EPS

Experimental Psychology Society

LONDON MEETING

7-9 January 2026

Open exchange of new ideas is central to EPS meetings. To foster up-to-date discussion, presenters are mandated to report work that is not yet published. We ask that attendees respect this mandate. Please do not record or publish presented material (e.g. via X, Bluesky or Facebook) without the presenter's permission. To remove any ambiguity regarding permission, this programme now includes a symbol next to every abstract (the hashtag shown on this page), where the presenter has agreed permission for their work to be shared on social media. Where no symbol is shown for a given presentation, there should be absolutely no filming, pictures, or social media of any kind. For explicit guidance on reporting at EPS meetings, please refer to the EPS handbook.

A scientific meeting will be held at the Department of Cognitive, Perceptual & Brain Sciences, University College London, 26 Bedford Way, London, WC1H 0AP, between 7th – 9th January 2026.

The local organiser is Adam Parker.

EPS President's Address
Wednesday 7th January, 5.15pm

Serendipity, Strategy and Psychic Secretions: From general processes to individual differences.
Robert Honey, Cardiff University

EPS Bartlett Lecture Symposium
Thursday 8th January, 2.00pm - 5.30pm

From neural networks to mental structures.
Organised by Patrick Haggard.

54th EPS Bartlett Lecture
Thursday 8th January, 5.45pm

A Unified Theory of Dual-Process Cognition.
Matthew Botvinick, Google DeepMind and University College London

Poster Sessions

There will be three poster sessions, to be held on Wednesday 7th January between 6.15pm and 7.15pm in Room 305 with an accompanying wine reception. The second poster session will be held on Thursday 8th January between 1pm and 2pm in Room 305 with an accompanying lunch reception. The third poster session will be held on Friday 9th January between 9.15am and 10.15am in Room 305 with accompanying tea, coffee and pastries.

Conference Dinner

The conference dinner will be held on Thursday 8th January from 7.30pm at the Tas Bloomsbury restaurant.

This form was available from 29th October until 4th December. Now that the form has closed, we will send instructions on how to pay and confirm your place at the conference dinner.

For more details on the conference dinner, please see page 106.

START OF PARALLEL SESSIONS

Session A **- Lower Ground Floor Lecture Theatre**

12:00 **Helene Slaattelid Øya* and Jens Roeser** (Sponsor: Jens Roeser) (Nottingham Trent University) How do you spell "hånd" in English: Does knowing another language affect word retrieval?

12:15 **Srimoyee Chaterjie*, Stephen Monsell and Aureliu Lavric** (Sponsor: Aureliu Lavric) (University of Exeter) Can bilinguals prepare to select among simultaneous voices based on the target speaker's language?

12:30 **Longjiao Sui*, Wanyin Li and Martin Vasilev** (Sponsor: Martin Vasilev) (Dalian Maritime University, China, University of Reading, University College London) From words to phrases: How phrase-level frequency affects reading in L1 and L2 speakers.

12:45 **Rebecca Ward*** (Sponsor: Jeremy Tree) (University of South Wales) Executive Functioning, Theory of Mind and Autism: Exploring the impact of bilingualism.

13:00 **Tea / Coffee**

START OF PARALLEL SESSIONS

Session B **- Ground Floor Lecture Theatre**

12:00 **Thomas Nyman*, Francesco Pompedda*, Pekka Santtila*, Eleonora Di Maso*, Yongjie Sun* and Angelo Zappala*** (Sponsor: Katie Gray) (University of Reading, University of Turku, Finland, Faculty of Arts and Sciences, New York University Shanghai, China, Shanghai Frontiers Science Center of Artificial Intelligence and Deep Learning, New York University Shanghai, China, Åbo Akademi University, Finland, East China Normal University, China, IUSTO - Salesian University Institute Torino Rebaudengo, Italy) Digital Jurors: Testing large language models as shadow juries.

12:15 **Ruijie Wang, Alys Legga*, Alyssia Jansz*, Yuanchen Xu* and Liming Chen*** (Bournemouth University, Dalian University of Technology, China) Generative AI in Healthcare: Effect of explanations and the role of AI on trust, perceived privacy and intent to use.

12:30 **Ariana Modirrousta-Galian*, Janson Yap*, Daryl Lee* and David Shanks** (Sponsor: David Shanks) (University College London) Quizzed by a Chatbot: Using AI for Test-Enhanced Learning.

12:45 **Caroline Catmur, Alicia Mixter*, Ammaar Sultan* and Bryony Payne** (King's College London) Machines Modelling Minds: Limitations on GenAI models' sensitivity to personality when inferring mental states.

13:00 **Tea / Coffee**

START OF PARALLEL SESSIONS

Session A **- Lower Ground Floor Lecture Theatre**

13:30 **Elif Kasgoz* and Asli Kilic*** (Sponsor: Deborah Talmi) (University of Cambridge, Middle East Technical University, Turkiye) Investigating Forward Asymmetry in the Contiguity Effect: Effects of performance, list reduction and event segmentation in the probed recall task.

14:00 **Yicheng Qiu*, Phoebe Fifield*, Lewis Ball, Gareth Gaskell and Heather Ferguson** (Sponsor: Heather Ferguson) (University of Kent, University of York) The effect of sleep on consolidating social interactions in a naturalistic environment.

14:30 **Daryl Lee*, Christopher Berry and David Shanks** (Sponsor: David Shanks) (University College London, University of Plymouth) Contextual cueing of visual search and awareness: Evidence for a single memory system from mousetracking and computational modelling.

15:00 **Tea / Coffee**

15:30 **Deborah Talmi, Jake Bernstein* and Nan (Elva) Peng*** (University of Cambridge, University of Edinburgh) Emotional and Neutral Memories are forgotten at the same pace.

16:00 **Wenjia Joyce Zhao*, Sudeep Bhatia* and Nicholas Ichien*** (Sponsor: Thomas Hills) (University of Warwick, University of Pennsylvania, USA, University of California, USA) Search through Memory Structure.

16:30 **Nooshin Momenzadeh*, Tobiasz Trawinski* and Letizia Palumbo** (Sponsor: Letizia Palumbo) (Liverpool Hope University) The impact of preference for interior space design on incidental recognition memory.

17:00 **Break**

17:15 **EPS President's Address**
Lower Ground Floor Lecture Theatre
Robert Honey, Cardiff University
Serendipity, Strategy and Psychic Secretions: From general processes to individual differences.

18:15 **Poster Session One – Room 305 with accompanying wine reception.**

START OF PARALLEL SESSIONS

Session B **- Ground Floor Lecture Theatre**

13:30 **Denise Cadete*, Matthew Longo, Holly Blood*, Elisa Ferre, Steven Morrison*, Kasia Kubik* and Harriet Morris*** (Sponsor: Matthew Longo) (Birkbeck University of London) From extra fingers to extra arms and even the fingers of others: Extending the limits of supernumerary embodiment.

14:00 **Aaron Kaltenmaier*, Quirin Gehmacher*, Peter Kok*, Matthew Davis and Clare Press** (Sponsor: Clare Press) (University College London, University of Cambridge) Temporal predictions as motor readouts of sensory predictions.

14:30 **Shasha Wei*, Alex Wade*, Daniel Baker* and Catherine Preston** (Sponsor: Catherine Preston) (University of York) Altered vibration signal combination in patients with chronic hand pain.

15:00 **Tea / Coffee**

15:30 **Katherine Roberts, Christopher Atkin, Sam Perry*, Stephen Badham* and Hareth Al-Janabi*** (Nottingham Trent University, University of Birmingham) Supporting older adults' decision-making: Benefits of improved perceptual clarity and reduced cognitive load.

16:00 **Thomas Hills, Li Ying*, Wenji Joyce Zhao*, Ziying Lin*, Shenghua Luan*, Jun Fang*, Chenran Shenzhang* and Minyi Chen*** (University of Warwick, Chinese Academy of Sciences, China, Max Planck Institute for Human Development, Germany, Indiana University, USA) Aging as cognitive enrichment.

16:30 **Rongru Chen*, Emma Holmes and Patti Adank** (Sponsor: Patti Adank) (University College London) Aging Ears, Adapting Minds: How older adults navigate the cognitive demands of degraded speech.

17:00 **Break**

17:15 **EPS President's Address**
Lower Ground Floor Lecture Theatre
Robert Honey, Cardiff University
Serendipity, Strategy and Psychic Secretions: From general processes to individual differences.

18:15 **Poster Session One – Room 305 with accompanying wine reception.**

Session A **- Lower Ground Floor Lecture Theatre**

09:00 **Silvia Seghezzi, Maia Armstrong* and Patrick Haggard** (Birkbeck University of London, University College London) The Cost of 'What Might Have Been': False memories for counterfactual actions.

09:15 **Megan Lawrence* and Charlotte Russell** (Sponsor: Charlotte Russell) (King's College London) Collaborative recall, memory and confidence across the lifespan.

09:30 **Maia Armstrong*, Daniel Yon and Silvia Seghezzi** (Sponsor: Silvia Seghezzi) (Birkbeck, University of London) The neurocognitive mechanisms of counterfactual false memories.

09:45 **Qiying Liu*, Tobias Sommer* and Deborah Talmi** (Sponsor: Deborah Talmi) (Univeristy of Cambridge, University Medical Center Hamburg-Eppendorf, Germany) How do retrieval processes modulate the effect of event boundaries on temporal memory?

10:00 **Elisabeth Knight*, Gabriella Vigliocco, Luca Onnis*, Claudia von Bastian and Alicia Forsberg** (Sponsor: Claudia von Bastian) (University of Sheffield, University College London, University of Oslo, Norway) The interaction of iconic gestures, vocabulary and working memory on early childhood learning.

10:15 **Tea / Coffee**

10:45 **Constantijn van der Burght and Antje Meyer** (Max Planck Institute for Psycholinguistics, The Netherlands, Leiden University, The Netherlands, Radboud University, The Netherlands) Working memory capacity predicts sensitivity to prosodic structure.

11:00 **Gwynnevere Suter*, Ian Apperly, Lei Zhang* and Emma Černis*** (Sponsor: Ian Apperly) (University of Birmingham) Using metamemory to compare dissociation and psychotic-like experiences in the general population.

11:15 **Ryan Elson*, Daniel Cocking, Adam Berrington*, Katherine Dyke*, Mohammad Zia Ul Haq Katshu* and Claudia Danielmeier*** (Sponsor: Emily Crowe) (University of Nottingham, Nottinghamshire Healthcare NHS Foundation Trust) Increased GABA levels in medial frontal cortex are associated with higher working memory accuracy.

11:30 **Xiangqi Luo*, Minhong Zhu*, Zhenjiang Cui*, Jo Taylor, Huafeng Tang*, Zhiyun Dai*, Yuxin Liu* and Zaizhu Han*** (Sponsor: Jo Taylor) (State Key Laboratory of Cognitive Neuroscience and Learning & IDG/McGovern Institute for Brain Research, Beijing Normal University, China, University College London, South Railway Station Campus of Beijing No.12 High School Education Group, China, Chinese University of Hong Kong, China, Institute of Developmental Psychology, Faculty of Psychology, Beijing Normal University, China) The impact of visual imagery absence on fine-grained memory for object colour and size: An Aphantasia Study.

11:45 **Matthew Logie*, Camille Grasso* and Virginie van Wassenhove*** (Sponsor: Robert Logie) (Université Paris Saclay, France) Complexity compression and the when of memory in virtual reality.

12:00 **Annual General Meeting - Lower Ground Floor Lecture Theatre**

13:00 **Poster Session Two - Room 305 with accompanying lunch.**

Session B **- Ground Floor Lecture Theatre**

09:00 **Mark Torrance*, Astha Singh* and Evgeny Chukharev*** (Sponsor: Jens Roeser) (Nottingham Trent University, Department of Computer Science, Iowa State University, USA, Department of English, Iowa State University, USA) Brief lookback cues content generation in spontaneous multi-sentence text production.

09:15 **Rebecca Norman*, Joanne Taylor and Jennifer Rodd** (Sponsor: Jo Taylor) (University College London) Quantifying the characteristics of stimuli in word learning experiments: Insights from large language models.

09:30 **Rupali Limachya*, Steven Frisson, Federica Degno, Kevin Paterson and Ascensión Pagán** (Sponsor: Kevin Paterson) (University of Birmingham, University of Leicester, Bournemouth University) Using eye movements to investigate prediction error cost during natural reading.

09:45 **Yunxi Li*, Jennifer Rodd and Adam Parker** (Sponsor: Adam Parker) (University College London) Processing words in context: Evidence from large-scale eye-movement corpora.

10:00 **Jennifer Rodd, Po-Heng Chen*, Hillarie Mann, Emily Lai*, Yuzhou Jin* and Tianlin Li*** (University College London, National Taiwan University) Web-based open-access vocabulary tests in Mandarin and Cantonese.

10:15 **Tea / Coffee**

10:45 **Louisa Gwynne* and Luigi Tamè** (Sponsor: Luigi Tamè) (University of Kent) Pain and touch differentially modulate corticospinal excitability, independent of afferent inhibition.

11:00 **Rachel Hagan*, Ralph Pawling, Francis McGlone and Susannah Walker** (Sponsor: Susannah Walker) (Liverpool John Moores University, Aalto University, Finland) Facial EMG responses to bitter, astringent and chemesthetic compounds differentiate between PROP Tasters and Non-Tasters.

11:15 **Siobhan Caughey*, Marius Golubickis, Esther Selvaraj*, Parnian Jalalian, Yadvi Sharma and Neil Macrae** (Sponsor: Neil Macrae) (University of Manchester, United Arab Emirates University, UAE, University of Aberdeen) Self-prioritization as a decisional strategy.

11:30 **Emerald Grimshaw*, Simon Thurlbeck*, Anna Matejko*, Robert Kentridge* and Dorothy Cowie** (Sponsor: Dorothy Cowie) (Durham University) How do the multisensory and interactive features of Immersive Virtual Reality impact its success as a pedagogical tool?

11:45 **George Gabriel*** (Sponsor: Emily Williams) (University of Leeds**)** Multi-session tracking of problem-solving abilities using a string rewriting task.

12:00 **Annual General Meeting - Lower Ground Floor Lecture Theatre**

13:00 **Poster Session Two - Room 305 with accompanying lunch.**

Session A **- Lower Ground Floor Lecture Theatre**

EPS Bartlett Lecture Symposium

From neural networks to mental structures.

Organised by Patrick Haggard.

14:00 **Elizabeth Jefferies** (University of York) Mapping the state space of thought: Default mode dynamics and semantic cognition.

14:30 **Tim Rogers** (University of Wisconsin at Madison, USA) Connecting models of cognitive control and semantic knowledge.

15:00 **Ulrike Hahn** (Birkbeck, University of London) Are large language models contributing to our understanding of cognition?

15:30 **Tea / Coffee**

16:00 **Kim Stachenfeld** (Columbia University, USA) Discovering symbolic models of human and animal behaviour with LLMs.

16:30 **Emmanuel Dupoux** (Ecole des Hautes Etudes en Sciences Sociales, France) Can AI help understand early language acquisition?

17:00 **Chris Summerfield** (University of Oxford and UK AI Security Institute) AI, Cognition and Society.

17:30 **Break**

17:45 **54th EPS Bartlett Lecture**
Lower Ground Floor Lecture Theatre
Matthew Botvinick, Google DeepMind and University College London
A Unified Theory of Dual-Process Cognition.

Conference Dinner

Session B **- Ground Floor Lecture Theatre**

14:00 **Sebastian Korb*, Joshua Baker*, Themis Efthimiou*, Arthur Elsenaar*, Marc Mehu*, Alister Clarke* and Matteo Lisi*** (Sponsor: Gethin Hughes) (University of Essex, University of Derby, University of Edinburgh, Royal Academy of Art, Royal Conservatory, The Hague, Webster Vienna Private University, Austria, Royal Holloway University) Electrically induced facial feedback: Effects on felt and perceived emotion.

14:30 **Emily Mason*, Mintao Zhao* and Stephanie Rossit** (Sponsor: Stephanie Rossit) (University of East Anglia) Beyond Categorical Emotion Perception: Profiling human and AI perception of face, text and voice-based emotions.

15:00 **Ruben Azevedo* and Ozan Cem Ozturk*** (Sponsor: Zara Bergstrom) (University of Kent) Context dependent cardiac cycle effects on the detection of threat-signalling stimuli.

15:30 **Tea / Coffee**

16:00 **Nigel Harvey, Xiaozhou Tan*, Ximeng Yin* and Susie Qi*** (University College London) Ethical compromise: Frequency, determinants and characteristics.

16:30 **Zo Ebelt*, James Yearsley*, Christoph Gallus*, Pawel Blasiak* and Emmanuel Pothos** (Sponsor: Emmanuel Pothos) (City University of London, THM Business School, Germany, Polish Academy of Sciences Cracow Branch, Poland) Freezing or Fuelling Change? Quantum signatures in human probability updating.

17:00 **Jinjin Wu*, George Farmer, Olivia Pready-James* and Paul Warren*** (Sponsor: Ellen Poliakoff) (University of Manchester) The robustness of anchoring in a naturalistic VR-based task.

17:30 **Break**

17:45 **54th EPS Bartlett Lecture**
Lower Ground Floor Lecture Theatre
Matthew Botvinick, Google DeepMind and University College London
A Unified Theory of Dual-Process Cognition.

Conference Dinner

09:15 **Poster Session 3 – Room 305 with accompanying tea, coffee and pastries.**

10:15 **Break**

START OF PARALLEL SESSIONS

Session A **- Lower Ground Floor Lecture Theatre**

10:30 **Serena Yu-xi Shi*, Jo Taylor and Bonnie Wing-Yin Chow*** (Sponsor: Jo Taylor) (University College London) The direct and indirect effects of morphological awareness on reading comprehension in L1 Chinese and L2 English.

11:00 **Dave Kenneth Tayao Cayado* and Kathy Rastle** (Sponsor: Kathy Rastle) (Royal Holloway, University of London) The Cost of a Narrow Lens: Why morphological processing and learning research needs more languages.

11:30 **Shijun (Iris) Yu*, Ian Apperly and Andrea Krott** (Sponsor: Andrea Krott) (University of Birmingham) No difference in lexical alignment between bilingual and monolingual primary school children.

12:00 **Yung Han Khoe*, Gerrit Jan Kootstra*, Stefan Frank*, Rob Schoonen* and Edith Kaan*** (Sponsor: Andrea Krott) (University of Birmingham, Radboud University, The Netherlands, University of Florida, USA) Investigating shared syntax in Spanish-English bilinguals and bilingual cognitive models: Code-switching increases cross-language structural priming.

12:30 **Lunch**

09:15 **Poster Session 3 – Room 305 with accompanying tea, coffee and pastries.**

10:15 **Break**

START OF PARALLEL SESSIONS

Session B **- Ground Floor Lecture Theatre**

10:30 **Friederike Schlaghecken** (University of Warwick) Conflict trials do not trigger cognitive adaptation in confound-minimized interference tasks.

11:00 **Paul Bejjani*, Karina Linnell, Mirko Febbo*, Rob Davis*, Carlos Trenado*, Laura Rai* and Guido Orgs*** (Sponsor: Karina Linnell) (Goldsmiths, University of London, Max Planck Institute for Empirical Aesthetics, Germany, University College London) Towards a causal investigation of flow and performance.

11:30 **Francesco Cabiddu*, Robyn Griffiths*, Sofia Tsitsopoulou* and Gary Jones** (Sponsor: Gary Jones) (Nottingham Trent University) Sequence length and time-course reveal limits of statistical learning theories.

12:00 **Varun Ramgopal*, Greta Fastrich*, Philip Higham, Ariana Modirrousta-Galian*, Mansi Pattni*, Rosalind Potts*, Julie Hadwin* and Tina Seabrooke** (Sponsor: Tina Seabrooke) (University of Southampton, University College London, University of Birmingham) Examining the benefits of spaced retrieval practice on transfer and the student experience in the classroom.

12:30 **Lunch**

Session A **– Lower Ground Floor Lecture Theatre**

13:30 **Jens Roeser, Pablo Aros Munoz* and Mark Torrance*** (Nottingham Trent University) "Write here, write now": Spelling difficulty disrupts parallel planning in sentence production.

14:00 **Martin Vasilev, Marina Serrano-Carot*, Hemu Xu* and Bernhard Angele** (University College London, Universidad Nebrija, Spain) Using webcams to study eye movements during reading: Are we there yet?

14:30 **Adam Parker, Amrita Bains, Dorothy Gao*, Emma Hance*, Yunxi Li* and Yifangjia Zhang*** (University College London, University of Oxford) Situational reading enjoyment predicts gaze behaviour during text processing.

15:00 **Gary Jones, Francesco Cabiddu*, Wenchong Du* and Caroline Rowland*** (Nottingham Trent University, Max Planck Institute, The Netherlands) Revisiting the noun bias: How frequency explains cross-linguistic differences in noun and verb production across early childhood.

15:30 **End of Meeting**

Session B **- Ground Floor Lecture Theatre**

13:30 **Carmen Lenatti*, Desirée Lopis*, Heather Ferguson and Luigi Tamè** (Sponsor: Luigi Tamè) (University of Kent, Université Paris Nanterre, France) Unveiling the impact of ageing on the body structural representations across different skin surfaces.

13:45 **Veronica Pisu*, Omer Yildiran*, Chloe Lam*, Saivydas Villani*, Pascal Mamassian*, Dominik Straub*, Constantin Rothkopf* and Guido Maiello*** (Sponsor: Anna Metzger) (University of Southampton, École Normale Supérieure, France, New York University, USA, Technical University of Darmstadt, Germany, University of Cambridge) Continuous psychophysics for rapid assessment of visual, oculomotor and upper-limb motor function.

14:00 **Samantha Dodds*, Ellen Poliakoff, Emma Gowen, Cheryl Capek* and Peter Kyberd*** (Sponsor: Ellen Poliakoff) (University of Manchester, University College London) More similar than different: Motor imagery use in laterality judgements of human and prosthetic hands.

14:15 **Celia Blaise*, Holly Clark* and Hannes Saal*** (Sponsor: Claudia von Bastian) (School of Psychology, University of Sheffield, University of Glasgow, Insigneo Institute for in silico Medicine, University of Sheffield) Where do I stop? How observer perspectives distort our body boundaries.

14:30 **Helen Smithson*, Philip Ulrich and James Cane** (Sponsor: James Cane) (Canterbury Christchurch University) Effects of ambient odour on unconscious visual processing: Evidence from breaking continuous flash suppression (bCFS).

14:45 **Patrick Haggard, Mihaela Dimova and Vivian Jia** (University College London) Tactile spatial perception and transformation noise.

15:00 **Einat Rashal*** (Sponsor: TBC) (Keele University) Grouping strength and presentation duration effects in the competition between grouping organizations.

15:15 **Maria Elena Stefanou*** (Sponsor: Charlotte Russell) (King's College London) The modulating effects of attention in multisensory integration.

15:30 **End of Meeting**

The first poster session will be held in Room 305, 26 Bedford Way, between 6:15 - 7:15pm, with an accompanying wine reception.

1. **Robyn Lees*, Denise Cadete*, Elisa Ferre and Matthew Longo** (Sponsor: Matthew Longo) (Birkbeck, University of London) Graphesthesia on held tools: Recognition of letters with both hands.

2. **Md Faysal*, Anqi Lei* and Nerissa Ho*** (Sponsor: Julie Ji) (University of Plymouth) Predictive modelling of psychological distress using daily thought patterns: A novel supervised machine learning approach.

3. **Melis Ozkara*, Alessandra Valentini*, Maria Arche* and Anuenue Baker-Kukona** (Sponsor: Anuenue Baker-Kukona) (University of Greenwich) Linking language and mathematics: Revisiting cross-domain and within-domain structural priming of relative clause attachments.

4. **Annika Boldt and Alejandro Lorca Vyhmeister*** (University College London, École Normale Supérieure, France) Metacognitive switch costs.

5. **Sonima Sharma*, Denise Cadete*, Matthew Longo and Elisa Ferre** (Sponsor: Matthew Longo) (Birkbeck, University of London) From Skin to Nail: Mapping tactile salience across hand dominance.

6. **Jordan Gunn* and Sean Polyn*** (Sponsor: Deborah Talmi) (Cambridge University, Vanderbilt University, USA) Same Item, Separate Contexts: Dissecting the structure of memory for repeated experience in free and serial recall.

7. **Chinwe Ekwuaju*, Ellen Seiss, Alastair Smith, Mathew Green* and Tara Zaksaite** (Sponsor: Tara Zaksaite) (Bournemouth University, University of Plymouth) When Routes Overlap: Executive function and memory interference in spatial navigation.

8. **Mohammed Seyed Houssaini* and Paul Engelhardt*** (Sponsor: Gabriella Vigliocco) (University of East Anglia) Semantic Resonance and Action Prediction: Modulating dynamic updating and static matching with action verbs.

9. **Locklina Skitt*, Irena Arslanova, Gianluca Finotti* and Silvia Seghezzi** (Sponsor: Silvia Seghezzi) (Birkbeck College, University of London) The neural correlates of sense of agency and its modulating effect between interoception and autism spectrum disorder: An EEG study.

10. **Daniel Fray*, Pietro Caggiano*, Keith Laws* and Nicholas Shipp*** (Sponsor: Mike Page) (University of Hertfordshire) Reaching Space: Sensory and environmental effects, a VR study.

11. **Emily Perry*, Andrew Martin and Maria Gallagher** (Sponsor: Maria Gallagher) (University of Kent) Investigating the time course of verticality sensitivity changes during visuo-vestibular conflict.

12. **Alnur Alchinbay*, Rob Honey, Dominic Guitard and Katy Burgess** (Sponsor: Dominic Guitard) (Cardiff University) The nature of conditioned inhibition.

13. **Greta Mohr*, Davina Vadgama*, Ruby De Lanerolle*, Sharon Chung*, Feng Dong* and David Lagnado** (Sponsor: David Lagnado) (University College London, University of Strathclyde) Everyday Causal Judgments of Flu Treatments: The role of effectiveness, outcomes, side effects and counterfactual alternatives.

14. **Chi Yan*, Geoffrey Bird, Maria Elena Stefanou* and Caroline Catmur** (Sponsor: Caroline Catmur) (Department of Psychology, King's College London, University of Oxford, University College London, Department of Neuroimaging, King's College London) The Empathic Mind's Focus: The mediating role of Alexithymia in the relationship between attentional control and empathy.

15. **Yue Qiu*, Beth Jefferies and Emma James** (Sponsor: Emma James) (University of York) How does prior morphological knowledge facilitate word learning and consolidation?

16. **Bowen Xiao* and Rebecca Lawson** (Sponsor: Rebecca Lawson) (University of Cambridge) A slow-paced task reduces readiness but increases caution under ambiguity.

17. **Nikki Ghadiminia*, Ruben Azevedo*, Robin Hellerstedt and Zara Bergstrom** (Sponsor: Zara Bergstrom) (University of Kent, Universidad Politécnica de Madrid, Spain) The effects of arousal on episodic memory retrieval.

18. **Raffaele Tucciarelli*, Laura Bird*, Zdenek Straka*, Maggie Szymanska*, Mathew Kollamkulam*, Harshal Sonar*, Jamie Paik*, Danielle Clode*, Matej Hoffmann*, Dorothy Cowie and Tamar Makin*** (Sponsor: Matthew Longo) (University of Cambridge, University College London, Durham University, Czech Technical University in Prague, Czech Republic, Reconfigurable Robotics Lab, Switzerland) Shaping the developing homunculus: The roles of deprivation and compensatory behaviour in sensory remapping.

19. **Jai Allen*, Katy Burgess and Rob Honey** (Sponsor: Katy Burgess) (Cardiff University) Does generating category exemplars enhance the recall of a list of words?

20. **Emel Küçük* and David Pitcher** (Sponsor: David Pitcher) (University of York) Mapping the third visual pathway using naturalistic stimuli.

The second poster session will be held in Room 305, 26 Bedford Way, between 1 - 2pm, with an accompanying lunch reception.

1. **Katherine Jennings*, Elisa Ferre and Matthew Longo** (Sponsor: Matthew Longo) (Birkbeck, University of London) No evidence of tactile distance anisotropy on the lips.
2. **Mahmoud Elsherif** (University of Leicester and University of Birmingham) Are two words seen as one object? How age-of-acquisition affects recognising and production pictorial representations of compound word.
3. **Paulina Salgado-Garcia*, Rory Devine* and Andrea Krott** (Sponsor: Andrea Krott) (University of Birmingham) The protective effect of bilingualism on mental health in early and middle childhood: A longitudinal investigation.
4. **Nick Simpson, Kirsten Rittershofer, Emma Ward, Matan Mazor and Clare Press** (Sponsor: Clare Press) (Department of Experimental Psychology, University College London, Functional Imaging Laboratory, University College London, All Souls College, University of Oxford, Department of Experimental Psychology, University of Oxford) A perceptual repulsion from gravitational expectations of acceleration.
5. **Dominica Eliasova*, Chloe Brunskill* and Zara Bergstrom** (Sponsor: Zara Bergstrom) (University of Kent, University of York) Does lying about the past affect memory for the truth differently in young and old adults?
6. **Martin Fischer and Samuel Shaki*** (University of Potsdam, Germany, Ariel University, Israel) Contextual effects on numerosity processing: Evidence for arithmetic-related biases.
7. **Ioana Andrada Mihalache*, Beth Richardson* and Philipp Ruhnau*** (Sponsor: John Marsh) (University of Lancashire) Reducing fatigue symptoms using neurostimulation: Improving wellbeing through home-based treatments.
8. **Cheyenne Svaldi* and Jo Taylor** (Sponsor: Jo Taylor) (University College London) The influence of classroom instruction on reading proficiency of curriculum words in primary school children.
9. **Katie Whitewood*, Nikki Ghadiminia*, Robbie Sutton* and Zara Bergstrom** (Sponsor: Zara Bergstrom) (University of Kent) Correcting misinformation images in memory: The impact of correction format on belief updating.
10. **Claudia von Bastian, Ayşin Aytatlı* and Hannes Saal*** (University of Sheffield) Testing the effect of statistical context on working memory.
11. **Chunlin Liao*, Wen Wen* and Patrick Haggard** (Sponsor: Patrick Haggard) (University College London, Rikkyo University, Japan) Experimenting with a hierarchical model of human sense of agency.
12. **Helen Binks* and Roni Tibon** (Sponsor: Roni Tibon) (University of Nottingham) Emotion Regulation and Memory: The impact of cognitive reappraisal on the trade-off effect.
13. **Misian Maljoku*, Maryam Haq*, Anna Sedda and Elisa Ferre** (Sponsor: Elisa Ferre) (Birkbeck University of London, London, Heriot-Watt University) Gravity shapes adaptive emotions.

14. **Andreia Santiago*, Nuno Gomes*, Louise Ewing, Marie Smith and Ines Mares** (Sponsor: Ines Mares) (ISPA – Instituto Universitário, Portugal, Universidade de Aveiro, Portugal, University of East Anglia, University of Western Australia, Australia, Birkbeck College, University of London) Distinct dimensions of social reward and their relation to prosocial behaviour.

15. **Brian Wong*, Arthur Samuel* and Efthymia Kapnoula** (Sponsor: Matthew Mak) (Basque Center on Brain, Language and Cognition, Spain, University of the Basque Country, Spain, Stony Brook University, USA, Ikerbasque, Basque Foundation for Science, Spain) Weak links between speech perception and production at the subphonemic level.

16. **Fiona Lancelotte* and Alexa Morcom** (Sponsor: Alexa Morcom) (University of Sussex) Knowing More, Remembering Less: Semantic control and episodic encoding in ageing.

17. **Sophia Hand*, Thomas Chazelle*, Sam Fenwick*, Meike Scheller*, Chris Allen* and Marko Nardini** (Sponsor: Marko Nardini) (Durham University) Normalising multisensory cue reliabilities for individual participants in cue combination studies: A comparison of two methods.

18. **Andrew Camara*, Lukasz Walasek*, Daniel Bennett* and Elliot Ludvig*** (Sponsor: Matthew Mak) (University of Warwick, Monash University, Australia, University of Melbourne, Australia) The Cash-Out feature in sports betting: The role of subjective control.

19. **Jamie Moffatt*, Leif Johansen*, Claire Yuke Pi*, Simon Thurlbeck*, Marco Gilles*, Sylvia Xueni Pan* and Dorothy Cowie** (Sponsor: Dorothy Cowie) (Durham University, Aachen University, Germany, Goldsmiths University of London) Embodiment and adaptation to an extendable arm in children and adults.

20. **Rahma Azmi*, Nooshin Momenzadeh*, Irene Senna*, Tobiasz Trawinski* and Letizia Palumbo** (Sponsor: Letizia Palumbo) (Liverpool Hope University) The impact of multisensory stimulation on wellbeing.

The third poster session will be held in Room 305, 26 Bedford Way, between 9.15am – 10.15am, with accompanying pastries.

1. **Hemu Xu*, Daryl Lee* and David Shanks** (Sponsor: David Shanks) (University College London) Measuring contextual cuing of visual search with artificial foveation: A scalable online alternative to eye tracking.

2. **Bryony Payne, Alicia Mixter*, Geoffrey Bird and Caroline Catmur** (King's College London, University of Oxford, University College London) Training better mental state understanding across different life experiences.

3. **Weilin Liu*, Sarah White and Kevin Paterson** (Sponsor: Kevin Paterson) (University of Leicester) Resilience and cost in syntactic prediction: Evidence from Either-Or construction.

4. **Tianyi Wang*, Liory Fern-Pollak* and Jackie Masterson** (Sponsor: Jackie Masterson) (University College London) Differences in spelling skill in adult speakers of Mandarin: An orthographic processing explanation.

5. **Aryan Misra*, Tommy McConnell* and Deborah Talmi** (Sponsor: Deborah Talmi) (University of Cambridge) LLM-based semantic analysis of involuntary recall in a laboratory analogue of trauma.

6. **Quirin Gehmacher, Aaron Kaltenmaier, Juliane Schubert, Nathan Weisz and Clare Press** (Sponsor: Clare Press) (Department of Experimental Psychology, University College London, Department of Imaging Neuroscience, University College London, Paris-Lodron-University of Salzburg, Austria, Christian Doppler University Hospital, Austria) The dynamic relationship between pupil dilation and neural surprise in natural language comprehension.

7. **Maryam Haq*, Misian Maljoku*, Natalie Ellis* and Elisa Ferre** (Sponsor: Elisa Ferre) (Birkbeck University of London) Detecting Gravity: The role of vestibular signals in internalising terrestrial gravity.

8. **Tara Zaksaite, Calvin Laursen, Rachel Skinner and Ellen Seiss** (Bournemouth University) The role of general and social anxiety in driving anxiety.

9. **Anqi Lei* and Nerissa Ho*** (Sponsor: Julie Ji) (University of Plymouth) Mapping emotional experiences onto thought patterns during film viewing.

10. **Wanyin Li*, Rachel McCloy and Eugene McSorley*** (Sponsor: Rachel McCloy) (University of Reading) Fast and Focused: Eye-tracking reveals decision-making strategies in food choices across social groups.

11. **Sze Long Chung*, Greta Mohr, Ruby De Lanerolle* and David Lagnado** (Sponsor: David Lagnado) (Department of Experimental Psychology, University College London, Department of Arts and Humanities, University College London) Credit and blame in medical context: Effects of treatment, adherence and patient actions.

12. **Anna Metzger and Matteo Toscani** (Bournemouth University) Modelling haptic perception of objects' 3D shape.

13. **Parnian Jalalian*, Marius Golubickis, Yadvi Sharma*, Rinki Kanakraj*, Esther Selvaraj* and Neil Macrae** (Sponsor: Neil Macrae) (University of Aberdeen, United Arab Emirates University, UAE) Reward value shapes the time course of self-bias.

14. **Jiayu Liu*, Beth Jefferies and Scott Cairney** (Sponsor: Scott Cairney) (University of York) Retrieval-induced forgetting of bittersweet memories.

15. **Jessye Clarke*, Kirsten Rittershofer*, Daniel Yon and Clare Press** (Sponsor: Clare Press) (Experimental Psychology, University College London, Department of Imaging Neuroscience, University College London, Birkbeck, University of London) Perceptual predictions track subjective, over objective, statistical structure.

16. **Robyn Griffiths* and Vibeke Rønneberg*** (Sponsor: Gary Jones) (Nottingham Trent University, University of Stavanger, Norway) Investigating children's handwriting process using real-time handwriting data.

17. **Christy Goodro*, Eva Lesovskaia*, Rebecca Knight* and Caroline Whyatt*** (Sponsor: Mike Page) (University of Hertfordshire) Time-to-contact perception and navigation skills in autism: Evidence from two virtual tasks.

18. **Martin Thirkettle** (The Open University) Toothless but Still Superior: Grins aren't required for happiness superiority effect in multi-target face search.

19. **Pegah Imannezhad* and Emmanuel Pothos** (Sponsor: Emmanuel Pothos) (City St George's, University of London) Quantum and Bayesian Models of Learning: A dual-process account of artificial grammar acquisition.

20. **Emily Williams, Tom Peney*, Matthew Warburton* and Faisal Mushtaq** (University of Leeds, University of Hull) Turbo Typing: Longitudinal dataset and analysis of typing skill and sub-skill development in young learners.

How do you spell "hånd" in English: Does knowing another language affect word retrieval?

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This research investigates to what extent form-related words such as cognates (share form and meaning) and false friends (share form but not meaning) affects lexical retrieval in bilinguals. If language co-activation occurs on a meaning level, false friends are predicted to be more difficult to retrieve. However, co-activation on a form level (orthography and phonology) is predicted to facilitate word retrieval. In three experiments, Norwegian (L1)- English (L2) bilinguals (Ns = 66, 60, 86) named images of everyday objects by typing their name in English while ignoring a superimposed (Exp. 1) or auditory (Exps. 2 and 3) distractor. Word type of image names and their distractor were either cognates, false friends, or a translation equivalent. Distractors were presented in Norwegian (all experiments) or English (Exps. 1 and 2). Distractor and image were presented simultaneously across all experiments; to dissociate the effect of distractor and image, Exp. 3 also presented the distractor before image (SOA of -300 ms) or after (SOA of 300 ms). Our results strongly suggest that word-form co-activation across languages facilitates writing in a non-dominant language, even when the co-activated L1 word differs in meaning from the target words

Can bilinguals prepare to select among simultaneous voices based on the target speaker's language?

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Previous multi-talker studies show that shifting attention between simultaneous voices worsens the listener’s performance compared to maintaining attention to the same voice. This “switch cost” can be reduced by cueing in advance the gender or location of the target speaker, indicating that listeners can tune in proactively to a voice based on its location or gender. Here we investigated whether bilingual listeners can also prepare for the language spoken by one of two simultaneous speakers. In two sessions, Cantonese-English bilinguals heard two simultaneous voices – a female and a male, each saying a number, one in Cantonese, one in English (the language spoken by each speaker varied unpredictably). A visual cue specified the language (in one session) or the gender (in another session) of the target voice at a cue-stimulus interval (CSI) which either permitted preparation (CSI = 1400 ms) or did not (CSI = 50 ms). Participants categorised as > or < 5 the number spoken by the target voice. The longer CSI reduced the switch cost by 46% for language cueing and by 31% for gender-cueing. Thus, preparatory tuning is at least as effective based on perceptual characteristics of a language as based on gender-related characteristics, such as pitch.

From words to phrases: How phrase-level frequency affects reading in L1 and L2 speakers.

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Language is creative but systematic, characterised by recurring multi-word sequences (MWSs), e.g., “black coffee”. Previous research shows that MWSs are read faster than less common sequences (e.g., “bitter coffee”). Since the evidence mostly comes from isolated-sentence experiments, it remains unclear how phrasal and word frequency influence natural reading and how their effects unfold over time. This study used eye-tracking corpora of narrative reading: the GECO (English monolinguals) and the GECO-CN (Chinese-English bilinguals). We extracted 1,300 adjective-noun pairs and analysed the effects of phrasal and constituent word frequency on earlier and later eye-tracking measures. The results revealed interactions between phrasal and word frequency in both L1 and L2 speakers. When phrasal frequency was low, word frequency had a stronger facilitative effect; as phrasal frequency increased, the word frequency effect weakened and even reversed. This suggests that frequent MWSs become entrenched in memory, consistent with usage-based models of language (Goldberg, 2006). Importantly, L2 speakers exhibited stronger word and phrasal frequency effects than L1 speakers, in line with lexical entrenchment accounts (Diependaele et al., 2013). These findings show that both lexical and phrasal knowledge influence eye movements during reading, and that language proficiency plays a role in modulating their effect.

Executive Functioning, Theory of Mind and Autism: Exploring the impact of bilingualism.

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Research shows that difficulties with Theory of Mind (ToM) and executive functioning (EF) are central to autism. However, emerging evidence suggests that bilingualism may confer benefits in ToM and EF. To date, existing studies concentrate on typically developing children, leaving a gap in understanding bilingualism across the lifespan. This study explored the influence of bilingualism on ToM and EF in both autistic and neurotypical adults. Participants completed a series of ToM and EF tasks, including the Director Task and a Task-Switching Paradigm. Analyses with fifty participants reveal two significant bilingualism-related advantages. First, bilingual participants demonstrated faster reaction times on correct incongruent trials in the Flanker Task. Second, bilinguals exhibited lower global switch costs. For the Flanker Task, a significant main effect of autism diagnosis was observed, indicating reduced accuracy among autistic participants. No further significant effects were found for bilingual status or autism diagnostic status. Findings suggest that bilingual experience enhances processing efficiency, regardless of autism diagnosis. In contrast, no significant differences were observed on ToM tasks. This may reflect limitations in task sensitivity or suggest that ToM abilities converge by adulthood. Results support evidence that bilingualism enhances cognitive flexibility and interference management for both neurodivergent and neurotypical adults.

Digital Jurors: Testing large language models as shadow juries.

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Shadow juries provide attorneys with feedback on trial strategies but are costly, challenging, and methodologically limited. This study investigated whether large language models (LLMs) can serve as digital juror "twins," replicating decisions of human jurors based on their sociodemographic and attitudinal profiles. Using data from Salerno et al. (2021), we created LLM-based counterparts for over 2,000 mock jurors by conditioning GPT-4o and GPT-o1 on each participant's voir dire responses and demographic information. These digital twins then rendered verdicts and awarded damages on the same trial vignettes. Results showed alignment between humans and their LLM twins. Verdicts were significantly associated (χ^2 = 294.87–305.70, $p < .001$, Cramer's V = 0.38–0.39) and demonstrated fair agreement (κ = 0.36–0.37). Damages awarded were significantly associated (χ^2 = 598.16–645.79, $p < .001$, Cramer's V = 0.74–0.77) and demonstrated substantial agreement (κ = 0.74–0.77). LLMs reproduced many - but not all - relationships between juror characteristics and case outcomes observed in humans. While differences emerged in the influence of extended voir dire measures, findings support the feasibility of constructing LLM-based shadow juries. These findings highlight the promise and constraints of LLMs as scalable, cost-effective shadow juries.

Salerno, J. M., Campbell, J. C., Phalen, H. J., Bean, S. R., Hans, V. P., Spivack, D., & Ross, L. (2021). The impact of minimal versus extended voir dire and judicial rehabilitation on mock jurors' decisions in civil cases. *Law and Human Behavior*, *45*(4), 336-355. https://doi.org/10.1037/lhb0000455

Generative AI in Healthcare: Effect of explanations and the role of AI on trust, perceived privacy and intent to use.

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Artificial intelligence (AI) tools such as ChatGPT are increasingly used by the public for everyday healthcare information and self-diagnosis, yet little is known about people perceive their trustworthiness, privacy implications, and usefulness. This study examined how ChatGPT's role (as a diagnostic tool or explanation assistant) and the type of explanation it provides influence these perceptions. A within-subject experiment was conducted with 98 participants, who reviewed 12

simulated patient-ChatGPT conversations across varied clinical scenarios. Conversations were manipulated across ChatGPT's role and explanation style ("why," "confidence," or none). After each interaction, participants rated trust, perceived privacy, and intent to use. The results revealed that trust and intent to use were rated higher when ChatGPT acted as an explanation assistant than as a diagnostic tool. Privacy was rated highest for "confidence" explanations. Interaction effects indicated that preferences of explanations differed by ChatGPT's role. Notably, "why" explanations were preferred when ChatGPT served as an explanation assistant, whereas no explanation was preferred when it acted as a diagnostic tool. These findings underscore the importance of context-sensitive AI design. Tailoring ChatGPT's role and explanation style may foster trust, support patient engagement, and guide responsible use of generative AI in everyday healthcare and self-diagnostic settings.

Quizzed by a Chatbot: Using AI for Test-Enhanced Learning.

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Over a century of research has shown that taking tests improves memory of studied information and improves learning and memory of new information compared to other methods, such as note-taking or restudying. This phenomenon is known as test-enhanced learning (TEL). In a preregistered experiment (N = 171), we examined whether an artificial intelligence (AI) chatbot can generate practice quizzes that promote TEL, which would facilitate the implementation of TEL by educators. We randomly assigned participants to a retrieval practice group or a control group. All participants first watched a ~15-minute educational video. The retrieval practice group then completed 20 multiple-choice questions (MCQs) generated by Gemini 2.5 Pro based on the video, each followed by immediate feedback that identified the correct answer and explained why it was correct. The control group read 20 explanations that corresponded to each MCQ and its feedback in the retrieval practice condition. Two days later, all participants completed a final test consisting of 20 human-generated MCQs. Contrary to our hypothesis, the two groups did not significantly differ in their final test performance. I will discuss these null results and present a planned follow-up experiment, for which data should be collected by the time of the conference.

This work was supported by the ESRC (ES/Y002482/1).

Machines Modelling Minds: Limitations on GenAI models' sensitivity to personality when inferring mental states.

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One of the most important skills in human social interaction is mentalising: inferring other people's hidden mental states. Improving the ability of artificial intelligence (AI) to infer mental states will be critical for future applications in areas such as education or mental health. Unfortunately, standard tests of both AI and human mentalising do not consider the importance of representing the mind that is generating the mental state. However, humans are highly sensitive to target personality when

inferring mental states. For example, in the 'Sally-Anne' false belief test, the more paranoid Sally is, the more likely human participants are to infer that she believes her object has been moved. Here we report performance from a range of generative AI models on this task. Many models including Claude-3.5, Llama3-70B, ChatGPT-4, o1-mini and DeepSeek-R1-70B demonstrate sensitivity to the target's personality, whereas the smaller Llama3-8B parameter model showed more rigid performance, consistent with only a superficial ability to 'pass' tests of mental state inference. Performance also varied substantially as a function of question type (free response, binary, or probability). These data illustrate the importance of ensuring AI models have sufficient information to personalise their responses to the mind whose mental state they are inferring.

Investigating Forward Asymmetry in the Contiguity Effect: Effects of performance, list reduction and event segmentation in the probed recall task.

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Individuals tend to recall items studied close in time consecutively, a phenomenon known as the contiguity effect, which is typically forward-asymmetric and time-invariant. Episodic memory models explaining this effect are divided into two categories: causal and non-causal. Causal models propose that each recalled item cues the next, whereas non-causal models attribute the effect to similarities between study and test contexts. To evaluate this similarity account, the probed recall task was developed. Prior findings using this task reported symmetrical short-term contiguity alongside long-term contiguity, outcomes that have been taken to favour causal accounts. In this line of work, four experiments were conducted to optimize the probed recall task by manipulating the number of study lists and event segmentation. Across all studies, both short-term and long-term contiguity effects were consistently observed, strengthening the case for causal explanations. Importantly, as correct list recall rate increased, the expected forward asymmetry emerged. This suggests that earlier findings of symmetry may have reflected low overall performance rather than a true absence of asymmetry in this paradigm. Together, these results clarify how the probed recall task captures the temporal organization of episodic memory and refine our understanding of the mechanisms underlying contiguity.

The effect of sleep on consolidating social interactions in a naturalistic environment.

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Previous studies have revealed that social relationships can be affected by the quality of sleep. Poor sleep can lead to greater conflict, reduced empathy, and stronger prejudice and stereotypes. To extend this research beyond the laboratory, we used wearable eye-tracking glasses to record social interactions in real-world contexts. Gaze allocation serves a crucial role in both gathering

information and communicating with others. The present study aims to investigate whether social behaviours and social memory can be enhanced by sleep. Participants' eye-movement during conversations were recorded and they were asked to recall the conversation in two different timepoints (immediate and delayed). Results showed that mutual and social gaze during conversation decreased significantly after sleep compared to wake, reflecting more efficient communication (Richardson et al., 2007). Moreover, people who had an overnight sleep recalled more of the conversation content and were more accurate in recall than people who stayed awake.

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Contextual cueing of visual search and awareness: Evidence for a single memory system from mousetracking and computational modelling.

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Many studies have argued that contextual cueing of visual search reflects an implicit process, with no correlation between learning and awareness measures. To gain a deeper understanding of the relationship between learning and awareness, we employed a novel mousetracking method in which participants moved an artificial fovea across AI-generated images to find a target. Search efficiency was measured via response times (RT) and cursor path ratio (CPR). For both measures, contextual cueing was independent of awareness in a contrast between high-confidence recognition misses and correct rejections. However, unlike prior research, a negative correlation between recognition ratings (quantifying awareness of repeated images) and search efficiency for old images was found. In a subsequent computational modelling analysis, we compared single-system (SS) models with a common signal for recognition and CPR, and multiple-systems (MS) models with two distinct signals. The SS unequal-variance model best fit CPR data, capturing critical patterns of the experimental results, supporting the single memory perspective and showcasing the value of the new mousetracking approach in studying learning and awareness in visual search.

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Emotional and Neutral Memories are forgotten at the same pace.

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The emotional memory literature is replete with claims that humans forget emotionally-arousing experiences more slowly than neutral ones. Accordingly, increased accuracy in recognising emotional stimuli in delayed memory tests has been attributed to preferential consolidation. We challenge this conclusion with receiver operating characteristic (ROC) curve data from two

experiments in which participants encoded neutral and negative sentences. During each of three recognition tests, they made old/new judgements with confidence ratings for a mixed list of target and lure words, from which the gold-standard Da' metric was calculated. Consistent with previous research, emotion increased accuracy, and power and log functions fitted the group data best. Crucially, emotion did not alter the slope of the forgetting function. Simulations show that a liberal bias when recognising emotional stimuli, expected for the typically more cohesive emotional sets, can mimic attenuated forgetting. Findings of increased memory advantage for emotional experiences over time may not be due to an effect of arousal on memory maintenance.

Search through Memory Structure.

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Semantic memory encodes both the individual features of concepts and the relations between them. We develop computational memory models that describe how people search through these memory structures. Our empirical paradigm involves open-ended word-pair analogy generation and free association tasks, and we infer the respective roles of featural and relational information in these tasks using formal model comparisons. Our tests reveal that both types of information play a key role memory search, but they are recruited differently depending on context and exhibit distinct dynamics. Overall, the use of relational structures appears to be more responsive to task demands across trials, and more stable across successive retrievals within trials. Importantly, we can quantitatively predict these effects and parameterize their associated mechanisms using a principled extension of established memory models, thereby integrating theoretical work on structured reasoning and memory search, and laying the foundation for process-level computational accounts of higher-level cognition.

The impact of preference for interior space design on incidental recognition memory.

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The relationship between image preference and memory formation remains debated (Babo-Rebelo et al., 2022; Lin et al., 2016). Across four experiments, we investigated whether a preference for images of interior design predicts incidental recognition memory accuracy, while controlling for individual differences. Stimuli systematically varied in ceiling height, spatial openness, and curvature, design features known to influence preference (Palumbo et al., 2022; Vartanian et al., 2013). In Experiments 1 - 3 (online and laboratory), participants completed preference ratings followed by immediate recognition memory tasks, with individual differences measured via Desire for Aesthetics (Lundy et al., 2010), Openness to Experience, and Extraversion (DeYoung et al., 2007). While participants reliably preferred rectilinear spaces, these preferences did not enhance recognition memory accuracy, likely reflecting a ceiling effect in their performance. Experiment 4

addressed this limitation by increasing the number of stimuli and introducing a filler task and an eight-day delay interval. Here, higher preference and greater distinctiveness significantly predicted recognition memory accuracy, with a marginal moderation such that preference effects were weaker for low ceilings and enclosed spaces. Together, these findings suggest that preference enhances long-term, but not short-term recognition memory, and that design features and stimulus distinctiveness modulate this effect.

Babo-Rebelo, M., Chatel, M., Tabacchi, S., Namiq, A., Travers, E., James, K., & Haggard, P. (2022). Aesthetic experience enhances first-person spatial representation. *Proceedings of the National Academy of Sciences, 119*(43), e2201540119. https://doi.org/10.1073/pnas.2201540119

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From extra fingers to extra arms and even the fingers of others: Extending the limits of supernumerary embodiment.

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The illusory embodiment of a sixth finger has shown remarkable flexibility in how the body is represented (Cadete & Longo, 2020; Newport et al., 2016). But what does it mean to perceive extra body parts? In this set of studies, I explored the mental representation of extra body parts: can it extend to other body parts, do we feel like we can act with them, how far from the body can they be perceived, and does it have to be invisible? First, we induced the illusion of a third arm, which participants vividly embodied across a range of orientations, paralleling the flexibility previously observed for extra fingers (Cadete et al., 2025). In another study, embodiment of a sixth finger

altered participants' perception of their action capabilities: apertures appeared easier to pass through, revealing functional integration of the illusory body part. To investigate spatial limits, the illusion was extended well beyond peripersonal space, with participants experiencing an extra finger located up to 45 cm from the hand. Finally, participants embodied the real finger of another person, stroked synchronously alongside their own, blurring the boundary between self and other. Together, these results demonstrate that supernumerary embodiment is not tied to the special status of fingers or their invisibility. Rather, they reveal a broader and highly flexible plasticity in body representation, extending across body part type, function, spatial range, and the self/other distinction.

Temporal predictions as motor readouts of sensory predictions.

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When will I see something and what will it be? Oscillatory phase-coupling (or 'entrainment') has been proposed to align our neural sensitivity with likely moments of stimulus appearance, however these accounts ignore that when we predict that we will perceive something, we usually also have a prediction of what it may be. Thus, we may not amplify all processing when we expect to perceive something but rather amplify particular channels encoding the predicted content. We here demonstrate oscillatory phase-coupling in vision and show how it relates to content-specific encoding. In a magnetoencephalography (MEG) study, participants observed 'entraining' Gabors at 1.3 or 2 Hz with predictable orientations. They were required to covertly maintain the rhythm of the entrainers to judge the timing of a delayed probe or instead judge the orientation of the probe. We found behaviourally-relevant oscillatory phase-coupling to the maintained rhythm in motor areas specifically when participants judged time. Meanwhile, neural decoding revealed the content of sensory predictions in early visual areas ("what") and that these visual predictions fluctuated in line with temporal predictions ("when"). These content-specific temporal predictions appeared regardless of task instruction but predicted the degree of content-invariant temporal predictions in the timing task.

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Altered vibration signal combination in patients with chronic hand pain.

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Chronic hand pain is associated with an altered excitatory-inhibitory balance within the primary somatosensory cortex (S1). Its effect on vibrotactile processing, however, remains unclear. We investigate this by assessing vibration thresholds and corresponding brain responses. In Experiment 1, vibration detection and discrimination thresholds were measured with a two-alternative forced-

choice task under two conditions: (1) ‘Full-26Hz’ (ten digits) and (2) ‘Interleaved 26/23’ (five target digits with baseline stimulus on the other five). In Experiment 2, steady-state somatosensory evoked potentials (SSSEPs) were recorded under three conditions: ‘Alternating-26Hz’ (five at 26 Hz), ‘Full-26Hz’ (ten at 26 Hz), and ‘Interleaved 26/23’ (five at 26 Hz, five at 23 Hz). Patients with chronic hand pain exhibited lower vibrotactile thresholds than controls ($p = 0.05$). A significant summation effect ($p < 0.001$) was observed at the detection threshold in the chronic pain group, but not in the controls. SSSEPs revealed stronger neural responses in chronic pain patients compared to controls ($p < 0.05$). Computational modelling further indicated reduced suppression effect between digits in chronic pain patients. These results suggest widespread sensitisation and diminished inhibition in chronic pain, leading to enhanced responses and potentially less distinct finger representations, which may underlie altered tactile perception.

This work was supported by the China Scholarship Council program.

Supporting older adults' decision-making: Benefits of improved perceptual clarity and reduced cognitive load.

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Making effective decisions is important for maintaining wellbeing and independence in older age. However, age-related declines in perception and cognition can make decision-making more difficult for older adults. In two online experiments, we investigated whether older adults’ decision-making could be improved by reducing the cognitive demands associated with 1) perceiving unclear information and 2) holding information in mind while making a decision. Experiment 1 (n=96) showed that older adults were able to make better decisions when decision-making information was perceptually clear (larger size, better contrast) compared with less clear. Young adults were not affected by the change in perceptual clarity. In Experiment 2 (n = 96), having the option to make annotations during the decision-making task did not improve older adults’ decision-making compared with a no-annotations condition. However, across both young and older adults there was a significant positive correlation between the number of annotations made and decision-making performance. Together, these findings suggest that older adults’ decision-making can be supported through simple steps to improve perceptual clarity and reduce cognitive load.

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Aging as cognitive enrichment.

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The enrichment account of aging proposes that age-related changes in cognition are a result of continued enrichment across the lifespan, not degradation, atrophy, loss, or deterioration. In other words, behavioural observations associated with late-life cognitive decline, such as those associated with declines in fluid intelligence, reductions in similarity judgements, and the sparsening of the free-association network, are natural consequences of continued learning across the lifespan. The enriched cognitive representation associated with this learning explains increases in crystallized intelligence, but modeling and empirical results show these also explain problems with inhibition, sparsening free associations, reductions in predictability, and widening similarity judgments. Moreover, enrichment also makes predictions about places where older adults should show increased cognitive performance. In this presentation I will discuss ongoing research modeling age-related cognitive enrichment and its relationship to empirical research. These models compare enrichment and degradation, and show how learning a representation from the environment leads to predictable behavioural patterns consistently observed for older adults. In addition, I will also present experimental work showing performance gains in older individuals on lexical decision tasks, which are predicted by enrichment. These show that older adults are faster at accumulating evidence in predicted lexical decision tasks after controlling for non-decision related processes.

Aging Ears, Adapting Minds: How older adults navigate the cognitive demands of degraded speech.

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Background: How perceptual adaptation modulates cognitive resources for degraded speech processing remains unclear, especially in the ageing population. This study used pupillometry to investigate listening effort changes during rapid adaptation to noise-vocoded speech in younger and older adults under selective and divided attention. Methods: Forty older [median age 72, IQR (68-75), 32.5% men] and sixty younger participants [median age 21.7, IQR (19-23), 28% men] with normal hearing completed a between-subject design. Participants listened to 72 twelve-channel noise-vocoded IEEE sentences containing a pair of pure tones with a 15% pitch difference. In the single-task condition, participants focused solely on recognising noise-vocoded sentences (selective attention). In the dual-task condition, participants both recognised speech and judged the direction of pitch shifts (divided attention). Findings: Divided attention did not impair adaptation rates, suggesting automatic perceptual learning across age groups. Despite comparable accuracy, older adults showed greater listening effort (larger pupil dilations, longer reaction times). Cognitive offloading patterns differed markedly: older adults released more effort in both conditions with gradual, sustained decreases, while younger participants showed sudden drops in single-task and no systematic pattern in dual-task. These findings reveal that older adults can manage listening effort efficiently but may employ different mechanisms than younger adults.

EPS President's Address

Serendipity, Strategy and Psychic Secretions: From general processes to individual differences.

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Pavlov observed that his dogs salivated not only when food was directly introduced into their mouths, but also to the presentation of other stimuli that had reliably co-occurred with the delivery of food. The finding was serendipitous, and he referred to such instances of salivation as psychic secretions or more prosaically conditional or conditioned responses. Our own research, born from a series of serendipitous interactions and findings, concerns reconciling general-process theories of associative learning with qualitative and quantitative individual differences in such conditioned behaviours; and in particular responses directed toward the conditioned stimulus (called sign-tracking) and those reflecting the unconditioned stimulus (called goal-tracking). The research is ongoing (i.e., incomplete), but has already prompted some revisions to received wisdom, including about the nature of associative structures involved, and the rules governing their acquisition and translation into behaviour.

The Cost of 'What Might Have Been': False memories for counterfactual actions.

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Counterfactual thinking, the ability to imagine alternative courses of action, supports planning and flexible behaviour, but also makes memory vulnerable to distortion. In particular, people may misremember actions that were planned but never executed, blurring the line between "what we did" and "what we might have done." To investigate this phenomenon, we developed a modified Tower of London task that combined problem solving with a recognition memory test. Participants solved tower configurations by moving coloured balls to match a goal state, then judged whether a series of configurations had occurred during their solution. Crucially, some test items came from the alternative counterfactual path that could have been taken but was not. Across two experiments, participants consistently showed higher false recognition of counterfactual configurations compared to novel ones, suggesting that action alternatives exert a systematic bias on memory. EEG analyses revealed differences in pre-motor activity at fronto-central sites when participants made erroneous recognition judgements. Multivariate decoding further indicated that patterns of pre-response activity carried information about false versus accurate memories. Together, these findings show that counterfactual alternatives are especially prone to false memory, highlighting how prospective representations shape retrospective memory for action.

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Collaborative recall, memory and confidence across the lifespan.

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Collaborative recall can enhance individual memory (Marion & Thorley, 2016) and may be especially beneficial for older adults (Harris et al., 2011). Most prior work has used artificial stimuli rather than real-world events. We examined the effects of age group (young vs. older adults) and recall condition (individual vs. collaborative) on memory for a staged exhibition event. Participants (n = 86) encoded the event in age-matched groups of four and completed recall sessions one, five, and twelve weeks' post-event. They also completed individual online recall assessments immediately post-event and after each session, scored with the Autobiographical Interview (Levine et al., 2002). Analyses of change from post-event baseline revealed that older adults in the collaborative condition increased total details recalled over repeated sessions, whereas those in the individual condition declined, though not below baseline. Proportion of internal (episodic) details remained stable across age groups and conditions. Metacognitive ratings showed age and condition effects: younger adults reported higher confidence overall, whereas older adults' confidence declined over time only in the individual condition, suggesting a protective effect of collaboration. Collaborative recall was also associated with increased reexperiencing in older adults, highlighting the role of social context in supporting subjective memory experience.

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The neurocognitive mechanisms of counterfactual false memories.

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"I could have done otherwise" is the essence of counterfactual thinking: imagining how things might have gone differently if only we had chosen another path. While this capacity supports planning, learning, and flexible behaviour, it also leaves us vulnerable to false memories of actions that were never performed. To investigate this, we developed a novel maze navigation task in which participants plan and execute the quickest route to a goal, before later identifying the path they actually took among alternative possibilities. On some trials, after planning but before execution, a block appeared on one of the initially available paths, rendering it implausible. We showed that participants (N=24) were more likely to misremember taking these blocked paths compared to unchosen but still-available alternatives. These results suggest that counterfactual false memories may arise either because inhibited plans remain active in memory, or because the visual salience of the block draws attention to specific alternatives. Follow-up experiments will test these possibilities.

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How do retrieval processes modulate the effect of event boundaries on temporal memory?

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Human memory organizes experiences into discrete events with boundaries that significantly influence temporal sequence recall. Research consistently shows temporal order memory (TOM) is superior for items within events versus those spanning boundaries. Wen and Egner (2022) challenged this by arguing that laboratory studies lack ecological validity since real-world

experiences involve distinctive contexts unlike those employed in laboratory tasks. Using unique, non-recurring cues for each event and reinstating them during testing, they found reversed TOM effects: participants remembered cross-boundary items better than within-event items. They concluded TOM reversal requires pairing stimuli with unique, retrievable contexts. We tested this hypothesis across three experiments. Participants studied 36 objects across six sequential events representing distinct situations, comprising of unique location and action. Participants then made temporal order judgments and estimated intervening items between object pairs. Contrary to predictions, we consistently observed stronger within-event than cross-boundary memory, even with distinctive contexts present during retrieval. Experiments 2-3 rendered events more distinct by incorporating negative-valenced actions, but the emotional manipulation did not alter results. Our findings demonstrate that event boundary effects persist regardless of context distinctiveness, suggesting fundamental organizational constraints on temporal memory that override contextual manipulations.

The interaction of iconic gestures, vocabulary and working memory on early childhood learning.

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Iconic gestures (body movements that depict properties of referents) are frequently used when communicating new information. Research suggests individual differences in working memory and vocabulary modulate how much learners benefit from multimodal cues. The timing of gestures may also impact learning. Here, young children (N = 51, ages 36 - 54 months) observed iconic gestures in the context of learning about new real-world words and concepts. After playing with toys representing unfamiliar animals and tools, children watched short, explanatory videos in which we manipulated the presence and timing of iconic gestures. We measured word-object mapping, and children's conceptual understanding by probing semantic features and category judgements. Vocabulary strongly predicted performance in word-mapping (BF10 > 1000) and semantic category (BF10 = 71.9). Both co-speech and demonstration gestures interacted with vocabulary and working memory abilities. Gestures supported children with lower vocabulary to learn new words, but offered little benefit to those with higher vocabulary. Similarly, gestures appeared to support children with lower visuo-spatial working memory (VSWM) to acquire semantic features, but were detrimental for those with higher VSWM. These findings suggest iconic gestures can scaffold early word and concept learning, but their effectiveness depends on a child's existing vocabulary and working memory resources.

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Working memory capacity predicts sensitivity to prosodic structure.

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Listeners vary in the perception and interpretation of speech prosody (the variations in intonation, loudness, and rhythm of spoken language). The source of this variability is unknown. We investigated whether the ability to recognise and classify prosodic structure is related to working memory (WM) capacity. This hypothesis stems from the tight connection between prosodic and syntactic (grammatical) structure, while processing syntax is known to relate to WM capacity. Healthy adult speakers of Dutch judged prosodic structures in a gating paradigm. The phrases contained early and late intonational cues that signalled whether the phrases contained an internal grouping or not. Listeners also took part in WM (digit span) and processing speed (letter comparison) tasks. There was an interaction between performance in the prosody judgement and WM tasks: high-WM listeners were better at classifying prosodic structure and required less prosodic information to detect the correct structure. There was no interaction between prosody processing and processing. The results demonstrate a close relationship between prosody processing and WM abilities, implying that WM is an important component of prosody processing.

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Using metamemory to compare dissociation and psychotic-like experiences in the general population.

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Despite significant co-presentation and symptom overlap, the relationship between the mechanisms of dissociation and psychosis remains unknown. This talk presents results from an experimental study comparing the metacognitive associations of dissociation and psychotic-like experiences (PLEs) in the general population (n=151). Dissociation, PLEs, and “hasty” thinking was assessed by self-report surveys. Reality monitoring (RM), the metacognitive ability to remember whether information was internally- or externally-generated, was tested by asking participants whether words from the encoding phase were generated by the participant or researcher. RM sensitivity and bias were then estimated using Bayesian hierarchical signal detection methods. There was no significant correlation between dissociation or delusion-like thinking and RM sensitivity or bias, nor between unusual sensory experiences and RM bias. However, unusual sensory experiences were significantly positively correlated with RM sensitivity. There were no significant differences between the dissociation-RM correlations and the delusion-RM and hallucination-RM correlations. Next, we ran three Bayesian graphical networks of RM, “hasty” thinking, and either dissociation, delusion-like thinking, or unusual sensory experiences respectively. The edge weights in these networks were compared and ultimately indicated no difference across the networks. This indicates that the metacognitive associations of dissociation and PLEs are largely similar, potentially explaining their overlap in presentation.

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Increased GABA levels in medial frontal cortex are associated with higher working memory accuracy.

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The medial frontal cortex (MFC) is involved in many cognitive functions required for working memory. In this study we used functional MR spectroscopy to investigate levels of GABA and glutamate across different phases of a working memory task. Compared to control trials, with no memory component, glutamate levels (the primary excitatory neurotransmitter) were increased during both encoding and recall. Neither the increase in glutamate during encoding nor recall correlated with working memory accuracy or reaction time. GABA, the primary inhibitory neurotransmitter, was not significantly higher during encoding or recall compared to control trials, but an increase in GABA levels correlated with higher working memory accuracy. This suggests an increase in inhibitory processes in MFC support working memory. Creatine, which is often used as an internal baseline, was significantly elevated during encoding. Creatine should therefore not be used for normalisation for functional MRS studies.

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The impact of visual imagery absence on fine-grained memory for object colour and size: An Aphantasia Study.

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Aphantasia, the inability to voluntarily visualise, offers a unique model to test imagery's role in memory. Although many memory functions appear preserved in aphantasia, deficits may arise in tasks requiring fine-grained perceptual detail like colour. We conducted two online experiments with congenital aphantasic individuals and matched controls. In Experiment 1 (20 aphantasic, 20 controls), participants memorised sets of coloured objects (6 sets of 20). Colours were sampled from

the full CIELAB space, and recall was assessed with a continuous colour wheel. Memory performance was quantified as angular error and decomposed into retrieval success (whether a colour was retrieved) and precision (how accurately it was remembered) via mixture modelling. Experiment 2 (18 aphantasic, 20 controls) tested whether deficits extend beyond colour using an analogous size-memory task. Results showed that in Experiment 1, aphantasic participants produced significantly larger errors than controls. Mixture modelling further revealed that these errors stemmed from reduced retrieval success, not reduced precision. In Experiment 2, no group differences were observed for size error, retrieval success, or precision. These findings highlight the critical role of imagery in enabling access to visual memory traces such as colour, while also showing that it may not be indispensable for all object features.

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Complexity compression and the when of memory in virtual reality.

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Memory for ‘what’ depends on the structure of events. How event structures influence memory for ‘when’ is not yet fully understood. Events are constructed within working memory along with predictions for what comes next. Boundaries, traditionally defined in terms of prediction error, act as anchors for the compression and encoding of events into longer-lasting memory. The construction of an event can also be described in terms of an accumulation of information. Experiencing a boundary can clear the contents of working memory in preparation for the next event. We question how the accumulation and compression of information within events influences memory for ‘when’. Here we employed an information theoretic approach to quantify the construction, compression and encoding of events with measures of complexity and entropy. We conducted a behavioural and EEG study employing a novel virtual reality environment to provide segmented sequences of images with transitions between virtual locations providing boundaries to ‘reset’ the accumulation of information. Preliminary findings suggest that the level of entropy within events determines the rate of compression, which drives temporal displacement errors in behavioural judgements of when an image appeared. We establish links between the processing of information and the ‘when’ of memory.

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Brief lookback cues content generation in spontaneous multi-sentence text production.

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Multi-sentence text composition often shows remarkable fluency. This results from semi-parallel, just-in-time processing. Writers often glance briefly back into the text that they have already produced before continuing ("lookback"). An obvious hypothesis is that these lookbacks serve to support planning what to say next. We recorded eye movements and keystrokes from 60 short argumentative essays composed by 30 competent adult writers (for how this was achieved). We extracted all instances where writers stopped and fixated at least 3 words in their already-written text then continued without revision or error correction. Data comprised (a) sentence completions (text written next up to the next sentence terminator), and (b) words fixated, excluding closed-class words. We then asked GPT3.5 to generate completions in four prompting conditions: just the writing task statement and the writer's previous text (baseline); baseline + fixated words, baseline + sentences that contained the fixated words; baseline + matched number of non-fixated words (another control). Semantic overlap between human and LLM completions (cosine distance from OpenAI's text-embedding-ada-002) was greater when prompts included fixated words / fixated sentences. This finding is consistent with lookback supporting semantic planning of next-text.

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Quantifying the characteristics of stimuli in word learning experiments: Insights from large language models.

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Word learning studies provide important evidence concerning the role of contextual diversity on word learning, but performance is often relatively low and highly variable across items. We used BERT (a large language model, Devlin et al., 2019) to understand how properties of the training sentences used by Norman et al., (2025) influenced learning. Each training sentence was presented to BERT with the to-be-learned pseudoword masked (e.g., "Enough proof had [MASK] so the jury could make a fair judgement") and its top five predictions for the masked target recorded (e.g., "emerged", "arrived", "accumulated", "appeared", "surfaced"). Participants' learning performance was better for stimuli where BERT's predictions, across ten different training sentences, were highly similar in meaning, indicating that word meanings are easier to extract from sentences that promote consistent meanings. In addition, learning was better when training sentences were strongly constraining, measured by the strength of model predictions, at least for items learned in the high-diversity condition. This suggests that word meaning extraction is easier when contexts strongly promote a specific meaning. This work highlights different linguistic properties of training stimuli that can influence learning, and how researchers can utilise computational modelling tools to improve the quality and consistency of their stimuli.

Using eye movements to investigate prediction error cost during natural reading.

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Current theories emphasise the role of lexical prediction in facilitating efficient word recognition during reading (Pickering & Gambi, 2018). A central assumption of these accounts is that readers should incur a processing cost when an anticipated word does not appear (Cevoli et al., 2022). This prediction error cost has been linked to post-N400 ERP components (Federmeier et al., 2007) and proposed as an explanation for larger predictability effects in older adults (Cheimariou & Morett, 2023). However, eye movements during reading studies have so far failed to provide behavioural evidence for this effect (Frisson et al., 2017; Luke & Christianson, 2016). To address this issue, we examined whether prediction error costs emerge in either young or older adults using synchronised eye-tracking and EEG during natural reading. Forty-one young adults (18-30 years) and 42 older adults (60-80 years) read sentences containing either a highly predictable or less predictable target word in strongly constraining or neutral contexts. Fixation times on target words showed robust effects of both contextual constraint and word predictability, but no evidence of a prediction error cost in either age group. These findings indicate an absence of behavioural prediction error effects in both young and older adult readers.

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Processing words in context: Evidence from large-scale eye-movement corpora.

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Our understanding of how readers process words in context is limited because most theories of lexical processing are based on experiments that lack the richness of natural language. To better understand how readers use context to support lexical processing and the processing of ambiguous words, we analysed four existing eye-movement datasets where participants read naturalistic texts: The Provo Corpus (84 participants reading 55 short texts), book synopses (76 participants reading 40 texts), the Oz Corpus (39 participants reading two short stories), and the GECO Corpus (43 participants reading an entire novel). Using measures derived at scale from large language models (i.e., GPT-2 and BERT), we examined how constraining sentence context (i.e., entropy), a word's unexpectedness (i.e., surprisal), and lexical ambiguity influenced reading times on words. Words appearing in less constraining contexts and unexpected words were read more slowly. Compared to the effects of contextual constraint and a word's unexpectedness, the effects of lexical ambiguity and its interactions with these variables were less reliable and numerically small. Overall, this work confirms the role of prediction during reading, though the extent to which it supports ambiguity resolution is a little less clear.

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Web-based open-access vocabulary tests in Mandarin and Cantonese.

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We present quick and reliable online tests of vocabulary knowledge suitable for native speakers of Mandarin and Cantonese. The two tests are based on the Web-based Open-access Reliable Decision on Synonyms (WORDS) English Vocabulary Test (Chen et al., 2024), in which participants read target words (e.g., ubiquitous) and select a near-synonym (e.g., omnipresent) from among three unrelated foils (e.g., interpersonal, catatonic, voluminous). The English version obtained 'good' reliability (N=121; Cronbach's $\alpha = 0.82$) and is freely accessible via Gorilla Open Materials (https://app.gorilla.sc/openmaterials/694887). We devised and piloted similar tasks in Mandarin (Experiment 1a: 82 items, 61 participants) and Cantonese (Experiment 2a: 90 items, 101 participants). We conducted item response theory analyses of these data to select optimal items for inclusion in the final, shorter tests. We assessed the reliability of these 30-item versions in different samples of native speakers of Mandarin (Experiment 1b; 102 participants) and Cantonese (Experiment 2b; 110 participants). The observed reliability was somewhat lower than the English version, but reached a level typically described as 'acceptable' in both Mandarin (Cronbach's $\alpha = 0.77$) and Cantonese (Cronbach's $\alpha = 0.74$). We discuss the challenges associated with creating parallel tasks across these different languages.

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Pain and touch differentially modulate corticospinal excitability, independent of afferent inhibition.

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Pain can profoundly impact motor functioning for self-preservation but is also associated with motor and somatosensory disturbances. Despite considerable research, it remains unclear whether pain and touch modulate motor processes independently or interact. Across two transcranial magnetic stimulation (TMS) experiments, we tested the effects of tactile and nociceptive inputs on corticospinal and sensorimotor processes using an afferent inhibition (AI) paradigm. In Experiment 1, a single electrocutaneous stimulus was delivered to the left index finger before single pulse-TMS over the right first dorsal interosseous (FDI) motor hotspot at one of five delays (15, 25, 35, 45, 60, or 160 ms). In Experiment 2, the same paradigm examined the effects of pain by administering moderate tonic heat pain to the forearm. In both experiments, significant reductions in TMS-induced motor output occurred at 25, 35, and 160 ms, with facilitation at 60 ms. This was unaffected by tactile afferent duration (Experiment 1) or tonic heat pain (Experiment 2). However, overall, corticospinal excitability was significantly reduced in painful compared to painless conditions. In summary, our findings show that tonic pain has a direct (inhibitory) effect on motor processes; however, in this context, tactile sensorimotor interactions remain unaltered.

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Facial EMG responses to bitter, astringent and chemesthetic compounds differentiate between PROP Tasters and Non-Tasters.

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PROP taster status (PTS) refers to an individual's perceptual sensitivity to the bitter compound 6-n-propylthiouracil (PROP). It is primarily a genetically inherited phenotype, linked to variation in fungiform papillae density on the tongue. However, PTS effects extend beyond bitterness, with reported associations between PTS and responses to chemesthetic and astringent stimuli, though findings are often inconsistent. Hedonic responses to oral stimuli are typically measured using subjective rating scales, requiring conscious evaluation and susceptible to demand characteristics. In contrast, psychophysiological techniques assess implicit hedonic reactions in real-time, capturing emotional responses without disrupting behaviour. This study investigated whether facial Electromyography (EMG), a validated implicit affect measure, could differentiate PROP tasters' and non-tasters' responses to bitter, chemesthetic, and astringent compounds. Participants were pre-screened for PTS, then facial EMG responses to caffeine (bitter), menthol (chemesthetic), and alum (astringent) were recorded. Super-tasters rated all stimuli as more intense than non-tasters, but only caffeine elicited significantly lower subjective liking. Corrugator EMG activity distinguished PTS to caffeine, while zygomaticus activity differentiated super-tasters from non-tasters across all stimuli. These results demonstrate that facial EMG is an effective implicit method for distinguishing super-tasters' from non-tasters' responses to a range of taste sensations, offering an objective complement to subjective ratings.

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Self-prioritization as a decisional strategy.

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Personal possession exerts a significant influence on decision-making, such that stimulus classification is speeded when objects belong to the self (vs. other persons). Exactly when and how this self-prioritization effect arises, however, remains a matter of speculation and debate. Accordingly, we hypothesized that self-prioritization derives from the application of an egocentric strategy (i.e., heuristic) during decisional processing. Using a modified object-classification task in which participants judged blended images comprising varying amounts of self-owned and friend-owned objects (i.e., pencils and pens), the results supported this viewpoint. Participants displayed greater sensitivity to their possessions only when a self-centric decisional strategy was applicable, an effect amplified when the demands of decision-making increased. These findings inform understanding of how ownership influences decisional processing, with wider implications for theoretical accounts of self-bias.

How do the multisensory and interactive features of Immersive Virtual Reality impact its success as a pedagogical tool?

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A recent review of studies using Immersive Virtual Reality (IVR) with children found that IVR contributed to positive learning outcomes1, however a systematic understanding of how each feature of IVR contributes to its success as a learning experience is still limited. The following two studies explore how the inclusion of multisensory and interactive features in an educational IVR experience contribute to factual recall, engagement and a feeling of presence (the feeling of “being there”). In Study 1 (N = 113, 7-13 years) the impact of a dynamic soundscape was explored, with participants randomly assigned to the SoundOn or SoundOff condition. In Study 2 (N = 106, 7-11 years) participants were randomly assigned to one of three conditions, ranging from low interactivity (no virtual body and objects were selected by gaze direction) to high interactivity (tracked virtual hands and passive haptics). Both studies found high levels of factual recall, with no significant impact of dynamic soundscape ($p = .388$), haptics ($p = .121$) or interactivity ($p = .348$). However, the inclusion of a dynamic soundscape significantly increased feelings of presence in IVR, $p = .017$, and the participants in the high interactivity condition experienced significantly higher engagement, $p = .003$.

1 Di Natale, A. F., Repetto, C., Riva, G., & Villani, D. (2020). Immersive virtual reality in K-12 and higher education: A 10-year systematic review of empirical research. *British Journal of Educational Technology, 51*(6), 2006-2033.

Multi-session tracking of problem-solving abilities using a string rewriting task.

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Longitudinal tracking of complex problem-solving abilities is useful for detecting cognitive decline and assessing the efficacy of associated treatments. However, repeated use of standard cognitive assessments can allow participants to learn the assessment task, confounding the intended measure of cognitive ability. To identify true changes in cognitive ability, successive assessments should minimise transfer of learning from previous tasks while recruiting the same cognitive processes. In this talk, I present a family of problem-solving tasks which satisfy these requirements. In these tasks, participants use an arbitrary pre-defined set of string rewriting rules to transform a start string into a goal string. Results from a four-day learning study (~60 participants, four sessions each) indicated that performance improvements were specific to individual rulesets: while practice improved performance on unseen tasks which used the trained transformation rules, learning did not transfer to unseen tasks which used untrained transformation rules. These results suggest that the string rewriting tasks may be suitable for longitudinal tracking of complex problem-solving abilities. I close with a brief proposal for a follow-up study assessing the factors which determine the difficulty of different task sets.

This work is supported by a Leverhulme Early Career Fellowship.

Electrically induced facial feedback: Effects on felt and perceived emotion.

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My lab uses facial neuromuscular electric stimulation (fNMES), in combination with EEG, to investigate the role of facial feedback in emotion at the behavioural and neural level. This provides us with a high degree of control over which muscles are activated when and to what degree. Using this innovative approach, we found across a series of studies that fNMES can modulate felt emotions, as well as facial emotion recognition, and modulate event related potentials, including the N170. In a recent pre-registered study, we introduced a novel paradigm in which participants judged which of two faces appeared happier in a delayed matching-to-sample task. A control condition

involved gender judgments using the same stimuli. While no significant behavioural effects of fNMES were observed in this comparison-based task, these findings suggest that the influence of transient facial muscle activation on emotional evaluation may be contingent on explicit emotional labelling rather than relative comparison. This highlights the context-dependent nature of facial feedback effects and underscores the importance of task demands in shaping emotion-related processing-an insight that informs both theoretical models of embodied emotion and practical applications in affective neuroscience.

Beyond Categorical Emotion Perception: Profiling human and AI perception of face, text and voice-based emotions.

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Classical theories of emotion perception propose the existence of basic emotions (anger, disgust, fear, happy, sad, and surprise), which are often perceived and identified as discrete categories. Here, we examined this view by investigating emotion profiles produced by human participants and AI models, rated from 0-100 along a range of expressions. In Study 1, participants rated emotions from dynamic facial expressions, text descriptions, and the combined face-text stimuli. Results revealed that humans perceive rich, multifaceted emotions from both facial expressions and descriptions of emotional scenarios. Adding textual context enhanced the perception of facial emotion, although the target emotions were most consistently perceived from descriptions of emotional scenarios. Humans and models appeared to produce similar emotional profiles, though models struggled to differentiate between negative emotions, like anger, sadness and pain. Study 2 extended this profiling approach to auditory expressions (affect bursts and speech tone). Here, differences were more pronounced, with humans generally producing stronger responses to target emotions. Taken together, these findings suggest that emotion perception entails rich, multidimensional emotional contents (i.e., emotional profiles), which are sensitive to modality and context. Moreover, while AI models are capable of producing human-like emotion categorisations, fine-grained differences in the perceived emotion profiles remained.

Context dependent cardiac cycle effects on the detection of threat-signalling stimuli.

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The timing of external stimuli to different phases of the cardiac cycle is known to influence perception and cognition, yet these effects appear to depend on both stimulus features and contextual factors. Previous work shows that while weak sensory signals are typically suppressed, salient or threat-related stimuli are enhanced during cardiac systole compared to diastole. However, the neurocognitive mechanisms underlying these effects remain debated. I present two studies examining how stimulus characteristics and contextual threat modulate cardiac influences on the detection of threat-signalling cues. In Study 1, participants discriminated fearful versus neutral faces filtered for high or low spatial frequency. In Study 2, participants detected snakes versus non-snakes

presented in the upper or lower visual field. Stimuli were timed to systole or diastole, and context was manipulated: during Threat blocks, participants were exposed to the possibility of aversive auditory stimulation, while Safety blocks involved no threat. Results indicate robust interactions between cardiac cycle phase, stimulus features (Study 1: spatial frequency; Study 2: visual field), and threat context. Study 2 data will additionally be analysed using diffusion drift modelling to further characterise underlying decision processes. Together, these findings highlight context- and stimulus-dependent cardiac influences on the processing of motivationally salient information.

Ethical compromise: Frequency, determinants and characteristics.

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When people decide sacrifice an individual to save a group, they are behaving in a utilitarian manner; when they decide not to make the sacrifice, they are behaving in a deontological manner, following the ethical principle of 'Do no harm'. Compromise judgments strike a balance between competing ethical principles by partially satisfying both. We measure compromise by asking people to judge the likelihood (0-100%) that they would make the sacrifice: responses other than 0% or 100% indicate compromise. We find a) compromise judgments are more common than has been previously estimated, b) judged likelihood of sacrificing an individual can be predicted from judgments of what is the 'right' thing to do and of the social acceptability of sacrifice, and c) judged likelihood of sacrifice increases by a fixed amount when the number of people saved by the sacrifice is doubled - but only up to the point where that number is in the range 128 to 256. After that, judged likelihood of sacrifice asymptotes, resulting in the function as a whole being best described as quadratic. The asymptote could indicate the point at which a set of individuals starts to be treated as a mass or crowd (cf. Dunbar's number, 150).

Freezing or Fuelling Change? Quantum signatures in human probability updating.

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Quantum probability models in decision-making can enrich understanding of relevant behaviours and provide formal explanations for misalignments between experimental findings of apparent cognitive fallacies and Bayesian prescription (Pothos & Busemeyer, 2022). In a series of experiments, we investigated updating of beliefs based on multiple pieces of information with varied impact, that is, probability updating. Perhaps surprisingly, it was difficult to establish clear expectations in a Bayesian framework, without several additional assumptions on the relation between the relevant events. We outline the best approach we could identify. Quantum theory does predict strong dependencies of the updated probability from the ordering of the conditionalizing premises. We demonstrate a) a misalignment between observations and classical, Bayesian

predictions, b) a degree of opinion change congruent with quantum probability theory and c) a shift in opinion change depending on information ordering, broadly as predicted by the quantum model. In a final experiment, we demonstrate that, given the right conditions, we can replicate the (psychological) quantum Zeno effect, a phenomenon of decelerated opinion change concerning updated probabilities, which is unique to quantum systems (Yearsley & Pothos, 2016). Moreover, we provide novel evidence of an anti-Zeno effect emerging within the same framework, demonstrating acceleration of opinion change.

The robustness of anchoring in a naturalistic VR-based task.

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Anchoring occurs both in high-level estimation of numeric quantities and lower-level perceptual tasks. This suggests anchoring might derive from generic processing underpinning estimation. Such tasks, however, are almost exclusively lab-based, and the information required to complete the task is rarely available to the participant similar to that in real-life. To address this, we immersed participants in a 3D virtual world on a platform with varying height. After presented with an anchor, participants estimated the height naturally, by interpreting sensory and cognitive cues from the environment. We manipulated the amount of information directly available to participants and contrasted anchoring effects in and out of VR. Despite participants clearly using the available perceptual information to make height estimates, anchoring effects were evident, displayed similar properties to those reported in previous lab-based studies and were consistent both in and out of VR. Our design also allowed us to recover a novel subjective anchoring measure which facilitated a particularly parsimonious descriptive model of our anchoring data. We conclude that anchoring is a generic feature of all estimation tasks and emphasise the potential for this cognitive bias to have significant impact on performance in any real-world task requiring quantitative estimation.

Bartlett Lecture Symposium

From neural networks to mental structures.

Organised by Patrick Haggard.

Mapping the State Space of Thought: Default Mode Dynamics and Semantic Cognition.

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Human thought unfolds in a high-dimensional state space, where large-scale brain networks shift between configurations that support perception, memory, and imagination. Understanding these dynamics is a shared challenge for cognitive neuroscience and computational modelling. In this talk, I will focus on the default mode network (DMN), which is engaged across diverse domains, including semantic cognition, autobiographical thought, and social processing. Despite this breadth of involvement, the DMN makes systematic contributions to cognition: it integrates multimodal features, supports abstract knowledge, and couples flexibly with control and perceptual systems, reflecting its position at the apex of the cortical hierarchy. From a state-space perspective, memory retrieval can be understood as transitions between different network states: sometimes DMN and executive control networks act in concert to support deliberate search, while at other times the DMN facilitates more automatic, context-driven access to knowledge. A dimensional account of these dynamics helps to explain why the DMN shows such diverse functional responses. Situating cognition within this framework allows distinctions from representational theories, such as automatic versus controlled retrieval or perceptually coupled versus decoupled states, to be mapped onto measurable network dynamics, showing how the brain's intrinsic organisation supports flexible thought.

Connecting models of cognitive control and semantic knowledge.

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The mechanisms that support cognitive control are often studied separately from those that support everyday semantic knowledge about the world, and vice versa. Yet control is often hypothesized to operate on representations that are essentially semantic; and most real-world semantic tasks require at least a degree of cognitive control. I will suggest that semantic representation and control can be usefully viewed as complementary aspects of a single functional system: one that generates behaviours shaped by moment-to-moment task context and by deep cross-contextual information acquired over the life-span. In simulation I will show how this view resolves some long-standing puzzles in cognitive psychology, including classic findings from Tversky on non-metric properties of psychological similarity judgments. I will then show how the modelling framework can aid in understanding recent functional imaging findings in the neural bases of semantic control.

Are Large Language Models Contributing to our Understanding of Cognition?

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There is currently fierce debate about the value of generative AI systems and the trajectory of their future development. This debate includes polarised views on their value for cognitive science. The talk introduces the current range of positions on the contribution of such systems to cognitive science and discusses examples in an attempt to get a better understanding of the ways in which we might expect these systems to benefit or not.

Discovering Symbolic Models of Human and Animal Behaviour with LLMs.

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Symbolic models play a key role in neuroscience and psychology, expressing computationally precise hypotheses about how the brain implements a cognitive process. Identifying an appropriate model typically requires a great deal of effort and ingenuity on the part of a human scientist. Here, we adapt FunSearch [Romera-Paredes et al. (2024)], a recently developed tool that uses Large Language Models (LLMs) in an evolutionary algorithm, to automatically discover symbolic cognitive models that accurately capture human and animal learning. We consider datasets from three species performing a classic reward-learning task that has been the focus of substantial modeling effort, and find that the discovered programs outperform state-of-the-art cognitive models for each. The discovered programs can readily be interpreted as hypotheses about human and animal cognition, instantiating interpretable symbolic learning and decision-making algorithms. Broadly, these results have intriguing takeaways for opportunities and challenges in using LLMs for scientific discovery and theory construction.

Can AI help understand early language acquisition?

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I'll examine how recent advances in self-supervised learning and large language models applied to child-centred audio or audio/video data address or fait to address early phonetic and lexical developmental landmarks in real children. I'll zoom in on the issues of robustness and data efficiency in child language learning, recasting the long standing controversy between statistical learning, social approaches and nativist hypotheses as a search and evaluation of inductive biases in AI models confronted with ecologically realistic data.

AI, Cognition and Society.

Chris Summerfield
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AI systems are increasingly powerful and now in widespread adoption. What does this mean for people and society? I will discuss work that studies how AI impacts humans, from a psychological and social standpoint. I will discuss the current and future risks and opportunities from rapidly advancing capabilities, including the deployment of multimodal and agentic systems.

End of Symposium

54th EPS Bartlett Prize Lecture

A Unified Theory of Dual-Process Cognition.

Matthew Botvinick
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One of the most firmly established ideas in psychology is that we have two modes of decision making: one fast and relatively simple, the other slower and more sophisticated. We find this idea in William James, in recent New York Times bestsellers, and everywhere in between. And it spans multiple research areas, from executive function to reward-based learning to judgment and decision-making. But why is the mind organized in this dual-process fashion? And how can we understand the involvement of dual-process function across so many disparate domains of mental function? In recent work, we've explored a potential answer to those questions. Using fundamental ideas from information theory and machine learning, one can bring a wide range of experimental findings under one parsimonious explanatory roof, a conjectural 'unified theory' of dual-process control.

The direct and indirect effects of morphological awareness on reading comprehension in L1 Chinese and L2 English.

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Morphological awareness is a key predictor of reading comprehension across languages. We examined how morphological awareness contributes to reading comprehension among Chinese-English bilingual children. Participants were 380 children (L1 Chinese, L2 English) who completed Chinese and English measures of morphological awareness, vocabulary, word reading, reading fluency, listening comprehension, and reading comprehension. Structural equation modelling tested direct and indirect pathways from morphological awareness to reading comprehension within and across languages. In L1 Chinese, morphological awareness had no direct effect on reading comprehension; instead, it influenced comprehension indirectly through word reading, reading fluency, and listening comprehension. In L2 English, morphological awareness directly predicted reading comprehension, with no significant indirect effects. Morphological awareness in Chinese also showed a cross-language transfer effect, indirectly predicting L2 English reading comprehension via English vocabulary, word reading, and reading fluency. These findings demonstrate different mechanisms by which morphological awareness supports reading comprehension in each language. They underscore the importance of morphological awareness in bilingual reading development and highlight the value of integrating morphology into literacy instruction.

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The Cost of a Narrow Lens: Why morphological processing and learning research needs more languages.

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The majority of words across the world's languages consist of smaller meaningful units, or morphemes, which combine and recombine to create new words (e.g., mis-trust-ful-ness). Previous research shows that such words are processed in terms of these smaller units. Psycholinguistics has made important advances in understanding this process of morphological decomposition, but existing insights are largely drawn from a narrow set of languages and morphological processes. In this study, we quantify linguistic and typological diversity in the morphological processing and learning literature. We coded research articles published over the last 50 years for four variables: year, language(s), morphological type(s), and participant type. Our survey revealed that about 85% of the studies come from English and closely related Indo-European languages (e.g., French, Spanish, German). We also found that about 62% of the studies focused on suffixation, the most frequent morphological process in English. We argue that this narrow scope limits theoretical progress. Many languages form complex words through reduplication, infixation, circumfixation, or nonlinear patterns that differ structurally from English suffixation. This paper demonstrates that our understanding of morphological processing and learning will remain narrow and incomplete until such processes are systematically examined. Expanding linguistic diversity is therefore necessary for

building a more comprehensive account of morphological processing and learning.

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No difference in lexical alignment between bilingual and monolingual primary school children.

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Speakers lexically align with interlocutors during communication and adjust their alignment to interlocutors' knowledge (Suffill et al., 2021). Given bilingual children's precocious social-communicative skills (e.g., Fan et al., 2015), they might align more frequently than monolingual children to ease communication. Alignment requires the suppression of a preferred label and can be affected by vocabulary knowledge (Kidd, 2012). Group differences in alignment might therefore be due to differences in vocabulary knowledge and executive function abilities. 30 bilingual and 30 monolingual children (aged 6 - 11 years) participated in 4 tasks: the "Snap Game" (Branigan et al., 2016) to elicit lexical alignment, Raven's Coloured Matrices to test general IQ, an executive function (Stroop-like) task ('Blue dog/red dog'), and the British Picture Vocabulary Scale. We compared bilingual and monolingual children's alignment with primes of preferred and dispreferred picture names. Replicating previous findings, children aligned with preferred primes more frequently than dispreferred prime names. But groups did not differ in alignment (neither for preferred nor for dispreferred names), suggesting that precocious social-communicative skills of bilingual children do not boost lexical alignment. Furthermore, we found no relationship of alignment with vocabulary knowledge, general IQ, or executive function skills in either group or condition.

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Kidd, E. (2012). Individual differences in syntactic priming in language acquisition. *Applied Psycholinguistics*, *33*(2), 393-418.

Suffill, E., Kutasi, T., Pickering, M. J., & Branigan, H. P. (2021). Lexical alignment is affected by addressee but not speaker nativeness. *Bilingualism: Language and Cognition*, *24*(4), 746-757.

Investigating shared syntax in Spanish-English bilinguals and bilingual cognitive models: Code-switching increases cross-language structural priming.

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After hearing a grammatical structure in one language, bilinguals become more likely to produce that structure in their other language [1]. However, the way bilinguals mix languages does not follow the script of cross-language priming experiments. They not only switch languages between but also within sentences. We hypothesize that code-switching in primes increases syntactic processing, leading to stronger cross-language priming. We tested this in an implicit learning model [2] and in Spanish-English bilinguals. We conducted simulated experiments, using instances of the Bilingual Dual-path model as simulated participants [3]. These processed Spanish transitive primes before producing English transitives. Primes were entirely Spanish, or started or ended with an English (code-switched) determiner and noun, or noun only. Only with a code-switched determiner and noun at the beginning, structural priming increased compared to entirely Spanish primes. We used these code-switched primes in our behavioural experiment. In this preregistered online experiment, Spanish-English bilinguals wrote English picture descriptions after hearing primes that were entirely Spanish or code-switched. As predicted by the model, the experiment revealed stronger priming after code-switched compared to entirely Spanish primes. This shows that processing code-switches increases syntactic processing, resulting in stronger cross-language structural priming, which can be explained as implicit learning.

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"Write here, write now": Spelling difficulty disrupts parallel planning in sentence production.

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We determined whether difficulty with word spelling delays planning of upcoming linguistic information. This prediction follows from the parallel view of planning in written language production (Roeser et al., 2025). In three experiments participants (Ns = 56, 80, 96) were asked to type descriptions of spatial arrangements of images (N = 36) of the form "The N1 and the N2 are …". N1 was manipulated for spelling difficulty (e.g. difficult: "broccoli"; easy: "chicken") and length. Typing hesitations extracted via Bayesian mixed-effects mixture models (Roeser et al., 2025) showed that difficult N1s were associated with more hesitations for keystroke intervals associated with the N1 and but not thereafter. When the N2-initial determiner was omitted ("The N1 and N2 are …"; Exp. 2), hesitations before N2 increased when N1 was short or difficult to spell. Finally, N2 preview (Exp. 3) reduced hesitations immediately before N2 for the short and the difficult-to-spell N1 conditions. These results show that, when planning of N2 could not be completed in parallel with output of preceding text, disruptions of the writing flow delay lexical retrieval of upcoming information.

Roeser, J., Conijn, R., Chukharev, E., Ofstad, G. H., & Torrance, M. (2025). Typing in tandem: Language planning in multi-sentence text production is fundamentally parallel. *Journal of Experimental Psychology: General, 154*(7), 1824-1854. https://doi.org/10.1037/xge0001759

This work was supported by the UKRI ESRC (ES/W011832/1) - Project title: "Can you use it in a sentence?": Establishing how word-production difficulties shape text formation.

Using webcams to study eye movements during reading: Are we there yet?

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Eye-movements have revealed a wealth of information about how readers process written language. Modern eye trackers can record eye-movements in the lab with high accuracy. However, such equipment is expensive, and participant testing is labour-intensive. Kaduk et al. (2023) recently reported that webcam eye-tracking may be a viable alternative, claiming that webcams can achieve 80% of the accuracy of laboratory eye-trackers. We conducted three experiments to test whether webcams can be used to study eye-movements during reading. Participants read short sentences with a target word frequency manipulation while their eye-movements were recorded with both an Eyelink and a webcam in the laboratory (co-registration, Experiments 1 and 3) or online with their own webcam (online study, Experiment 2). In the lab, the webcam-based system recorded raw gaze positions that were highly correlated with the Eyelink (mean r= 0.83). We found evidence for word frequency effects in the webcam data, although it was weaker than in the Eyelink data. In the online study, data quality was much poorer, although the effects were numerically consistent with the lab-based studies. In summary, webcam-based eye-tracking may be viable for studying reading, especially under laboratory conditions. However, obtaining useful data may require collecting many more observations.

Situational reading enjoyment predicts gaze behaviour during text processing.

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Motivation to read is typically studied as a stable trait, yet it also fluctuates within individuals. We examined how both trait- and state-level reading enjoyment shape engagement and eye movements during naturalistic reading. Seventy-six adults read 40 book synopses, rated enjoyment, answered comprehension questions, and decided whether to wait to view the book cover, while their eye movements were recorded. Mixed-effects models disaggregated between-participant (trait) from within-participant (state) enjoyment. Both levels predicted greater willingness to wait and higher comprehension. Trait enjoyment was associated with longer passage and word reading times. State enjoyment was linked to longer passage times, increased word skipping, faster early word

processing, and increased regressions, suggesting more efficient first-pass reading accompanied by increased rereading. These findings suggest that momentary fluctuations in intrinsic motivation dynamically shape reading strategies, revealing a close link between perceived value and the allocation of cognitive resources during text processing.

Revisiting the noun bias: How frequency explains cross-linguistic differences in noun and verb production across early childhood.

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Frequency of occurrence is one of the main drivers of early children's vocabularies. However, multiple authors have concluded that it fails to account for one of the most important phenomena in word learning - the order in which children acquire nouns and verbs. Across many languages, there is an early noun bias despite nouns occurring far less frequently than verbs. In this study we use large-scale caregiver-child corpora and a computational model to re-look at noun and verb learning in English, German, Spanish and Mandarin. Our results show clear evidence for variations in the strength of the noun bias across languages which are, in fact, directly explained by a combination of the number (frequency) of noun and verb types used by caregivers and their sufficient frequency: how often most nouns and verbs need to occur in caregiver speech to be learned. Our findings provide further evidence for frequency shaping early children's language development, in this case determining the relative distributions of nouns and verbs in their mental lexicons.

Conflict trials do not trigger cognitive adaptation in confound-minimized interference tasks.

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In 2-alternative interference tasks, congruency effects are typically smaller following an incongruent than following a congruent trial. According to high-level control accounts, this congruency sequence effect (CSE) reflects active adaptation processes triggered by the mismatch between target and distractor information on incongruent trials. Conversely, low-level accounts explain CSEs as resulting from perceptual or learning confounds. Confound-minimized designs with two alternating sets of stimulus-response pairs (e.g., left/right vs up/down) provide mixed results, with CSEs found in some but not all paradigms. However, these studies typically average data across all trials, disregarding whether a given trial was preceded by one, two, or more (in-)congruent trials. Five experiments (total N > 660), using different interference paradigms, demonstrate that sequence length is a crucial factor: regardless of whether the task produced overall CSEs, there were never any CSEs with sequence length 1, and always CSEs at length 2 (results for lengths >2 differed for different paradigms). Because in alternating-set paradigms, trial n-1 is from a different, but trial n-2 from the same S-R set as the current trial n, these results strongly suggest that even in 'confound minimized' designs, CSEs reflect low-level confounds rather than high-level control.

Towards a causal investigation of flow and performance.

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Recent accounts have characterized flow as an optimal psychophysiological state associated with enhanced performance in sports (Harris et al. 2023) and involving three core experiential dimensions: absorption, effortless control, and intrinsic reward (Norsworthy et al., 2021). We first tested a novel experimental paradigm designed to differentiate flow from non-flow states in basketball shooting tasks through dominant/non-dominant hand manipulation, with the primary objective of assessing the relative contributions of each of the three core experiential dimensions of flow on performance. Results showed the experimental paradigm was effective in generating significantly greater global flow, absorption, effortless control, intrinsic reward and performance in dominant hand compared to non-dominant hand conditions. Only effortless control uniquely predicted and mediated performance, implicating implicit motor processing as a potential mechanism linking flow to enhanced performance. We go on to report the preliminary reports of an ongoing study that implements mobile EEG and eye-tracking to further investigate the mechanisms underlying the relationship between flow and performance, with the ultimate aim of developing a causal model of flow.

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Norsworthy, C., Jackson, B., & Dimmock, J. A. (2021). Advancing our understanding of psychological flow: A scoping review of conceptualizations, measurements, and applications. *Psychological bulletin*, *147*(8), 806.

Sequence length and time-course reveal limits of statistical learning theories.

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Statistical learning - identifying coherent groups/sequences of information based on their co-occurrence in information streams - is a fundamental learning mechanism. However, most paradigms test performance at the end-point of learning, lacking sensitivity to long sequences and ignoring time-course behaviour that differentiates competing theoretical accounts. We remedy these problems using a new mouse-tracking visual statistical learning paradigm that records time-course behaviour and trains participants on a broader range of sequence lengths. Across six pre-registered online studies (N = 216) with uniform (2-, 3-, or 4-item) and mixed length sequences (2+4, 3+4, 2+3), we found: shorter sequences were learned more easily than longer ones (length effect); sequences were learned better in shorter contexts (e.g., 4-item sequences in mixed vs uniform designs) (context effect); and a trend for earlier items in a sequence to be learned more easily than later ones (order

effect). We further tested these data against three prominent computational accounts (CLASSIC, PARSER, TRACX). While all captured the direction of length and context effects, none reproduced relative differences across experiments, and all showed either absent or exaggerated order effects. We discuss how models might be refined to capture the dynamics of human statistical learning.

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Examining the benefits of spaced retrieval practice on transfer and the student experience in the classroom.

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Spaced retrieval practice is a learning technique in which people attempt to recall information multiple times, with delays between each attempt. We conducted a semester-long, classroom intervention to investigate the benefits of spaced retrieval practice on knowledge transfer from practice to a final test on a Psychology module. We examined the role of repetitions on the nature of learning (deep vs. rote learning). Students completed three learning practice sessions (LPSs) each week, for 10 weeks. Within each LPS, participants studied multiple-choice (MC) questions with four answer options. They restudied half the questions (with the correct answer highlighted) in each LPS and practised retrieving the correct answer for the remaining questions, before receiving feedback. At the end of the semester, participants completed a 200-item final MC test involving repeated, related (questions related to the LPS questions), and new questions. While a typical retrieval practice effect was observed for repeated questions (retrieval > restudy), no overall transfer effects were observed for related questions (related = new). However, further exploratory analyses showed signs of both positive and negative transfer, which may have cancelled each other out. Furthermore, retrieval practice contributed to an increased sense of mastery, motivation, and attention control, and reduced anxiety compared with restudying.

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Unveiling the impact of ageing on the body structural representations across different skin surfaces.

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The body structural representation (BSR) refers to a map of the body in which the spatial configuration of different body parts is defined[1]. Recent evidence from our lab demonstrates that multiple BSRs are defined depending on the stimulated skin surface (glabrous vs. hairy skin)[2]. In

healthy ageing, body representation follows an inverted U-shaped trajectory, declining after the age of sixty[3]. However, it remains unclear to what extent the ageing process impacts BSRs across different skin surfaces. To investigate this, we employed an adapted version of the "in-between" test[4], in which healthy younger adults (N = 22) and older adults (N = 22) received tactile stimulation on their fingertips and were asked to estimate the number of unstimulated fingers between two touched ones. We observed a significant difference in numerosity estimation between skin surfaces: greater numerosity was reported for glabrous skin, but only when non-adjacent fingers were stimulated. This pattern was consistent across age groups; however, in older adults the distinction between glabrous and hairy skin was significantly more pronounced. Our findings indicate that, although body-part recognition remains stable across the lifespan, ageing selectively affects the BSR, with the representation of hairy skin being more impaired than that of glabrous skin.

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Continuous psychophysics for rapid assessment of visual, oculomotor and upper-limb motor function.

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'Continuous psychophysics' offers rapid, accurate estimates of visual sensitivity via simple target-tracking tasks. Tracking performance is evaluated from the cross-correlation between target and tracking velocities: noisier perception yields less accurate tracking. The method also provides estimates of motor variability, making it a promising tool for assessing sensorimotor performance in diverse populations. In two experiments, we tested whether the paradigm differentiates visual,

oculomotor, and upper-limb performance. In Experiment 1, participants tracked a randomly moving target using their gaze, with and without concurrent mouse-tracking. Visual noise was manipulated by varying the spread of target bivariate Gaussian blobs of fixed total luminance. Mouse-tracking was more accurate (higher peak cross-correlation) but exhibited longer lag than eye-tracking. Yet, performance declined similarly across modalities: with increasing visual noise, peak cross-correlation decreased and occurred later, suggesting differences reflect oculomotor versus upper-limb function. In Experiment 2, participants tracked a randomly moving concentric Gabor using the mouse under three levels of simulated visual impairment using their dominant and non-dominant hand. Performance worsened (lower peak, longer lag) with greater visual impairment and consistently declined with simulated motor impairment. Our results show that continuous psychophysics differentiates visual and motor functions, highlighting its potential as an accessible, quantitative tool for sensorimotor assessment.

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More similar than different: Motor imagery use in laterality judgements of human and prosthetic hands.

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The Hand Laterality Judgement Task (HLJT) involves making laterality judgements of rotated images of hands. People typically use motor imagery (MI) to do this task, indicated by the biomechanical constraint effect (BCE): faster responses to images representing medial rotations compared with lateral rotations. Our study investigated how people respond to human and prosthetic hands in a HLJT. Prostheses vary in human-likeness, from highly realistic to highly mechanical. The Uncanny Phenomenon describes how human-likeness can influence emotional responses towards artificial forms (Mori, 1970). Therefore, human-likeness could affect MI use when making laterality judgements of prosthetic hands. We built on the findings of Duncan-Cross et al. (2024) who reported similar processing between human and prosthetic hands in a HLJT. Our task used images of the backs of human, realistic-looking prosthetic and mechanical-looking prosthetic hands. Including only backs was to investigate whether MI would be used when a visual-based strategy was more feasible. One-hundred participants completed an online HLJT with these images. All three hand types produced a BCE and there were no significant differences in size of the BCE between the hands. This indicates there was a similar use of MI when judging hand laterality, despite the differences in human-likeness.

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Where do I stop? How observer perspectives distort our body boundaries.

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Little research has examined how perceptual processes differ in individuals who frequently adopt observer-like, third-person perspectives. Across two studies, we investigated whether the tendency to adopt an observer perspective in dreams and memories influences individuals' ability to accurately perceive their own body boundaries in a psychophysical task. We found that although observer dreams and observer memories were highly correlated, only participants who frequently experienced dreams from a third-person perspective performed significantly worse in identifying their body boundaries. We also observed asymmetries in the distribution of these perspectives: more individuals had experienced at least one observer dream than had experienced observer memories. However, those who did report observer memories tended to experience them more frequently; over one-third of participants reported that at least half of their memories were from an observer perspective. Together, our findings demonstrate that while both phenomena involve externalized self-perspectives, they may impact cognitive and perceptual processes differently. Observer perspectives in dreams, though more widespread, are less likely to dominate one's dreaming style, but when they do, they impair bodily boundary perception. In contrast, observer perspectives in memories, although less common, tend to become more habitual or pervasive once established, yet do not appear to affect perceptual accuracy.

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Effects of ambient odour on unconscious visual processing: Evidence from breaking continuous flash suppression (bCFS).

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Olfactory inputs are proposed to bias early selection of threat, but it is unclear whether any influence precedes awareness. We addressed this using breaking continuous flash suppression (bCFS), which holds stimuli outside awareness long enough to probe preconscious competition. Fifty-four adults completed a within-subjects task under three odour conditions (clean air control, pleasant, unpleasant). Visual targets crossed Image Type (faces, complex scenes) with Valence (threat, neutral)., with Breakthrough times (BT) indexing access to awareness. Repeated-measures ANOVAs, supported by Bayesian analyses, showed that pleasant odour reliably slowed BTs relative to control and unpleasant, indicating a global deceleration of access to awareness. Critically, odour did not interact with image type or valence; Bayesian factors supported the null for these interactions. Supporting previous studies, visual factors showed faces broke suppression faster than complex scenes, and threatening facial expressions emerged sooner than neutral faces. This threat advantage did not extend to complex scenes. Within scenes, evolutionarily relevant images (e.g., snakes, fire) reached awareness more rapidly than modern images (e.g., knives, guns). These findings indicate that ambient odour shifts global processing speed without influencing which visual

inputs win preconscious competition; prioritisation appears governed by stimulus-intrinsic factors rather than olfactory-visual interactions under suppression.

Tactile spatial perception and transformation noise.

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Classical perceptual processing theories emphasize transformation from receptor-centred to object-centred coordinates, as when foveating a visual object seen from different angles. Analogous transformations for touch work somewhat differently: the brain must recognise when touch from two different skin regions in fact signals the same object. Previous work on comparing tactile spatial perception across skin regions focussed on biases introduced by receptor density variations, without considering transformation precision. We presented pairs of tactile distances, each defined by two raised dots, successively to either the same or different parts of the index fingertip. Participants judged whether the first or second tactile distance was longer. Judgement precision, derived from psychophysical function slopes, was worse when participants compared distances across two different skin regions, relative to the same region. Effects of shifting spatial attention between skin regions were unlikely to explain these effects. Instead, we suggest that transformations from skin receptors to spatial representations are noisy, with each skin region having its own, local source of noise. Stimulating the same region twice yields a better signal-to-noise ratio than stimulating two different skin regions. Local variations in perceptual transformation noise thus limit the ability to form coherent, global percepts through touch.

Grouping strength and presentation duration effects in the competition between grouping organizations.

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The competition between grouping organization is thought to be a dynamic process, however, which factors affect this dynamic are still unclear. The current study investigated grouping strength and presentation duration as possible factors. Participants were presented with a prime stimulus containing a competition (e.g., rows by brightness similarity/columns by proximity). Grouping strength was manipulated as two levels (high/low) for each grouping cue. Prime presentation duration varied between four brief durations (40, 100, 250, 400 ms). Following the prime presentation, two test patterns were presented, depicting columns or rows. Participants were asked to report which of the test patterns they perceived as similar in organization to the preceding prime. Response bias was calculated for reporting the organization in the prime depicted by brightness similarity vs proximity. Response time (RT) was also measured. Results showed a general dominance for brightness similarity over proximity. Bayesian multilevel modelling revealed supporting evidence for the main effects of the three factors and the interaction between brightness similarity strength and presentation duration on Response bias. For RT, supporting evidence was found for the three-way interaction. These results contrast with previous findings on the competition between these grouping cues, revealing some of the flexible nature of the competition.

The modulating effects of attention in multisensory integration.

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Multisensory integration (MSI) facilitates efficient processing of information from multiple sensory modalities and is essential for everyday life. However, the role of attention in MSI remains debated, with studies suggesting MSI occurs automatically and others suggesting a modulation by top-down attention. To investigate the MSI-attention interplay and its electrophysiological correlates, we employed two paradigms: a) a simple reaction-time task with a red circle (visual modality), a 1000Hz tone (auditory) or both simultaneously (bimodal), and b) the Sound-Induced Flash Illusion (SIFI,) where presenting two tones with one flash leads to perceiving two flashes. To manipulate attention, both these tasks were presented within a visual N-Back. Preliminary results from the reaction-time task revealed significantly faster responses to bimodal compared to unimodal modalities ($p<.001$), and during the no-back condition. ERP analyses showed increased P100 amplitude for the bimodal versus the visual modality ($p<.001$), and during the 0-Back ($p=.012$). The P200 amplitude increased for the bimodal compared to the auditory modality ($p=.021$), and during the 2-back versus the 1-back and no-back conditions ($p<.001$). These findings combined confirm robust MSI but also suggest that the attentional effects on MSI may differ according to the processing stage, with attention modulating MSI at later stages.

Graphesthesia on held tools: Recognition of letters with both hands.

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Tactile perception is often regarded as the perception of direct contact with the skin, such as touch from another person, clothing, air, or vibration. However, these perceptual abilities extend beyond the body: we can perceive contact on tools we hold, even when they are out of sight. Such tool-mediated perception is usually studied in terms of localising points of contact, but it can also support more complex discrimination. To investigate how well attuned this ability is, the classic letters b, d, p and q were drawn on a board held by participants out of sight with white noise played on headphones. Participants were able to correctly identify the letters at levels greater than chance, demonstrating that tool-mediated tactile perception can support the recognition of fine-grained shapes. The task was performed with both the left and right hands, and handedness was assessed with the Circles task. Performance was above chance for both the dominant and non-dominant hand, suggesting that tool-mediated perception of higher-level tactile information is available regardless of handedness. The absence of handedness effects suggests that this ability reflects tactile perception rather than tool-use skill, which is typically subject to manual dominance.

Predictive modelling of psychological distress using daily thought patterns: A novel supervised machine learning approach.

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The continuous flow of human thought shapes cognitive processes that play a central role in mental health. This study investigated whether naturally occurring daily thoughts can predict psychological distress using machine learning. A total of 190 students from the University of Plymouth completed experience sampling probes seven times daily over five days, yielding 5,063 data points. Each probe captured 18 dimensions of ongoing thought alongside contextual information, while psychological distress was measured using the Depression, Anxiety, and Stress Scale (DASS-21). Seventeen thought features were used to train and evaluate Random Forest models with 5-fold cross-validation. The models classified depression, anxiety, stress, and overall psychological distress with high accuracy (≥81%), with slightly lower performance for anxiety (71%). Area under the curve values exceeded 0.88 for all outcomes except anxiety (0.79). SHAP analysis identified intrusive thoughts as the strongest predictor of depression and the second most influential for stress, while past-oriented thought was strongly associated with anxiety and future-oriented thought with stress. For overall distress, distracting thought was most predictive. These findings demonstrate that machine learning can classify psychological distress from everyday thought patterns and reveal interpretable cognitive profiles, supporting scalable, precision approaches to mental health care.

Linking language and mathematics: Revisiting cross-domain and within-domain structural priming of relative clause attachments.

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While language and mathematics are often treated as separate domains, cross-domain structural priming suggests potential cognitive links between them (e.g., Scheepers et al., 2011). Three structural priming experiments were conducted with native English speakers to investigate this relationship further. In two cross-domain studies, participants solved arithmetic prime equations hypothesised to bias high (e.g., 3 + ((6 - 2) / 2)=) or low (e.g., 3 + 6 - (2 / 2) =) structural attachment before completing structurally ambiguous target sentence fragments (e.g., Nora visited the students of the piano teacher who…). Both a replication study and a study with refined (e.g., unambiguous) prime equations failed to show significant cross-domain priming. In a third within-domain study, participants completed prime sentence fragments hypothesised to bias high or low structural attachment before completing structurally ambiguous target sentence fragments. Surprisingly, this study also failed to show significant within-domain priming (e.g., with closely related materials). Together, these findings raise questions about the cognitive link between language and mathematics, suggesting that this link may not be as clear as previously assumed.

Metacognitive switch costs.

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Metacognition-the ability to evaluate our own decisions-relies on multiple cues and evidence sources. Yet it remains unclear how these sources are integrated, and whether shifting between them incurs costs. While task switching in perception reliably produces such costs, analogous effects in metacognitive judgments are less well understood.
We addressed this using a two-dimensional perceptual decision task. On each trial, participants categorised dot displays using both stimulus dimensions, but the source relevant for confidence (one or both dimensions) was varied. This design allowed us to test the impact of repeating versus switching informational sources for confidence.
Results revealed a metacognitive "switch cost": More specifically, confidence judgments were shaped by previous ratings (confidence leak), and this leak was stronger when the source was repeated or compared to when it was switched. These findings indicate that confidence judgments flexibly draw on multiple evidence sources but are constrained by switching demands, paralleling task-switching phenomena in perceptual control.

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From Skin to Nail: Mapping tactile salience across hand dominance.

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Tool use often produces a sense that the implement becomes an extension of the hand, illustrating flexibility in body representation. However, little is known about how distal keratinized structures such as fingernails are perceived in this context (Longo, 2024). In this exploratory study, we examined tactile perception of fingernails with respect to handedness. Sixty participants received controlled tactile stimulation on the fingernails and fingertips of both dominant and non-dominant hands. Handedness was assessed using Edinburgh Handedness Inventory and two handedness tasks: the circles task and the pegboard task (McManus et al., 2016), quantifying manual preference and performance. Preliminary results indicate differences in perceived tactile salience between nails and adjacent skin, modulated by hand dominance. Participants reported a weaker yet clearly above chance sense of embodiment for nail stimulation, suggesting that fingernails occupy an intermediate representational status, between a tool and a body part. These findings open a new line of inquiry into how non-innervated structures contribute to the phenomenology of touch and lateralised perception and highlight the need for further research on how handedness shapes tactile integration beyond the skin.

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Same Item, Separate Contexts: Dissecting the structure of memory for repeated experience in free and serial recall.

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Repetition usually improves recall, but each occurrence of an item is embedded in its own episodic context. Retrieved-context theory (RCT) predicts that repetitions knit these contexts together: when an item is encoded or retrieved, it reinstates features from prior occurrences, creating blended cues (Howard & Kahana, 2002; Polyn et al., 2009; Lohnas & Kahana, 2014). Such blending links occurrences across time, but also predicts associative interference across a repeated item's neighbourhoods where one occurrence's neighbours intrude into another's recall. To test these predictions, we investigated how the temporal contiguity effect -- the tendency to successively recall items that were studied near each other in time -- manifests when items have multiple occurrences. We re-examined six free- and serial-recall datasets with matched control baselines. Three robust patterns emerged that contradict RCT's interference predictions: (i) no elevated transitions between neighbourhoods of different occurrences, (ii) a consistent bias toward the first occurrence's

neighbours rather than balanced access, and (iii) preserved forward chaining in serial recall without cross-occurrence errors. Together these results indicate that repeated items remain separable in memory, rather than linked by associative blending. Episodic memory appears to balance integration and specificity not by fusing occurrence contexts, but by letting distinct traces compete at retrieval.

When Routes Overlap: Executive function and memory interference in spatial navigation.

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Spatial navigation often requires distinguishing between overlapping routes, a process vulnerable to memory interference. Executive functions (EF) are hypothesised to influence this interference, but the specific roles of updating, inhibition, and shifting in managing spatial interference are not well understood. This study employed a neuropsychological battery and a desktop virtual reality navigation task to investigate this relationship. Participants learned multiple routes that shared common overlapping intersections and landmarks, allowing for the isolated measurement of Proactive and Retroactive Interference. Preliminary data from a pilot study of young adults (N = 21) did not show a statistically significant difference in interference effects in this sample. No significant evidence of proactive (prior learning on new route acquisition) or retroactive (new learning on prior route recall) interference was observed. However, updating ability (Digit Span-Backwards) was significantly correlated with more efficient initial route learning, while inhibition and shifting did not significantly predict interference measures. The findings provide foundational evidence that distinct EF components may differentially influence the resolution of spatial memory interference, warranting further investigation in a larger study.

Semantic Resonance and Action Prediction: Modulating dynamic updating and static matching with action verbs.

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A previous experiment by Springer et al. (2012) found that the degree of movement portrayed by an action verb could influence the process used during an action prediction task using the Occluder Paradigm. Verbs with a low degree of movement prompted “static matching” (the next visible frame of an action post-occlusion was matched to the last visible frame of the action). Verbs with a high degree of movement showed static matching and “dynamic updating” (an individual maintains a dynamically updating representation of the action). We examined this influence in the English language using the same paradigm. Static or dynamic verbs were presented (masked) as a prior before participants watched a point-light action video. This action was occluded for variable periods of time. Following occlusion, participants were presented with a static image of the action. Their task was to identify if the static image came from a later point in the point-light action video or from a depth-rotated version of the video. Predictions indicate analysis of error rates and reaction times will

find a main effect of pose time (indicative of static matching) and/or a significant occlusion time - pose time interaction (indicative of dynamic updating) in the relevant conditions.

The neural correlates of sense of agency and its modulating effect between interoception and autism spectrum disorder: An EEG study.

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Autism spectrum disorder (ASD) is a neurodevelopmental condition characterised by difficulties in social communication and the presence of restricted and repetitive behaviours. Beyond these core diagnostic features, recent work has suggested that altered interoception and differences in sense of agency (SoA) may provide additional insight into cognitive mechanisms underlying autistic traits. Interoception, the ability to perceive internal bodily signals, has been found to be atypical in ASD, and difficulties in monitoring and controlling actions may also reflect alterations in SoA. Yet the relationship between interoception, SoA, and autistic traits remains poorly understood. In the present study, we examined whether individual differences in interoceptive accuracy predict variation in SoA and autistic traits in a non-clinical sample. Twenty-seven healthy adults completed the heartbeat tracking task as a measure of interoceptive accuracy, the Autism Quotient (AQ-28) to index subclinical autistic traits, and an intentional binding paradigm as an implicit measure of SoA. Consistent with prior work, participants showed stronger binding at short action–outcome intervals. However, interoceptive accuracy did not reliably predict binding magnitude, nor did AQ-28 scores predict interoceptive accuracy. These findings suggest that while interoception and SoA are both candidate mechanisms relevant to ASD, their relationship to autistic traits may be more complex than previously assumed.

Reaching Space: Sensory and environmental effects, a VR study.

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Action in the environment requires accurate mental representations of the surrounding space. Previous research has demonstrated the plasticity of such a space through task demands and internal mental representations of the body. However, studies have typically examined a unidirectional linear assessment of the peripersonal space directly in front of the individual. This exploratory study examined a volumetric area of perceived maximum reachable space across multiple experimental conditions. In doing so, it attempted to isolate the role of visual and proprioceptive self-related sensory feedback for these distance estimations, whilst also accounting for the possible effects the direction of travel a target may have on this perception of space. There were significant overestimations of reach when compared to baseline, particularly when participants relied upon solely visual information. In three-dimensional space, lower targets were significantly over estimated, which also interacted with the other experimental conditions. These findings highlight the implicit and critical role proprioceptive information has in action, and for the representation of space around the individual.

Investigating the time course of verticality sensitivity changes during visuo-vestibular conflict.

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Verticality is the perception of "up" and "down" relative to gravity and is fundamental for spatial orientation. It depends on the multisensory integration of visual and vestibular cues. Sensitivity to verticality can be disrupted by sensory conflicts between these modalities. For example, during roll optic flow, vision signals motion while the vestibular system signals stillness. Such visuo-vestibular conflict decreases verticality sensitivity during and immediately after exposure. Yet, it remains unclear how sensitivity changes over prolonged conflict and how we recover afterwards. We examined whether verticality sensitivity fluctuates during extended visuo-vestibular conflict. Participants performed a verticality detection task, judging whether lines were vertical or tilted. The task lasted 10 minutes while either roll optic flow or random visual stimulation displayed in the background. Responses were analysed using signal detection methods, with d' and criterion calculated across six 90-second windows. Results revealed an immediate reduction in vertical sensitivity following optic flow onset, with d' remaining low during exposure but increasing near the end, suggesting a quadratic pattern. Thus, visual-vestibular conflict reduces the ability to discriminate vertical from tilted stimuli, though the effect is non-linear over time. Preliminary follow-up results indicate partial recovery after conflict, with d' increasing shortly afterward.

The nature of conditioned inhibition.

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When one stimulus, A, has predicted the absence of another, B, the presentation of A comes to prevent the memory of B from becoming active. Rescorla and Wagner (1972) proposed that this preventative effect was based on A gaining a negative association with B. This proposal predicts that A will also prevent activation of other memories or responses which B has excitatory associations with: The negative A-B association is multiplied by the positive associations that B has acquired. We report a series of experiments that tested this prediction (cf. Espinet et al., 1995). Participants first received passive exposure to 4 pairs of stimuli (AX, BX, CY, DY; where A-D were coloured squares, and X and Y were white shapes), which should engender (mutual) inhibition between colours presented with a common shape (i.e., A and B; C and D). The question of interest was whether this passive exposure would result in a response later linked to B being inhibited by A. When X and Y were salient and participants could report the requisite associations from passive exposure (e.g., A was presented with X not Y), the experimental results were consistent with the prediction derived from the Rescorla-Wagner model.

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Everyday Causal Judgments of Flu Treatments: The role of effectiveness, outcomes, side effects and counterfactual alternatives.

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How do people judge whether a flu treatment caused recovery? We investigated how effectiveness, outcomes, and side effects shape everyday causal reasoning, and how counterfactual alternatives are considered. Participants read scenarios describing flu drugs that were either effective or ineffective, with a high or low chance of side effects. Each scenario specified whether the patient recovered (good vs. bad outcome) and whether side effects occurred. Participants then rated the drug's causal influence and judged what would have happened with an alternative drug, with no drug, or with chamomile tea. Causal ratings were consistently higher for effective than ineffective drugs. Good outcomes increased ratings when the drug was effective, but made little difference when the drug was ineffective. Side effects showed strong context-dependence: for effective drugs, they raised ratings after bad outcomes, suggesting they were treated as evidence the drug "worked," whereas for ineffective drugs they had little impact. Counterfactual judgements also followed systematic patterns: alternative drugs were expected to improve outcomes, chamomile tea was judged minimally effective, and no-drug scenarios reflected expectations of spontaneous recovery. Together, these findings demonstrate that everyday medical judgements integrate drug effectiveness, outcome valence, side effects, and counterfactual reasoning about alternatives.

The Empathic Mind's Focus: The mediating role of Alexithymia in the relationship between attentional control and empathy.

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Empathy is the ability to understand or experience others' feelings and to respond appropriately to their emotions. Attentional control refers to the ability to flexibly allocate attention and cognitive resources. Previous studies have suggested an association between different components of empathy and attentional control, however it is possible that the relationship between attention and empathy is mediated by alexithymia, because this sub-clinical trait includes a tendency to pay less attention to internal emotional states. Therefore, in the current pre-registered study we used both self-report and task-based measures of empathy to examine the relationship between empathy and attention, and explored whether this was related to alexithymia. A total of 296 participants completed the Attentional Control Scale, the TAS-20 measure of alexithymia, and both self-report and task-based measures of empathy. Individuals who self-reported more Attention Shift abilities had higher levels of Cognitive Empathy and lower alexithymia, whereas individuals with higher self-reported Attention Focus abilities had lower levels of Affective Empathy and alexithymia, but higher scores on a facial emotion identification task. Both of the attention-empathy relationships appear to be

mediated by alexithymia. These findings highlight that alexithymia is a critical factor underlying the distinct relationships between different attentional processes and empathy.

How does prior morphological knowledge facilitate word learning and consolidation?

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Many English words are multi-morphemic, composed of smaller units of meaning. It is well-established that learners can use this morphological information to support new vocabulary, indicating a role for prior knowledge in shaping lexical representations. Yet, it remains unclear how this prior knowledge affects learning and consolidation, as distinguished by the Complementary Learning Systems model (Davis & Gaskell, 2009). The current study examined this by leveraging participants' pre-existing familiarity with morphemes. During training, participants learned 24 pseudowords (half with Latin-based morphemes) via typing tasks and a multiple-choice test. In the immediate post-test, participants completed word recall, definition recall, and fill-in-the-blank tasks to assess form and meaning knowledge of the new words. A delayed post-test (24 hours later) repeated these tasks and introduced an immediate-serial-recall task to measure morpheme structure sensitivity. We also measured participants' prior vocabulary and morphemic knowledge to explore individual differences. Across tasks, words containing morphemes were recalled more accurately than those without, showing a consistent advantage of prior knowledge. This benefit remained stable across sessions, suggesting morphological knowledge primarily enhances encoding and/or retrieval rather than influencing the course of offline consolidation.

A slow-paced task reduces readiness but increases caution under ambiguity.

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The inter-trial interval (ITI) sets the duration between a response and the onset of the next trial. Long ITIs create slow-paced tasks, which are recommended for measuring pupillometric and haemodynamic responses. However, slow-paced tasks also undermine participant engagement, leading to longer reaction times and increased mind-wandering. To further examine how task pace affects attentional states, we used a decision-making task and drift-diffusion modelling (DDM) to separate its effects on various components of information processing. Participants decided whether an ambiguous facial expression appeared happy or fearful, and experienced task blocks with long or short ITIs. Across both an in-person experiment and an online replication, the long ITI condition significantly increased reaction times, with no significant effect on emotion classification. Long ITI also reduced subjective ratings of response readiness, alertness, and task focus. A hierarchical Bayesian analysis with DDM revealed that long ITI increased both boundary separation and non-decision time, but information processing efficiency was unaffected. These results suggest that, in slow-paced tasks, participants were less prepared to respond, but responded more cautiously after stimulus detection. Further research is needed to test whether task pace affects motor readiness, or incurs a fixed cost of re-engaging with the task.

The effects of arousal on episodic memory retrieval.

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Previous work has examined the effect of physiological arousal on episodic memory encoding and consolidation, yet the role of arousal at retrieval remains less understood. Some evidence suggests that arousal may facilitate episodic memory retrieval, but this issue has not been comprehensively tested with experimental designs that separate different retrieval processes. In Experiment 1, we induced mild arousal via gentle handgrip exercises and tested the effects on item recognition and source memory in young healthy adults. Behavioural analyses showed no significant effects on recognition or source memory accuracy, response bias, or reaction times, despite participants reporting higher subjective arousal during handgrip than a control condition. In Experiment 2, we are recording heart rate as an objective measure of arousal, and EEG to explore whether handgrip-induced arousal modulates neural markers of memory retrieval processes even in the absence of overt performance changes. This study aims to determine which markers of retrieval are sensitive to arousal in order to illuminate their functional roles in memory. The findings may also inform non-invasive methods for supporting memory performance in both healthy and memory-impaired people.

Shaping the developing homunculus: The roles of deprivation and compensatory behaviour in sensory remapping.

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Children with a congenital limb difference face significant challenges in a world designed for people with two hands; even simple tasks, like opening a bottle, can be difficult. Nevertheless, these children develop adaptive strategies to compensate for their missing limb. This presentation will examine the behavioural and neural development of a congenital limb difference. We investigated the behavioural patterns of a group of children (5-7 years old) and adults (>25 years old) with a congenital unilateral upper-limb difference and compared them to a respective peer control group. Additionally, we used functional magnetic resonance imaging (fMRI) to observe brain changes resulting from both their behaviours and the limb difference. We found that children born without a hand exhibit early, widespread changes in brain maps, with body parts shifting across the somatosensory homunculus. While adaptive behaviours explain some individual differences, they cannot override the initial, deprivation-driven remapping. Our computational model suggests that homeostatic mechanisms are key, actively reshaping the entire somatosensory map during childhood. These results provide crucial insight into how brain plasticity occurs from early childhood as a consequence of deprivation and how these changes remain stable throughout development. Furthermore, our findings propose a potential mechanism driving this plasticity.

Does generating category exemplars enhance the recall of a list of words?

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Practice tests on previously studied information can enhance new list learning, compared with restudy or solving maths problems. The context-change theory of this forward testing effect (FTE) proposes that interim tests cause internal context changes that segregate learning episodes and reduce proactive interference. Prior research suggests that retrieving items that are not relevant to the learning materials (non-episodic retrieval) induce context changes. Therefore, the benefits of practice retrieval tests should extend to non-episodic retrieval. To date, this prediction has only been examined in a small number of studies, and the generality of the effects has not been established when the psycholinguistic properties of the materials were well controlled. In the current study, participants studied three related or unrelated word lists. After lists 1 and 2, participants (n = 204) restudied or retrieved the previous list, or generated category exemplars from an unrelated category. After list 3, participants retrieved items from this final list. A forward testing effect was observed for lists containing related and unrelated items; but generating category exemplars did not enhance learning more than restudy, and was significantly worse than list retrieval for both related and unrelated lists. These findings challenge the context-change account of the FTE.

Mapping the third visual pathway using naturalistic stimuli.

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The third visual pathway proposes a network of brain regions specialised for social perception. Using naturalistic stimuli, researchers have investigated brain regions involved in social perception and how they respond to dynamic social interactions depicted in films. This study aims to extend previous findings and investigate the functional connectivity between regions in the third visual pathway. In the MRI scanner, participants (n=30) viewed 8-minute audiovisual clips representing three different levels of social interaction. This included multiple characters interacting with each other (high social interaction), a monologue from one character (low social interaction) and landscapes presented with background music (no social interaction). Additionally, 8 minutes of resting-state data was collected. It is hypothesised that regions within the third visual pathway, such as the superior temporal sulcus, would demonstrate increased neural activity and stronger functional connectivity when viewing scenes of high social interaction compared to scenes with low and no social interactions. Through combining naturalistic stimuli and functional connectivity analyses, this study provides a greater understanding of how distributed brain regions coordinate to process social interactions. Such research encourages future studies on individual differences or how clinical populations may engage the third visual pathway during social perception.

No evidence of tactile distance anisotropy on the lips.

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A growing volume of research provides evidence of an illusion in tactile distance perception experienced by healthy individuals. The extent of the illusion appears to differ between body regions. This study tested whether people experience tactile distance anisotropy on the lip. Participants were touched twice, once with the stimuli oriented across the width (i.e., the medio-lateral axis) and once with the stimuli oriented along the length of the lower lip (i.e., the proximo-distal axis). Participants made untimed judgments of whether the first or the second stimulus felt larger. The same experimental procedure was conducted on the dorsum of the hand. Our results show that a clear anisotropy was apparent on the hand dorsum, consistent with previous results; in contrast, no such effect was apparent on the lips. This study contributes to this area of research by providing further evidence of anisotropy in tactile distance perception on the dorsum of the hand. No evidence of anisotropy was found on the lips. Previous work has shown that anisotropies are either absent or much less in magnitude on body parts with glabrous skin. Our findings lend further support to the differences in tactile distance anisotropies on hairy or glabrous skin.

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Are two words seen as one object? How age-of-acquisition affects recognising and production pictorial representations of compound word.

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Adults recognize objects learned in childhood, like “unicorn” faster than those learned later, such as “taxes.” This is known as the Age-of-Acquisition (AoA) effect. The integrated account proposes this effect stems from higher demands on semantic processing or arbitrary input-output mappings. To investigate this, 48 British English students completed an object decision task and an object naming task using 150 compound words. Compound words were chosen because their arbitrary mapping to morphemes requires increased semantic processing. Here participants completed an object decision task, object naming and a subtraction between these measures for each item per participant. Results showed that early-acquired objects were identified and named more quickly than late-acquired objects. The subtraction of object decision from object naming also revealed strong AoA effects. The findings suggest that the influence of the AoA effect and semantic predictors is larger in picture naming tasks than in object decision tasks. This supports the representation theory, indicating the AoA effect is rooted in semantic and phonological representations. The larger AoA effect observed in the subtraction also bolsters the mapping theory, suggesting the effect lies in the connections between these representations. Overall, these results align with the integrated account of the AoA effect.

The protective effect of bilingualism on mental health in early and middle childhood: A longitudinal investigation.

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Extensive evidence suggests that poor mental health during childhood predicts future mental health issues in later life (e.g., Kovess-Masfety et al., 2016). Bilingualism may benefit mental health, but research remains limited and contradictory (eg., De Houwer, 2015). This study examined the impact of growing up bilingual on children's mental health trajectories from early to middle childhood, analysing data from the UK's Millennium Cohort Study. A total of 15,435 children, including 2,146 bilinguals were assessed at the ages three, five, seven and eleven years. Without accounting for confounding factors, bilinguals showed higher rates of internalising problems and no difference in externalising problems. When accounting for confounding factors, bilinguals exhibited lower levels of internalising and externalising problems across all timepoints. Socioeconomic status moderated the effect for externalizing problems, with benefits observed mainly in low and medium socioeconomic groups. This suggests that bilingualism may offer a protective effect against mental health issues in childhood, particularly for children growing up in low socioeconomic contexts.

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A perceptual repulsion from gravitational expectations of acceleration.

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Accurately perceiving unexpected events can be crucial for updating internal models in light of surprising evidence. However, it is more often observed that we are instead biased to report and perceive what is more likely to be there, optimising perception for speed and veridicality. Recently it has been found in the visual domain that objects are more likely to be reported as decelerating when moving downwards compared to upwards – a repulsion from the expectation that gravitational forces cause objects to accelerate downwards. We examined the nature of this effect as a test case for the nuanced influences of expectation on perceptual decisions. Across three experiments, we replicate the original effect, demonstrate that the bias can be observed relative to both world-centered and eye-centered coordinates, and present evidence from a perceptual reproduction task, suggesting that it has a perceptual locus. We consider potential underlying mechanisms, including a response to a salient error signal against a precise prior, an adaptive mechanism for animacy detection relying on deviations from physical expectations, or the accumulated effect of attractive gravitational biases in individual frames.

Does lying about the past affect memory for the truth differently in young and old adults?

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Brain changes that occur during aging can impair memory and make older adults more susceptible to memory distortions and forgetting. When young people lie about past events by fabricating false information, this can cause forgetting or distortions to their true memories of those events. However, it is not known whether false fabrication influences memory differently in younger versus older adults, as investigated here. Younger (aged 18-35) and older (aged 62-81) adults first viewed a video about a crime, and after 24 hours, they fabricated details about what they had seen. Next, they completed both cued recall and recognition tests to assess what they could remember from the original crime video. Results revealed that older adults were less able to lie successfully and less able to remember the video in comparison to younger adults. However, there were only small and non-significant impacts of fabrication on memory in both age groups, showing that the large aging-related impairments in memory ability were not accompanied by enhanced fabrication-induced memory distortions. People's ability to separate lies from truth in memory therefore seems more robust to aging-related brain changes compared to their more general memory ability.

Contextual effects on numerosity processing: Evidence for arithmetic-related biases.

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Visual perception of numerosities (dot clouds on a computer screen) is a frequently studied core domain of cognition. Accurate numerosity estimation underlies numerical and mathematical competences and has diagnostic applications, e.g. for predicting dyscalculia.
Low-level features (e.g. display brightness, density, element connectedness, spatial frequency) were extensively studied to understand estimation biases. Here we presented context cues prior to target numerosities in a go/no-go task requiring context processing. We observed context effects suggesting semantic biases from arithmetic operators. Experiment 1: 36 neuro-typical adults estimated numerosities (9 to 35 black dots on white background, permitting co-varying visual features) after smaller/equal/larger context numerosities. We found reliably larger estimates following larger compared to smaller contexts. Experiment 2: 36 neuro-typical adults estimated numerosities after

plus/minus signs. We found reliably larger estimates following plus compared to minus signs. Results inform related recent work on arithmetic heuristics and biases (Shaki et al., 2018; Shaki & Fischer, 2025) and may have practical implications.

Shaki, S., & Fischer, M. H. (2025). Anchoring bias in mental arithmetic. *Psychological Research, 89*:27. https://doi.org/10.1007/s00426-024-02035-7

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Reducing fatigue symptoms using neurostimulation: Improving wellbeing through home-based treatments.

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Chronic fatigue, increasingly reported after the COVID-19 pandemic, significantly contributes to road and work-related accidents. Transcranial direct current stimulation (tDCS) shows efficacy in reducing fatigability in multiple sclerosis [1] and other conditions (e.g., Sjogren's syndrome [2]) with a mild side-effect profile. The simplicity of tDCS allows for the creation of inexpensive home-use devices, enabling accessible treatment. This study evaluates the efficacy of a home-based tDCS intervention to alleviate fatigue symptoms. A double-blind, randomised, sham-controlled trial is underway with participants who experience varying fatigue severity, undertaking a 2-month tDCS home intervention. EEG is recorded in a sub-sample of participants at baseline [T1], post-stimulation [T2], and 3-month follow-up [T3]. Physiological measurements (e.g., heart-rate and skin temperature), subjective measures of fatigue, as well as performance on a Rapid Serial Visual Presentation (RSVP) task, are collected. Linear mixed-effects models will compare questionnaire, physiological, and behavioural outcomes across groups and time points. Post-hoc comparisons will include correction for multiple testing. Correlation and regression analyses will assess relationships between baseline fatigue severity and intervention outcomes. Exploratory EEG analyses will include spectral power (alpha and theta), event-related potentials, and connectivity measures to identify neurophysiological markers linked to fatigue and their potential modulation by tDCS.

The influence of classroom instruction on reading proficiency of curriculum words in primary school children.

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Considerable variability in young adult reading skills has sparked interest in the mechanisms underlying reading efficiency. Theories propose that, in alphabetic languages, reading efficiency reflects a shift from indirect print-to-sound-to-meaning mapping (phonic decoding) to direct print-to-meaning mapping (whole-word reading). However, this shift has not been demonstrated for children's real-world experience with words. The lexical quality hypothesis also suggests that efficient reading may depend on strong whole-word orthographic knowledge and/or understanding of words. This longitudinal study therefore investigates whether children's reliance on phonic decoding for curriculum words decreases after a year of school experience and how this relates to word spelling and understanding. Participants are 181 eight- to ten-year-old typically developing children, who are tested at the end of year 4 (before experience with the words) and again at the end of year 5 (after a year of experience with the words). Items are 50 year 5 maths and science curriculum words. Linear mixed effects models are used to evaluate: 1) How spelling-to-sound consistency and word length influence reading accuracy/speed, 2) How these effects change over time, 3) How reading accuracy/speed relates to word spelling and understanding. Results from the year 4 data will be presented, since data collection is ongoing.

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Correcting misinformation images in memory: The impact of correction format on belief updating.

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The issue of how to best correct visual misinformation stored in memory is increasingly important due to recent advancements in generative AI technology that have enabled bad actors to flood the internet with highly believable and memorable false images. However, prior research has predominantly focused on correcting textual misinformation. Here, we investigated how people can successfully correct their beliefs in false images. In Experiment 1, participants [N=86] first viewed a set of photo-realistic AI-altered versions of true photographs. Next, they were informed that some images were false via three different correction formats; only by text, by seeing the true image, or by seeing true and altered versions side by side. Final tests showed that belief in AI images could be corrected with all types of formats, but presenting both true and false images together during corrections was most effective. Experiment 2 investigated whether belief updating was mediated by the memorability of corrections and their persistence in memory over time. This research highlights that memory for visual misinformation can be corrected, and the importance of integrating such strategies into digital platforms to counter the growing impacts of AI-generated misinformation.

Testing the effect of statistical context on working memory.

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Working memory is often studied with tasks that use discrete items like letters or numbers. However, many real-world experiences are embedded in continuous, statistical context. We investigated whether the presence of such continuous contextual information affects working memory performance for individually remembered items. We deterministically generated continuous background images from sets of 2, 4, or 6 oriented lines that reflected underlying statistical relations between the displayed stimuli. These backgrounds added no new information about the items but served as non-informative context. Across 25 participants tested on 240 trials each, we found the expected decrease in performance with increasing set size ($p < .001$, repeated-measures ANOVA). Context did not have a main effect on memory ($p = .98$), but it significantly interacted with the type of memory probe ($p = .01$). Specifically, when the contextual background was displayed, memory for targets was impaired, whereas performance improved for distractors and lures (items presented at a location different from the probed location). These findings suggest that even non-informative context can significantly affect how items are retrieved from working memory.

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Experimenting with a hierarchical model of human sense of agency.

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Sense of agency is the subjective experience of controlling actions and their outcomes. We used a novel paradigm to measure three distinct cognitive levels of sense of agency: participants (N=24) used a mouse to move three dots varying in controllability (20-90%). When a target appeared, they could freely select the order in which they moved these dots to reach the target. We measured movement trajectories, and preferences regarding which dot to move. On some trials, we additionally offered a choice whether to skip or attempt -reaching the target, and used signal detection theory to test whether participants' metacognitive decisions were indeed sensitive to predicted difficulty of control. Results showed: motor performance varying linearly with control level, strong preference for reaching with highly controlled dots, and reliable metacognitive decisions to skip based on overall degree of control. In Experiment 2 (N=24), we separated trials with lower and higher overall levels of control into different blocks. We replicated motor and selection findings. We further found that metacognitive decisions were more sensitive in higher versus lower control blocks. Our results challenge previous ideas about unitary sense of agency based on attribution processing alone, and instead suggest the brain encodes sense of agency hierarchically.

Emotion Regulation and Memory: The impact of cognitive reappraisal on the trade-off effect.

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Emotionally enhanced memory (EEM) is the finding that emotional events are remembered better than non-emotional ones. Whilst enhancing memory for the emotion-eliciting object, a trade-off effect can occur where memory for contextual aspects of the event is reduced. Cognitive reappraisal is an emotion regulation strategy involving reinterpretation of meaning to alter emotional impact. We investigated the impact of emotional valence and cognitive reappraisal on the emotional memory trade-off effect. We hypothesised that EEM and trade-off effects would be replicated under no-regulation. Competing hypotheses predicted that reappraisal would either reduce EEM and trade-off due to arousal reduction, or maintain EEM and increase context memory due to stimulus elaboration. Participants viewed negative and neutral items within coloured frames under no-regulation and down-regulation conditions. Item memory and context memory (frame colour) were both tested. No significant effects were observed for context memory, but for item memory, we observed better memory for negative vs. neutral items, and in the no-regulation vs. down-regulation condition. Our findings demonstrate enhanced item memory without reduced memory for contextual details, together with an overall detriment of cognitive reappraisal. These results refine boundary conditions for the emotional trade-off effect and underscore potential influences of cognitive strategies in emotional contexts.

Gravity shapes adaptive emotions.

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As human spaceflight extends to the Moon, Mars, and beyond, understanding its psychological and cognitive impacts is critical for mission success and astronaut well-being. On Earth, the vestibular system continuously monitors gravity's direction, signalling head position to the brain. This information is integrated by a distributed cortical network, including the posterior insula, somatosensory cortices, and temporo-parietal junction. Gravity thus plays a fundamental yet often overlooked role in regulating behaviour. Disgust is a core adaptive emotion that protects against threats. Rapid recognition of disgust in others is a key survival skill, particularly in extreme or unfamiliar environments such as space. To investigate how altered vestibular-gravitational signals affect this ability, participants performed a Disgust Detection Task under two conditions: a gravity-incongruent head-down tilt (6° below the feet), which activates vestibular processing, and an upright control. Stimuli included neutral faces and low-intensity disgust expressions (10%) from the Radboud Faces Database. Using Signal Detection Theory, we measured disgust detection sensitivity (d′) and response bias (c). Head-down tilt significantly reduced sensitivity to disgust without affecting response bias. These findings demonstrate that altered gravity can impair the perception of survival-relevant cues, emphasising the vestibular system's critical role in integrating gravitational information to support adaptive emotional responses.

Distinct dimensions of social reward and their relation to prosocial behaviour.

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Prosocial behaviour, defined as actions benefiting others, activates reward-related brain regions (e.g., striatum; Wu & Hong, 2022). Yet, heightened reward sensitivity can reduce prosociality (Scheres & Sanfey, 2006), and externally rewarding prosocial actions may undermine future helping (Frey & Götte, 1999). This contrasting evidence highlights the need to distinguish different types of reward sensitivity. The present study investigated the role of social reward in prosocial behaviour. Prosociality was measured in 205 adults (M age = 22.4; 167 women) using self-report (Self-Report Altruism Scale, SRA; Rushton et al., 1981) and an experimental task (Prosocial Cyberball; Riem et al., 2013). Social reward sensitivity was measured via self-report (Social Reward Questionnaire, SRQ – assesses enjoyment in being admired, group interactions, and reciprocal relations; Foulkes et al., 2014) and an experimental task (Motivated Viewing Task – indexes effort to view happy vs. sad faces; Aharon et al., 2001). Results showed that some aspects of social reward sensitivity positively predicted self-reported prosocial behaviour. Time spent choosing to view happy (vs. sad) faces significantly predicted prosocial behaviour, whereas SRQ subscales did not. These findings suggest

that social reward, particularly motivation to see others happy, is linked to prosocial behaviour. By contrast, external social motivations e.g., motivation to be admired, were unrelated. This study highlights the importance of focusing on others' well-being, rather than self-directed social incentives, in understanding the drivers of human prosocial behaviour.

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Weak links between speech perception and production at the subphonemic level.

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Recent research has shown that speech perception is gradient: listeners are sensitive to fine-grained acoustic differences at the subphonemic level, though individuals vary in the degree of this gradiency. Consistency also varies, with some listeners giving more stable responses than others to repeated presentations of the same stimuli. Separately, work on speech production has demonstrated that listeners can imitate subphonemic detail with varying accuracy and consistency. However, it remains unclear whether perception and production are linked at the subphonemic level. To address this question, we recruited 50 Spanish speakers who completed a Visual Analogue Scale (VAS) task measuring perceptual gradiency and consistency along a Spanish /ba/-/pa/ continuum, manipulated in 7-ms steps of voice onset time (VOT), the primary acoustic cue to the bilabial voicing contrast. The same participants also performed an explicit imitation task using the same stimuli, and their produced VOTs were used to derive measures of imitation accuracy and consistency. Results revealed only weak relationships between perceptual gradiency and imitation accuracy, and between perceptual consistency and imitation consistency. These findings challenge accounts that posit a strong coupling between perception and production, indicating that the processes underlying subphonemic perception and imitation are more independent than previously assumed.

Knowing More, Remembering Less: Semantic control and episodic encoding in ageing.

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As people age, their episodic memory declines, due in part to less effective encoding into memory. Prior knowledge is critical for memory encoding and is preserved or increases in later life, but recent data suggest that the ability to access and use this information in a controlled manner becomes impaired. This reduced semantic control ability may partially explain episodic memory encoding difficulties. In this preregistered study, 100 younger adults (aged 20-35) and 100 education-matched older adults (aged 65-80) encoded object images using three different orienting tasks: semantic access, semantic control, and intentional encoding. Memory was then tested using the same, similar

or new object images. Both the intentional and the semantic control encoding task yielded equivalent improvements in yes/no recognition memory and lure discrimination in the two age groups, compared to the semantic access task. In contrast, as we had predicted, for source memory older adults benefited less from engaging semantic control than younger adults, despite comparable performance when encoding under the semantic access condition. Interestingly, the same interaction was not significant for intentional encoding. This result supports the proposal that impaired semantic control contributes to episodic memory decline in ageing.

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Normalising multisensory cue reliabilities for individual participants in cue combination studies: A comparison of two methods.

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Humans can integrate the information from multiple sensory cues optimally: cues may be averaged based on their relative reliability to improve perceptual precision. However, when one cue is much more informative than the other, the expected benefit of integration becomes small and hard to detect. Therefore, normalising cues to achieve similar sensory reliabilities on an individual basis is crucial for testing integration hypotheses. As part of a project on multisensory localisation with novel cues, the current study investigated two methods of normalising sensory reliabilities. In an odd-one-out task, participants judged which stimulus was different from two others on a property of interest (e.g., pitch or colour). In a two-alternative forced-choice task, participants compared two stimuli on a property of interest. The thresholds obtained in these tasks were used to create individualised, normalised space-cue mappings (e.g., colour-to-location), with which participants were asked to locate hidden objects. Our results indicate that the forced-choice task was a better basis for calibrating stimuli. This could be due to its directionality, an important property of the space-cue mapping. Future studies can benefit from individual-participant cue normalisation, but should carefully consider which method will be most diagnostic of behaviour in the target task.

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The Cash-Out feature in sports betting: The role of subjective control.

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"Cash out" is a common feature in sports betting platforms. The feature allows users to settle their bet before the relevant sporting event has concluded in exchange for a guaranteed payout, the value of which changes dynamically based on the current likelihood of the bet winning. Experimental research has found that cash out increases risk tolerance, such that people place larger bets in gambling tasks when cash out is available. Cash out is marketed as a way for users to increase control over their bets, and research suggests that subjective control strongly influences judgment and decision-making; consequently, the current research explores whether the effect of cash out on increased risk tolerance is mediated by subjective control. Participants completed an online card-betting task; on some trials, cash out was available but the decision to accept or reject the offer was pre-determined by the experiment's programming ('automatic' trials). Participants placed smaller bets on automatic trials relative to when they had control over the decision to cash-out. Bet size on automatic cash-out trials did not significantly differ from trials in which cash-out was unavailable. These results suggest that perceived control plays a central role in the effect of cash-out availability on bet size.

Embodiment and adaptation to an extendable arm in children and adults.

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Virtual Reality (VR) confers the opportunity to experience the body in a way that is markedly differ from one's own and even to enhance its functionality. How can a user embody such a virtual body? We examined the Go-Go technique, which extends the virtual arm.
Adults, younger children (5-7 years) and older children (8-10 years) made forward reaching movements to feed a virtual animal. The virtual arm was either slightly reduced (F-, 80%), slightly increased (F+, 120%) or greatly increased (F++, 400%) in its visual gain and functionality. Only adults in the F++ condition felt a reduced sense of ownership over the virtual hand. In addition, following enhanced 'GoGo' experiences participants of all ages judged that they could reach further than at baseline. Reach kinematics showed that all ages adapted well to the new arm, increasing reach velocity in enhanced GoGo conditions while maintaining safely controlled reaches. However, different age groups also found specific movement solutions. While adults showed the same acceleration pattern across baseline and GoGo conditions, children adopted more cautious decelerative phases for F++ conditions. These age-dependent differences in how easily people adapt to an extended virtual arm were present despite similar felt ownership and reach affordance.

The impact of multisensory stimulation on wellbeing.

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Multisensory rooms (MSRs) are used to enhance overall well-being in educational, therapeutic settings and public spaces. In a first study, we assessed the effectiveness of a multisensory space on mood and arousal in neurotypical individuals (N=34). In a second ongoing study we adopted the same protocol with individuals with intellectual and learning disabilities (N=22). The protocol employed a within-subjects design. We tested two MSR conditions: passive contemplation of the available sensory tools and active engagement with preferred tools. Before each condition (active and passive), participants underwent a rest condition (baseline) without sensory stimulation, followed by the presentation of 60 positive and negative emotional images from the International Affective Picture System (IAPS). The dependent measures were physiological excitement (GSR and HRV) and subjective ratings of arousal and mood. In the first study, both physiological and self-reported measures improved in the MSR conditions relative to the IAPS conditions. A similar pattern of results was found in the second study with self-report measures. However, here there were no significant changes in physiological excitement due to high variability across participants and the small sample size. Overall, these findings offer insights on the effectiveness of multisensory spaces in terms of mood restoration and wellbeing.

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Measuring contextual cuing of visual search with artificial foveation: A scalable online alternative to eye tracking.

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Visual search plays a central role in human attention, with the contextual cueing (CC) task widely used to examine how repeated spatial regularities facilitate search efficiency. Traditional CC experiments measure response times and only shed light indirectly on the unfolding of attention. Eye-tracking-based CC research provides more dynamic information but has a number of practical limitations. We address these limitations by combining AI-generated naturalistic scenes with artificial foveation via a mouse-contingent aperture, enabling participants to explore complex environments under constrained visual access. This novel method reveals CC effects both in response times and mouse trajectories. These effects were particularly pronounced with high-complexity images, providing an analog of search set-size effects. Additional exploratory analyses, including time bin comparisons, dwell proportion, and trajectory variance, further illustrated the method's capacity to capture fine-grained dynamics of attentional deployment. Beyond confirming the presence of CC, our results revealed stable within-participant search patterns despite variability across individuals, providing rich insights into attentional processes under visual uncertainty. This method offers a low-cost, scalable, and remotely deployable alternative to traditional eye-tracking setups, providing a practical and flexible framework for future research on attention and visual learning.

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Training better mental state understanding across different life experiences.

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Mentalising refers to the capacity to understand one's own and others' thoughts and emotions, i.e. their mental states. The Mind-Space Framework (Conway et al., 2019) theorises that this ability is constrained by familiarity with target minds; people struggle to accurately understand others whose experiences have created different underlying patterns of relationships between personality, situations, mental states and behaviour. Indeed, prior research demonstrates that people with typical developmental backgrounds struggle to understand those with trauma histories (Stagaki et al., 2025), likely due to these experiential differences. This raises an important question: what information does one need to know about others to accurately understand them? In this study, participants completed the Trauma-Informed Mentalisation Measure (TIMM; Stagaki et al., 2025), featuring vignettes co-produced with childhood trauma survivors. An intervention group (n=50) received information identifying targets with trauma histories and brief training on trauma's psychological impact, while controls (n=50) received no background information. Generalized linear mixed models determined a significant main effect of condition, with superior performance in the intervention group. Findings

suggest that understanding targets' likely positions in Mind-space can improve cross-experience mentalising. This research establishes a foundation for studies examining whether trauma-related professional experience and/or formal training further enhance mentalising abilities.

Resilience and cost in syntactic prediction: Evidence from Either-Or construction.

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Prediction is a fundamental top-down process during language processing. Readers anticipate not only upcoming words but also syntactic structures to enable efficient processing (Ferreira & Qiu, 2021; Pickering & Gambi, 2018), the expectation could facilitate integration when confirmed while create processing costs when disrupted. Either-or constructions provide a useful test for examining syntactic prediction during reading (Staub & Clifton, 2006), when the word either is present, a facilitation effect on the or-construction is observed. The current eye-tracking study will further explore whether the location of intervening information influences the syntactic prediction in English reading. For instance, "At the Italian restaurant, John ordered (either) a pizza and chips or a calzone" versus "At the Italian restaurant, John ordered (either) a pizza or a calzone and chips". The findings showed a resilient facilitation on the or-construction when either is present regardless of the location of the intervening and-construction. An interaction is also observed for the and-construction with longer fixation time when either is present and the and-construction takes place between the either-or construction. In sum, the results indicate that syntactic expectations can be maintained across intervening material, though local processing difficulty arises when unexpected structures disrupt anticipation.

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Differences in spelling skill in adult speakers of Mandarin: An orthographic processing explanation.

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The study involved examination of the underlying factors contributing to individual differences in spelling ability among Mandarin-speaking adults. 58 participants were divided into two groups based on their single-word spelling scores and completed assessments of visual attention span (VAS), phonological processing, and Rapid Automatised Naming (RAN). The results indicated that VAS, but not phonological processing or RAN, significantly distinguished better spellers from poorer ones. Qualitative analysis of spelling errors was performed using error categories adapted from Han et al. (2007) and Shen and Bear (2000). The analysis revealed that poorer spellers produced many orthographic errors, particularly involving deletions and substitutions of strokes within characters. In contrast, the better spellers made proportionally more homophone and semi-homophone errors, as well as orthographic addition errors. Item-based analyses were conducted to examine associates of spelling accuracy, using word length as the independent variable in the partial correlation after controlling for printed word frequency. Word length was significantly associated only with the

spelling performance of poor spellers, not that of better spellers, after controlling for printed word frequency. It is suggested that differences in the function of orthographic working memory may be an explanation for the pattern of findings.

LLM-based semantic analysis of involuntary recall in a laboratory analogue of trauma.

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The Trauma Film Paradigm is widely used to study intrusive memories, but what makes a particular experience intrusive remains unclear. Using LLM-based semantic analysis, we examined how features of film segments shape voluntary versus involuntary recall. The set-up of the test was matched: in both conditions, participants performed a vigilance task which included presentation of blurred scenes from previously-seen negative or neutral clips. In a between-subject design, participants either voluntarily recalled film details or reported when they had an involuntary memory of the films. The algorithm computed the times a reported memory matched the cue. There was no difference between the number of memories reported; cue-memory matches were more frequent in the negative and involuntary conditions, suggesting they arise more frequently in response to sensory cues, in support of the Dual Representation Account. Analysing quality of memories recalled voluntarily or involuntarily, while watching the film segment that came just before the arousal "hotspot", the most arousing film segment, was the strongest predictor of negative involuntary memories. Higher agency revealed a higher likelihood of segments being recalled voluntarily. These findings highlight a cognitive anticipatory mechanism that drives intrusive encoding and demonstrate the promise of computational methods for advancing trauma memory models.

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The dynamic relationship between pupil dilation and neural surprise in natural language comprehension.

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Predictive processing theories propose that language comprehension involves generating and updating context-based expectations. We tested the influence of such predictions in cortical activity and also pupil-linked arousal, a known proxy for locus coeruleus–noradrenergic (LC-NA) system activity, to elucidate their functional relationship. Using large language models to estimate word-by-word predictions, we analysed magnetoencephalography (MEG) and pupil data from 24 participants listening to naturalistic audiobooks. Replicating prior work, we found that cortical responses

recorded with MEG were modulated by both lexical surprise and semantic prediction error. Crucially, pupil dilation showed a distinct and more selective response profile. It was significantly modulated by semantic prediction error but not by lexical surprise or other linguistic control variables. This functional dissociation suggests that while cortical signals track multiple levels of prediction, the LC-NA system is selectively engaged by high-level violations that may challenge a listener's evolving internal model of the narrative. We further assess the mapping function from surprise to these physiological measures, demonstrating that non-linear response profiles better capture dynamics. Our findings are consistent with predictive processing theories that posit neuromodulatory systems like the LC-NA are gated by the relevance and precision of prediction errors, rather than by surprise uniformly.

Detecting Gravity: The role of vestibular signals in internalising terrestrial gravity.

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It is difficult to imagine a more pervasive force than gravity. We have evolved in a constant 1g terrestrial gravity environment and our brain constantly integrates vestibular, visual, visceral and proprioceptive inputs to construct an internal model of gravity. This model allows us to navigate and interact seamlessly with our surroundings. Yet, how sensitive are we to variations in gravitational acceleration? To investigate this, we used a signal detection approach to quantify sensitivity to gravitational acceleration when objects moved either congruently with gravity (downward) or against it (upward). In the first experiment, participants completed a gravity detection task, identifying the acceleration of a ball moving on a screen following either terrestrial (1g) or Martian (0.3g) acceleration, in both downward and upward directions. The results indicated higher sensitivity to detecting terrestrial gravity when the object moved downward compared to upward, with no differences in response bias. In the second experiment, we altered vestibular signalling by administering disruptive Galvanic Vestibular Stimulation during the gravity detection task. Vestibular stimulation significantly reduced sensitivity to gravitational acceleration for downward motion. These findings confirm the presence of an internalised 1g model of gravity and highlight the essential role of vestibular signals in shaping this internal representation.

The role of general and social anxiety in driving anxiety.

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Social Anxiety refers to a feeling of fear of social situations and activities. Social anxiety can affect variety of activities which have social elements. One of these is driving. Driving can be seen as a social behaviour as it involves carrying out a set of manoeuvres in the presence and in response to other drivers. An example of this is fearing the reactions of other drivers after making a mistake, or being affected by being observed when driving with passengers. Huang, Lin and Wang (2018) previously found that social anxiety moderated the link between public self-consciousness and driving errors. However, it is not clear what how social anxiety plays in driving anxiety. The present

online study (N = 98) investigated the predictive variables for self-reported driving anxiety, negative thoughts about driving, and driving avoidance using multiple regression analyses. The predictors were: general anxiety, social anxiety and avoidance, as well as gender. We found that 1) Driving anxiety was significantly predicted by social anxiety and gender, but not by general anxiety (adjusted R2 = .23); 2) Negative intrusive thoughts about driving were predicted by general anxiety, but not by gender or social anxiety (adjusted R2 = .16); 3) Driving avoidance was not predicted by social avoidance, general anxiety, or gender (adjusted R2 = .04). These findings indicate that while social anxiety and gender might have a role to play in driving anxiety, this does not translate to avoidance behaviour in driving situations.

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Mapping emotional experiences onto thought patterns during film viewing.

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Thoughts support construction and regulation of emotional experiences in real life. However, nuanced thought-emotion relationships have not been systematically characterized during dynamic emotional experiences. Utilizing emotion-inducing films, the current study mapped subjective emotions (e.g., valence, arousal) and bodily feelings (activation/deactivation) onto on-going thought patterns. Participants (N = 162) watched 6 short animations with varied themes, and completed thought and emotion ratings via multi-dimensional experience sampling (Smallwood et al., 2021) as well as body sensation maps via the emBODY tool (Nummenmaa et al., 2014). Principal Component Analysis of the thought data identified five latent dimensions: detailed inner speech, past-oriented thinking, sensory engagement, deliberate positive thoughts, and intrusive distraction. Linear mixed models revealed that, under strong negative emotions, participants reported more detailed inner speech, past-oriented thinking, and intrusive distraction. Notably, engaging in detailed inner speech was also linked to heightened bodily activation in the head/chest areas and predicted by better emotion introspection ability. In contrast, positive emotion was associated with more sensory engagement and deliberate positive thoughts, with stronger sensory focus linking to increased activation in the head. Taken together, our findings highlight heterogeneous mental processes involved in processing complex emotional stimuli, which may serve distinct functions that support different aspects of emotional experience.

Fast and Focused: Eye-tracking reveals decision-making strategies in food choices across social groups.

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Everyday food-related decisions have significant consequences for our health, but little is known about the determinants of these choices and how they differ in underrepresented populations. We used eye tracking to investigate decision-making strategies in university students (N = 97, M age =

21.5) and community participants from lower socioeconomic backgrounds (N = 89, M age = 47.6). In a snack-pair task, participants completed 21 trials created by pairing crisp snacks from seven different brands, and indicated their preference on each trial. Community participants made faster decisions with fewer fixations, compared to university participants, while both groups showed similar eye movement behaviour e.g., average fixation durations and saccade amplitudes. Within trials, fixation counts decreased and durations increased as the decision progressed, indicating a streamlining of attention. Importantly, both groups fixated more and for longer on their ultimately preferred snack, with this bias strengthening over the course of the trial. Together, these findings show common attention patterns in food preference decisions across groups, alongside clear differences in speed and effort. Including underrepresented community groups provides a more complete understanding of consumer decision-making and informs theory on the dynamics of everyday food choices.

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Credit and blame in medical context: Effects of treatment, adherence and patient actions.

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This study investigates how individuals attribute blame and credit to clinicians and patients in medical interactions. Two within-subject experiments (N1=50, N2=80; 50% medical professionals and students) examined how treatment type (typical vs. atypical), patient adherence (adherent vs. non-adherent), and patient behaviour (positive vs. negative) influence attributions in hypothetical scenarios. Experiment 1 used varied disease scenarios, while experiment 2 focused on depression with counterbalanced scenarios to ensure generalisability. Results show that patients are generally seen as more responsible, receiving greater blame and credit than clinicians. We demonstrated a difference in how blame and credit are assigned. Credit is assessed independently; positive patient behaviour increases their credit, and adherence increases the clinicians' credit. Blame, however, is collectively attributed, meaning blaming one party often reduces blame for the other. Specifically, atypical treatments, adherence, and positive behaviour increase clinicians' blame but reduce patients'. Furthermore, clinicians are judged as less causal for health outcomes, and they are more causal for positive than negative outcomes. Non-adherence decreases clinicians' causality for all outcomes but increases patients' causality only for negative outcomes, without affecting positive outcome causality. Patient behaviour does not impact the perceived causality of the clinicians for any outcomes.

Modelling haptic perception of objects' 3D shape.

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Haptic perception of objects is crucial for interacting with them - a key evolutional advantage. Tactile information is gathered by complex hand and finger movements. However, how our brain combines these puzzle pieces to construct shape perception remains a mystery. A significant challenge has been the inability to precisely measure where an object is touched. Here, we investigated how humans use their hands to explore objects by using marker-based motion tracking (Qualisys). Blind-folded participants successively explored three novel natural shapes out of 10 different 3D printed replica of bell peppers (Norman et al., 2004) - a reference in the first interval and two comparisons in the second. The task was to decide which of the comparisons was the same as the reference. We could predict touched positions based on local features by training a 3D encoder-decoder for voxel-wise binary classification of touched versus non-touched positions. These results indicate that haptic exploration is partially driven bottom-up. Correlations of the model's response with simple features suggest that saddle-like local curvature is most salient. Based on touched locations we could predict correct human decisions, but not the errors, suggesting that human responses are based on more sophisticated strategies.

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Reward value shapes the time course of self-bias.

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Personal possession wields a potent influence on decision-making, such that objects owned-by-self are categorized more speedily than comparable items belonging to other people. The temporal characteristics of this self-prioritization effect, however, are little understood. Notably, it is uncertain whether the duration of self-bias is sensitive to the characteristics of owned objects, particularly when the items have implications for the self-concept. Accordingly, using an object-classification task, here we explored the extent to which a theoretically important stimulus-related factor, reward value, influences the time course of self-bias. Across three experiments, participants classified high- and low-value items (i.e., stones [Exp. 1], cryptocurrencies [Exp. 2 & 3]) that allegedly belonged to self and a friend. A consistent pattern of effects was observed, indicating that reward value moderated both the extent and persistence of self-prioritization. Specifically, although self-prioritization emerged for both high- and low-value items, this facilitatory effect was larger and more enduring for the former (vs. latter) stimuli. These findings highlight the dynamic character of decisional bias, with implications for theoretical accounts of self-function.

Retrieval-induced forgetting of bittersweet memories.

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Active forgetting optimises memory function by selectively weakening certain memories. Retrieval-induced forgetting (RIF) is one form of active forgetting: when we repeatedly recall certain memories, related memories tend to be forgotten, likely due to inhibition. However, how does RIF operate when a single memory contains both joyful and distressing content? Does retrieving positive memories inhibit related negative ones, or vice versa? We investigated RIF in the context of such "bittersweet" memories where opposing emotional representations share common cues. Across three experiments, participants learned category-target associations (e.g., weather-warm), then practiced retrieving some associations (weather-wa__), before completing a final test. In Experiment 1, we discovered that retrieving negative memories reduced positive memory recall (showing the RIF phenomenon), but retrieving positive memories failed to reduce negative memory recall. Experiment 2 revealed that this likely occurred because negative targets induced stronger inhibition of positive competitors. Building on these findings, Experiment 3 investigates whether RIF may not emerge when competitors possess stronger emotional salience than targets. Our findings demonstrate that emotional salience determines the strength of competitive processes underpinning the RIF phenomenon. These results contribute to understanding emotional memory processing and may provide mechanistic insight into negative memory biases often observed in psychiatric mood disorders.

Perceptual predictions track subjective, over objective, statistical structure.

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Predictive processes in cognition and the brain are usually modelled as tracking objective event probabilities. However, we know little about how our subjective experiences of statistical structure and corresponding prediction errors may determine these functions, as they will likely be related to, but dissociate from, the objective statistics. To this end, we conducted two studies where cues (tones) predicted visual outcomes (Gabors) with varying contingencies, and adult participants discriminated these outcomes. Uniquely to our paradigm, participants also rated the subjective expectedness (Experiment 1; N = 35), or surprise (Experiment 2; N = 35) associated with the outcomes. Decision speed was best explained by independent contributions from both the cue-outcome statistics and the subjective magnitude of expectation (or prediction error), indicating that objective environmental structure and experience of it jointly influence perception and learning. By contrast, choice behaviour (accuracy/response) was typically primarily explained by the subjective experience, with little additional variance explained by objective structure. These findings open a host of interesting questions about the relative objective and subjective contributions to prediction, perception, and learning.

Investigating children's handwriting process using real-time handwriting data.

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A child's writing ability is commonly judged on neatness, spelling, coherence, and argument quality. Less is known, however, about how writing disfluencies influence the overall quality of text. Fluency is particularly relevant under time constraints, where fluent writers can produce more text. Moreover, hesitations may disrupt thought processes, reducing content quality. This study investigated the relationship between handwriting fluency and text production in primary school children. Fifty-eight Norwegian students aged 9-11 completed a copying task in which they reproduced a short sentence three times before writing it from memory as many times as possible within one minute. Handwriting movements were recorded in real time using a digital tablet. Measures of pen tip speed, hesitation duration, and supernumerous velocity peaks were analysed to assess their impact on productivity. Results showed that the number of words produced within one minute was significantly influenced by hesitation time and supernumerous velocity peaks, but not by mean pen tip speed. Longer hesitations and reduced fluency hindered output, suggesting that disruptions in motor execution constrain working memory, thereby limiting higher-order processes such as planning and composition. These findings highlight the importance of handwriting fluency for writing efficiency and suggest implications for educational practices.

Time-to-contact perception and navigation skills in autism: Evidence from two virtual tasks.

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Autistic individuals frequently report challenges with navigation and predicting movement, though empirical findings remain mixed. We conducted two complementary online studies to examine how autistic traits influence spatio-temporal processing. In Study 1, participants completed a Time-to-Contact (TTC) task in which a car or human avatar moved toward a target in either a rich (cue-rich) or impoverished (low-cue) virtual environment. Participants judged when the object would reach the target after occlusion. Environmental richness influenced performance in autistic individuals, who performed better in rich compared to impoverished conditions, whereas control participants performed similarly across environments. In Study 2, participants completed a mobile navigation game Sea Hero Quest (SHQ) and a self-assessed navigation skills questionnaire. In SHQ, wayfinding was assessed via route distance and duration. Autistic participants travelled shorter routes and spent less time on obstacle, but not regular levels, suggesting potential superiority recalling cognitive maps and switching between different types of navigation. However, they reported worse self-assessed navigation scores. Together, these studies suggest that autistic traits influence both temporal predictions of motion and self-assessed navigation ability. Combined TTC perception and large-scale spatial navigation results suggest differences on multiple levels of processing involved in predictive coding, with implications for everyday functioning in autism.

Toothless but Still Superior: Grins aren't required for happiness superiority effect in multi-target face search.

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Previous research (Thirkettle & Wilson, 2024) demonstrated a happiness superiority effect in a novel visual search task, where participants more efficiently identified happy faces than angry ones amongst arrays of randomly assorted emotional expressions. However, prior studies (e.g., Savage et al., 2013) have raised concerns that low-level visual artifacts-particularly in classic one-target search paradigms-may confound such effects. While our task mitigates many of these issues through multiple, distinct, targets and including trial-by-trial randomisation of all array images, one potential confound remains: the bright visual cue created by exposed teeth in toothy smiles. To isolate this factor, we compared search performance using closed-mouth smiles versus toothy-grinned happy faces as targets. Results revealed that the happiness superiority effect persisted with closed-mouth smiles, though it was attenuated. This suggests that while low-level features like visible teeth may enhance detection, the effect is not solely driven by them. Our findings align with Becker et al. (2011), supporting the robustness of the happiness superiority effect and pointing to underlying mechanisms beyond mere visual salience.

Quantum and Bayesian Models of Learning: A dual-process account of artificial grammar acquisition.

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How do humans internalize complex structural patterns in passive learning tasks? This study explores this question through a dual-process framework, integrating quantum-inspired and Bayesian modeling within the domain of Artificial Grammar Learning (AGL). Moving beyond longstanding debates over the existence and measurement of implicit learning (e.g., Reber, 1989; Shanks & St. John, 1994), we propose that explicit learning corresponds to Bayesian inference-structured, deliberate, and introspectively accessible -while (apparent or at the moment) implicit learning reflects quantum-like uncertainty, where knowledge remains latent until elicited through judgment (Epping & Busemeyer, 2023). In our new experiment, participants engaged in AGL tasks under two conditions: active (intentional) and passive (incidental) learning. Their structural knowledge was assessed using subjective measures of conscious awareness (Dienes and Scott 2005; Scott & Dienes 2008), enabling classification into explicit and implicit learners. Computational modeling revealed a dissociation: Bayesian models captured performance in active learning, while quantum models better fit passive learning data. These findings were consistent across awareness classifications (aimed to capture mostly implicit vs. explicit learners), suggesting that implicit learning may function through fundamentally different cognitive mechanisms-mechanisms that resist introspection and resemble the principles of quantum superposition. Our work provides a new angle to the long-standing implicit, explicit debate, in terms of modern theory in mathematical psychology.

Turbo Typing: Longitudinal dataset and analysis of typing skill and sub-skill development in young learners.

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Keyboard typing is a fundamental digital-age skill, yet current training methods often focused on rote sentence practice rather than optimised approaches. Thurstone (1930) proposed that learning curves reflect improvements in discrete sub-skills, making it crucial to identify which sub-skills underpin typing at different points in time. We trained over 100 ten-year-olds in ten-finger touch typing over six months using Turbo Typing. Participants completed four 20-minute sessions per week across 22 school weeks. Every four weeks (six times), participants completed a block of typing skill and sub-skill tests, and in between these, progressed through a typing course. Typing speed increased from an average of 17 to 23 words per minute. Regressions at each of the six blocks found that sub-skills could predict 30-47% of the variance of typing speed. Crucially, rollover rate and keypress duration predicted typing speed consistently across training, while bigram frequency sensitivity and error detection were predictive in the early stages, and manual dexterity and letter frequency sensitivity in the middle stages. Therefore, future work could assess whether specialised sub-skill training at the relevant time points can improve typing pedagogy relative to the standard approach. The Turbo Typing dataset containing over 12 million keystrokes will be openly available.

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EPS President's Address

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Professor Robert Honey

Cardiff University

Serendipity, Strategy and Psychic Secretions: From general processes to individual differences.

5.15pm, Wednesday 7th January 2026

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Google DeepMind and University College London

A Unified Theory of Dual-Process Cognition.

5.45pm, Thursday 8th January 2026

Lower Ground Lecture Theatre.

No registration is required to attend in person.

APPLYING TO JOIN THE
EXPERIMENTAL PSYCHOLOGY SOCIETY

To apply for membership to the Experimental Psychology Society please go to the EPS website: https://eps.ac.uk/applying-for-membership/ and fill in the form, ensuring all boxes are completed (Entries should be made in clear black type) before signing and returning to the EPS Administrator: expsychsoc@kent.ac.uk or sending to:

Sam Hurn
EPS Administrator
School of Psychology
Keynes College
University of Kent
Canterbury
CT2 7NP

Application forms should be sent to the EPS Administrator by one of the application deadlines, 1st March or 1st September.

All information should be included on the form, not on additional sheets.

Under "Publications", only articles that have appeared in print by the time of nomination, in peer-reviewed psychological or cognate journals, should be listed. Because of space limitations, a complete publication list is not required; *two* recent examples, where the nominee is in a prominent authorship position (e.g. sole, first or last), are sufficient.

Applicants must be nominated by one EPS Ordinary Member.
These forms should be returned by 1st March or 1st September.
See Criteria and Procedures on following page.

EPS
Experimental Psychology Society

CRITERIA AND PROCEDURES TO JOIN

Soon after the closing date of 1st March or 1st September, brief details of all candidates will be circulated to members of the Society, who may request further information if they wish. The nomination forms will be considered by the Committee at their Spring and Autumn meetings. The EPS Administrator will check whether each candidate is eligible for admission to Ordinary Membership, i.e. those candidates who have:

a) secured a PhD
b) published at least two independent accounts of their work in a reputable, peer-reviewed psychological journals
c) personally delivered an oral paper or a poster to the Society at one of the three EPS scientific meetings held each year

Candidates who do not meet all these criteria can be considered only in exceptional circumstances. Those who are resident outside Europe will be asked for assurance that they can attend meetings reasonably often.

Any candidate not selected as eligible by the EPS Administrator will be informed of this and will be advised whether he/she may again be proposed for membership in a future year and if so subject to what conditions. The list of those selected as eligible will be put to the Annual General Meeting in January or the Summer Business meeting for approval.

Meeting Accommodation.

Below is a selection of London hotels, some of which are close to the venue. PLEASE NOTE these are not recommendations, and you should check the website and prices before making your booking:

The Academy Hotel

Holiday Inn

Ibis Accor

LSE Passfield Hall (Student Accommodation)

Premier Inn

Travelodge

Wardonia Hotel

Other alternatives and prices are available on booking sites such as booking.com etc.

Travel

London is well served by transport links, both for travelling to and from London from the UK, Europe and the wider world, and for getting round the city.

Full details of travel to UCL

UCL Online Campus Map

Conference Dinner.

The conference dinner will be held on Thursday 8th January from 7:30pm at TAS Bloomsbury, which is just a 10 - 15 minute walk from the meeting. The restaurant address is 22 Bloomsbury Street, London, WC1B 3QJ.

This form was available from 29th October until 4th December. Now that the form has closed, we will send instructions on how to pay and confirm your place at the conference dinner.

You will NOT have received a confirmation email after completing the form, but will have seen a success message on the screen after you have completed the form and pressed submit. Once Conference Dinner registration closes, we will contact everyone who submitted and you will receive an invoice for payment of the dinner.

Starters are all vegetarian and will be shared with the whole table, so you only need to choose a main course. Please note that dessert is not included as meals are generously portioned.

MEZE TO SHARE

(served with homemade Anatolian bread)

HUMUS (Houmous) Ⓥ
Pureed chickpeas with tahini, garlic, olive oil and lemon juice

MAYDANOZ SALATASI (Tabbouleh) Ⓥ
Finely chopped parsley and mint tossed with tomatoes, onions, bulgur, pomegranate, olive oil and lemon juice

MANTAR Ⓥ
Sauteed mushrooms in garlic, onions, peppers, leeks and tomatoes, topped with cheddar cheese

ISPANAKLI YOGURT Ⓥ
Thick and creamy yogurt blended with spinach and garlic

ZEYTINYAGLI PATLICAN Ⓥ
Aubergine cooked in olive oil with tomatoes, garlic, peppers and chickpeas

BOREK Ⓥ
Filo pastry triangles stuffed with feta cheese and spinach

FALAFEL Ⓥ
Mediterranean style chickpea and broad bean patties, tossed in spices, deep fried, served with houmous

CHOICE OF MAIN COURSE

TAVUK SIS (Chicken Shish)
Skewer of marinated chicken cubes, served with couscous

KARISIK IZGARA (Mixed Grill)
Mixed grill of chicken cubes, lamb cubes and kofte, served with couscous

TAVUK GUVEC
Chicken casserole with mushrooms, leeks, onions, tomatoes, garlic, peppers and parsley

KALAMAR TAVA
A main portion of our popular lightly battered squid rings, served with rose infused sweet-sour sauce and salad

KARIDES GUVEC
Prawn casserole with tomatoes, parsley, peppers, leeks, mushrooms, double cream and garlic in white wine sauce

DOMATES SOSLU KOFTE
Lamb meatballs cooked with fresh tomatoes, potatoes, parsley, leeks, onions and peppers

MUSAKKA
Classic TAS style Mediterranean layered bake of aubergine, lamb mince, potatoes, onions and parsley, topped with bechamel sauce

TURLU Ⓥ
Anatolian village style stew of potatoes, aubergines, courgettes, mushrooms, peppers, carrots, tomatoes, celery and garlic served with couscous and yogurt

ISPANAKLI PATATES Ⓥ
Potatoes cooked with spinach, tomatoes and onions, served with yogurt

Ⓥ Suitable for Vegetarians

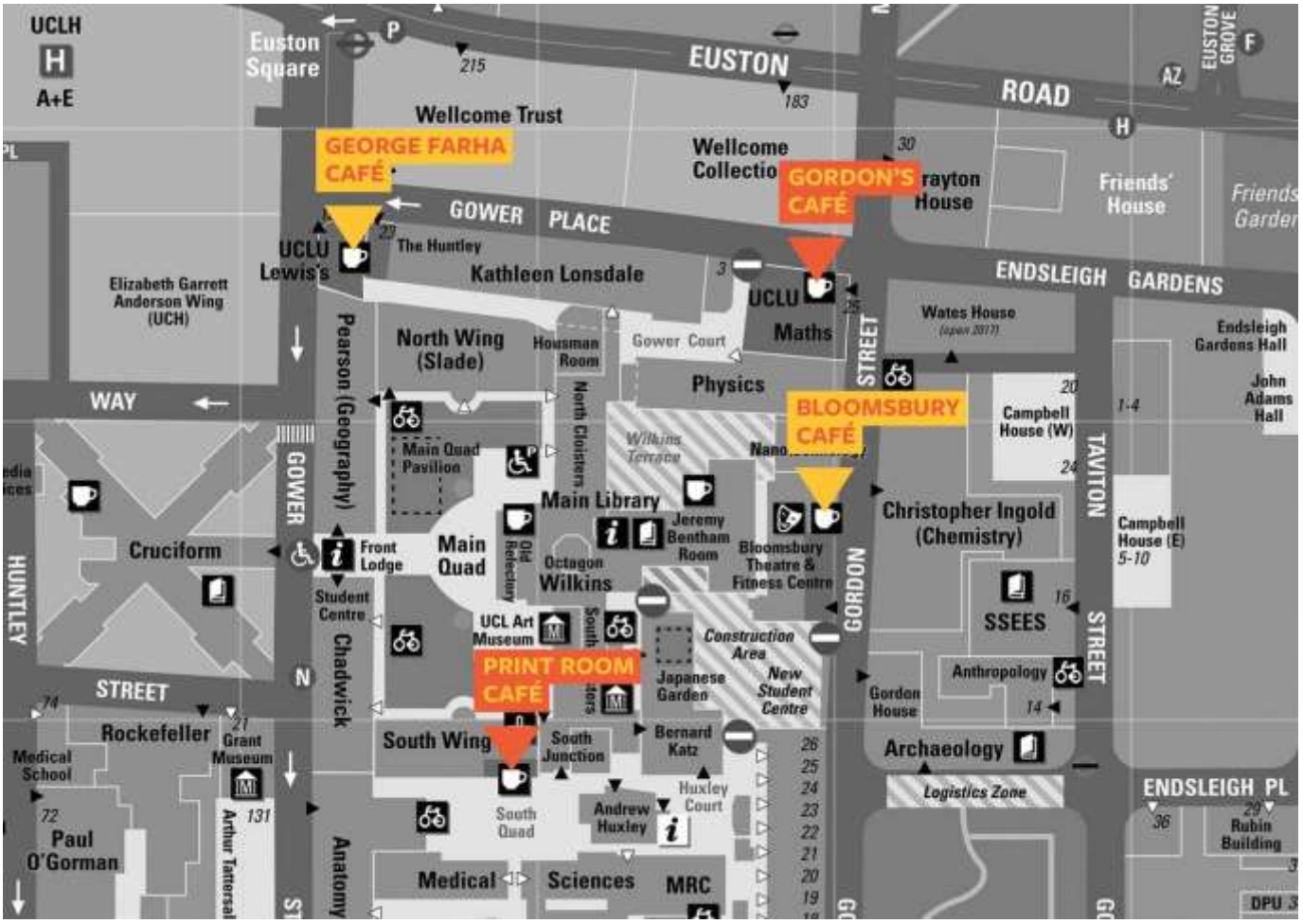
All our food is prepared in a kitchen where nuts, gluten and other allergens may be present and our menu descriptions do not include all ingredients. Please inform your server if you have any allergies or special dietary requirements.

The standard dinner cost for EPS members is £39. Please note that postgraduates can book at a reduced fee of £19.50, but must provide evidence of their postgraduate status by emailing a letter from their supervisor (or a direct email from the supervisor) to expsychsoc@kent.ac.uk.

Food Options

During the conference, there are plenty of off-site shops and restaurants near to the venue offering a range of food.

There are also many options to eat and drink around UCL locations, [for full information please follow this link.]



Annual General Meeting

The 78th Annual General Meeting will be held on Thursday 8th January 2026 from 12:00pm in the Lower Ground Lecture Theatre at the Department of Cognitive, Perceptual & Brain Sciences, University College London, 26 Bedford Way, London, WC1H 0AP.

AGENDA

26/01 Minutes of the Annual General Meeting, held on Thursday 9th January 2025

See Attachment 1.

26/02 Matters Arising

26/03 Secretary's Report

26/03.1 Annual Report of the Society

26/04 Treasurer's Report

26/04.1 Treasurer's Report

26/05 QJEP Editor's Report

26/05.1 Editor's Report

26/06 Confirmation of the Fifty-Fifth Bartlett Lecturer

26/07 Confirmation of the Twenty-Fifth EPS Mid–Career Award Lecturers

26/08 Confirmation of the Thirty-Fourth EPS Prize Lecturer

26/09 Confirmation of the Fifteenth Frith Prize

26/10 Election of Officers and Committee Members

26/11 Admission of Ordinary Members

26/12 Arrangements for Future Meetings

26/13 Any Other Business

26/14 Date, Time and Place of Next Meeting

Election of Officers and Committee Members

Following the autumn EPS committee meeting, we are delighted to announce the Committee's award nominations for approval at the Annual General Meeting in January 2026.

The Committee seeks approval for the following nominations:

Election of the Fifty-Fifth Bartlett Lecturer
Marc Brysbaert (Ghent University, Belgium)

Election of the Twenty-Fifth EPS Mid-Career Award Lecturer
Clare Press (University College London)

Election of the Thirty-Fourth EPS Prize Lecturer
Jennifer Murphy (University of Surrey)

Election of the Fifteenth Frith Prize Lecturer
Denise Cadete (Birkbeck, University of London)

The Committee submits the following nomination for EPS Honorary Secretary:

Jim Grange (Keele University)

The Committee submits the following nomination for EPS Conference Secretary:

Alastair Smith (University of Plymouth)

The Committee submits the following nomination for QJEP Editor in Chief:

Carolyn McGettigan (University College London)

Admission of Ordinary Members

Under Rule 7 the list of applicants for Ordinary Membership was earlier circulated electronically in the December newsletter. These applications were provisionally approved at the Autumn Committee meeting.

Attachment 1.

Annual General Meeting

The 77th Annual General Meeting was held on Thursday 9th January 2025 from 12:00pm in the Lower Ground Lecture Theatre at the Department of Cognitive, Perceptual & Brain Sciences, University College London, 26 Bedford Way, London, WC1H 0AP with ~50 attendees.

MINUTES

25/01 Minutes of the Annual General Meeting, held on Thursday 4th January 2024

The minutes were approved without change.

25/02 Matters Arising

No matters arising.

25/03 Secretary's Report

23/03.1 Annual Report of the Society

2024 saw three well-attended meetings with excellent prize lecture talks at UCL, NTU and York. Numerous research grants were awarded; 10 Small Grants, 10 Study Visits,2 Kuppuraj Bishop Study Visits, 9 Student Bursaries (URB=7, NGRB=2) and 2 Research Workshops as well as two ECR events at EPS York and the re-launch of the EPS Pairing Scheme.

The AGM was asked to consider allowing Research Plan Posters to be eligible for the criterion to apply for Ordinary Membership, this proposal was approved following clarification that this was to suit the criterion of presenting to the Society and that quality of work was sufficiently tested by needing to publish at least two articles.

25/04 Treasurer's Report

25/04.1 Treasurer's Report

The draft accounts for the financial year ending in September 2024 show that Society funds are stable compared to the previous year, with the decline in royalties from publishing being compensated for with the reduction of costs of meetings and grants. Members were reminded about the increase in membership fees from 2022 and to update standing orders accordingly if not already done.

The Society has now completed the application process to make investments approved by the AGM of 2023, with the next step to start investing in January 2025. A member asked about the ethical and sustainability of the investments and these are listed on the CCLA website but are in line with best practice for charities such as the EPS. Members approved the start of the investments over the next 12-month period.

Members were informed that the Society is now able to Gift Aid donations, which are at no cost to the donor. Members were invited to consider donating to the Society in the future. A member asked about the income from the VRF, which is not high but members were reminded to consider paying this also, especially if presenting research.

Attachment 1.

25/05 QJEP Editor's Report

25/05.1 Editor’s Report

Submissions to QJEP are holding steady with the number of downloads increasing, which is a key factor for the publisher, SAGE. Review times are getting faster but there is an issue of papers being outside the scope of the journal, which has resulted in an acceptance rate of 41%. Impact Factor is 1.5 in the new calculations, but there is a lag so this will change in the next year or two to reflect what is currently happening.

The call for Special Issues of QJEP is still open, with three such issues currently active and will likely be very successful. Members were reminded that review and theory papers are always welcome, as less of these are submitted.

The role of Eidtor-in-Chief will be advertised for 2026 in the Spring, with members asked to think about any possible candidates and make them aware. AH welcomes any contact regarding the role and is happy to answer questions members or potential candidates may have.

25/06 Confirmation of the Fifty-Fourth Bartlett Lecturer

Confirmed

25/07 Confirmation of the Twenty-Fourth EPS Mid–Career Award Lecturer

Confirmed

25/08 Confirmation of the Thirty-Third EPS Prize Lecturer

Confirmed

25/09 Confirmation of the Fourteenth Frith Prize

Confirmed

25/10 Election of Officers and Committee Members

Confirmed

25/11 Admission of Ordinary Members

Confirmed

25/12 Arrangements for Future Meetings

EPS Meeting: Lancaster University, 2nd – 4th April 2025.
This meeting will include the joint 23rd EPS Mid-Career Prize Lecture by Jennifer Rodd (with an accompanying symposium organised by Jo Taylor). There will also be a special symposium in honour of Andy Johnson, organised by Mike Page.
Local Organiser: Padraic Monaghan

Attachment 1.

EPS Meeting: University of Dundee, 8th – 11th July 2025.
This will be a joint meeting with the Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS), and will include the 53rd Bartlett Lecture by Mike Burton (with an accompanying symposium organised by Rob Jenkins). This meeting will also include the 2025 EPS / BSA Undergraduate Project Prize talk by Akilles Rechardt.
Local Organiser: Lizzie Bradford

EPS Meeting: University College London, January 2026.
Local Organiser: Adam Parker

EPS Meeting: Newcastle University, April 2026.
Local Organiser: Tom Smulders

EPS Meeting: University of Essex, July 2026.
Local Organiser: Maria Laura Filippetti

EPS Meeting: University College London. January 2027.
Local Organiser: TBC

EPS Meeting: Cardiff University. April 2027.
Local Organiser: Rob Honey

EPS Meeting: University of East Anglia. July 2027.
Local Organiser: Louise Ewing

25/13 Any Other Business

Thanks to outgoing committee members; Jennifer Cook, Emma James and Nura Sidarus for all of their work during their three year terms. Another thank you to the meeting organisers; Adam Parker, Jeremy Tree and Sam Hurn.

25/14 Date, Time and Place of Next Meeting

The next business meeting will be on Thursday 3rd April at the University of Lancaster.

Attachment 1.

Admission of Ordinary Members

Under Rule 7 the list of applicants for Ordinary Membership was earlier circulated electronically in the December newsletter. These applications were provisionally approved at the Autumn Committee meeting.

Following the autumn EPS committee meeting, we are delighted to announce the Committee's award nominations for approval at the Annual General Meeting in January 2025.

The Committee seeks approval for the following nominations:

Election of the Fifty-Fourth Bartlett Lecturer
Prof Matthew Botvinick (Stanford University, United States of America)

Election of the Twenty-Fourth EPS Mid-Career Award Lecturer
Prof Elizabeth Jefferies (University of York)

Election of the Thirty-Third EPS Prize Lecturer
Dr Melissa Colloff (University of Birmingham)

Election of the Fourteenth Frith Prize Lecturer
Dr Connor Keating (University of Birmingham)

The Committee submits the following nomination for EPS Honorary President:

Asifa Majid (University of Oxford)

The Committee submits the following nominations for Ordinary Committee Members:

Emily Crowe (University of Nottingham) – ECR Representative

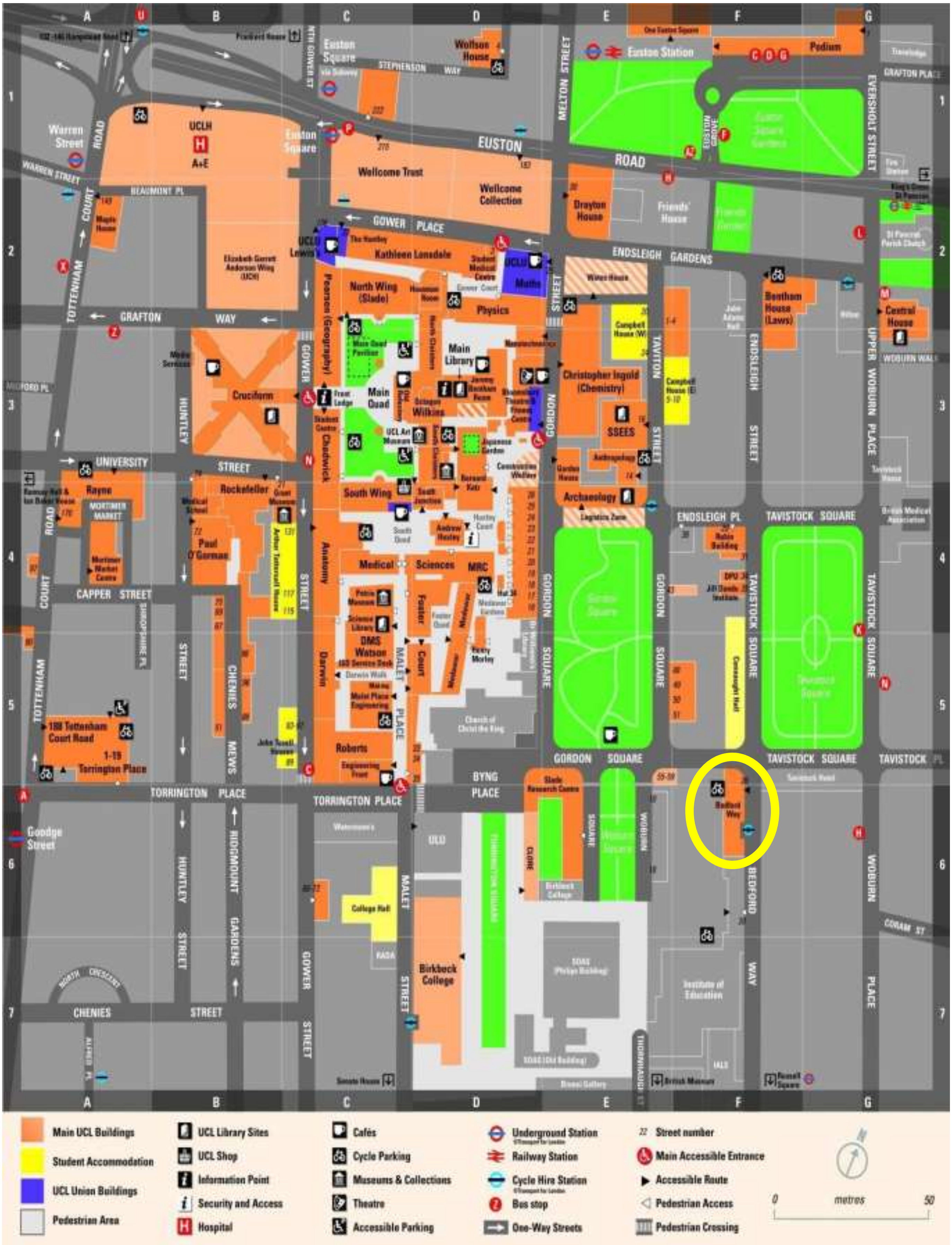
Rachael Hulme (Heriot-Watt University)

Matthew Mak (University of Warwick)

Kay Ritchie (University of Lincoln)

Next Meeting: EPS Meeting: Newcastle University.
Monday 30th March – Wednesday 1st April 2026.

Local Organiser: Tom Smulders



EUSTON ROAD
Euston Station
Euston Square
Warren Street
Goodge Street
UCLH
Wellcome Trust
Wellcome Collection
GOWER PLACE
Kathleen Lonsdale
North Wing (Slade)
Physics
Main Library
Main Quad
Wilkins
Cruciform
GRAFTON WAY
UNIVERSITY STREET
Rockefeller
South Wing
Medical Sciences
MRC
DMS Watson
Roberts
Anatomy
Darwin
Foster Court
Christopher Ingold (Chemistry)
SSEES
Archaeology
ENDSLEIGH GARDENS
ENDSLEIGH PL
TAVISTOCK SQUARE
GORDON SQUARE
TORRINGTON PLACE
BYNG PLACE
Birkbeck College
College Hall
Bedford Way
Institute of Education
CHENIES STREET
CAPPER STREET
Main UCL Buildings
Student Accommodation
UCL Union Buildings
Pedestrian Area
UCL Library Sites
UCL Shop
Information Point
Security and Access
Hospital
Cafés
Cycle Parking
Museums & Collections
Theatre
Accessible Parking
Underground Station
Railway Station
Cycle Hire Station
Bus stop
One-Way Streets
Street number
Main Accessible Entrance
Accessible Route
Pedestrian Access
Pedestrian Crossing
0 metres 50