, temporal prediction, and rule discovery in humans. Participants were exposed to rhythmic sequences of 10 stimuli governed or not by a latent rule, a predictable change in stimulus statistics after five stimuli,and then asked to predict the 10th stimulus from incomplete sequences. Individual differences in sensory integration timescale for rule-free sequences predicted efficient rule discovery. Conversely, discovering the latent rule shaped the timescale and format of sensory integration for rule-based sequences. Tampering with the rhythmicity of stimulus presentation impaired rule discovery without affecting sensory integration accuracy. Selective perturbations of recurrent neural networks trained in the same conditions confirmed these specific interactions. Together, these findings provide insights into the flexibility of human inferences based on variable yet predictable sensory input.

Cognitive fatigue can be monitored during naturalistic activities using economic choices

Poster #15, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: cognitive fatigue, naturalistic, ecological, cognitive control, economic choices

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Cognitive fatigue can be defined as a work-induced neurophysiological state in which people tend to avoid cognitive control exertion. Traditional markers of cognitive fatigue, self-report and performance drop with time-on-task, are not reliable. In a series of studies conducted in the lab, we showed that cognitive fatigue can be more reliably assessed using economic choice tasks. After a few hours of cognitive control exertion, participants shift their preferences toward immediate rewards, which can be captured, using computational modeling, as a growing choice bias. Here, we report experiments that tested whether this choice bias can also capture the cognitive fatigue induced by real-life activities. In a first study, inter-temporal choice tasks were used to monitor the preferences of medical school students (n = 53), while they were revising their book chapters over an entire workday (7 hours). In a second study, inter-temporal tasks were used to assess the preferences of ultra-trail runners (n = 53), before and after a 156-kilometers race (25-50 hours). In both studies, results showed a significant increase in the choice bias, suggesting that both mental and physical activities, when pursued with sufficient intensity and duration, impair the recruitment of cognitive control when decisions must be made.

Subcortical brain circuits reflect changing motivational demands at different time scales during effort-based decision-making

Poster #16, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: motivation, effort, volatility, average effort, learning, uncertainty, nucleus accumbens, amygdala, hypothalamus, ventral tegmental area, subcortical region, flexibility

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Humans show remarkable flexibility in adapting their motivation to constantly changing environments. Most work looking at motivated behaviour to date has focused on cortical regions in tasks where effort requirements are directly instructed. However, in everyday life, motivational requirements are not precisely signalled by the environment and likely rely on contributions from small subcortical nuclei. In the current study, we used ultra-high-field MRI to examine how small subcortical nuclei of the human brain support effort learning and decision-making when effort is not signalled. Participants were asked to make decisions between two options with varying reward points and required effort (squeeze force), in environments with overall low vs high effort requirements. High average effort increased effort sensitivity and encouraged choice switches. A prediction error-based learning model was able to capture the influence of average effort demands on estimated effort updating across trials. 7T-fMRI BOLD showed that posterior hypothalamus reflected average effort demands, centra/cortical amygdala reflected the effort required to persist, ventral tegmental area reflected the effort of switching, and nucleus accumbens represented rewards differentially in high vs low effort environments. Finally. functional connectivity in this network changed as a function of effort changes. In summary, when effort is not instructed, subcortical circuits support flexible regulation of motivational demands at different timescales.

Cultural Differences in Optimism Biases for Dietary Risk Perception

Poster #17, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: optimism bias, belief updating, cross, cultural, bias, risk perception, depressive symptoms, cognitive bias

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Health-related optimism " the propensity to underestimate one's own health risks associated with an unhealthy diet can be a psychological barrier to effective risk communication and adherence to preventive actions (Miles and Scaife 2003). However, it is unknown whether these biases differ between Western nations, such as France, and non-Western nations, such as India. Here, we tested a total sample of 209 college students, recruited at university campuses in France (n=100) and India (n=109). All participants estimated their own and someone else's risk for food-related health hazards and could update these beliefs after learning about the base rates of these hazards in the general population. We found that all participants underestimated their risk compared to the risk of others with no cultural difference (India: $t(107) = 5.87$, $p < .001$; France: $t(98) = 2.86$, $p = .02$). However, while participants in France were also optimistically biased when updating these beliefs ($t(98) = 4.37$, $p < .001$), participants in India lacked optimistically biased belief updating ($t(107) =$ â^'0.57). Participants in India scored higher on depressed mood measured by the Beck's Depression Inventory (BDI) than the French participants ($t(191) = 4.04$, $p < .001$). A significant interaction effect of context and BDI score on optimistically biased belief updating (beta = -0.22, $p < .001$) indicated that, specifically in the Indian sample, the more depressed participants were, the less optimistically biased their belief updating was. These findings suggested that mental health indicators are associated with differences in optimism biases in updating food-related health risks between Western and non-Western nations.

Monitoring Dopamine and Noradrenaline with tungsten microelectrodes: A Proof of Concept with Machine Learning Enhanced Voltammetry

Poster #18, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: electrochemistry, voltammetry, neurotransmitters, dopamine, noradrenaline, serotonin, intracranial recordings

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Monoaminergic neurotransmitters are involved in many cognitive functions including learning, decision-making, and behavioral control. However, our understanding of neuromodulatory processes and their dysregulation in the human brain remains limited due to the spatial and temporal constraints of traditional in-vivo neurotransmitter measurement techniques (e.g PET scan, microdialysis). To address this gap, machine-learning-enhanced voltammetry was recently developed to monitor micrometric and sub-second fluctuations of dopamine, serotonin, and noradrenaline in awake humans. In brief, this involves applying triangular potential waveforms to carbon-fiber or platinum-iridium microelectrodes to induce redox reactions in the extracellular medium. The resulting current traces are measured and fed to machine-learning algorithms to predict monoamine concentrations with high sensitivity and specificity. Our goal is to adapt this method to tungsten microelectrodes used in the context of epilepsy monitoring. To do so, we applied a 10Hz triangular potential waveform (-0.8 to 1.4mV, 800V/s) between the tungsten microelectrode and a platinium-iridium macroelectrode and recorded current responses in in-vitro solutions containing distinct concentrations of dopamine, serotonin, noradrenaline, and various pH levels. These current traces were used to train a convolutional neural network, evaluated on out-of-training data. Our preliminary results demonstrate that this approach can accurately quantify dopamine and noradrenaline concentrations, but failed to detect serotonin. Model predictions were consistent across five new electrodes, though further validation is required using explanted electrodes. These findings provide proof of concept that dopamine and noradrenaline monitoring is feasible with tungsten microelectrodes, offering a promising avenue for advancing our understanding of monoaminergic signaling.

Different cognitive phenotypes in multi-level learning

Poster #19, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Multi Level learning, Individual Differences, Reinforcement Learning

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Human learning in complex environments requires the coordination of learning operates across multiple levels of information processing. However, it remains unclear whether most learners simply acquire multiple levels in parallel, or adopt more idiosyncratic, level-specific strategies. We introduce Cosmic Connections, a multi-day, multi-level learning paradigm in which participants are engaged in a gamified sorting task embedding different reward contingencies at the response, stimulus dimension, and task switching level. Group-level averages suggested a steady increase in reward across days, smooth learning trajectories, and a primary reliance on concrete response-level information. However, individual difference analyses in task performance and strategy reports revealed distinct â€~cognitive phenotypes', with some people showing strong prioritization of simpler response-level contingencies, while others relied more on dimension-level information, or a combination of both. Learning trajectories indicated further differences in both abrupt and gradual strategy shifts over time. Together, our findings indicate that most learners do not uniformly integrate multi-level contingencies, even when all contingencies can be learned in parallel.

Computational characterization of subjective confidence in learning under uncertainty

Poster #20, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: confidence, learning, uncertainty, Bayesian inference

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In Bayesian inference, confidence refers to a learner's estimate of the reliability of their current belief. In ideal Bayesian observer models, confidence estimates closely track human subjective reports, making Bayesian frameworks a powerful tool for studying confidence without requiring explicit reports on every trial . A common operationalization of confidence in ideal observer models is the precision of the posterior distribution, defined as the inverse of its variance. Alternative metrics, such as posterior entropy or maximum posterior probability, have also been proposed. However, these measures are often highly correlated in standard tasks, and it remains unclear which metric best captures human confidence. This raises a central question: How can subjective confidence be formalised computationally? More specifically, which computational metric best captures human subjective confidence? Addressing this issue is critical, as different metrics imply different algorithmic implementations. Here, we adapt a probabilistic learning task to systematically dissociate candidate confidence metrics. The online task selectively probes subjective confidence on trials where model-derived confidence measures (e.g., precision, entropy, and maximum probability) are maximally decorrelated, allowing us to distinguish between competing formalizations of confidence. This approach enables us to identify which computational metric best predicts subjective confidence.

A predictive modelling pipeline for deriving treatment response-sensitive personalized neural circuits for anxiety and depression

Poster #21, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Biomarkers, Depression, Anxiety, Prediction, treatment

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Anxiety and depression are highly prevalent and debilitating psychiatric conditions, yet treatment selection for first-line pharmacological and psychological interventions still relies largely on trial and error. This study introduced a novel predictive modelling pipeline that integrates theory-driven neural circuits with data-driven regularization to derive personalized treatment response-sensitive circuit scores for predicting anxiety and depression response to psychotherapeutic or pharmacological intervention. Using baseline functional magnetic resonance imaging data from 141 anxious-depressed patients and a reference sample of 97 healthy controls, twenty-two features of dysfunctional task-based activation, task-based connectivity, and task-free connectivity were extracted across five theoretically defined functional circuits: negative affect, positive affect, default mode, salience, and attention. To regularize these features, ridge regression models were trained to predict post-intervention clinical outcomes based on depression (PHQ-9) and anxiety (GAD-7) scores across an escitalopram, placebo, cognitive behavioural therapy (CBT), and waitlist intervention. The twenty-two features were aggregated into the five circuits based on their prediction strength for each clinical outcome. These resulting personalized circuit scores were then tested as moderators of treatment response in two randomized controlled trials comparing cognitive behavioural therapy (CBT; n=63) versus a waitlist control (n=35), and escitalopram (n=21) versus a placebo group (n=22). This revealed that decreased default mode circuit engagement at baseline predicted greater depression improvements following CBT versus waitlist ($\hat{I}^2$=1.209, p=0.010). Conversely, increased salience circuit engagement predicted greater anxiety reduction following escitalopram versus placebo ($\hat{I}^2$=-2.314, p=0.028). This study provides preliminary evidence that personalized neural circuit biomarkers can prospectively predict differential treatment response in anxiety and depression.

Gamified learning and decision-making assessments as markers of depressive symptoms

Poster #22, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: computational, psychiatry, phenotyping, prediction, reinforcement learning, decision making, metacognition, machine learning, depression

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Altered learning and decision-making processes have been centrally implicated in depression, and inter-individual differences in these processes have been put forward as promising candidate markers of depressive symptomatology. In this preregistered study, we created and tested a rapid, digitized learning and decision-making assessment tool to predict concurrent depressive symptoms in the general population. Participants (N = 1,259) completed five gamified learning and decision-making tasks and a self-report depression scale in the Brain Explorer smartphone app. We used cross-validated, regularized elastic net and extreme gradient boosting models to identify a profile of behavioural, computational, and demographic metrics and tested its ability to predict depressive symptoms. Results indicate the identified profile to have only limited predictive performance (explaining 2.5-3% of variance in depressive symptoms), and to be strongly driven by demographics. While metacognitive biases reflecting reduced and more variable confidence were consistently identified as predictive features of depression, and extreme gradient boosting models showed statistically significant incremental predictive ability of behavioural and computational predictors beyond demographics, we overall find limited predictive use of the learning and decision-making assessments as markers of depressive symptomatology. These results align with recent research in computational psychiatry showing limited ability of inter-individual differences in task-derived behavioural and computational variables as predictors of mental health. We encourage research to investigate whether, instead, intra-individual fluctuations in learning and decision-making markers predict dynamic fluctuations in mental health symptoms, in line with personalized medicine's focus on tracking individual trajectories.

Longitudinal Associations of Therapeutic Expectations and Dissociative Symptoms With Depressive Symptom Change During Ketamine Infusions

Poster #23, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Ketamine, Major depressive disorder, Therapeutic expectations, Dissociative symptoms, Longitudinal study, Treatment response

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Background Ketamine is a rapid-acting antidepressant that induces acute dissociative symptoms. In routine clinical care, however, it remains unclear how therapeutic expectations and dissociative symptoms relate to changes in symptom severity during ketamine treatment. Methods We conducted a retrospective longitudinal observational cohort study of 100 adults (63 women, 37 men) with major depressive disorder or bipolar depression receiving six open-label racemic ketamine infusions over 3 weeks. Therapeutic expectations were assessed at baseline and prior to each infusion; dissociative symptoms were assessed post-infusion using the Clinician-Administered Dissociative States Scale (CADSS); and depressive severity was measured using the Montgomery-Åsberg Depression Rating Scale (MADRS) at baseline and after each infusion. Cross-lagged mixed-effects models and multilevel mediation analyses examined temporal and indirect associations. Results Depressive severity improved across the induction course. Higher therapeutic expectations were associated with greater symptom improvement, whereas associations with dissociative symptoms were weaker and not independent of expectations. Cross-lagged analyses showed that dissociative symptoms predicted subsequent reductions in depressive severity, whereas expectations predicted improvement. Expectations increased over sessions among the strongest responders. Mediation analyses indicated an indirect association linking expectations to end-of-course improvement via dissociative symptoms and early changes in depressive symptoms. Conclusions Therapeutic expectations and dissociative symptoms were dynamically associated with antidepressant response during ketamine treatment. Expectations appear to reflect a stable contextual factor, whereas dissociative symptoms may reflect session-level processes associated with early clinical change. Early dissociative symptoms during the first infusion may act as a cue supporting an indirect pathway linking baseline expectations to treatment outcome.

Suboptimalities in Confidence Arise from the Mapping Between Internal Estimates and Reports

Poster #24, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Metacognition, Perceptual decision making, Signal detection theory, Psychophysics

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Decision confidence is defined as the subjective probability that a choice is correct. This subjective variable cannot be observed directly, it must be inferred from behavioural reports. Producing these reports requires translating an internal confidence estimate into an action within the task constraints, meaning reported confidence reflects both the internal signal and the policy used to express it. Here, we conducted a pre-registered online experiment to investigate whether the reporting method introduces systematic distortions in confidence. Forty participants performed an orientation discrimination task followed by i) a 4-point confidence rating, or ii) a confidence-forced-choice (CFC) judgement. Each participant completed two sessions, during which they performed both confidence reporting conditions in counter-balanced block order. We used the confidence-noise confidence-boost model to assess the contribution of additional noise and additional information (boost) to confidence reports relative to the perceptual decision, and compute confidence efficiency as the relative sensitivity of confidence reports (to discriminate decision accuracy). We found that participant's use of the confidence rating scale significantly affected their confidence efficiency. A biased use of the confidence rating scale significantly decreased confidence efficiency. Our results show task-specific suboptimalities in confidence, indicating that the mapping from internal confidence to an explicit report introduces additional cognitive processes that systematically shape reported confidence.

Dynamic range adaptation in vast decision spaces: asymmetric sensitivity to reward boundary shifts in humans

Poster #25, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Reinforcement learning, Range adaptation, Non, stationary environments, Large action spaces, Ecological validity

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Humans routinely make decisions in environments where both the number of available options and the magnitude of potential rewards vary widely over time. Yet most reinforcement learning studies in cognitive science rely on simplified tasks with few options and stable reward distributions, leaving the mechanisms underlying decision-making in ecologically richer settings poorly understood. To address this, we designed a bandit task consisting of 30 sequential blocks, each presenting 20 options over 10 trials, with reward ranges shifting between blocks through large-amplitude jumps in either the minimum, the maximum, or both boundaries of the reward distribution. The behavior of fifty participants was compared against several computational models, including an extended range normalization model featuring asymmetric learning rates for range expansion and contraction. Human participants showed clear sensitivity to the direction of maximum reward value transitions: exploitation rates increased when it shifted upward and decreased when it shifted downward. This pattern is captured by the excitation and depression dynamics of the extended Range model, in which sudden reward range shifts temporarily push normalized Q-values outside their expected bounds, driving the agent toward transient over-exploitation or over-exploration until the range estimate adapts. Bayesian Model Comparison confirmed that the extended Range model provided a better account of individual behavior than all alternatives. Interestingly, however, the model's accuracy does not extend to minimum reward shifts: humans show a flat exploration rate regardless of changes to the reward floor, whereas the model predicts an increase. This discrepancy suggests distinct mechanisms for tracking upper and lower reward boundaries, a hypothesis that ongoing work aims to formalize.

Correcting misconceptions and shaping preferences about energy with reinforcement learning

Poster #26, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Reinforcement learning, Belief updating, Misconceptions, Reinforcement, based intervention

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Addressing the climate crisis requires citizens to make informed choices about sustainable energy policy, yet public debates are often shaped by inaccurate beliefs about the environmental and health impacts of different energy sources. Accurate knowledge of key variables " such as greenhouse gas emissions and mortality rates " is essential for informed decision-making, but these beliefs are often flawed and resistant to change. Here, we test whether a brief, interactive, reinforcement-based intervention can correct such misconceptions and influence societal investment preferences. Across seven countries, participants exhibited systematic misbeliefs, including overestimating the emissions and mortality associated with nuclear power and underestimating the mortality of biomass. Our intervention significantly improved accuracy across all features and energy sources. Importantly, correcting beliefs about COâ,, emissions and mortality rates led to shifts in preferences toward lower COâ,, emission and lower-mortality energy mixes, with consistent effects across countries. Follow-up assessments showed that most intervention effects persisted for up to 14 weeks. These findings identify a pathway from belief correction to preference change in the environmental domain and suggest that brief, reinforcement-based interventions could provide a scalable tool for improving public decision-making in climate policy and other domains shaped by persistent misconceptions.

Goal proximity, fatigue, and first milestone shape persistence in sequential effort-based decisions

Poster #27, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Sequential decision making, Effort based decision making, Persistence, Goal directed behavior

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Persistence in goal-directed behavior requires dynamic integration of effort costs, progress signals, and performance feedback across time. While effort-based decision-making has been extensively studied in isolated choices, less is known about how individuals regulate persistence in sequential contexts where decisions unfold continuously. Here, we introduce a novel interactive paradigm in which participants repeatedly choose whether to persist in an effortful task or disengage for a lower reward. Participants (N = 56) controlled a bird avatar navigating obstacle sequences, with multiple decision points embedded within each trial. We tested three hypotheses: (i) fatigue-related disengagement due to repeated effort, (ii) increased persistence with goal proximity, and (iii) enhanced persistence following the first milestone. Results revealed that disengagement increased with repeated attempts and time-on-task, consistent with fatigue-like dynamics. In contrast, proximity to goal robustly reduced disengagement, supporting goal-gradient accounts. Critically, the first milestone exerted a strong influence: passing the first checkpoint sharply reduced disengagement behavior, suggesting a gating role of milestone completion. Further analyses showed that persistence decisions integrate both retrospective (effort already invested) and prospective (effort remaining) evaluations. Decision dynamics indicated reduced conflict for persistence near goal completion, whereas disengagement close to reward elicited increased conflict. Finally, disengagement decisions were preceded by short-term performance declines, without gradual increases in decisional conflict. Together, these findings show that persistence emerges from the dynamic interaction of effort costs, progress signals, and performance feedback, which jointly shape both choice outcomes and the unfolding of the decision process.

A Bayesian belief updating account of confirmation bias during advice seeking and integration

Poster #28, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: advice, social decision making, confidence, computational modelling

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People often rely on advice from others when making decisions. Yet this process can be biased: individuals may favor their own beliefs and disregard any advice, or specifically favor advice that confirms their beliefs, regardless of accuracy. While both forms of confirmation bias are commonly observed in daily life, their cognitive underpinnings remain unclear. To address this gap, we designed a novel task that measures advice-seeking and advice-integration decisions as well as decision confidence, with advisors varying in accuracy and confirmatory tendencies. Both types of decisions from an online sample (N=539) were jointly modeled using a Bayesian belief-updating framework, with biased variants that allowed differential weighting of (i) prior belief relative to advice, and of (ii) confirmatory relative to accurate advice. The model including both biases best captured participants' decisions, revealing stronger weighting of prior beliefs over advice and sensitivity to advisors' confirmatory tendencies. Model-derived belief uncertainty and choice difficulty both uniquely contributed to confidence, and the influence of belief uncertainty on confidence was stronger in individuals with greater prior-weighting bias. Together, these findings offer a mechanistic account of biased belief formation - and its link to metacognitive sensitivity - across both seeking and integrating advice from others. This work paves the way for investigating links between confirmation bias and real-world belief rigidity, especially in today's polarized information ecosystem as well as along mental health symptoms of social dysfunction.

A model-centered introduction to curiosity

Poster #29, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: intrinsic motivation, curiosity, reinforcement learning, novelty, surprise, learning progress

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Curiosity, defined as a transient motivational state for information, explains many non-greedy decisions in humans. Novel, surprising and uncertain situations are thought to elicit curiosity, leading to various models for information-seeking behaviors. We present a unified and empirical comparison of existing curiosity models from the decision-making and reinforcement learning literature. We provide and explain at least one mathematical formula for each curiosity category, implement them, and compare them on the same uncertain and changing task. This comparison illustrates how motivation and exploration may evolve differently based on what elicits curiosity. This work promises to increase the understanding of curiosity models and provide a synthesized toolbox for future models of information-seeking behaviors in animals or artificial agents.

How to slay a dragon: Hierarchical reinforcement learning of skills in a multi-level learning environment

Poster #30, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Multilevel Learning, Reinforcement Learning, Computational Modeling

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Learning is one of the most fundamental human cognitive processes, which can occur at different levels of abstraction. Previous literature suggests that people are biased to attribute their success to concrete actions first, before relating them to more abstract features of actions. Here, we designed a gamified â€~Dragon Slayer' paradigm to investigate how participants navigate a multi-level learning environment where they need to learn about the effectiveness of different attacking skills (concrete level), different elements (intermediate level), and strategic switching (abstract level). Using a computational model with time-varying parameters, we evaluated whether learning at more concrete levels is prioritized during the earlier stages of learning, while learning at more abstract levels is more of a "last resortâ€. Together, we provide a paradigm and computational framework for understanding how humans optimize cognitive resources by delaying learning about abstract representations until they offer a clear functional advantage.

How Different Facets of Information Elicit Curiosity Over Time

Poster #31, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Curiosity, information seeking, dynamics, individual difference

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Curiosity has been defined as the desire for information in the absence of extrinsic rewards (Posnock, 1991). It is often quantified as a single scalar value, using either subjective ratings or behavioural proxies such as the time or cost individuals are willing to invest to obtain information. However, information is inherently multidimensional (Lowenstein, 1996). Therefore, it remains unclear how different facets of information elicit curiosity, and how this evolves as the information is acquired. We developed and deployed a novel dynamic tangram puzzle paradigm in which participants viewed animations of puzzles composed of seven pieces. Each animation played in reverse order the progressive randomisation of the location, colour, and surface pattern of the pieces, together defining a textured object. At points during the animation, participants reported their curiosity about two main facets of the puzzle (i.e., positional and texture information) and how easy they found it to predict the final shape. Our preliminary results (N = 29) show that curiosity is not uniformly distributed across the two information dimensions. Participants showed stronger curiosity about positional information than texture-related information. Moreover, when participants perceived the final shape as easier to predict, they tended to report lower curiosity about positional information, although this effect varied across individuals.

Disentangling Motoric and Semantic Contributions to Pavlovian Bias

Poster #32, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Pavlovian bias, instrumental learning, reward/punishment, motor, semantic

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Reward and punishment cues can bias instrumental behavior: reward-predictive cues facilitate the learning of active responding (go response), whereas punishment-predictive cues facilitate the learning of inaction (nogo response). This phenomenon, known as the Pavlovian bias, is commonly attributed to motor activation versus suppression induced by reward and punishment. However, recent evidence suggests that the semantic meaning of responses also contributes to this bias. In the present study, we disentangled motoric and semantic contributions to Pavlovian bias using a modified go/no-go paradigm. In our task, participants learned whether to repair specific robots or not, to either win points (reward) or avoid losing points (punishment). Crucially, repair and non-repair decisions could require either a go or a no-go response, independently manipulating motor execution (go vs. no-go) and action meaning (repair vs. not repair). Across four experiments (total N = 249), we consistently observed that reward facilitated the learning of repair decisions while punishment facilitated the learning of non-repair decisions, demonstrating a robust semantic Pavlovian bias. Importantly, when semantic meaning was dissociated from motor execution, we found no evidence for a motoric bias: reward and punishment did not differentially influence the learning of go versus no-go responses. These findings suggest that Pavlovian bias primarily operates at the level of action meaning rather than motor activation. Theoretically, this shifts the locus of Pavlovian bias from motor circuits to representational systems, and highlights the critical role of semantic meaning in determining how cues shape behavior.

Balancing stability and flexibility: a meta-learning algorithm for behavioral adaptation in mice

Poster #33, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Decision, making under uncertainty, Reinforcement learning, Adaptive learning rate, Volatility and stochasticity, Computational modeling, Prefrontal cortex

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Learning through trial and error (reinforcement learning, RL) enables animals to adapt to dynamic environments. Updating behavior from reward prediction errors requires balancing stability and flexibility: learners must avoid overreacting to noise while remaining sensitive to meaningful environmental changes. How this balance is achieved, and which prefrontal circuits support it, remains unclear. We trained mice in a probabilistic reversal task while independently manipulating two forms of uncertainty: reward probability (stochasticity) and contingency reversal frequency (volatility). We first derived normative predictions by identifying, for each environment, the learning rate ($\hat{l}pm$) and exploration"exploitation parameter ($\hat{l}^2$) that maximize cumulative reward in a standard RL model. Simulations predicted that optimal $\hat{l}pm$ should increase with volatility and decrease with stochasticity, while optimal $\hat{l}^2$ should decrease with both. Behaviorally, mice adapted their learning rates in line with these predictions, increasing $\hat{l}pm$ in volatile environments and decreasing it under high stochasticity. In contrast, decision policies remained relatively stable across conditions, deviating from the predicted modulation of $\hat{l}^2$. This dissociation (adaptive $\hat{l}pm$ but stable $\hat{l}^2$) motivated a meta-RL model in which learning rates are dynamically adjusted based on internal estimates of volatility and stochasticity derived from reward prediction errors. This model best accounted for behavioral data and captured trial-by-trial learning adjustments. To link computation to neural substrates, we selectively inhibited prelimbic (PrL), cingulate (Cg2), and lateral orbitofrontal (LO) cortices. Preliminary results suggest dissociable contributions of these regions to distinct computational parameters, supporting an integrated framework linking normative theory, adaptive behavior, and prefrontal circuits in decision-making under uncertainty.

Curriculum learning benefits for nested tasks in human and machine learning

Poster #34, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: curriculum, curriculum learning, modelling

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A curriculum is a meaningful ordering of learning material (e.g., stimuli or tasks), to improve learning. For instance, learning material can be ordered from easy to difficult. An agent can also learn how to efficiently order its own learning material: this meta-cognitive process is referred to as curriculum learning. Curricula have been studied in machines (Bengio et al., 2009) and in humans (Dekker et al., 2022), and so has curriculum learning (e.g., Wu et al., 2021 in machines; Poli et al., 2022 in humans). Thus far, curriculum research has focused on learning independent tasks. We show, however, that dependencies between tasks play a crucial role. Task dependencies potentially allow for reusing components from easier tasks in more difficult ones, thus exploiting the full power of curricula. Computationally, our work demonstrates that "nestedâ€ models (i.e., models in which information from simpler models can be reused in more complex ones), show clear benefits in learning tasks that include dependencies. Behaviorally, we demonstrate that humans are able to exploit such task dependencies as well. Future work will develop and empirically fit computational models with an additional higher-order level that decides at every trial what task to train on, thus (meta-)learning their own curriculum.

Neurocomputational Mapping of Social Norm Transgression in Frontal-Lobe Damage

Poster #35, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: social norm, bvFTD, decision making, computational modeling

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The brain mechanisms supporting compliance with social norms "and thereby the stability in human societies" remain poorly understood. Prior work suggests that norm adherence is driven by multiple motives, including internalized moral values, concern for reputation in the presence of others, and the desire to avoid sanctions. However, the cognitive and neural processes underlying these influences are still unclear. Patients with frontal-lobe damage, such as those with behavioral variant frontotemporal dementia (bvFTD), frequently exhibit pronounced social transgressions, providing a valuable clinical model to investigate the neural bases of social normative decision-making. Here we compared patients with bvFTD, patients with Alzheimer's disease (AD) and healthy controls using a social norm violation task. Participants decided whether to comply with or violate a social norm to obtain a reward under varying conditions of audience presence and potential sanctions. We characterized behavior using a computational model that estimated the probability of norm violation as a cost-benefit trade-off between self-interest and social costs. We found that bvFTD patients exhibited more frequent norm transgressions than both AD patients and healthy controls. This increase was explained by a reduced influence of internalized norms and diminished sensitivity to audience-related costs. Finally, model-based lesion-mapping linked individual differences in computational parameters to regional neurodegeneration measured with 18FDG-PET and T1-weighted MRI. Together, these findings identify distinct motivational and neural mechanisms underlying social norm compliance and show how frontal-lobe degeneration in bvFTD disrupts normative decision-making, leading to increased social transgressions.

Dissecting the neurocognitive architecture of joint action

Poster #36, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Social Decision, Making, Reinforcement Learning

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Background and Aims: Social behavior depends on coordinated actions to achieve shared goals, but the cognitive and neural bases of social decision-making are still unclear. While individual decisions rely on value-based processes in cortico-striatal circuits, it is unknown whether joint decisions require specialized social mechanisms or similar value-based computations. *Methods*: Pairs of mice were trained in a cooperative decision-making task in which spatially coordinated choices produced joint rewards. Social influence was systematically manipulated by varying partner identity, available sensory cues, and spatial configurations. Behavioral choices were analyzed using logistic regression to quantify the contribution of social and non-social factors. In parallel, multi-agent reinforcement learning models were implemented to capture learning dynamics and task structure underlying social coordination. Now, we are combining this behavioral and computational framework with neural recordings and chemogenetic inhibition of the medial prefrontal cortex (mPFC). *Results*: Mice successfully learned to coordinate with mutualistic rewards. Swapping spatial positions while maintaining pairs' identity revealed coordination in an egocentric reference frame. Preliminary computational modeling suggests mice use separate value representations for self and other actions. Logistic regression showed that current decisions depend on recent self and other choices, with social information weighted more heavily for recent choice history. *Conclusions*: This work establishes an integrated experimental and computational framework for dissecting social decision-making in mice. Findings suggest egocentric, value-based coordination mechanisms. Future work will determine whether coordination emerges from parallel versus joint state representations and will use mPFC recordings to link neural activity with computationally inferred variables during social decisions.

How cognition and emotions shape gambling decisions: a multi-method approach

Poster #37, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: computational psychiatry, risky decision, making, gambling, emotions, skewness

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Gambling disorder is defined as persistent and uncontrolled maladaptive gambling behavior leading to significant impairment and distress. Gambling games such as slot machines and lotteries are typically characterized by skewed reward distributions, and their profitability suggests that people are naturally attracted towards these skewed gambles. Yet, surprisingly, very few studies in the gambling literature have investigated skewness. This study aims to examine the cognitive and emotional mechanisms of decision making under a skewed gambling paradigm and their links with problematic gambling. We developed a novel, ecologically valid gambling task deployed in a large online study using a split-sample approach (exploratory: 300; confirmatory: 600). Participants were recruited based on their gambling frequency, ranging from at least once a month to multiple times per week. To capture real-time emotion measures, we leveraged participants' webcams for automated facial emotion recognition during the task. Additionally, a subsample of the confirmatory cohort (textasciitilde{}150 participants) completed two weeks of ecological momentary assessment (EMA) probing daily gambling activity and emotional states in their natural environment. In the exploratory sample, specific computational model parameters (e.g., sensitivity to skewness, variance, expected value) selectively predicted gambling severity, with these associations mediated by distinct gambling motives and cognitive biases. We plan to replicate these findings in the confirmatory sample, and integrate computational model parameters, clinical questionnaires and EMA measures to further characterize these relationships. In parallel, we are employing the same task in a neuroimaging study (functional and diffusion MRI) with individuals diagnosed with gambling disorder to examine underlying neural mechanisms.

The influence of cardiac changes on error awareness and decision confidence in a perceptual judgment task

Poster #38, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: embodied metacognition, error, related cardiac deceleration, interoception, performance monitoring

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Performance monitoring is important for efficient goal-directed behaviour. Previous research has shown that bodily signals, including heart rate, act as an information source for cognitive judgments and their evaluation. For example, the heart beats slower after a mistake than after a correct response, a phenomenon known as error-related cardiac deceleration. However, whether this cardiac deceleration directly influences metacognitive judgments such as confidence or error awareness remains unclear. In this study, participants decided which of two dot arrays contains more dots and subsequently report their confidence and error awareness (on a scale from 1 to 6). Heart rate is continuously recorded using a pulse oximeter. Preliminary results (N = 19) indicated that participants made errors on 30% of trials, detecting 38.71% of them. Participants reported higher confidence on correct versus error trials (Mcorrect " error = 0.50, $p < .001$). Furthermore, preliminary analysis indicated a significant post-response difference in the inter-beat interval, with errors eliciting greater acceleration than correct trials according to the estimated marginal means (EMM difference = 0.12, SE = 0.05, $t(5661) = -2.65$, $p = .008$), contrary to our hypothesis. Future analyses will confirm this pattern across a larger sample, then test whether the amplitude of these heart rate changes correlate with error awareness and confidence, i.e. greater changes relate to greater error awareness. Lastly, we examine whether better interoceptive abilities strengthens the relationship between decision-related cardiac changes and metacognitive judgments. Together, this study aims to clarify whether and how cardiac signals contribute to metacognitive judgments.

Metacognitive Efficiency in Eating Disorders

Poster #39, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: metacognition, decision, making, eating disorders, computational psychiatry, clinical

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Objective: To quantify metacognitive efficiency across ED diagnoses using psychophysical and computational approaches. Methods: We assess metacognition in a clinical sample of ED patients (n = 150; anorexia nervosa, bulimia nervosa, binge-eating disorder, and other conditions). Participants complete a validated perceptual decision-making task with trial-by-trial confidence ratings on self-evaluation of performance. Metacognitive efficiency is estimated using second-order signal detection theory models. Results: Recruitment is ongoing; 76 ED patients have been enrolled to date. Initial analyses support the feasibility and validity of the perceptual task and provide interim exploration of confidence and metacognitive efficiency across diagnostic groups. Conclusion: Early findings are promising and suggest that metacognitive processes may differ across ED diagnoses. Ongoing inclusion of a control group will allow more insightful comparisons and provide further understanding of metacognition in ED transdiagnostically. This work aims to clarify the cognitive mechanisms underlying ED symptoms and support the development of targeted therapeutic interventions.

When to act : environmental influences on Self-paced Goal-directed actions

Poster #40, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: goal directed behavior, self paced actions, action initiation, drift diffusion model, environmental contingencies

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Everyday decisions require interacting with the environment in order to achieve the desired goals. Goal-directed behaviour relies on the ability to associate actions to their consequences and estimating outcome value. In this framework, goal-directed behaviour can be initiated by internal estimates (action-outcome associative strength and outcome value), without external stimuli. Hence, these estimates would determine not only what to do, but also when to act. Indeed, deciding how fast to initiate self-paced actions is a key determinant of optimal behavior, as it shapes cost"benefit trade-offs such as the opportunity cost of time and motor effort. This raises a key question: how do environmental parameters (associative strength, outcome value) shape self-paced action timing, and through which cognitive processes? Here, we developed a self-paced operant task in which mice perform nose pokes to obtain food rewards in the absence of external cues. We then manipulated environmental statistics through contingency degradation, outcome devaluation, and partial extinction. To probe action initiation dynamics, we analysed response rates and timing distributions, and fitted a drift"diffusion model (DDM) to quantify evidence accumulation and decision threshold parameters. Mice displayed clear behavioural sensitivity to experimental manipulations, confirming goal-directed control. Timing analyses and preliminary DDM fits revealed that environmental statistics differentially modulate temporal patterns in action initiation and DDM parameters. This work provides an integrated experimental and computational framework to dissect the temporal dynamics of self-initiated goal-directed actions in mice.

Divergent computational strategies in rule-based perceptual decisions: from flexible cue combination to heuristic top-down decisions.

Poster #41, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Hierarchical decision making, inference, Contextual perception

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Real-life decision-making requires the flexible integration of top-down contextual beliefs and bottom-up sensory evidence. Using a hierarchical visual categorization task where the decision-relevant feature (color or motion) is governed by a volatile hidden rule, we investigated how humans trade rule inference against feature salience to select the dimension on which to answer. By developing a Bayesian model of inference and feature selection, we formalized the choice policy as a relative weighting between the inferred posterior distribution of the rule and the difference in visual salience between features. Our computational modeling reveals strong inter-individual variability: while a small fraction of participants adopts a flexible policy that combines rule inference and feature salience to maximize immediate and long-term reward, the majority adopts a hierarchical policy where feature selection is based solely on top-down rule beliefs. A possible explanation for this heterogeneity is that the hierarchical policy is a resource-rational strategy to mitigate attentional bottlenecks. Using artificial recurrent neural networks (RNNs) trained to perform the same task, we show that a change in task framing"i.e., the way the network decision is read out"controls the selected policy. We then evaluate the robustness of each implemented strategy to resource constraints such as computational noise. Together, these findings shed light on informational tradeoffs that shape complex real-life perceptual decisions and offer a framework to study their computational mechanisms.

Altering depressive attributions through causal learning: a randomised controlled trial

Poster #42, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: learning, depression, attributions, psychotherapy

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Self-critical attribution styles are a core feature of depression and are targeted by psychological therapies. We designed a "causal learningâ€ intervention to teach individuals to make self-enhancing attributions through feedback. Here, 361 participants completed a test of their baseline attribution tendencies for positive and negative everyday events across two attributional dimensions (internal"external and global"specific) and were randomised to either a causal learning or a matched reinforcement learning control task. After six brief sessions over two weeks, all participants repeated the attribution task alongside psychiatric questionnaires. While causal learning did not decrease overall depressive symptoms compared to control learning (mean difference in PHQ-9 change= -0.45, 95% HDI=[-1.32, 0.42]), there was stronger evidence of decreases in depressive attributions (mean difference in change in dysfunctional attitudes scale [DAS]= -0.73, 95% HDI=[-1.53, 0.001]). In Bayesian intention-to-treat analyses, we found strong evidence that the causal learning task increased self-enhancing attributions for positive events (more internal-global causes chosen) and reduced self-critical attributions for negative events (more external-specific causes chosen), compared to control learning, including when attributional changes were distilled into a latent "beneficial shiftâ€ factor. There was also accompanying evidence that this beneficial shift mediated more improvement in both proximal (DAS) and distal (PHQ-9) symptom measures following causal learning than after the control intervention. Ongoing analyses will assess whether attributional shifts and their mediation of symptom change are predicted by learning rates in initial sessions, as suggested by preclinical work.

Confirmation bias grows with confidence during reinforcement learning

Poster #43, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: Reinforcement learning, confidence, confirmation bias, metacognition

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The confirmation bias, which characterizes how individuals favor information that supports their views, has been extensively described in various contexts, from social media behavior to simple trial-and-error instrumental learning. In reinforcement learning, it typically manifests as a reduced integration of disconfirmatory outcomes. Whether the confirmatory learning bias is stable or susceptible to modulations by internal variables or environmental factors remains relatively unexplored. Through a series of two-armed bandit experiments featuring various outcome contingencies (N=314 participants; 13 unique experiments, clustered in 3 groups of different volatility levels), we assess how the subjective assessment of decision accuracy (choice confidence) impacts the integration of confirmatory and disconfirmatory outcomes in human decision-makers. We find that choice confidence amplifies the confirmatory-updating bias in both stable and volatile environments, even when accounting for the effects of confidence on random or directed exploration. These results highlight the complex interaction between confidence and confirmation bias in RL and offer insights into how metacognitive factors shape learning and behavior.

Problem difficulty and waiting time shape the level of detail and temporal organization of visual strategies in human planning

Poster #44, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: eye_tracking, planning, adaptive_behaviour, temporal_ordering, visual_search

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Planning entails identifying sequences of actions to reach a goal, yet we still have incomplete knowledge of how problem constraints, such as difficulty and available time, influence the visual strategies supporting plan construction, both in terms of coverage of the to-be-executed plans and its temporal organization. To fill this gap, we recorded participants' cursor and eye movements in a multi-target problem solving task on a grid. We manipulated two orthogonal dimensions: problem difficulty, by introducing the novel construct of misleadingness, which measures how nodes' distances on the grid diverged from their relative position along the solution, and waiting time, by allowing participants either to act immediately or wait before moving. We found that difficulty significantly affected both performance and gaze: harder problems reduced success rates, required more corrections and pauses, elicited longer pre-movement inspection that provided higher coverage of the to-be-executed plan, and more re-fixations. When participants could start immediately, they did so without fully consolidating their plan. This led to more pauses and backtracks, but also to more precise gaze-cursor alignment during execution, suggesting improved online control compensating for incomplete planning. With increased planning time, greater difficulty led participants to achieve a better temporal alignment between pre-movement visual inspection and cursor movement during execution. Overall, our results suggest that problem difficulty increases the visual coverage of the upcoming plan, whereas time availability shapes the extent of replanning during execution and determines whether gaze-path coherence emerges before movement or only during execution in difficult problems.

Achieving metacognitive insight into latent decision-making parameters

Poster #45, **Poster Session 1**, Wednesday 27 May 2026, 16:00-17:30

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Keywords: decision making, metacognition, drift diffusion model, electrophysiology

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Perceptual decisions are accompanied by metacognitive experiences, such as the sense of confidence, which closely follows the speed and accuracy of each decision. However, confidence can only inform a general sense of performance. More specific metacognitive insight into the setting of latent decision process parameters (such as bias and impulsivity) could confer adaptive benefits relative to general confidence, by allowing decision-makers to pinpoint the source of an error. We asked participants to report subjective bias and impulsivity after their decisions on a random dot motion (RDM) task and used a hierarchical drift diffusion model (hDDM) to show that these ratings closely follow trial-to-trial variability in estimates of drift bias and decision boundary, indicating that people indeed have insight into their bias and caution on individual trials. In ongoing work, we are investigating the informational sources that may underlie insight into bias. Subjective bias may draw on task-related features - including stimulus, response time, and accuracy " and/or on readouts of physiological signals present during the decision-making process. We are using electroencephalography (EEG) and pupil dilation data to investigate the extent to which neurophysiological signals previously linked to drift bias contribute to subjective reports of bias. We expect to replicate the previously found insight into bias, and to find that -when asked to provide a metacognitive report about their bias, participants base their report -at least in part- on a noisy read-out of neurophysiological signals.

Ventromedial prefrontal cortex activation and behavioral-motivational awareness linking weight status to health-oriented dietary decision-making

Poster #1, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Motivational Interview, Dietary decision making, Resting State fMRI

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Listening to one's own reasons for changing unhealthy eating habits (i.e., change talk) influences the extent to which food choices are driven by health or taste. This effect has been reported to be strongest in participants with overweight and obesity (Rodrigues et al. 2026). In this study, we investigated the intrinsic neural and psychological sources of this effect using the same dataset. Our hypothesis was that the effect of weight status on how people consider healthiness and tastiness during dietary choices after hearing change talk could be due to differences in the intrinsic activity of the ventromedial prefrontal cortex (vmPFC), a brain region linked to valuation and self-referential thoughts, and to variations in motivation to change. We combined resting-state functional magnetic resonance imaging and drift diffusion modelling of food choices and reaction times in 80 participants (63 women/17 men) with varying body mass indices (BMI) by a serial mediation analysis. Results indicated that higher BMI was associated with greater intrinsic vmPFC activity (beta=0.32, p=0.01). Participants with greater vmPFC activity showed increased motivation to change (beta=0.33, $p < 0.001$) and sampled health over taste evidence during dietary decisions after hearing change talk (beta=0.38, p

Exploring Post-Reinforcement Pauses In Electronic Gambling Machine Behaviour With The Volatile Kalman Filter

Poster #2, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: DDM, electronic gambling machine, volatile Kalman filter

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Electronic gambling machines (EGMs) are a popular but harmful form of gambling (Allami et al., 2021). Gamblers often show cognitive biases (e.g., gambler's fallacy) which might result from incorrect inferences about the latent states of the environment (Peters, 2025; Redish et al., 2007). While playing EGMs, participants show increased reaction times (RTs) after positive reinforcement (Delabbro & Winefield, 1999). This effect, called the post-reinforcement pause (PRP) has been observed for a long time (Ferster & Skinner, 1957). However, the underlying processes are still poorly understood, especially in EGMs. We hypothesise that PRPs are related to an update in the perceived volatility of the environment's latent state. In the current study, we reanalysed the behavioural data of 46 participants playing on a EGM for up to 200 trials (Paliwal et al., 2014). Using hierarchical Bayesian modelling, we fit multiple drift-diffusion models (DDMs) on the data. To test our hypothesis, we calculated the volatility of the paradigm with volatile Kalman filter (VKF; Piray & Daw, 2020) and used it to modulate the different DDM parameters: non-decision time, boundary separation, initial starting point, and the drift-rate. We compare these models to a basic DDM. The best fitting model will be selected based on the WAIC score, as well as its prediction of the observed data.

Decision Making Distorts Internal Evidence Driving Decisions

Poster #3, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: action selection, belief distortion, inferior parietal cortex, multi, alternative choice

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Decision-making is usually viewed as a valuation process of choice options followed by a read-out subserving action selection. We hypothesized that action selection is not merely a read out but alters valuation. We investigated whether and how selecting an option among several ones alters option valuations guiding selection. Through computational modeling and behavioral experiments, we found selection-based distortions in evidence-based belief representations guiding selection. More precisely, we found that option selection leads to equalizing evidence-based beliefs across the unchosen options (belief equalization effect) while maintaining the evidence-based belief supporting the actual choice. By contrast, selecting options based on external cues unrelated to evidence-based beliefs induced no belief distortions including equalization effects across the unchosen options but inflated the belief of the chosen option (belief inflation effect). fMRI data confirm that while the pre-Supplementary Motor Area and the dorsal Anterior Cingulate Cortex subserve action selection deriving from evidence-based beliefs encoded in the inferior parietal cortex bilaterally, these inferior parietal representations of evidence-based beliefs underwent belief equalization effects bilaterally. These results reveal that action selection is not only a read-out of decision variables resulting from valuation processes but does alter the decision variables through reducing encoded information that drives selection.

False but Phonologically Plausible Linguistic Priors Induce Cross-Linguistic Auditory Illusions

Poster #4, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: auditory illusion, predictive coding, predictive routing, EEG

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According to predictive coding theory, perception emerges from the dynamic interaction between top-down expectations and bottom-up sensory input, whereby the brain continuously minimizes prediction error through hierarchical inference. In the auditory domain, this process can give rise to perceptual illusions, particularly when incoming signals are ambiguous yet compatible with prior knowledge. A striking example is the misperception of foreign song lyrics as meaningful phrases in one's native language, driven by phonetic similarity. In the present study, we investigated how linguistically structured priors shape auditory perception during naturalistic song listening. Participants read short sentences in either English or Italian before listening to excerpts of English songs and rated the perceived correspondence between text and audio. Critically, a subset of Italian sentences was phonologically similar to the English lyrics, inducing a cross-linguistic auditory illusion in which participants reported a match despite the absence of semantic correspondence. Electroencephalographic recordings showed that neural markers of surprise"namely, the P200 component and gamma-band activity"were enhanced when auditory input violated prior expectations. In contrast, these markers were attenuated during illusory trials, indicating reduced prediction error despite objective mismatch. Time"frequency analyses further revealed an early increase in gamma power followed by sustained beta-band activity in the illusory condition, consistent with an initial detection of sensory discrepancy followed by top-down reinterpretation. These findings elucidate how phonologically plausible but incorrect linguistic priors reshape perceptual experience and modulate predictive processing in complex auditory contexts.

Intrinsic fluctuations of motivation, mood and emotions in self-organized behaviours

Poster #5, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: motivation, decision making

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We all experience fluctuating moods, motivations and emotions in our daily lives, even when our incentives remain unchanged. We know that such evolving cognitive states can impact how we make decisions, learn or otherwise engage with our external and internal environment. Despite this, cognitive processes are mostly investigated in event-related designs or block-wise comparisons assuming static context. Importantly, a person's real world internal environment can fluctuate in meso- (minutes) as well as macro-timescales (days, weeks), but we still do not know how different elements such as motivation, emotion and mood interact intrinsically, nor do we have neural or cognitive models of their change and interactions. Emotions, mood and motivation are all very relevant drivers of brain and cognitive context that happen to fluctuate slowly and partially intrinsically, not based on simple task features, and their potential interaction makes it essential to investigate them concurrently, not just separately. Thus, we built a task to measure types of cognitive context of motivation, mood and emotions concurrently during self-organized decision making and learning behaviours, looking especially at intrinsic motivation by allowing varied levels of engagement with the environment. Ultimately, in this project, we want to understand both neural and behavioural motivational state specific processes in an ecological, real life and clinically relevant context.

Correspondence between reinforcement learning phenotypes and transdiagnostic clinical symptomatology across development

Poster #6, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Reinforcement learning, developmental computational psychiatry, model, based control, anxiety, rumination
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Most mental health disorders emerge during childhood and adolescence, yet the neurocognitive mechanisms through which symptoms arise remain poorly understood. In adults, reinforcement learning (RL) computations have been linked to psychiatric symptoms. RL computations also change across development. Characterizing how these changes relate to emerging symptoms can help identify which children are at risk and what targets to intervene on. In a sample of 1000 individuals aged 10"25, participants completed three tasks targeting sensitivity to positive versus negative outcomes, Pavlovian bias, and model-based control, alongside self-report measures of psychiatric symptoms. Factor analysis on the latter identified four symptom dimensions: rumination, anxiety, irritability, and anhedonia. Rumination and anxiety increased with age, irritability decreased, and anhedonia was stable. Computational modeling revealed age-related shifts in learning, including increasing sensitivity to negative outcomes and greater model-based control with age, while Pavlovian biases were stable. Examining the correspondence between learning phenotypes and symptom dimensions in the discovery sample (n=500), individuals who deployed greater model-based control reported more rumination, beyond the effect of age alone. Anxiety was predicted by older age, heightened Pavlovian bias, and model-based control, such that individuals high on both showed the greatest anxiety, while the contribution of Pavlovian bias diminished with age. Irritability and anhedonia were not meaningfully predicted by any task parameter beyond age. Rumination and anxiety were both linked to greater model-based control, consistent with proposals that mental traversal of state sequences underlying model-based learning may give rise to repetitive negative thinking.

Efficient exploration during multi-step planning

Poster #7, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: exploration, planning, reinforcement learning, generalisation, risk

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Humans routinely generalise from past observations to unseen states. This should allow them to judiciously seek out information with high potential for such generalisation. To assess this form of efficient exploration, we introduce the â€~Manhattan tolls task', a paradigm where agents navigate a 2D grid to minimise costs or maximise rewards. Costs/rewards are sampled from probability distributions that are structured along either rows or columns. Exploring the environment therefore yields information that, based on this structure, can be generalised to many other unseen states, facilitating subsequent path-finding. Participants (N=120) preferentially selected paths carrying more generalisable information with respect to their current context, particularly when maximising rewards as opposed to minimising costs. As learning progressed, however, the objective-dependence of this tendency to choose maximally exploratory paths reversed: that is, they preferred paths with high informational value under the inferred context when minimising costs, but tended to select riskier paths when maximising rewards. This indicates that humans explore efficiently via a valence-dependent bias towards informative options, illuminating how exploration and generalisation jointly support planning in complex decision spaces.

The cognitive cost of breathlessness: dyspnea shifts the balance of reinforcement learning

Poster #8, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Ventilation, Dyspnea, Cognition, Cognitive flexibility, Reinforcement learning

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Dyspnea, the subjective experience of breathing difficulty, is increasingly recognized as a paradigmatic interoceptive percept. Despite its observable effects on perception and affect, little is known about how dyspnea impacts core learning mechanisms supporting adaptive behavior. Dyspnea may offer an ideal testbed for uncovering how the brain arbitrates between attending to urgent internal states and maintaining ongoing learning. Unlike externally applied stressors, dyspnea constitutes an internal first-person threat signal demanding cortical engagement while sparing sensory and motor channels for concurrent tasks. We induced effort-based dyspnea in 40 healthy adults using inspiratory threshold loading, generating excessive respiratory work sensation without hypoxia or hypercapnia. In a crossover design, participants completed a probabilistic reinforcement learning task with contingency reversals under loaded and unloaded breathing while EEG was recorded. Dyspnea left basic learning intact but selectively impaired reversal learning. For small rewards, post-reversal performance under dyspnea dropped below chance at the first reversal (47.2% correct vs. 56.5% unloaded; p=0.011), indicating active perseveration. For large rewards, flexibility was initially preserved but impairment emerged at the second reversal (67.9% vs. 78.3%; p=0.018), suggesting motivational salience transiently buffered flexibility but could not sustain it. Concurrently, Pre-inspiratory Potentials (PIPs) were enhanced during loading (54% vs. 21% unloaded; p=0.021), consistent with increased interoceptive signaling diverting resources from task demands. These findings suggest dyspnea shifts the system toward the exploitation of established knowledge at the expense of flexible updating, particularly when external incentives are low, offering insight into how embodied states shape adaptive cognition.

Meta-learning attentional strategies in multidimensional reinforcement learning

Poster #9, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Meta, learning, reinforcement learning, attention, feature, based learning, object, based learning, generalisation

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Reward learning in complex, multidimensional environments requires balancing abstract generalisation with stimulus-specific precision. Previous work suggests that humans initially rely on feature-based abstraction to support fast generalisation, before shifting toward more precise, object-based learning. We asked whether humans also generalise these attentional strategies to novel contexts. In a large-scale study (N = 351), participants learned reward contingencies in an environment where one feature dimension (colour or pattern) was informative at a group level but imperfectly predictive at the stimulus level. In a subsequent phase with novel stimuli, the informative dimension either remained stable (Repeat) or changed (Switch). Behavioural performance was indistinguishable between conditions, yet computational modelling revealed a marked difference in strategy: when the relevant dimension remained stable, participants maintained a hybrid approach; when it switched, they rapidly abandoned abstraction in favour of object-based learning. Time-resolved analyses showed that this reconfiguration began almost immediately upon entering the new context. Humans therefore tune the level of abstraction they use based on inferred environmental reliability, striking a balance between rapid generalisation and stimulus-specific precision.

Risk escalation is amplified by stakes, not by a sense of control

Poster #10, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Risk escalation, rationality, rewards, financial risk, agency

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People are often faced with the same risky choices repeatedly: how much to invest, how much to drink, how fast to drive. These decisions are not made just once, but dozens of times. How does repetition per se alter risk-taking? Here, we isolate the effect of mere repetition from outcome learning to examine how risk attitude changes over time. Across three experiments, participants made repeated financial wagers on lotteries with positive expected value. Initially, participants wagered far below the optimal of a risk-neutral agent. With repetition, however, risk-taking gradually escalated. Two factors boosted risk-taking, moving participants even closer to the â€~rational' benchmark: stakes and agency. Participants wagered more when potential rewards were high and when they could select their own cue to wager on. Yet only stakes shaped the trajectory of escalation, with steeper escalation emerging exclusively at higher reward potential. These findings illuminate how repetition erodes risk aversion and suggest strategies for promoting adaptive risk-taking while curbing maladaptive escalation.

How goals shape pleasure: Testing a multidimensional homeostatic RL model of consummatory anhedonia

Poster #11, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Hedonic experience, Goal progress, Reinforcement Learning, Depression

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Anhedonia - diminished capacity to experience pleasure - is a cardinal symptom of depression and is associated with poor clinical outcomes and treatment response. Traditional accounts conceptualise anhedonia as a deficit in primary reward capacity, however there is a lack of empirical evidence to support this view. We proposed a computational account in which pleasure reflects subjective inferences regarding progress towards personally-meaningful goals, formalised within a Reinforcement Learning (RL) framework. We tested the key behavioural predictions of this theory: that pleasure is predicted by perceived goal progress in a proximity-dependent manner, and is influenced by the underlying belief structure. Across three experiments (N=500), using self-report and task-based paradigms, we manipulated goal structure, dimensionality, and subjective importance, and applied an RL-based model to compute trial-wise progress alongside participants' self-reported pleasure ratings. All hypotheses were supported. Greater perceived progress toward the current goal predicted greater pleasure, most strongly for more important goals. Equivalent progress more proximal to the goal elicited a stronger hedonic response than when more distal. Manipulating the underlying belief structure altered perceived progress and associated pleasure experience, and adding an additional dimension to the belief structure reduced the hedonic impact of goal progress. Anhedonia and related symptoms were associated with greater perceived distance to real-world goals. These findings support our theory that hedonic experience reflects inferred progress toward valued goals, and may function as a goal-dependent shaping signal to guide behaviour rather than arising solely from primary reward sensitivity.

Cognitive and physiological markers of neuropsychiatric symptom propensity in Alzheimer's disease

Poster #12, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Alzheimer, pupillometry, effort, computational modelling, decision, making

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Neuropsychiatric symptoms (NPS), including apathy and depression, are common in Alzheimer's disease (AD) and are associated with faster clinical progression and reduced quality of life. Early dysfunction of the locus coeruleus"noradrenergic (LC-NA) system may increase vulnerability to NPS, given its role in autonomic regulation, cognitive effort, and adaptive emotional responses. Task-evoked pupil dilation provides a non-invasive functional index of LC-NA activity. We tested whether pupillary measures could capture individual differences in NPS propensity in older adults with intact or mildly impaired cognition. Participants (N = 51, mean age 75 $pm1$) completed an effort-based decision-making task combined with a numerical Stroop paradigm. On each trial, they were first offered a reward contingent on reaching a performance threshold, then chose whether to accept or reject the offer. Accepted trials were followed by a rapid Stroop sequence of 20 digit pairs and subsequent positive or negative performance feedback. We quantified behavioural performance, choice behaviour, and task-evoked pupil responses. Canonical Stroop effects were evident in both behaviour and pupil dilation. These effects did not differ as a function of cognitive impairment. Instead, cognitive impairment was primarily associated with reduced pupil-linked effort recruitment before Stroop performance. In contrast, NPS-related effects emerged during valuation and feedback. Depressive symptoms were associated with reduced reward weighting, increased weighting of performance confidence during choice, and enhanced pupil responses to positive feedback. Apathy was associated with blunted pupil encoding of decision value. These findings support pupillometry as a promising functional biomarker of NPS vulnerability in AD.

Challenging the Confidence Heuristic: Humans Sum Confidence Levels during Collaboration

Poster #13, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: collaboration, decision confidence

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When two people make a decision together, do they follow the more confident partner, or combine both partners' confidence judgments to reach a better choice? During collaboration, humans often include statements about their sense of confidence. This ability is crucial, as sharing confidence can increase group performance. Current consensus is that humans heuristically follow the choice from the member expressing the highest confidence as the group decision (i.e. a max rule). However, previous research only investigated this phenomenon in two-choice scenarios, where the max rule is equivalent to selecting the option with the highest sum of confidence ratings (i.e. a sum rule). To disentangle both strategies, we conducted two pre-registered collaborative decision-making experiments with three-alternative forced choice tasks. After making an initial, individual perceptual judgment, participants reached a collaborative group decision following consultation with a virtual, computer-generated collaborator (Experiment 1), or with an actual person reflecting real-world interactions (Experiment 2). Our results show that, across both experiments, the sum rule better explains human collaboration than the max rule and, consistent with model predictions, also proved to be the more effective collaborative strategy. Taken together, our results demonstrate that the previously assumed confidence heuristic does not accurately describe human collaborative behavior, but that instead humans use a sum rule during collaboration.

Implicit priors shape perceptual representations and decisions

Poster #14, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: perception, decision, making, MEG

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Our perception of the world is shaped not only by sensory input but also by prior knowledge. While previous research has largely focused on simple, unambiguous stimuli, relatively little is known about how expectations influence perception when sensory information is noisy and incomplete. In particular, it remains unclear whether expectations affect perceptual representations themselves or primarily influence decision-making. Similarly, the role of prior knowledge learned implicitly through experience remains underexplored. This project addresses these questions using a task in which participants viewed ambiguous stimuli (face"house morphs) and combined this noisy sensory information with implicit prior knowledge to make categorical perceptual decisions. During the task, brain activity was recorded using magnetoencephalography (MEG), allowing us to track the time course of these effects. Behaviorally, participants' decisions were biased by prior expectations. Multivariate decoding analyses allowed us to disentangle the processes underlying this effect. Neurally, prior information influenced response preparation even before stimulus onset. Importantly, prior expectations additionally modulated the neural representation of the stimulus itself, and this effect was related to participants' behavior. Together, these findings show that implicitly learned priors shape perceptual decisions at multiple stages, influencing both early decision processes and the neural representation of sensory evidence.

Decomposing the variability in teenagers' decision-making

Poster #15, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Decision, making, computational modeling, development, adolescents

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Why do teenagers make more variable or inconsistent decisions than other age groups? Remarkably, we currently still lack the understanding of where this choice variability originates from. Here, we investigate two complementary hypotheses: 1) ongoing neural development leads to imprecise learning about option values, resulting in suboptimal decision-making, and 2) the adolescent-specific volatile and unpredictable social environment might render it adaptive to explore more information about alternative options, thereby sometimes foregoing the current best option. Participants (N=500, 7-30 years old) will complete a two-armed bandit task in a nonsocial and social context, where one option gives a higher average pay-out than the other one. Importantly, reward contingencies drift gradually over time, requiring participants to continuously update their value estimates for each option. To disentangle imprecise learning and exploration as two sources of decision variability, we will fit a noisy Kalman Filter model to participants' choices (Lee et al., 2023). Specifically, the model includes a learning rate controlling how much estimated option values are updated, a decay rate reflecting working memory decay of the unchosen option value, a learning noise term reflecting imprecise value updating, and a temperature parameter capturing exploration through a "softmaxâ€ choice policy. Preliminary results from an adult pilot dataset (N = 16) show higher switch rates and increased temperature in the social compared with the nonsocial context. This would suggest that social environments are perceived as more volatile, making exploration potentially more adaptive. We expect adolescents to show more pronounced exploratory behavior compared with younger and older participants.

Population geometry of working memory representations in prefrontal cortex under nucleus basalis stimulation

Poster #16, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: working memory, nucleus basalis stimulation, dor, solateral prefrontal cortex, population geometry, linear decod, ing, GPFA

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Intermittent stimulation of the nucleus basalis (NB) of Meynert can improve working memory (WM) performance. To study the effects on neural activity, Qi et al. (2021) recorded macaque dorsolateral prefrontal cortex (PFC) during a visuospatial WM task, showing that NB stimulation increases delay-period firing and reduces trial-to-trial variability, while paradoxically broadening spatial tuning and reducing single-neuron selectivity. These findings motivate a population-level analysis to determine whether NB stimulation reorganizes stimulus representation in ways not captured by single-neuron analysis. Using the electrophysiological recordings from Qi et al. (2018) and guided by the population-analysis framework of Bagur et al. (2018), we will characterize how NB stimulation changes the low-dimensional organization of baseline, target and distractor activity across stimulus and delay period epochs, and quantify decoding-based discriminability of target versus distractor representations. This work aims to characterize PFC population geometry under NB stimulation and to test whether any such changes can help interpret the coexistence of improved performance with reduced single-neuron selectivity under NB stimulation.

Beyond Self-Report: Measuring Implicit Confidence

Poster #17, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Confidence, Implicit Confidence, Pressure Sensitive Device

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Confidence, the subjective feeling of being correct, is usually measured via self-report, which is prone to biases and unreliable in some clinical populations. To address this, we developed a pressure-sensitive device to capture implicit confidence signatures through motor response dynamics. Our study adapted a paradigm to disentangle confidence from accuracy: participants detected Gabor patches embedded in noise, presented either centrally or peripherally, with contrast adjusted to correspond to the detection threshold. Based on previous findings, we expected to find underconfidence in peripheral vision despite equal detection accuracy. Eye-tracking was used to ensure fixation at the center, and detection response was reported via the pressure-sensitive device. After every two trials, participants reported which of their last two decisions (central vs. peripheral) they felt more confident about. Preliminary results showed higher accuracy for peripheral than central stimuli, which deviates from our intended design. Moreover, accuracy was higher for peripheral stimuli and target-present trials. Correspondingly, peak response force was higher for central stimuli, incorrect decisions, and target-absent trials. This suggests that participants pressed the button more strongly when they were less likely to be correct, and thus less confident. However, because detection accuracy differs between central and peripheral conditions, it remains unclear whether these force dynamics reflect implicit confidence or are influenced by differences in accuracy. In the next phase, we will refine the paradigm to ensure equivalent accuracy while preserving the intended confidence manipulation. This will allow us to robustly test whether response force dynamics serve as an implicit measure of confidence.

From Drift to Behavior: DisRNNs Reveal Latent Structure and Aging Effects in Decision-Making

Poster #18, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: lifespan, decision making, RNN, variability, learning

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Perceptual decision-making exhibits substantial trial-to-trial variability, reflecting fluctuations in internal cognitive and neural states that shape behavioral strategies. Capturing these latent dynamics is crucial for understanding how decisions evolve over time. Latent variable models, and in particular disentangled Recurrent Neural Networks (DisRNNs), offer a data-driven framework for discovering such hidden structure directly from behavioral sequences. While DisRNNs have been successfully applied to bandit tasks, their potential for studying perceptual decision-making remains unexplored. Here, we evaluate the capacity of DisRNNs to recover intertrial dependencies in simulated and real behavioral data. We first train DisRNNs on synthetic data generated from Diffusion Decision Models (DDMs) in which either the drift rate or starting point varies systematically with the previous choice. The DisRNN accurately reconstructs latent trajectories corresponding to these DDM parameters, and the learned recurrent update rules reproduce the underlying temporal dependencies embedded in the simulation. We then apply the model to mouse choice data from the International Brain Laboratory (IBL) task, predicting choices from both the presented stimulus and the preceding choice. The network uncovers the block structure of the task. More specifically, study of inter-subject differences show age-dependent strategies, even when the network is uninformed about the age of the mice. In particular, learning of block structure decays with age, with older mice developing compensation mechanisms to maintain accuracy in the task. Together, these findings demonstrate that DisRNNs can uncover interpretable latent decision dynamics, bridging mechanistic cognitive modeling and flexible neural network approaches.

Nonparametric Bayesian Contextual Control: Integrating Automatisation and Prior Knowledge for Stable Adaptive Behaviour

Poster #19, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: structure learning, contextual inference, value, based decision making, repetitionbased automatisation, habituation, schema deployment, active inference, dirichlet process, hierarchical dirichlet process hidden markov model, bayesian brain

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Humans have a remarkable ability to act efficiently and accurately in familiar situations while remaining flexible in novel circumstances. Nonparametric contextual inference has been proposed as a computational principle that can model how agents achieve flexible yet stable behaviour in dynamic and possibly unknown environments. However, it remains an open question how humans learn, deploy and reuse stable contextual task representations so efficiently. To address this question, we propose the nonparametric Bayesian Contextual Control (NP-BCC) model, which integrates nonparametric contextual learning with two well-established cognitive mechanisms: repetition-based automatisation and schema-like prior knowledge. These two mechanisms are assumed to support behavioural stability and facilitate novel task acquisition. Simulations in dynamic multi-armed bandit tasks of increasing difficulty illustrate how the NP-BCC can acquire and reuse contextual task representations, with the proposed mechanisms operating in the intended, functionally meaningful manner. Specifically, we show via simulations that automatisation not only enhances task performance but also stabilizes contextual inference and structure learning, while structured prior knowledge accelerates the acquisition of novel contexts. We discuss the implications of our findings for computational accounts of adaptive behaviour and contextual learning, and outline directions for future empirical work, including investigations of context-dependent behavioural dysregulation relevant to conditions such as substance use disorders.

Flexible re-coding of sensory signals supports bias correction and reliability weighting during evidence accumulation

Poster #20, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Perceptual, Decision Making, Flexible behavior, Cognitive modeling, MEG, Human

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Humans can make reliable perceptual decisions even when sensory input is noisy, ambiguous, or rapidly changing, but this requires flexibility; continuously adapting how sensory information is interpreted depending on the task, the environment, and internal goals. While past work has shown that humans can accumulate evidence flexibly by selecting or combining visual features, an equally important, but untested, property would be to transform raw sensory signals into evidence even before integrating it. Such a transformation would allow for the correction of systematic biases and account for varying reliability, thereby dramatically improving decision speed and accuracy. We tested this hypothesis in two behavioral tasks in which participants (total N=204) viewed sequences of colored, oriented gratings. The color either indicated that the grating's orientation was biased away from the true direction (biased task) or signaled how reliable that sample was for the final judgment (reliability task). Participants were asked to report the overall direction of the sequence while using the color cues to de-bias or weight each elements' evidence. Bayesian modeling showed that they flexibly removed bias and weighted each sample by reliability, achieving near optimal performance. This allowed them to integrate unbiased and weighted abstract evidence, rather than their raw sensory perceptions. Preliminary MEG recordings reveal a dynamic neural code that supports evidence de-biasing and abstraction prior to its integration.

Does arousal guide adaptive choice? Evidence from pupil dynamics in reinforcement learning

Poster #21, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Reinforcement learning, arousal, pupillometry, prediction errors, affect

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Adaptive decision-making requires integrating value representations with bodily states. The somatic marker hypothesis (Bechara et al., 1997) proposes that physiological signals contribute to advantageous choice, that is, they not only correlate with decision quality but inform it. In this study, we examined how pupil-linked arousal " an index of central neuromodulatory activity and a potential somatic marker " tracks value learning and relates to decisions in a reinforcement learning task. Participants (N = 103) performed a two-armed bandit task, learning to choose among four stimuli with different reward probabilities presented in pairs. A Q-learning model was used to estimate trial-wise stimulus values and prediction errors. We tested whether pupil dynamics during stimulus evaluation, choice execution, and feedback tracked computational learning variables and whether this coupling modulated decision quality. Replicating previous studies, feedback-locked pupil tracked outcomes and prediction errors. During stimulus presentation, pupil did not directly reflect stimulus value. However, pupil dilated stronger following low-reward choices " even before reward feedback. Importantly, pupil size during choice was predicted by an interaction between stimulus value and decision quality: the value-pupil association was stronger during high-reward choices, consistent with a functional contribution of pupil-linked arousal to choice. These findings indicate that pupil dilation does not merely reflect effort or surprise but is functionally engaged in value-based decision-making. Inspired by the somatic marker hypothesis, our study highlights how arousal signals interact with reinforcement learning mechanisms to support adaptive cognition, contributing to affective and neurocomputational models of motivated decision-making (e.g. Silvetti et al., 2018).

A Bayesian Hierarchical Model of Ambiguity Preferences

Poster #22, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: decision, making, Bayesian modeling, uncertainty, behavioral economics

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Understanding how individuals perceive and respond to uncertainty is a fundamental challenge in neuroscience, behavioral economics, and related disciplines. Traditionally, uncertainty about the probability of outcomes has been classified into two types: risk (known probabilities) and ambiguity (unknown probabilities). Leonard Savage's (1954) Subjective Expected Utility (SEU) theory proposed that ambiguity could be reduced to risk under rational principles. However, Daniel Ellsberg's (1961) urn experiments revealed widespread ambiguity aversion, demonstrating systematic violations of SEU. This result, known as the Ellsberg paradox, called into question Bayesian models of human behavior. More recently, the Bayesian brain hypothesis has gained traction in neuroscience, offering a unifying perspective on perception, learning, and action. To reconcile these findings, we present a Bayesian hierarchical model of ambiguity preferences grounded in expected utility maximization. In our model, optimism and pessimism stem from prior beliefs about outcomes. Through numerical simulations, we demonstrate that ambiguity-averse and ambiguity-seeking behaviors emerge from pessimistic and optimistic priors, respectively. The implementation of our model is based on approximate Bayesian inference (message passing), which ensures flexibility - for example, the model can handle both single-choice and sequential decision problems requiring dynamic belief updating - while maintaining biological plausibility.

Spatial and temporal contexts drive visual temporal integration via spatiotemporal normalisation

Poster #23, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Visual perception, Temporal integration, Spatio, temporal integration

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The visual system is known to integrate sensory information across both space and time, but these dimensions are often studied separately. Here we provide novel behavioural evidence for an intricate interaction of spatial and temporal contexts, and propose a computational model of this spatio-temporal integration that is biologically plausible. We designed a controlled task that forces human participants to integrate information over both space and time to perform well. Stimuli were temporally segmented rings of oriented elements and participants had to detect a missing element in the ring. We found that temporal integration was enhanced when successive visual events were temporally proximate and spatially aligned to form continuous contour, but also, and more surprisingly, when they were brief. Notably, the spatial effects on integration are temporally asymmetric: integration is facilitated when more events are presented earlier in the sequence, and even more so when they form a collinear contour. These findings indicate that temporal integration is sensitive to both the spatial configuration and the number of visual events presented over time, supporting a continuous rather than discrete process at early visual stages. All of these results are well accounted for by a computational model in which temporal integration arises from the overlap of internal signals generated by individual visual events. These signals are shaped by a spatially and temporally tuned divisive normalisation mechanism and integrated via coincidence detection. Predictions from this model match human performance in seminal past work as well as novel stimulus displays, offering an account of how spatio-temporal interactions determine what we perceive and when.

Endogenous fluctuations in dopaminergic midbrain impact reward learning

Poster #24, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Dopamine, Learning, real time fMRI, Decision making

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Reinforcement learning is known to depend on dopaminergic activity, with reward prediction errors signalling expectation violations. Whilst this formalism provides a canonical understanding of this framework, humans appear to be subject to various sources of noise, often captured using a variety of different learning biases (Dubois et al., 2021; Wagner et al., 2025; Wyart & Koechlin, 2016). Here, we speculated that this learning variability might be driven by fluctuations in dopaminergic midbrain activity. Such spontaneous fluctuations have been observed widely in the brain, and we previously showed that they are behaviourally meaningful (Chew et al., 2019). To probe this, we deployed a real-time fMRI approach whilst participants learned a stationary probabilistic bandit task. Using activity-dependent trial presentation, we found that low dopaminergic activity was associated with a stronger preference for the most rewarding stimuli. This effect was most prominent during later learning stages, especially in the final block of the task ($F(3,880) = 2.86$, $p = .036$). Our findings extend the behavioural impact of endogenous dopaminergic fluctuations to reward learning. Dubois, M., Habicht, J., Michely, J., Moran, R., Dolan, R. J., & Hauser, T. U. (2021). Human complex exploration strategies are enriched by noradrenaline-modulated heuristics. eLife, 10, e59907. https://doi.org/10.7554/eLife.59907 Wagner, B. J., Wolf, H. B., & Kiebel, S. J. (2025). Action repetition biases choice in context-dependent decision-making. Communications Psychology, 3(1), 177. https://doi.org/10.1038/s44271-025-00363-x Wyart, V., & Koechlin, E. (2016). Choice variability and suboptimality in uncertain environments. Current Opinion in Behavioral Sciences, Computational Modeling, 11, 109"115. https://doi.org/10.1016/j.cobeha.2016.07.003

Undecided versus Confidently Neutral: Cognitive States of Uncertainty in Auditory Perceptual Decisions

Poster #25, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: perceptual decision making, audition, neutrality, confidence

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In noisy environments, listeners may remain undecided or neutral about what they heard. Yet, typically used forced-choice paradigms require a decision even under uncertainty, limiting our understanding of perceptual states of neutrality. Here, we tested whether sensory ambiguity elicits different states of perceptual neutrality in a vowel discrimination task. Participants identified minimal-pair target words (e.g., satt-Saat) whereby the duration of the critical phoneme (/a/) varied along a continuum around individually-determined perceptual boundaries. On each trial, participants categorized the target as short or long, or selected one of two uncertainty options: requesting a repetition, indicating mere indecision, or committing to a neutral response. In three experiments, we investigated the effect of internal ambiguity (Exp.1) and external noise (Exp.2) on decisions and confidence ratings (Exp.3). Exp.1 (n=36) showed that participants chose both uncertainty responses most frequently for ambiguous stimuli. Moreover, responses transitioned from indecision to committed neutrality, supporting the existence of different states of perceptual uncertainty. In Exp.2 (n=36), targets were embedded in speech-shaped noise, which led to an increase in neutral responses and broader response curves, suggesting that perceptual neutrality is shaped not only by internal ambiguity but also by external noise. Exp.3 (n=38) showed that confidence ratings were equally high for committed neutral and categorical responses, and even higher for neutral responses to ambiguous targets. In sum, our findings indicate a distinct decisional neutral state for ambiguous sensory inputs. We provide the first behavioral evidence for perceptual states of uncertainty, enabling a more naturalistic understanding of perceptual decision-making.

Brain emotion signatures during foraging under threat

Poster #26, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Emotions, foraging, threat, decision, making, brain signatures, behaviour, fmri, self, organised behaviour
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Seeking rewards while remaining vigilant against threat is a fundamental tension in adaptive behavior. To better understand how emotions shape behavior in such situations, we analysed data from participants performing a naturalistic task recreating this dilemma, combining behavioral measures, self-reported mood ratings, and neuroimaging data (fMRI). To relate neural activity to emotional states, we rely on emotional brain signatures - multivariate patterns shown to predict specific subjective emotions. Here, we use these validated patterns to track emotion-related brain states during foraging under threat in real time. Our analyses revolve around three questions: Do brain signatures of emotions covary with task parameters? Do brain signatures of emotions relate to participants' self-reported mood? To what extent can brain signatures of emotions predict subsequent behaviour? Results show that task-related features significantly modulated emotional brain signatures. Specifically, Increased time pressure was associated with an increase in brain states associated with surprise. We further predict that brain states associated with surprise, fear, and sadness are expected to relate positively with stress, reflecting shared mechanisms of threat detection. In contrast, sadness, fear, and neutral affect are expected to relate negatively to excitement. Finally, we expect emotional brain states to predict subsequent behavior, with surprise-related activity anticipating more cautious decision-making under pressure. To ensure robustness, these findings will be conducted on one half of trials and replicated in the other. By integrating behavioral, neural, and subjective measures, this study aims to shed new light on the dynamic interaction between emotions and decision-making during self-organised behaviour.

Towards a computational account of self-efficacy beliefs: The role of confidence and perceived controllability

Poster #27, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Self, efficacy, metacognition, confidence, perceived, controllability, resource allocation

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Self-efficacy beliefs, defined as beliefs in one's ability to control behavior to achieve desired outcomes, play an important role in guiding behavior and shaping effort investment in the face of challenges (Bandura, 1977; Ly et al. 2019). Yet, the mechanisms underlying how self-efficacy beliefs are formed remain unclear. We propose to dissociate two components: expectations of how effort leads to performance (based on internal contingencies), and expectations of how performance leads to outcomes (based on external contingencies). We propose that self-efficacy corresponds to subjective mappings translating effort into expected performance (internal contingencies). Self-efficacy may also be derived from the entire effort-to-outcome chain, when intermediate steps before the outcome are opaque. To test this, we developed a novel behavioral paradigm designed to disentangle the contributions of perceived environmental controllability and confidence in one's abilities. We first manipulated performance-to-outcome mapping via instrumental outcome divergence while keeping task difficulty constant (Liljeholm et al., 2011). Participants completed a perceptual decision-making task in which the high-divergence condition yielded more distinct outcomes for correct and incorrect responses compared to a low-divergence condition. Preliminary results (N=35) show that participants report significantly higher self-efficacy ratings in the high-divergence condition, despite no difference in objective performance between conditions. We are currently developing a follow-up task manipulating the effort-to-performance relationship to measure its impact on subjective self-efficacy ratings and subsequent effort allocation. Ultimately, we aim to formalize these findings to bridge the self-efficacy literature with computational models of effort allocation to provide a mechanistic account of self-efficacy beliefs.

Spontaneous Tracking of Others' Minds In Social Learning

Poster #28, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: social learning, reinforcement learning, mentalizing

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Social learning encompasses processes ranging from model-free strategies (e.g., pure imitation or reinforcement-based learning without internal representations) to model-based approaches (involving constructing models of the world and others' minds). Inferring others' minds (i.e., mentalizing) can optimize learning but is cognitively costly compared to model-free learning. While individuals can flexibly switch between these modes depending on their utility, the conditions under which model-based processes are favoured remain unclear. Building a model of another's mind requires tracking their behavior, even when it is not directly relevant to one's own goals. Over three experiments (N = 401), we examined whether humans spontaneously track a demonstrator's choice preferences during a dimensional task, despite these preferences being orthogonal to participants' own reward outcomes. On average, participants accurately tracked the demonstrator's preferences for choices related to their own rewards, but barely better than chance for irrelevant choices. The low tracking of the demonstrator's preferences was not due to task difficulty: when incentivized, participants reliably reported all of the demonstrator's preferences. Of note, response times were longer when incentivized to keep track of the demonstrator's preference, consistent with the idea that mentalizing is cognitively costly. Computational modelling revealed heterogeneity in the population, though most participants' data were best explained by a model without model-based tracking of the demonstrator's choice preferences. Taken together, these findings support utility-based accounts of how people allocate cognitive resources in social interaction and challenge the idea that mentalizing operates spontaneously.

Strategic Decision-Making Under Informational Constraint

Poster #29, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Strategic Behavior, Experience, Description Gap, Reinforcement Learning, Social Learning

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In social, strategic games, solutions like the Nash equilibrium usually assume that individuals are perfectly rational and know their environment's payoff structure. In reality, human decision-making is bounded and relies on partial information. This information scarcity is not merely a matter of quantity but of nature. It involves internal signals, such as counterfactuals ("What would I have obtained had I acted differently?â€), and social signals ("How does my outcome compare to others'?â€), which can themselves be counterfactual ("What if the other player had acted otherwise?â€). While the impact of information quantity is well-studied, how the nature of feedback modulates learning remains poorly understood. In the present study, participants (N=209) play repeated dyadic games where we manipulate the nature and amount of available information, comparing a Complete Information condition (full payoff matrix available) with several Partial Information conditions (diverse counterfactual and social feedback). Results demonstrate a significant shift in learning dynamics. Under full information, the probability of repeating a choice shows a non-linear sensitivity to payoff magnitude: participants discriminate between low outcomes but exhibit relative indifference toward higher ones once a strategic threshold is reached. In contrast, this pattern flattens under partial information, aligning with a simpler, linear reinforcement signal. This suggests a more direct dependency on absolute reward value when the game structure is less known. We further characterize how feedback nature can trigger signals akin to regret, disappointment, envy, or guilt, thereby modulating learning. Finally, we introduce a Reinforcement Learning model integrating various internal and social signals to explain how the nature of information drives strategic behavior shifts.

Does confidence computation and use follow a cost-benefit trade-off?

Poster #30, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: metacognition, rationality, confidence, adaptive behavior

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Metacognition is widely considered a key cognitive process supporting adaptive behavior. Confidence judgments, in particular, play an important role across domains such as learning, perception, and information-seeking. However, the usefulness of confidence varies across contexts. For example, when a lecture substantially affects final grades, it is important to closely monitor one's level of understanding to guide learning, whereas inaccurate confidence matters less for less important lectures. We therefore propose that the value of confidence, defined as its contribution to reward-maximizing behavior, depends on the task context. If computing confidence incurs cognitive costs, participants should trade off its potential benefits against these costs. To test this prediction, we manipulate the value of confidence within an adaptive information-seeking task to examine whether participants flexibly adjust their metacognitive processing. In this task, participants first make an initial decision, then choose whether to seek additional information at a cost before making a final, rewarded decision. Normatively, participants should seek information primarily when they are uncertain. We compare behavior under two payoff structures: a low-value condition (low reward, low cost of information-seeking) and a high-value condition (high reward, high cost of information-seeking). We predict that both confidence precision (i.e., metacognitive sensitivity) and its influence on behavior will increase in the high-value condition, where inaccurate confidence is more costly. We first derive predictions from a Bayesian agent that optimizes expected reward while incurring a cost for computing high-precision confidence estimates. We then compare these predictions to human behavior.

The role of sleep in multisensory information integration

Poster #31, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: multi sensory information integration, learning, memory, sleep, EEG

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Humans continuously process multisensory input to guide decisions in a complex environment. This raises questions about how different sensory modalities are integrated into coherent, generalizable knowledge structures. While previous research has focused on multisensory integration in perceptual contexts, it remains unclear how this integration unfolds during more abstract cognitive processes, such as category learning and rule inference. We address these questions by investigating how multimodal sensory information is integrated into hierarchical category representations. Participants engage in a category learning task that uses naturalistic stimuli depicting everyday coffee shop scenes, each defined by three feature dimensions: auditory (music), static visual (interior design), and dynamic visual (activity). Each feature dimension can take on four different values, which are ranked on a scale from 1 to 4. Participants repeatedly choose the higher-valued coffee shop scene in a two-alternative forced-choice task, receiving feedback to guide learning. Previous research has shown that sleep benefits rule inference in decision tasks, including information integration category learning. We test whether and how sleep supports the abstraction of rules across modalities by contrasting performance in participants who stay awake vs. sleep after training. Sleep showed a significant benefit for out-of-sample rule inference compared to a time interval spent awake. Next, the role of aperiodic EEG activity and oscillatory markers on behavioral performance after sleep will be investigated to test whether sleep actively reorganizes knowledge representations to enhance integration across sensory modalities.

Selective dysfunction of causal credit assignment in obsessive-compulsive disorder

Poster #32, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: computational psychiatry, decision making, MEG, computational modeling, OCD

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Obsessive-compulsive disorder (OCD) is a psychiatric condition characterized by unwanted thoughts and repetitive behaviors that impair daily functioning. Emerging evidence suggests that altered beliefs about controllability " how much one can influence the state of the world through their actions " may play a central role in the pathophysiology of OCD. We tested this hypothesis using a probabilistic reversal-learning task which affords precise comparison between inferences based on action consequences (outcome-based) versus environmental observations (cue-based) in severe OCD patients (N = 17) and matched healthy controls (N = 23). Behavioral modeling revealed that OCD patients perceive the task as more volatile than matched healthy controls across cue- and outcome-based conditions, in agreement with previous research. Moreover, OCD patients are less accurate than healthy controls at making outcome-based inferences. By decoding task representations from magnetoencephalographic (MEG) activity patterns, we identified the neural signatures of this deficit in the outcome-based condition. OCD patients showed (1) a degraded neural representation of evidence strength (the amount of evidence provided by each stimulus) specifically when it contradicted their current beliefs about the correct action, and (2) a transient impairment in the neural representation of belief updates (the match between the evidence and the prior belief) immediately following patients' changes-of-mind. Together, these findings highlight a selective deficit in causal credit assignment in OCD " the ability to correctly attribute prediction errors to environmental changes rather than action failures. This framework redefines OCD computationally as a disorder of doubt regarding the outcome of one's choices.

Sub-second monoamine detection in the human brain

Poster #33, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Fast, scan cyclic voltammetry (FSCV), Monoamine dynamics, Translational neuroscience

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Fast-scan cyclic voltammetry (FSCV) is a powerful electrochemical technique enabling sub-second monitoring of neurotransmitter dynamics and has been used predominantly in rodents to measure phasic dopamine release. However, substantial technical and analytical challenges have limited its broader adoption and translation to human research. Recent work combining optimized stimulation waveforms with deep-learning regression approaches based on ensembles of convolutional neural networks has enabled the separation of dopamine, serotonin and norepinephrine, opening new possibilities for studying fast neuromodulatory interactions in the human brain. Despite these advances, FSCV has relied almost exclusively on carbon-fiber microelectrodes, which present practical and regulatory limitations for clinical implementation. Here, we describe the adaptation of FSCV to clinically approved stereoelectroencephalography (sEEG) electrodes routinely used in French clinical practice. We validated this approach through systematic in vitro calibrations using clinically compatible sEEG electrode configurations, assessing sensitivity, chemical selectivity and signal stability across physiologically relevant concentration ranges. Our results demonstrate that sEEG electrodes support reliable and chemically selective FSCV measurements at sub-second timescales, comparable to those obtained with traditional microelectrodes. This work establishes FSCV on clinical sEEG hardware as a scalable and translationally viable platform for fast monoamine detection in the human brain, laying the groundwork for future in vivo studies and investigations of neuromodulatory dynamics in psychiatric and neurological disorders.

A Validated RL Task Battery for Monoaminergic Intervention Trials

Poster #34, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Reinforcement Learning, Depression, Computational Psychiatry, Reliability

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Neuroscience research has identified distinct computational functions for dopamine and serotonin in learning, decision-making, and motivation. However, these mechanistic insights have yet to be integrated into clinical practice. In depression treatment, for instance, selection between serotonergic and dopaminergic antidepressants remains guided by trial and error. Mechanistic clinical trials may help bridge this gap by linking measurements of the distinct computational functions subserved by dopamine and serotonin to treatment outcomes. This requires well-validated cognitive task batteries suited to clinical populations. Here, we describe the validation of a reinforcement learning (RL) task battery developed for RELMED, a multisite clinical trial assessing the differential effects of escitalopram and bupropion on RL and clinical symptoms. A comprehensive RL task battery targeting domains identified in a systematic review was validated through iterative work with people with lived experience. The battery encompasses probabilistic instrumental learning (PILT), reversal learning, learning under working memory load, action vigour, Pavlovian-instrumental transfer, information seeking, and controllability. We report a pre-registered validation in an age- and sex-stratified longitudinal online sample (N = 300). Psychometric analyses demonstrated robust reliability across tasks. PILT showed high split-half and moderate test"retest reliability. Working memory load and reversal tasks achieved moderate to high reliability. Press-rate-based vigour tasks showed strong reliability, and PIT exhibited strong split-half with moderate test"retest reliability. The controllability task also showed high reliability. Cross-task correlations revealed distinct RL domains. This short RL battery demonstrates robust psychometric properties, enabling simultaneous, comprehensive, and mechanistic assessment of learning processes potentially influenced by monoaminergic pharmacological interventions.

A computational model of reverse delay discounting

Poster #35, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: reverse delay discounting, reinforcement learning, decision, making, computational psychiatry

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Background: Humans daily face choices between immediate gratification and long-term benefits. This tension is captured by delay discounting: the tendency to prefer immediate rewards over delayed ones, even when the latter are greater. This tendency underlies maladaptive behaviours such as smoking and overeating, and is a core feature of psychiatric disorders, including ADHD and addiction. Crucially, this tendency can be reversed, a phenomenon here referred to as Reverse Delay Discounting (RDD), whereby prioritising future rewards correlates with positive outcomes. While manipulations like Episodic Future Thinking can drive this reversal, its computational mechanisms remain poorly understood. Methods: We present a novel Reinforcement Learning model that formalises these mechanisms by introducing a weight parameter (Ï‰). Building on recent computational frameworks suggesting that choices emerge from a computation integrating multiple motivational factors to guide decision-making (Cogliati Dezza et al., 2024), this parameter quantifies the salience of future rewards, allowing the model to capture RDD, a feature missing in standard discounting models. We test the model using a novel multi-step Sequential-State-Discounting task, comparing its performance against standard exponential and hyperbolic models. Results: The model predicts that Ï‰ effectively captures RDD by acting as a weight for future salience where standard models fail. Computational simulations demonstrate how varying Ï‰ influences decision-making patterns and generates distinct reverse discounting profiles. Conclusion: This work provides a mechanistic understanding of RDD, capturing individual differences by quantifying the salience of delayed rewards. This establishes a computational framework for designing targeted, personalised interventions across psychiatric disorders characterised by impulsive decision-making.

Does Temporal Expectation Modulate the Amplitude of Rhythmic Auditory Sampling?

Poster #36, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Rhythmic sampling, Auditory perception, Temporal expectation, Reaction time, Dense sampling

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Perception may unfold rhythmically rather than continuously, with ongoing oscillatory processes giving rise to periodic fluctuations in attentional sensitivity and, consequently, behavioral performance. Although such rhythmic sampling has been studied extensively in vision, evidence in audition remains limited. Here, we tested whether temporal expectation modulates the amplitude or frequency of rhythmic auditory behavioral sampling using a dense-sampling reaction time paradigm. Participants performed an auditory pitch discrimination task, indicating as quickly as possible whether a tone was high or low. The target could occur in an early or late temporal window. Crucially, if no tone occurred in the early window, it was guaranteed to occur in the late window, thereby increasing temporal certainty over time. Reaction times were densely sampled across a 480 ms interval (16 onset times, 30 ms spacing), yielding time series of behavioral fluctuations. Statistical significance was assessed using autoregressive surrogate time series that preserved temporal autocorrelation while removing structured oscillatory components. Analyses revealed significant theta-band (4"8 Hz) oscillations in reaction time. Accuracy showed a corresponding rhythmic pattern in antiphase with reaction time, consistent with rhythmic fluctuations in performance rather than a speed-accuracy trade-off. Critically, temporal certainty modulated oscillation amplitude: rhythmic fluctuations were larger in the late window, whereas peak frequency remained comparable. These findings suggest that increasing temporal certainty amplifies rhythmic auditory sampling without altering its intrinsic frequency.

How losses change the way we search: valence effects on generalization-guided exploration

Poster #37, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: generalization, loss aversion, exploration, exploitation

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Gaussian Process (GP) regression models capture how individuals balance exploration and exploitation by generalizing from rewarding experiences to guide search (Wu et al., 2018). However, it remains unclear whether people generalize similarly from losses, and how losses might alter exploration strategy. We investigated whether framing outcomes as gains, losses, or mixed alters how people search spatially structured environments. Across two pilot studies (Prolific; N = 20 each), participants completed 24 blocks (8 per valence) of a spatially correlated bandit task. Each block presented an 11Ã-11 grid with spatially correlated rewards drawn from a smooth Gaussian process. Participants sampled 10 tiles per block, aiming to maximize the average revealed value. Reward values were either all positive, all negative, or mixed, with valence manipulated within subjects across blocks. Distances between sequential clicks were greater in negative and mixed conditions than positive (b = â^'3.19, z = â^'12.28, p < .001), and local search was less frequent (b = 0.04, z = 12.94, p < .001). These effects replicated across studies and were not associated with differences in performance or novel clicks, suggesting valence alters the spatial structure of search rather than its breadth or effectiveness. Preliminary modelling extends GP-UCB models with valence-dependent parameters to investigate whether the observed behavioral differences are better explained by loss aversion (asymmetric weighting of negative versus positive outcomes) or by shifts in the prior mean over expected rewards. These findings demonstrate that people generalize from losses as well as gains when exploring structured environments, with implications for theories of exploration across outcome domains and individual differences.

An integrative framework for the human sense of control

Poster #38, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: control, empowerment, planning, uncertainty, individual differences

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From managing daily schedules to making major life decisions, the extent to which we feel a sense of control over our environment shapes how we perceive the world and plan our actions. But when exactly do we consider ourselves to be in control? Here, we address this question from both theoretical and empirical perspectives. First, we take a top-down approach and propose that humans feel in control when they are prepared to tackle tasks that may arise in the future. We formalize this perspective through a precise yet interpretable measure of controllability that quantifies three key factors: (i) the range of available distinct actions, (ii) the certainty, or (iii) the possibility, of achieving desired outcomes. Our measure encompasses these factors through the value of a single free parameter, thereby unifying and extending previous conceptions and formalizations of control in both cognitive science and machine learning. Second, we test whether our proposed measure also captures human preferences in three experiments in which participants either rate their sense of control or prepare themselves to seek rewards or avoid punishments. Our measure accurately predicts human preferences in all three experiments and reveals substantial individual differences in participants' weighting of possibility versus certainty. Collectively, our work lays a principled foundation for understanding how environmental structure and personality traits shape the human sense of control and its neural underpinnings.

Pulled in the wrong direction! Rethinking measures of response control in computational models of conflict tasks

Poster #39, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Response control, decision making, Diffusion Model for Conflict tasks

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In an increasingly digital world full of distractions, everyday decisions are guided by multiple sources of information. Some of these sources are relevant to the task at hand, while task-irrelevant information may activate an automatic, possibly conflicting response. This requires us to navigate distractions and places demands on our ability to control responses in the presence of conflicting information. In the current work, I show that common computational approaches used to measure response control " specifically in the popular Diffusion Model for Conflict tasks " can lead to incorrect inferences. Response control is often equated solely with distractor strength, quantified by the model's "peak amplitudeâ€ parameter. However, I demonstrate that response control is not exclusively determined by peak amplitude and that no unique mapping exists between this parameter and behavioral performance. This has important implications: individuals with similar peak amplitudes may nevertheless differ greatly in how conflict impacts their decision formation, necessitating an integrative approach to quantifying their true control capacity. To address this, I provide an alternative, system-level conceptualization of response control that accounts for the dynamic interplay between automatic and controlled activation (i.e., the broader decision context). Building on this system-level measure of response control, I moreover introduce a diagnostic framework that specifies how differences in control ability can be traced back to parameter-specific roles played by distractor strength, processing efficiency and decision strategy. In sum, I provide an alternative conceptualization to approach response control during cognitive conflict as the net impact of irrelevant information on decision formation.

Decision-making trades off learned and perceived information

Poster #40, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: decision making, eye tracking, value learning, information gathering

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A fundamental question in cognitive science is how information from internal memory is combined with external sensory input when making decisions. We hypothesized that previously learned and currently perceived information trade off against each other, such that information from one source reduces the gathering and usage of information from the other. To test this hypothesis, we designed a novel two-armed bandit task where each arm is composed of both learned and perceived elements. We monitored participants' gathering of perceptual information using eye tracking. Participants' choices and gaze deployment showed a trade-off between the impact of learned and perceived information. The more a participant utilized internally stored learned information, the less they gathered perceptual information, and vice versa. To understand the factors underlying the trade off, we developed a computational model of participants' information gathering. This showed that the trade-off results from the faster gathering of learned information, which makes it less valuable to invest effort in gathering additional perceptual information. Preliminary findings also suggested that an individual's tendency to primarily rely on one source of information is a stable individual trait. These findings contribute to the understanding of how humans use learning and perception in forming decisions.

Whence emotions? A theoretical examination of approximate strategies to toy meta-reasoning problems under resource constraints.

Poster #41, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Meta Markov Decision Processes, Resource rationality, Computational Psychiatry, Emotions

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We investigate the computational foundations of affective states by framing them as emergent properties of resource-constrained meta-reasoning. Using a Meta Markov Decision Process framework, we formalise how an agent navigates internal knowledge states when evaluating potential outcomes incurs specific costs. We parameterise these toy environments using decision trees of varying depths and branching factors. Crucially, we define the environment's statistical structure through parent-child and child-child reward covariance, utilising metrics such as Mean Squared Variation and Mean Squared Successive Difference. By applying policy iteration to compute optimal knowledge state evaluations, we benchmark various approximate strategies " myopic, distal, quasi-breadth-first and quasi-depth-first searches " against the optimal solution. Our analysis identifies noteworthy knowledge states where specific approximations outperform others under strict resource limits. We demonstrate a fundamental asymmetry in strategy requirements. In "pessimistic" worlds dominated by negative rewards, an agent must evaluate extensively to minimise worst-case scenarios. Conversely, in "optimistic" worlds, it often suffices to identify a single "good thought" or path to maximise payoff. These divergent requirements for information acquisition suggest that consistent patterns in sub-optimal, heuristic evaluation may provide a formal mechanism for understanding how consistency-maximisation and resource management give rise to the core functional components of emotional experience.

Movement vigor reflects social utility in altruistic punishment decisions

Poster #42, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Social decisions, altruistic punishment, movement vigor, kinematics, ultimatum game, trust game

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How individuals move toward a choice option reflects its subjective value, or utility, with higher subjective utility leading to faster responses and greater velocity. However, social decisions are often guided not only by personal rewards but also by consequences for others. For example, individuals willingly incur personal costs to sanction unfair behavior. How vigorously do they engage in such altruistic costly punishments? In Study 1, using a motor version of the Ultimatum Game, we found that movement vigor increased with offer magnitude when offers were accepted but decreased when offers were rejected as a form of punishment, revealing a striking reversal of the canonical vigor"value relationship. In Study 2, we examined the factors driving this reversal using a social exchange task. We found that, in altruistic punishment decisions, movement vigor was modulated not by self-cost or other-cost alone, but by their ratio: the efficiency of punishment. These findings establish movement vigor as a proxy of social utility, providing a continuous readout of the computations underlying complex social decisions involving the weighting of incurred and inflicted costs.

Effort, Delay, and Value-based decision-making deficits in Alzheimer's Disease

Poster #43, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Motivation, Neuroeconomics, Value, based decision, making, Temporal discounting, Alzheimer's disease, Apathy

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The brain mechanisms supporting motivation to exert effort and endure delays for rewards are increasingly understood in healthy individuals. However, it remains unclear whether neuroeconomic models can explain the causal dysfunctions driving apathy and impulsivity in brain disorders. To address this, we applied a neuroeconomic framework to patients with Alzheimer's disease (AD), a condition oftern marked by apathy and impulsivity. Our goal was to identify specific motivational dysfunctions and demonstrate the translational potential of theoretical models. We compared AD patients to healthy and clinical controls using a comprehensive motivation task battery. Participants (i) rated reward and effort items, (ii) chose the most appetitive of two rewards, and the least aversive of two efforts, (iii) decided whether to exert efforts and whether to wait for rewards, and (iv) preformed real physical effort (handgrip) for rewards. We analyzed their behavior using computational models grounded in decision theory and cost-benefit optimization. We found that AD patients were less willing to exert effort for reward, both in fictive decision-making and actual effort tasks, and were less patient when rewards had to be imagined rather than observed. We further linked these behavioral effects to pathological biases in reward sensitivity, effort sensitivity, and discounting rates, especially under mental simulation. Lesion-mapping was used to connect local neurodegeneration, measured with 18FDG-PET and T1-weighted MRI, to these motivational deficits. These findings offer a mechanistic explanation for decision-making impairments in AD, bridging neuroeconomics theories with clinical neuroscience.

Foraging strategies toward predictable resources in a group of captive bonobos (Pan paniscus).

Poster #44, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: foraging, socioecology, ethology, bonobo

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In natural environments, primates optimize foraging by exploiting ecological and social information. However, the combination of social and ecological information to guide foraging within groups remains poorly understood. We investigated this question in bonobos (Pan paniscus), a tolerant species displaying food-sharing behaviours. We hypothesized that individuals exploit ecological information depending on their social position along two dimensions. First, in a cooperative context where individuals share information, foraging behaviour should be more sensitive to information regarding resource availability in more central individuals. Second, direct social competition over food may generate distinct strategies to adjust to resource availability in dominant v.s. subordinate individuals. We conducted a four month foraging experiment with 20 captive bonobos at La Vallée des Singes (France). We recorded search behaviours (search propensity, first search latency and search duration) toward two controlled food resources (nuts v.s. grapes), each available and hidden at three distinct patches and at distinct temporal intervals (every two vs. five days). We evaluated inter-individual differences in search behaviours based on social centrality, measured through co-appearance at patches, and dominance score. Individuals with higher centrality showed a stronger modulation of all search measures by spatio-temporal information on resource availability. Also, dominance had an effect on search behaviour: subordinates search sooner than dominants, but without showing a better modulation to resource availability. These results suggest that knowledge about resource availability is used differently depending on social position, highlighting the interaction of ecological and social constraints in foraging strategies.

A Grip on the Mind: Dissociating Effort, Difficulty, and Confidence Through Handgrip Dynamics

Poster #45, **Poster Session 2**, Wednesday 27 May 2026, 17:30-19:00

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Keywords: Mental effort, Difficulty, Physical effort, Confidence, Decision, making

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Converging behavioural and neural evidence suggests that mental and physical effort rely on partially overlapping evaluative and control mechanisms. This overlap is promising, as mental effort remains difficult to measure directly and is traditionally inferred through proxies (e.g., response times) that are confounded by task difficulty. A key open question is whether physical activity can serve as a better proxy of mental effort during cognitive tasks. We examined whether continuous handgrip dynamics could dissociate effort, difficulty, and confidence during an arithmetic task. Three difficulty levels were designed to produce theoretically dissociable patterns: difficulty increased monotonically (easy < hard < extreme), invested effort followed an inverted-U pattern (extreme â‰¤ easy < hard), and confidence decreased with difficulty (extreme < hard â‰¤ easy). Across three studies (n = 16, 23, 40), grip force dynamics were tested as potential indices of these distinct constructs. Results showed that both handgrip measures and response times tracked effort-related patterns and dissociated them from difficulty and confidence. Notably, certain handgrip signatures specifically captured confidence, independently of the other two constructs. Regarding subjective reports, response time tracked self-reported effort and difficulty but, surprisingly, was unrelated to subjective confidence once objective difficulty was accounted for. In contrast, specific handgrip markers dissociated subjective effort from difficulty and confidence, and others tracked subjective confidence even after controlling for response time. Together, these findings reveal meaningful metacognitive dissociations among effort, difficulty, and confidence. While response times primarily reflect effort but remain confounded by difficulty, handgrip dynamics offer construct-specific signatures, highlighting their potential as a better proxy of mental effort.

Implication of the locus coeruleus in cognitive effort: Pharmacogenetic evidence in Rhesus Macaques (Macaca mulatta)

Poster #1, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Noradrenaline, Pharmacogenetics, Working memory, Cognitive control, Locus coeruleus, Primates

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The locus coeruleus (LC), a noradrenergic nucleus in the brainstem, is involved in numerous processes such as vigilance, attention, and decision-making. Recent studies suggest that the LC is also involved in effort regulation, in tasks requiring physical effort. Here, we evaluated the role of the LC in cognitive effort using a selective and reversible pharmacogenetic approach in rhesus macaques (Macaca mulatta). The effects of LC inhibition were assessed in a simple spatial working memory task. We evaluated both working memory performance and the level of behavioral organization in space and time. Under LC inhibition, monkeys exhibited a significant decrease in working memory performance, but no change in the level of behavioral organization, and no decrease in the amount of rewards collected. Importantly, LC inhibition had no effect in a control task involving the spatial search component, but no working memory. Thus, LC inhibition induces a specific and quantitative effect on working memory performance, which supports the idea that it plays a critical role in cognitive effort.

Intrinsic motivation drives progressive preference formation for abstract images

Poster #2, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: drift diffusion model, intrinsic motivation, abstract stimuli, subjective value, gaze bias, 2AFC, autonomy, competence, self consistency, learning, decision making

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Decision-making is traditionally explained as a mechanism used to maximize extrinsic rewards. However, recent research suggests that behavior can also be intrinsically motivated by items without clear connections to extrinsic outcomes. In this context, the intrinsic value of agentic processes in decision-making remains poorly understood. To study how sense of control modulates visually-guided decisions and preferences, we used a two-alternative forced-choice task where subjects chose between abstract fractal images of varying complexity. We collected subjective liking ratings and behavioral measures, including reaction time and gaze. Individual preference functions were predominantly monotonic, with participants displaying stable orientations toward increasing or decreasing fractal complexity. Forced-choice behavior was aligned with subjective liking, following a self-consistency principle integrating autonomy and competence. Importantly, preferences for fractals developed progressively over time. Reaction times decreased across trials, and gaze trajectories revealed a growing gaze bias effect, suggesting participants spontaneously constructed a coherent internal ranking system based on fractal complexity. Drift Diffusion Modeling confirmed this pattern, as drift rates for fractal choices increased over time, indicating that participants learned to more efficiently extract and integrate visual features to resolve intrinsic preference. In contrast, in a control block using affective images, subjects ranked images immediately based on valence, requiring no learning. These findings reveal that intrinsic valuation of abstract images is not a reflexive response but a dynamic, higher-order evaluative process. Even without instruction, participants organize and rank stimuli, driven by intrinsic motivations for self-consistency and effectance. This suggests the brain progressively accumulates evidence from visual features to construct subjective value, reinforced by the intrinsic reward of agentic choice.

Experiential value neglect is robust across learning and representation structures

Poster #3, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Decision making, Description, Experience Gap, Value Representation, Reinforcement Learning

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In decision-making, option values can stem from past experiences with rewards and punishments (experiential) or from explicit descriptions of outcomes and probabilities (descriptive). According to the strong common currency (CC) hypothesis, these subjective values are encoded on a shared scale, allowing for direct symmetrical comparisons. Most studies examine decision-making within either experiential or descriptive options separately. However, when individuals choose between the two - such as deciding between a restaurant we've visited before and one known through online reviews - do these values compete on equal terms? Garcia et al. (2023) examined such hybrid choices by asking participants to choose between learned experiential options and symbolically described ones, and found systematic neglect of experiential options. This study explores, through five experiments, whether experiential neglect arises from differences in learning and representation structures. More specifically, we manipulated learning architecture, test-phase feedback, stimulus representation, and feedback representation. Our findings show that experiential neglect persisted across all conditions, further challenging the dominant CC theory. We suggest that this neglect is primarily driven by retrieval-based uncertainty in experiential valuation. Furthermore, we observed valence effects on experiential valuation. Aligned with broader evidence for a positivity bias in learning and decision-making, participants showed reduced sensitivity to experiential losses relative to gains.

Electrocortical markers of audiovisual detection and conï¬dence

Poster #4, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: metacognition, multisensory integration, detection decision, confidence, intracranial recordings

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Imagine deciding if a mosquito is in your bedroom before going to sleep. How do you ensure that nothing is there? In many contexts, the ability to infer the presence or absence of stimuli from multiple sensory signals and to establish a feeling of confidence based on these signals is crucial. Here, we sought to characterize the neural underpinnings of audiovisual confidence. Participants performed a detection task of audiovisual, visual, and auditory stimuli at unimodal detection-threshold intensities. They indicated whether a stimulus was present or absent (irrespective of the modality) before reporting their amodal confidence in their answer on a continuous scale from 0% (sure incorrect) to 100% (sure correct). Finally, they provided modality-specific detection judgments and confidence on a two-dimensional, audiovisual, scale where each axis ranged from 100% sure absent to 100% sure present. Data from seven patients with pharmaco-resistant epilepsy implanted with stereotactic electrodes for clinical evaluation have been collected so far. Our preliminary results showed that participants detected bimodal stimuli more accurately than unimodal ones. At the neural level, several regions of interest (superior temporal gyrus, ventral visual cortex, insula) showed distinct high-gamma activity following detected vs undetected stimuli. Moreover, activity in the superior temporal gyrus was higher for audiovisual compared to audio stimuli, supporting the view that primary sensory regions are also multimodal. Finally, decisional processes and confidence judgments were reflected in the insula, independently of the modality of presentation. Together, these preliminary results provide new insights into the cortical markers of multisensory perception and metacognition.

Asymmetric coding of reward prediction errors across the frequency spectrum: Evidence from human intracranial recordings

Poster #5, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: reward prediction error, asymmetric coding, intracranial EEG, reinforcement learning

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Humans adjust their behavior according to the outcomes of their actions. However, sensitivity to positive and negative outcomes may selectively vary across subjects, tasks, and contexts. This variation is proposed to underlie learning in uncertain environments, play a key role in mood disorders, and has been shown to improve the performance of reinforcement learning algorithms. However, the neuronal dynamics that regulate the asymmetric coding of reward are little understood. To address this issue, we leveraged the high spatiotemporal resolution of intracranial recordings in humans while they performed an interval timing task where we carefully manipulated the expectation of winning or losing on each trial. In different frequency bands, we show greater sensitivity to positive than negative reward prediction errors (RPE) across prefrontal areas, insula and hippocampus. In exploratory analyses, we also investigated whether oscillatory synchrony enables the communication of RPE information in the network and whether asymmetric RPE signals were directly related to learning from previous outcomes. Our findings suggest that broadband neuronal dynamics in a distributed cortical network support the use of asymmetric RPE signals for learning in humans.

How Social Environments Shape Brains: Interpretable Neural Network Investigations

Poster #6, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Paranoia, Computational Psychiatry, Therapeutic Modelling

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Accounts of why and how the mature brain and emergent behaviour are impacted by interpersonal adversity during development are incomplete. Clearer theoretical accounts hold promise for more targeted longitudinal studies in humans and for more precise psychiatric support. We address this by modelling the emergence of biased reasoning through exposure to different agent preferences in mixed-motive games using a combination of reinforcement learning and recurrent neural networks. We distinguish between adaptive and maladaptive networks based on performance and belief"behaviour alignment, and simulate three therapeutic interventions designed to realign belief-behaviour mapping from entrenched inflexible mistrust to flexible and responsive trust. We show that a therapy that impacts both the behaviour and the representations of the maladptive networks is best suited for remission. Our analysis provides insight into how the interface between individual learning styles and one's social environment during development gives rise to maladaptive strategies, how this may account for symptoms such as paranoia, and how variance in individual and interpersonal factors impacts the efficacy of therapeutic rehabilitation. We also emphasise that if AI-human collaborations are to be successful, attention must be paid to the behaviour networks are exposed to during development.

Adaptive variability in human behavior relies on distinct cognitive mechanisms and shifts across the lifespan.

Poster #7, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: reinforcement learning, decision, making, computational modeling, variability, development

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Adaptive variability in behavior is crucial when environments reward unpredictability, yet its underlying cognitive mechanisms remain poorly understood. Adversarial environments can elicit variability by explicitly reinforcing variable choice sequences; however, the literature lacks paradigms and computational modeling approaches that systematically compare behavior across stable, volatile, and adversarial choice contexts. We introduce a novel hide-and-seek paradigm that manipulates variability demands via different hiding strategies and use computational modeling to disentangle five candidate cognitive mechanisms: stochastic choice, fast reinforcement learning, frequency-based memory, sequence-based memory, and episodic memory. Across three experiments (N = 290), we show that participants flexibly increased stochasticity, frequency-based memory, and reliance on episodic memory as variability demands increased in adversarial environments, while learning rates only differentiated behavior in stable versus volatile environments. To investigate the development of these different strategies, we also studied behavior in the adversarial environment across age (N = 495, ages 5-74 years). Pure stochasticity seemed to increase with age, while novelty seeking (deliberately choosing what is not in the episodic memory buffer) decreased with age. These findings demonstrate that adaptive variability is a multifaceted process that extends beyond increasing noise or fast learning, and undergoes a distinct developmental shift from memory-driven novelty seeking to increased stochasticity.

Embodied Decision Making in Insects, Animals and Robots

Poster #8, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Embodied Decision Making in Insects, Animals and Robots

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Contemporary Artificial Intelligence (AI) achieves performance through scale: large datasets and computational resources. Brains, on the other hand, operate under resource constraints while remaining far more effective in real-world scenarios than state-of-the-art AI technologies. Building on fundamental prior work into how animals should optimally make value-based decisions, this theoretical contribution studies cross-inhibition with nonlinear activation, a motif for decision-related brain regions, in multi-choice scenarios where agents are rewarded by the value of the selected option. We present a non-linear model of competing decision units and analyse for its stable behaviour. Initial results show that decision-making exists within a bounded window of external drive: below a lower threshold the circuit remains in a symmetric state of indecision, while above an upper threshold, non-linear saturation forces competing units to equalise, destroying the asymmetry that encodes a decision. For circuits with greater than two computational units, the window contains a hierarchical bifurcation structure, a symmetrically organised tree of nested binary splits in which sub-populations are progressively separated and suppressed. This decision-making mechanism generalises previous binary models in giving rise to adaptive value-based decision-making strategies.

Physicians' metacognition in medical decision-making

Poster #9, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Clinical decision, making, metacognition, confidence, self, evaluation

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Decision-making is a cornerstone of medical practice, profoundly influenced by many factors including time constraints, stress, fatigue, and uncertainty. Given the frequent lack of immediate feedback, a physicians' metacognition, or their ability to evaluate and reflect on their decisions, is crucial for determining when to request complementary tests or seek a second opinion (Boldt et al., 2019). A large literature reports that physicians are overconfident when making medical decisions (Berner & Graber, 2008; Saposnik et al., 2016). However, the validity of these findings is questioned due to methodology pitfalls leading to poor ecological validity. Moreover, most previous studies do not distinguish between i) metacognitive bias, the general tendency to report high or low confidence irrespectively of actual accuracy, and ii) metacognitive sensitivity, the capacity to discriminate between one's own correct and incorrect decisions (Fleming & Lau, 2014). We aim to overcome these limitations by drawing from state-of-the-art paradigms and tools from the cognitive science of metacognition (Maniscalco & Lau, 2012; Rouault et al., 2019) To examine overconfidence and to disentangle metacognitive bias from metacognitive sensitivity, we developed a carefully-controlled set of case-vignettes of patients with headaches that was completed by 52 physicians. We found that, although physicians are overconfident, they maintain relatively good insight into the accuracy of their decisions. In addition, and unlike previous reports, we found limited interindividual variability depending on specialty, gender, or seniority level. These results shed new light on the (meta)cognitive properties of medical decision-making and carry practical implications for medical education.

Extrinsic motivation reduces noise in evidence integration

Poster #10, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Motivation, noise, evidence accumulation, decision, making

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Motivation is thought to improve the performance of cognitive processes involved in decision-making. Previous research has studied how potential rewards improve decisions through selective attention and speed-accuracy trade-off. However, whether and how motivation can decrease random errors arising from internal noise in cognitive processes remains unclear. To address this question, we used an incentivized evidence accumulation task, where we asked human participants (N = 72, with upcoming replications) to categorize sequences of oriented gabors, with varying sequence lengths and monetary stakes (potential gain/loss for correct/incorrect response). We found that, even in the absence of external distractors or a speed-accuracy trade- off, incentives increase accuracy, and this effect was equal between gain and loss domains. Furthermore, we used a computational model to show incentives reduce noise primarily in evidence accumulation, as opposed to sensory processing or action selection. Model parameters capture average qualitative patterns of behavior as well as individual differences. Our results show novel mechanisms of motivated performance which improve information processing efficiency, and are distinct from other known mechanisms that highlight attention and response caution.

Computational principles of dual contribution of dopamine in reinforcement learning and action selection

Poster #11, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Spiking Neural Networks, Reinforcement Learning, Neuromodulation, Dopamine

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When making decisions in volatile environments biological agents are able to take into account the statistics of action-outcome contingencies and use them to select appropriate behaviour. In this context, Dopamine has been widely studied as a reinforcement signal for synaptic plasticity, but it has also been shown to affect action selection and contribute to the regulation of the exploration-exploitation trade-off. How the dopaminergic system reconciles these two functions is not fully understood yet. In this work, we present a spiking neural network model of Dopamine-driven reinforcement learning and decision-making. First, we compare two models of Dopamine-driven learning which compute reward prediction errors respectively using direct and disinhibition-based dopaminergic control. We show that both mechanisms produce expected firing regimes, but that the disinhibition model is better able to learn about reward statistics. Then, we fit this model against behavioural data from mice performing a 3-armed bandit task. We examine how the dopaminergic signal emerging from the interaction of neural populations in the model enables it to both acquire expected values from the task, as well as affect action selection and the exploration-exploitation tradeoff. Thus, this work aims to uncover the computational principles underlying the dual role of Dopamine as a reinforcer and modulator, and has implications for the study of decision-making brain circuits.

Neurocomputational mechanisms of social threat avoidance under distinct sources of uncertainty

Poster #12, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Social threat avoidance, outcome uncertainty, goal conflict, EEG, Reinforcement learning

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Social threat promotes avoidance behavior, yet avoidance is not uniformly expressed across individuals. Previous work showed that when action"outcome contingencies were deterministic, participants readily avoided social threat, but avoidance decreased when contingencies became random. Critically, approximately one third of participants persistently avoided threat despite stochastic outcomes, suggesting that social threat avoidance depends on how individuals track environmental statistics. The present study investigates how distinct forms of uncertainty shape social threat avoidance during goal conflict. Participants (N = 54) perform a probabilistic two-armed bandit task where they learn to select the higher-reward option. On each trial, one option may be paired with a task-irrelevant angry or neutral avatar. In incongruent trials, maximizing reward requires approaching the threatening stimulus, creating conflict between instrumental goals and avoidance motivation. Uncertainty is manipulated along two dimensions: stochasticity, or outcome noise, and volatility, defined as the rate of change of reward probabilities generated by a random walk process. Electroencephalographic activity is recorded to characterize neural signatures of conflict monitoring and adaptive updating. Computational modeling enriches interpretation by providing mechanistic insights on updating and policy shifts. By embedding social threat within environments that vary in stochasticity and volatility, this study examines how different types of uncertainty influence avoidance and whether social threat biases the estimation and integration of these sources. This approach allows us to test whether individual variability in social threat avoidance depends on the representation of environmental statistics, providing a mechanistic account of when avoidance adapts to environmental change and when it remains rigid.

Efficient coding and Bayesian inference in emotion judgements

Poster #13, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: emotions, computational model, inference

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Emotional state reports are critical for health and illness, yet the formal processes governing emotional judgements remain poorly understood. A key challenge is that repeated emotion ratings show robust variability, typically dismissed as noise, though this variability may instead reflect uncertainty in an underlying inferential process. In sensory perception, such uncertainty is captured by Bayesian inference and efficient coding. Here, we tested whether these principles apply to emotional state judgements. We hypothesised that (1) emotional judgements show meaningful variability; (2) this variability affects reports and choices in line with Bayesian inference; (3) emotional states are represented in keeping with efficient coding principles; and (4) this uncertainty is consciously accessible. Across three experiments, 145 participants viewed validated emotional video clips. In study 1, participants rated still images from the videos twice and completed a 2-AFC choice task on their emotional content. In study 2, rating duration was manipulated. In study 3, emotional material was presented in blocks to strengthen prior expectations. Emotional state judgements showed substantial variability, and this variability affected choices: more uncertainty reduced the preference slope in a 2-AFC task. Emotion judgements far from the prior peak were biased toward it. Emotion judgements also showed signatures of efficient representation, with more likely states encoded more precisely, and characteristic repulsion near the prior peak. Finally, aspects of emotion judgements were consciously accessible via confidence judgements. These results suggest that emotional judgements follow principles of Bayesian perceptual inference and efficient coding, paving the way for formal analyses of emotional inference.

NORMARL: A Multi-Agent Reinforcement Learning Framework for Adaptive Social Norms in Resource Sustainability

Poster #14, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: multi agent reinforcement learning, adaptive learning, computational modeling, sustainability, norm internalization, common pool resources

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Human behavior plays a crucial role in determining the sustainability of common-pool resources, where the misalignment of individual actions and collective goals often leads to overexploitation and resource depletion. Traditional approaches, such as taxation and cost-based interventions, often fail to account for the cognitive processes that drive individual decision-making, limiting their effectiveness in addressing long-term challenges. In this study, we propose the Norm-ORiented Multi-Agent Reinforcement Learning (NORMARL) framework, which integrates psychologically plausible parameters " specifically, norm internalization and adaptive learning " to explore the dynamics of resource exploitation. Our model simulates interactions between agents and a shared resource, where agents adapt their beliefs based on environmental feedback about norm consumption. Resource dynamics are driven by collective consumption and replenishment processes, while agents optimize their utility by considering individual and social costs. This computational framework provides a platform to investigate the role of plausible cognitive mechanisms in promoting cooperation, sustaining resources, and enhancing social welfare. Our results demonstrate that higher levels of norm internalization and adaptive learning significantly improve sustainable behavior, enabling recovery from environmental shocks and preventing resource depletion. NORMARL provides insights on how incorporating cognitive mechanisms into computational models can highlight the effectiveness of educational and behavioral interventions as a complement to economic policies in promoting sustainable behavior.

Foraging in a volatile environment: the role of autistic traits

Poster #15, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: volatility, adaptive learning, autistic traits, foraging

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Adapting to uncertain and changing environments is a fundamental challenge in everyday life. Within predictive processing accounts, this depends on how agents estimate environmental volatility (i.e., uncertainty about changes in the rules governing outcomes) and integrate this information over time to guide behavior. This study investigates how people forage in volatile environments and how individual differences in autistic traits might influence such behavior. Fifty young adults performed a tablet-based, game-like foraging task in which reward contingencies followed a hidden alternating rule across blocks, with transient rule violations. Participants had to infer this structure through exploration to maximize rewards. Linear mixed-effects analyses showed that participants adapted their behavior to changes in environmental contingencies. Performance improved within blocks and this effect became stronger across blocks, as reflected by a significant interaction between trial and block number. Crucially, this adaptation was modulated by autistic traits such that both groups adapted to the volatile environment, but through qualitatively different strategies. Participants with higher autistic traits became progressively less disrupted at rule changes, showing reduced performance costs on the first trial following a rule change. In contrast, participants with lower autistic traits showed no comparable reduction in initial disruption, but recovered more rapidly within each block as the experiment progressed. These findings show that individual differences in autistic traits modulate how people adapt their foraging behavior in a volatile environment.

Contextual modulation of learning rate by uncertainty

Poster #16, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: belief updating, learning rates, unexpected uncertainty, network reset

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Unexpected changes in the environment induce uncertainty and have been found to speed up learning. Such adaptation is associated with an increase in pupil-linked arousal and a reconfiguration of brain networks. We investigated the specificity of surprise-driven modulation of learning rates. If environmental changes lead to a widespread 'network reset', then, following a change, learning rate adaptation might spill over to concurrent tasks. We designed a belief-updating task with 2 states that independently followed two distinct change-point processes. Contrary to an expected spillover effect, we found that learning rate modulation was specific to the state in which a suspected change occurred. Moreover, changes in prediction confidence were also specific to the statistics of the respective state. This suggests a need to refine the theories of how our brains respond to unexpected environmental changes.

Social Transmission of Goals Reflects Value-Based Social Learning

Poster #17, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Goals, Reinforcement Learning, Social Learning

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What goals we pursue might depend on the goals of our friends and parents, yet the computational mechanisms supporting social transmission of goals are not well understood. To address this gap, we modified a two-stage paradigm previously used to study social influence in reinforcement learning. In the learning task, participants (N = 171) first selected a goal (ingredient) and then searched a grid to obtain a required quantity of that ingredient. Crucially, one ingredient was more abundant than the other, making one goal objectively easier to attain. To manipulate social influence, participants were provided with the choices of alleged previous participants during goal selection. These simulated individuals predominantly favoured either the easy goal (congruent condition) or the difficult goal (incongruent condition). All participants subsequently completed a transfer test, which had the same structure as the learning task, including the social information, but used a different option pair. Results showed that participants exposed to congruent social information in the learning task were significantly more likely to adopt the majority-preferred goal in the novel context than those exposed to incongruent information. Furthermore, a Social Feature Learning model, which formalises social influence as experience-dependent value learning, accounted well for participants' behaviour. These findings suggest that social goal transmission is driven by value-based social learning, and that the spread of goals across individuals may reflect domain-general reinforcement learning mechanisms rather than goal-specific processes.

Determinants of Speed-Accuracy Trade-Off and Efficiency in Human Decision-Making

Poster #18, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Decision making, speed accuracy trade off

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One of the most fundamental features of human decision-making is the speed-accuracy trade-off (SAT): humans can act faster by sacrificing accuracy, or more accurately by sacrificing speed. Yet in some situations, this trade-off can be overcome, allowing for both fast and accurate (i.e. efficient) behaviour. Here, we investigate why decision-making varies along these dimensions and what determines the setting of the SAT. Participants (n=65) completed a novel binary decision-making task in which they chose between two options that varied in reward value. Behaviour varied along two key axes: SAT and efficiency. To characterise the factors driving these variations, we developed a hybrid analysis approach combining neural networks with symbolic regression. This approach yielded interpretable computational models of behaviour with high predictive accuracy and outperformed standard linear regression. Crucially, the model captured both linear and nonlinear relationships between task variables and behaviour. Environmental features and past experience predicted variation along SAT and efficiency. In particular, cautiousness scaled nonlinearly with reward at stake, with diminishing sensitivity at higher reward levels, consistent with a concave utility-like relationship. In addition, behaviour exhibited intrinsic, autocorrelated fluctuations along both SAT and efficiency. Together, these results suggest that regulation of the SAT is shaped by both extrinsic factors and intrinsic dynamics.

Environmental Uncertainty Gates the Neurocomputational Construction of Social Hierarchy

Poster #19, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Social Hierarchy, Competition, Cooperation, Reinforcement learning, Attribution.

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Navigating social hierarchies is a cornerstone of human survival, yet how we learn our competence standing within a group remains poorly understood. Using a multi-player social learning paradigm with computational modeling and electroencephalography (EEG), we show that competition drives a challenge-oriented motivation, where individuals prioritize superior opponents despite lower expected utility, a strategic shift marked by reduced value-sensitivity. Conversely, cooperation triggers a self-serving bias characterized by devaluation of teammates. Critically, this bias is gated by environmental uncertainty that manipulated via task difficulty. Increasing task difficulty abolished the partner-devaluation effect, suggesting environmental uncertainty acts as a strategic regulator beyond cognitive noise. At the neural level, this behavioral gating is mirrored by a functional shift from fine-grained value updating to prioritize outcome salience. While feedback-related negativity (FRN) tracks prediction errors in low difficulty, it vanishes under high difficulty, where the brain instead recruits P300 responses. Our work suggests that social competence rank representations are constructed through dynamic arbitration between context-specific strategies of competitive challenge-seeking but cooperative self-protection, and domain-general, resource-rational heuristics. This flexible neurocomputational architecture supports a principle of cognitive economy, optimizing adaptability in an uncertain world. This work provides evidence that social rank perception is not a passive readout of social outcomes, but a sophisticated neurocomputational compromise between social motives and the statistical structure of the environment.

Disentangling Geometric and Ordinal Regularities in memory: A Novel Factorial Paradigm for Sleep-Dependent Sequence Consolidation.

Poster #20, **Poster Session 3**, Thursday 28 May 2026, 16:00-17:30

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Keywords: Compositional Generalization, Structural Priors, Sleep, Language of Thought, Learning, Memory, Sequences
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The role of sleep in memory consolidation remains debated, specifically regarding whether it actively transforms representations or passively protects them from interference. This study addresses these conflicting perspectives by using a high-dimensional behavioral paradigm designed to isolate memory transformation for geometrical versus temporal structural priors. We trained 181 participants (sleep n = 107, wake n = 74) on a delayed sequence reproduction task involving 16-element trajectories on an octagonal grid, a length exceeding typical working memory limits. Using a 6x6 factorial design, we crossed six geometric rules with six ordinal rules. Participants learned nine sequences spanning four "learning quadrants," allowing for precise measurement of both retention and generalization to novel rule combinations. This approach moves beyond traditional procedural-declarative dichotomies by testing the ability to generalize geometric and ordinal transformations. Preliminary results indicate a double dissociation: wakefulness and sleep do not strengthen the same classes of regularities. While overall generalization remained stable across groups, the qualitative error profiles shifted. These findings suggest that the offline state differentially shapes the internal representation of geometric versus ordinal constraints. Our data support the view that sleep-dependent consolidation is a highly selective process that prioritizes the abstraction of "gist" or latent structures. By moving beyond simple motor-tap models and modeling sequence representation as LoT-programs, this study provides a granular behavioral foundation for future investigations into human neural replay using MEG and EEG. The results highlight how the brain selectively prioritizes specific structural information during consolidation.

CreaSearch: Goal-directed idea generation during creative thinking

Poster #1, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: generation, search, creativity, goal dimensions

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How humans generate candidate ideas under various goals is essential to better understand decision-making mechanisms. Traditionally, creativity, i.e., the ability to produce ideas both original and adequate to the context, is thought to involve both a spontaneous generative process and a goal-directed evaluative process. Our project challenges this view, proposing that the generative process also relies on goal-directed mechanisms. We hypothesize that idea search trajectories are guided by creativity goal-relevant dimensions, i.e., originality and adequacy. To test this, we adapted the Free Generation of Associates Task, a classical creativity task, into a fluent version, such that participants had to verbalize their sequence of ideas in response to a cue-word before providing a final response. Three conditions were assessed : spontaneous association (goal-free condition), creative association (goal-directed condition), positively valenced association (goal-directed control condition). Participants then rated their associations for likeability, adequacy, originality, and valence to access the goal-relevant dimensions (online n=157, onsite n=102 across 3 samples). Results revealed distinct patterns across conditions.The investigation of response sequences revealed that adequacy consistently showed a floor effect throughout the responses sequences in all conditions, yet decreasing more in the creative condition. Conversely, originality increased faster and reached a higher plateau in the creative condition compared with control conditions. These findings suggest that idea generation during creative thinking may be driven by goal-relevant dimensions. Model simulations are underway to clarify how goal-relevant dimensions mapping guides this search process. Altogether, this study aims to better understand the underlying neural mechanisms supporting idea generation during creative thinking.

Bridging learning and deliberation in multi-choice decision making

Poster #2, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Multi, alternative decisions, circular DDM, reinforcement learning, REINFORCE, policy, gradient

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Reinforcement learning models of multi-choice decision making typically predict choices while ignoring reaction times (RT), whereas multi-choice evidence accumulation models describe deliberation but lack mechanisms for learning. We address this gap by embedding a circular drift-diffusion model (CDDM) within policy-gradient reinforcement learning (RL-CDDM), allowing agents to learn policies from reward feedback while generating joint predictions of choice and RT. In this framework, policy parameters (drift direction; concentration; and baseline reward expectation) are updated during learning, enabling analysis of how speed-accuracy tradeoffs evolve. We compared first-order (maximizing expected reward) and second-order (learning the reward distribution) learning algorithms. Simulations varied reward probability across boundary heights, learning rates and baseline update rates yielding 3971 simulations (3,971,000 trials). Across conditions, drift magnitude emerged as a sufficient statistic for speed and accuracy, collapsing behavior across parameter regimes onto a single mechanistic curve. The two algorithms exhibited distinct learning trajectories. Under abundant reward (95% probability), the second-order algorithm drove Î° beyond reward concentration producing near-instantaneous and highly accurate responses, but failed to learn effective policies under sparse reward (15% probability). In contrast, the first-order algorithm yielded moderate but robust performance across reward environments. The algorithms also differed in error response profiles: first-order produced faster error responses arising from drift-target misalignment, whereas the second-order generated slow error responses. Together, our findings suggest distinct policy-gradient algorithms may be advantageous under different reward regimes, with first-order as a robust default and second-order when returns justify the added cost.

Distinct Information Search and Value Computation in Within- and Across-Domain Choices

Poster #3, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: multiattribute, decision making, fMRI, vmPFC, value based, value computation, attention, search strategy
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Decisions can be made within domains, where options share similar attributes, and across domains, where options differ fundamentally. Current theories of value-based decisions, particularly the common-currency theory, posit that the brain translates the various attributes of different options into a common value, enabling a standardized value-comparison mechanism. We challenge this assumption by proposing that the need to compute integrated values depends on the type of decisions. First, we assume that overt information gathering relies on distinct search strategies in within- compared to across-domain decisions (specifically, the frequency of option-wise comparisons is higher in the latter). Furthermore, we hypothesize that integrated values in value-coding areas (especially ventromedial prefrontal cortex, vmPFC) are represented differently in within- and across-domain choices. To test this hypothesis, we developed a value-based, multi-attribute decision-making task that included both types of choices. N = 50 healthy participants were instructed to complete the task while their fMRI signals and gaze data were recorded. As predicted, participants showed more attribute-wise searches (p

Multiple Processes Contribute to Delay Discounting in Depression

Poster #4, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Delay Discounting, Depression, Behavioural Tendencies

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Delay discounting (DD) is widely used as a measure of impulsive choice in psychopathology. However, findings in depression are inconsistent, with reports of increased, decreased or unchanged discounting. Yet the basis of this variability remains unclear. Here, we hypothesised that the heterogeneity in DD behaviour reflects the combined influence of multiple behavioural processes associated with depression, which exert dissociable and potentially opposing effects on future valuation. We analysed data from a large online sample (N = 1,028) who completed a DD task alongside a battery of behavioural questionnaires assessing impulsivity, risk-taking, prospection (future self-continuity and vivid mental imagery), social cognition and time perception. Using partial least squares structural equation modelling (PLS-SEM), depressive-like state was specified as a predictor of discounting, with behavioural measures modelled as parallel mediators, controlling for demographic factors. Indirect effects were estimated using bootstrapping (5,000 resampling). Depressive-like state showed a small negative direct association with discounting (Î² â‰ˆ â^'0.07), alongside a significant positive total indirect effect (Î² â‰ˆ +0.08; bootstrap confidence intervals excluding zero), suggesting opposing mediation pathways. At the level of specific pathways, increased risk-taking was associated with steeper discounting, whereas reduced vividness of mental imagery was linked to shallower discounting. The other behavioural dimensions also contributed to the overall indirect effect but did not independently mediate discounting. These findings suggest that DD in depression may reflect multiple opposing processes rather than a single one, which may explain the variability across studies.

Humans attribute greater informational value to rewards in social contexts

Poster #5, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: behavior, social cognition, computational modeling, reinforcement learning

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Uncertainty is intrinsic to human environments and fundamentally shapes decision-making. While extensively studied in reinforcement learning, its role in social contexts remains poorly understood, due to a lack of studies with proper control conditions. Here, we adapt the restless two-armed bandit task to a social setting, using two matched conditions (social vs. non-social) to isolate and characterize social effects via computational modeling. We also distill participants' behavioral phenotypes into two dimensions: learning and exploration. Across two independent samples (N=205 and N=297), participants in social contexts exhibited a positive shift along both dimensions: enhanced learning"both in rate and precision"and a more exploratory, less repetitive choice policy. Individual dimensional scores were strongly correlated across conditions, suggesting that the task captures a trait-like component that remains stable across social and non-social contexts. These results suggest that individuals attribute greater informational value to social rewards compared to non-social rewards, aligning with broader social cognition research.

Recurrent interactions between local and global confidence explain the pervasive nature of confidence biases

Poster #6, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: confidence bias, decision confidence, global confidence, Signal, Detection Theory, leaky integration, prediction error

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Humans display pervasive confidence biases, yet the underlying mechanisms explaining this pervasiveness are poorly understood. Here, inspired by the largely untested theory of a metacognitive hierarchy, we hypothesize that recurrent interactions between local confidence in decisions and global confidence in task performance result in self-sustained, long lasting confidence biases. Results from a perceptual decision-making paradigm reveal clear recurrent interactions between local and global confidence, providing empirical evidence for interactions between different levels of the metacognitive hierarchy. We fit our data to four competing computational models in which global confidence reflects an integration of local confidence but with different integration rules, and in turn biases local confidence. The best fitting model shows that a dynamic integration of biased local confidence judgements into the updating of global confidence results in a continuous reinforcement of initial (distorted) beliefs, providing a mechanistic explanation for self-sustaining confidence biases. We discuss practical recommendations that follow from this model to battle pervasive confidence biases.

Learning to reach consensus and how consensus can shape learning

Poster #7, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Reinforcement learning, decision making, simulations, consensus reaching

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Consensus decision making is central to group behavior across ecological, social, organizational, and political contexts. Classic theories assume individuals begin with clear prior preferences, yet real-world decisions often require trial-and-error learning through which preferences are formed. How consensus emerges when individuals simultaneously learn and decide remains poorly understood. Reinforcement learning (RL) provides a powerful framework for modeling experience-based decisions, capturing how agents update value representations to guide future actions. We examined a population of RL agents performing a multi-armed "consensus banditâ€ task, where agents earn bonus rewards when they unanimously choose the same option. This design creates a tension between exploring better alternatives and coordinating for a consensus bonus. Agents can learn by weighting environmental feedback (choices/rewards) and/or social cues (others' choices and consensus bonuses). By varying model parameters, we asked: (1) Which environmental and structural factors"such as group size, payoff profiles, and consensus bonus magnitude"facilitate or hinder consensus? (2) How do individual differences in cognitive parameters, biases, and learning strategies influence convergence dynamics? Results show that agents flexibly combine individual and social learning depending on task structure. Higher consensus bonuses increase attention to social information, whereas low discriminability between options impairs optimal consensus formation and can instead produce convergent toward suboptimal choices. Consensus emergence strongly depends on interactions between agents' learning rates, exploration tendencies, and weighting of social versus environmental information. Higher standard deviation in these parameters' distribution significantly slows the emergence of consensus, highlighting the importance of incorporating learning dynamics when modeling consensus formation.

Prefrontal cortex dynamic of strategic inference

Poster #8, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: PFC, sEEG, Strategic inference

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The medial prefrontal cortex (mPFC) plays a key role in executive function, particularly in adapting behavior under uncertainty and volatility. However, its precise neuro-computational role remains unclear. We propose that the mPFC supports strategy inference by evaluating the reliability of self-generated hypothesis on the hidden rules governing the environments. Our model forgoing gradual adaptation of strategies through state-action reinforcement learning and solely use decision outcomes as strategy reliability update signals instead. 20 subjects implanted with stereo-EEG in PFC, made a modified Wisconsin Card Sorting Test. First, subjects results reproduce healthy control performance and unique pattern of strategy inference. Second, we could decode key variables of the model and model state from PFC activity. Cluster based analysis on temporo-spatial decoding accuracy highlight specific patterns as sustained activity in orbitofrontal and ventromedial PFC cortex related to reliability and more triggered activity in lateral PFC related to action selection and choice outcomes. Additionally we show that neural space manifold exhibit specific trajectories in theta and gamma band exploitation, exploration and properties of the rule change. These findings establish the importance of direct inference over abstract strategy spaces for flexible adaptation in humans.

The reference bias: how perception of performance feedback affects mood fluctuations

Poster #9, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Feedback, Mood, Reference Bias, Mood Disorder, CBT

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Mood disorders are associated with persistent depressive states and cognitive biases, including a tendency to overweight failures relative to successes. This tendency can be implicit, because feedback perception depends on a hidden point of comparison: when we evaluate our actions, we may compare them either to doing nothing (and be pleased by what we achieved), or to some ideal performance (and be dismayed by what we failed to achieve). To quantify this reference bias, we designed a task in which participants memorize lists of arbitrary name-number associations and then recall them one by one. For each list, they receive feedback on the number of hits and misses, converted into points with monetary value, and then they rate their mood on a visual analogue scale. Across 3 experiments in healthy individuals, results show that mood ratings are more affected by points gained than by points missed. In our current work, we investigate the reference bias in depressed patients undergoing cognitive behavioral therapy (CBT) based on either mindfulness meditation or behavioral activation. Preliminary results suggest that mindfulness-based CBT helps with improving the reference bias, the mood rated by depressed patients becoming more sensitive to points gained, relative to points missed.

Trial-by-Trial Fluctuations in Decision Criterion Shape Confidence

Poster #10, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Decision confidence, Signal Detection Theory, computational modeling, time, varying parameters

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Many of the choices we make are accompanied by a sense of confidence. Within classical Signal Detection Theory (SDT), confidence is conceptualized as the absolute distance between a decision variable and a decision criterion. The decision criterion is traditionally modelled as being stable over an experimental session. However, recent work challenges the notion of a static decision criterion, suggesting instead that the criterion undergoes trial-by-trial f luctuations. Combining SDT theory and model simulations, we predict that fluctuations in the decision criterion shape confidence. In 15 human decision-making datasets, trial-by-trial estimates of decision criterion were obtained with the Hierarchical Model for Fluctuations in Criterion (hMFC). Across all datasets, we confirmed our pre-registered hypothesis that confidence is shaped by single-trial criterion state. This effect was found in 14 out of 15 individual datasets, indicating a robust pattern across a variety of task paradigms and confidence reporting scales. Going beyond self-report, the shaping of confidence by criterion f luctuations was replicated in an implicit measure of confidence, RTs, and in two key neurophysiological markers, pupil-linked arousal and a neural signature of confidence. Our results demonstrate that variability in confidence, which has traditionally been treated as noise, actually reflects genuine sensitivity to the current state of the (fluctuating) decision criterion.

Facial expressions predict optimal switching in an online goal-pursuit task

Poster #11, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: decision making, emotions, affect, mood, goal pursuit, foraging

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Understanding the link between emotions and decision-making behaviour remains a key challenge in the field. The current study presents data from a large online sample (N=850) who completed an incremental goal-pursuit task (adapted from Holton et al., 2024), during which facial expressions were continuously recorded via the webcam using a pre-trained classifier, and were asked to rate how strongly they felt a set of given emotions at the end of each block. We explore whether facial expression patterns associated with self-reported emotions can predict switching behaviour. Analyses indicate that: 1. Across-sample facial expression patterns in the moments leading up to the decision can predict end-of-block frustration ratings. 2. The same frustration-predicting facial expression patterns also predict switching behaviour above and beyond what is explained by task variables. 3. The same frustration-predicting facial expression patterns are generalisable across task contexts. These findings suggest that in this goal-pursuit task that captures sunk-cost-like over-persistence, feelings of frustration shift behaviour in the direction of optimality by prompting switching away from the current goal. These data also demonstrate scalable methods for tracking affective states in real-time for large online studies. This approach may offer new opportunities for studying dynamic emotion-behaviour links in temporally extended decision-making tasks. References: Holton, E., Grohn, J., Ward, H., Manohar, S. G., O'Reilly, J. X., & Kolling, N. (2024). Goal commitment is supported by vmPFC through selective attention. Nature Human Behaviour. https://doi.org/10.1038/s41562-024-01844-5

Beyond model-free Pavlovian responding: a two-stage Pavlovian-instrumental transfer paradigm

Poster #12, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Pavlovian conditioning, Pavlovian instrumental transfer, model based learning, model free learning, computational modeling, reinforcement learning, mind wandering

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Pavlovian responding is a core component of behavior often measured via Pavlovian-instrumental transfer (PIT), where Pavlovian cues bias instrumental actions. Standard single-lever PIT paradigms cannot easily dissociate model-free from model-based reinforcement learning. While indirect evidence suggests a role for model-free responding, the contribution of model-based strategies is unclear. It also remains unknown whether internal cognitive states, such as mind wandering, specifically impair model-based but not model-free PIT, as theory would predict. We developed a novel, trial-by-trial two-stage PIT paradigm to computationally dissociate these systems by leveraging probabilistic state transitions and trial-wise outcome predictions. After each two-stage Pavlovian learning trial, participants performed a single-lever PIT trial. Model-based learning was specifically supported through explicit value queries and detailed instructions. Computational modeling was used to quantify individual learning strategies, and mind wandering was assessed through questionnaires and thought probes. Analysis revealed trial-by-trial updating of outcome expectations based on probabilistic task structure, consistent with model-based Pavlovian responding. Behavioral responses during PIT were best explained by a computational model-based reinforcement learning model. We found little evidence for model-free Pavlovian responding. Higher levels of mind wandering were associated with reduced model-based control but did not impact model-free indices. Our findings provide evidence that single-lever PIT can operate through model-based mechanisms, challenging the assumption that it works predominantly model-free. By also demonstrating that internal attentional states selectively modulate model-based PIT, this work offers new avenues for understanding maladaptive behavior in psychiatric conditions where Pavlovian responding is implicated.

How Oscillations Support Working Memory in Guiding Action

Poster #13, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: working memory, oscillations, modelling

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Working memory is essential for adaptive cognition because it enables the temporary storage and manipulation of information. However, how both aspects are neurally implemented has remained rather unclear. Brain oscillations have long been proposed as a mechanism for implementing temporary storage of information, in part because neurophysiological data imply a strong involvement of such oscillations in working memory processes. Yet, oscillations in themselves are not sufficient to implement the complex tasks that working memory is needed for. Here, we present a computational model that combines oscillatory dynamics with a recurrent neural network to explain how biological agents store task-relevant information and manipulate it to guide action. The model successfully reproduces several benchmark findings, including serial-position effects and load-dependent declines in performance. Together, these results provide a unified mechanistic account of multiple behavioral and neurophysiological signatures of working memory and show how working memory processes can be learned and adapted across multiple timescales.

Prefrontal mechanisms of goal progress inference and monitoring in macaque monkeys

Poster #14, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: goal progress, incremental goal pursuit, prefrontal mechanism, non, human primate

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A hallmark of the complex behaviour demonstrated by primate species is the ability to pursue long term goals, including over multiple steps. This process requires the animal to track progress and to evaluate how that progress is changing over time. We currently know little about how the brain achieves these functions necessary to efficient incremental long term goal pursuit. We analyzed single-unit activity from macaque midcingulate cortex (MCC) and lateral prefrontal cortex (LPFC) during a "check-versus-workâ€ task in which animals "workedâ€ for immediate small rewards whilst also "checkedâ€ on a gauge which grows at a specific rate within each block, indicating the current progress towards a longer term goal of a large reward. We found that LPFC seemed to play a particular role in progress rate inference with strong encoding of progress rate during checks. On the other hand, MCC appeared to maintain progress rate information across check and work trials, which we linked to longer intrinsic timescales of neurons in this region. Furthermore, MCC's neural representation of feedback is modulated by progress rate whereas the feedback valence axes remain parallel. This geometry allowed for rate invariant readout of work success as well as rate specific processing of the reward. Finally, we trained a RNN to predict progress under the same constraints. The network developed a similar internal progress rate representation. Targeted lesions of rate-related units impaired progress prediction. Together, these results identify complementary LPFC"MCC contributions to progress rate inference and contextual control during long term goal pursuit.

Willing but unable: transdiagnostic dissociation of effort choice and performance under fatigue

Poster #15, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Motivation, Effort, based decision, making, Fatigue Dynamics, Transdiagnostic psychopathology, Drift diffusion modeling, Computational Psychiatry

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Motivated behavior requires not only deciding whether to act, but also translating that decision into effortful action. However, research in mental health has largely focused on the decision stage, often defining deficits as altered willingness to exert effort, leaving its relationship to execution unclear. Moreover, this work has primarily relied on categorical diagnoses, with transdiagnostic approaches"capturing dimensional variability"remaining underexplored. In addition, fatigue, a pervasive symptom across mental health conditions, remains largely absent from current models. Here, we address these gaps in a large-sample study (N = 550), in which participants choose between low- and high-effort options defined by spatial working memory load, perform the selected task, and report fatigue. Combining behavioral analyses, drift diffusion modeling, and computational modeling of fatigue dynamics, we show that higher compulsivity and intrusive thought (CIT) is associated with increased willingness to choose high-effort options, reflected in faster evidence accumulation, but poorer execution, including reduced drift rates and elevated decision thresholds. Both CIT and anxiety"depression (AD) are associated with higher baseline fatigue and greater fatigue accumulation. Critically, their effects on effort-based choice diverge over time: individuals high in CIT consistently select high-effort options, though this tendency is attenuated by fatigue, whereas individuals high in AD show no early difference but exhibit reduced effort selection as fatigue accumulates. Together, these findings reveal a dissociation between willingness and capacity across transdiagnostic dimensions, and identify fatigue as a dynamic, dimension-specific constraint on motivated behavior, offering a mechanistic account of motivational dysfunction.

How LLMs Learn to Know What They Know: A Metacognitive Tale of Confidence and Consistency

Poster #16, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: LLMs, Metacognition

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Large language models (LLMs) have transformed information access but suffer from a critical limitation: they fabricate facts yet always provide answers, regardless of whether they possess the requisite knowledge. We investigate whether LLMs can learn metacognitive monitoring"the ability to know what they know. Using QLoRA fine-tuning on factual benchmarks (MMLU-PRO and MEDMCQA), we first demonstrate that modern open-access LLMs exhibit poor baseline calibration between predicted and actual accuracy. After training, calibration improves substantially across five diverse LLMs, with strong generalization to held-out topics. However, deeper analysis reveals that models accuracy prediction strongly correlate with output distribution entropy raising questions about whether they learnt to predict epistemic knowledge. Models achieving the best calibration are those whose confidence most closely matches output consistency, suggesting a form of statistical metacognitive monitoring rather than genuine epistemic awareness of their own knowledge. These findings have important implications for LLM deployment and raise fundamental questions about the nature of LLM metacognition.

The Neural Basis of Stimulus-Driven Overconfidence

Poster #17, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: confidence, perceptual decision making, magnetoencephalography

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An essential part of decision-making is confidence - the ability to judge how likely our choices are to be correct or incorrect. Despite its fundamental role, the neural computations underlying confidence judgements are still poorly understood. While confidence and accuracy are inherently correlated, confidence judgements can be biased and thus dissociated from accuracy. Such dissociations provide a window into the underlying computational mechanisms. One such case is the positive evidence manipulation, where subjects are overconfident for strong evidence that supports their choice. Here, we employed this manipulation in an magnetoencephalography (MEG) study, in which participants performed an orientation discrimination task with simultaneous choice and confidence reports. We found that neural choice and confidence representations were similar with and without stimulus-driven overconfidence. However, in the overconfident high-evidence condition, both the mean and variance of neural choice signals were increased. Furthermore, a simple computational model of choice and confidence predicted both the increase of the neural choice signals and of subjective confidence across individual subjects. Our results suggest that overconfidence is not due to a cognitive bias, but reflects a stimulus-driven change of the distribution of neural choice signals.

Leveraging task structures for cognitive flexibility

Poster #18, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: Environment structure, Multitask learning, Attention, Cognitive flexibility, Stability, Generalization, Connectivity, Neural networks, Catastrophic forgetting

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Humans and artificial agents must often learn and switch between multiple tasks in dynamic environments. Success in such settings requires cognitive flexibility: the ability to retain prior knowledge (cognitive stability) while also transferring it to novel tasks (cognitive generalization). Cognitive flexibility research has largely focused on the role of model architecture to achieve these complementary goals. However, it is less well understood how the structure of the environment itself influences cognitive flexibility, and how it interacts with model architecture. To address this gap, we design a multi-task learning environment in which tasks are defined by a combination of two cue dimensions, allowing us to characterize the environment with graph-theory methods. We also introduce gating-based (multiplicative) and concatenation-based attention models that can decompose tasks into components and can sequentially allocate attention to them. We compare the attention-based models' performance in the multi-task learning environment to multilayer perceptrons. Generalization and stability are systematically evaluated across environments varying in richness and task connectivity. We observe that richer environments improve both generalization and stability. In addition, a critical novel observation is that (graph theory based) connectivity between the tasks in the environment strongly modulates both stability and generalization, with especially pronounced benefits for attention-based models. These findings underscore the importance of considering not only cognitive architectures but also environmental structure and their interaction in shaping multi-task learning, generalization, and stability. To empirically evaluate these findings, we are conducting behavioral experiments to assess human performance on the same task structure.

Environmental Cues Regulate Cognitive Flexibility After Extended Training

Poster #19, **Poster Session 4**, Thursday 28 May 2026, 17:30-19:00

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Keywords: cognitive flexibility, cognitive control, context, task, switching, associative learning

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Cognitive flexibility, the ability to efficiently switch between tasks, is typically viewed as a resource-demanding executive function under strategic control. However, flexibility may also be shaped by learned associations with environmental context. In the present study, participants were exposed to two environments with different task-switching probabilities across multiple days of training, followed by a probe phase with balanced task-switching probability to assess transfer. During training, a robust proportion effect emerged consistently across all three days, with greater switching efficiency in the high-switch environment. Critically, in the probe phase, this environment-specific effect was absent after 1 and 2 days of training, but emerged reliably after 3 days. These findings suggest that while participants rapidly adapt to local task demands during training, the formation of context-dependent, environment-triggered cognitive flexibility requires extended experience. These findings suggest that people can associate the need for cognitive flexibility with their environment, providing an environmental triggering mechanism for cognitive control.